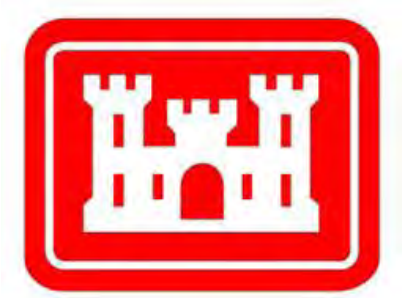
FINAL
PRELIMINARY ASSESSMENT OF AQUEOUS FILM FORMING FOAM AREAS

PUEBLO CHEMICAL DEPOT

Contract No. W9128F-18-D-0027
Delivery Order No. W9128F18F0158

Prepared for:



U.S. Army Corps of Engineers
Omaha District

Prepared by:

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September 2020

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LIST OF ACRONYMS AND ABBREVIATIONS

µg/L	micrograms per liter
AFFF	aqueous film-forming foam
ARMY	U.S. Army
BRAC	Base Realignment and Closure
BTI	Building Technology Incorporated
CDNR	Colorado Department of Natural Resources
CDPHE	Colorado Department of Public Health and Environment
CDWR	Colorado Division of Water Resources
CENWO	U.S. Army Corps of Engineers, Omaha District
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CIM	Colorado Information Marketplace
DO	Delivery Order
DoD	U.S. Department of Defense
EPA	U.S. Environmental Protection Agency
FTA	fire training area
HGL	HydroGeoLogic, Inc.
Jacobs	Jacobs Engineering Group
LOQ	limit of quantitation
LRA	Local Redevelopment Authority
Matrix	Matrix Design Group
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NUS	NUS Corporation
PA	preliminary assessment
PCD	Pueblo Chemical Depot
PFAS	per- and polyfluoroalkyl substances
PFBS	Perfluorobutanesulfonic Acid / Perfluorobutane sulfonate
PFHpA	Perfluoroheptanoic Acid
PFHxS	Perfluorohexanesulfonic Acid
PFNA	Perfluorononanoic Acid
PFOA	Perfluorooctanoic Acid
PFOS	Perflourooctanesulfonic Acid / Perflourooctane Sulfonate
PFOSA	Perfluorooctane Sulfonamide
PFPeA	Perfluoropentanoic Acid
ppt	parts per trillion

RCRA	Resource Conservation and Recovery Act
SDWA	Safe Drinking Water Act
SWMU	solid waste management unit
TLI	TLI Solutions, Inc.
UCMR3	Third Unregulated Contaminant Monitoring Rule
UFP-QAPP	Uniform Federal Policy-Quality Assurance Project Plan
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

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1.0 INTRODUCTION

1.1 BACKGROUND

This Preliminary Assessment (PA), prepared for the Base Realignment and Closure Division (BRAC) through the U.S. Army Corps of Engineers Omaha District (CENWO), covers the entirety of the property considered excess at the Pueblo Chemical Depot (PCD) and describes potential sites where aqueous film-forming foam (AFFF) was used or stored to determine if a release of per- and polyfluoroalkyl substances (PFAS) to the environment may have occurred. This PA is part of the Department of Defense, and the Department of the Army's overall response to assess potential sources or releases of PFAS into the environment and is consistent with Army guidance issued by the Office of the Assistant Chief of Staff for Installation Management on 4 September 2018 and Department of Defense Assistant Secretary Defense guidance issued on 15 October 2019.

HGL conducted this PA at PCD in accordance with the Final Uniform Federal Policy-Quality Assurance Project Plan (UFP-QAPP) (HGL, 2018) and pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, 42 U.S.C. §9601 et seq.),) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP, 40 CFR Part 300).

1.2 PROJECT OVERVIEW

The PCD PA was conducted at three solid waste management units (SWMUs) identified as potential sites where AFFF was used or stored. The PA also included a comprehensive assessment of other potential PFAS areas pursuant to Army guidance. The three investigated SWMUs include:

- SWMU 14 – Landfill
- SWMU 28 – Plating Waste Drainage Ditch and Former Building 539
- SWMU 29 – Fire Protection Training Area

The objective of the PA was to determine if historical site activities were likely to have released PFAS into groundwater, soil (surface and subsurface), surface water, or sediments at the above SWMUs or other locations at PCD. HGL conducted a comprehensive assessment of the historical use of AFFF at PCD, including conducting interviews, an aerial photograph assessment, and records search.

1.3 PRELIMINARY ASSESSMENT METHODOLOGY

Per the EPA's *Guidance for Performing Preliminary Assessments Under CERCLA*, the primary goal of a PA is to complete a high-quality assessment of a site that results in a correct site screening

or further action recommendations on a nationally consistent basis (EPA, 1991). Accordingly, the objective of this delivery order is to perform a PA to determine if a release of PFAS may have occurred in groundwater, soil (surface and subsurface), surface water, or sediments at PCD (USACE, 2017). HGL completed this objective by preparing a scope specific UFP-QAPP, completing a comprehensive assessment of the PCD's historical use of AFFF, and documenting the findings in this PA in accordance with EPA guidance (EPA, 1991).General information relative to PFAS is presented in Section 2.4.

The approach used to conduct the PA in accordance with NCP, 40 CFR 300.420(b):

(1) Collect readily available information and conduct a site and environment reconnaissance.

(2) Distinguish between sites that pose little or no threat to human health and the environment and sites that require further investigation.

(3) Identify sites requiring assessment for possible emergency response actions.

(4) Furnish appropriate information about the site to the appropriate stakeholders.

1.4 REPORT ORGANIZATION

This PA report is organized as follows:

- Section 1.0, Introduction. Provides a project overview, and describes the methods used to conduct the PA.
- Section 2.0, Installation Description. Provides a description of the installation and mission, provides a basewide environmental setting, summarizes previous investigations, and presents the areas of investigation.
- Section 3.0, Fire Training Areas (FTAs). Describes the FTAs identified during the PA visit.
- Section 4.0, Non-Fire Training Areas. Describes the non-FTAs identified during the PA visit.
- Section 5.0, Summary and Conclusions. Summarizes PA report and provides conclusions for both FTAs and non-FTAs.
- Section 6.0, References. Provides references consulted during the preparation of this PA report.
- Appendix A, Photo Documentation. Provides photos taken during the PA visit.
- Appendix B, Sampling Data. Provides PCD sampling data obtained during the PA.
- Appendix C, Records of Communications. Provides records of all communications during the PA visit.

2.0 INSTALLATION DESCRIPTION

PCD is in southeastern Colorado, approximately 14 miles east of Pueblo and immediately north of the Arkansas River in Pueblo County. Other communities within the vicinity include the town of Boone to the southeast and the unincorporated communities of Avondale to the south across the Arkansas River and North Avondale south of PCD along State Highway 96. Figure 2.1 shows the location of PCD.

During its history, PCD operated as the following: Pueblo Ordnance Depot; Pueblo Army Depot; Pueblo Depot Activity; U.S. Army Depot Activity, Pueblo; and Pueblo Army Depot Activity. PCD originally occupied 24,845 acres of land acquired through condemnation, lease, or purchase (USACE, 1994; Army, 1979).

2.1 FORMER MISSION AND LAND USE

This section presents historical information on the history of PCD and is based on information presented in archive search reports and previous environmental investigations.

In 1942, the mission of PCD included 1) supplying central western states with military articles necessary for national defense, including the long-term storage of assembled vehicles, tanks, artillery, small arms, and fire control equipment; 2) storing and maintaining all classes of practice ammunition supplied military installations throughout the central western United States; 3) maintaining and preserving ordnance materials; and 4) training civilian personnel (USACE, 1994; Building Technology Incorporate [BTI], 1984).

In 1943, PCD's mission included maintaining vehicles and materials handling equipment, and, later, to serving as an ammunition and general supplies depot. By 1946, PCD repaired and stored returning combat materials from overseas. In 1948, PCD began the process of demilitarizing ammunition with the construction of ammunition workshop buildings. By 1951, PCD provided general supplies and ammunition to a ten-state area (USACE, 1994; BTI, 1984).

From 1959 to 1961, a missile maintenance facility constructed in Building 529 allowed fifth echelon maintenance work on the Sergeant, Pershing, Redstone, and ENTAC missile systems. From 1959 to 1966, PCD also stored sealed nuclear warheads. By 1966, depot level maintenance of Hercules, Nike, Ajax, and Hawk air defense missile systems occurred at PCD. Additionally, PCD had the mission of storing, supplying, and maintaining fixed and floating engineer bridges (USACE, 1994; BTI, 1984).

In 1971, PCD was designated as a historical property repository for the storage of artifacts from Germany and South Vietnam that could be used in museum displays or on military posts. The mission further expanded to include a program for remanufacturing the Pershing Guided Missile, and the Air Force selected PCD to receive, store, inspect, and issue the Maverick missile (USACE, 1994; BTI, 1984).

Realignment of the Army Material Command in 1974 resulted in PCD ultimately being reassigned to the Toole Army Depot. During the 1980s and 1990s, PCD operated as a supply depot under the command of Toole Army Depot. PCD received, stored, issued, maintained, and disposed of certain

military items and provided limited maintenance to prevent deterioration of facilities and to retain shipping and receiving capabilities (USACE, 1994; BTI, 1984).

2.2 CURRENT LAND USE AND PROPERTY INFORMATION

In accordance with Public Law 100-526, the 1988 Base Realignment and Closure Commission recommended realignment of PCD by transferring its supply mission to Tooele Army Depot in Utah and its ammunition mission to Red River Army Depot in Texas. Closure of PCD could not occur because of ongoing chemical weapons demilitarization that did not begin until 2012. Storage and disposal of chemical weapons is the only remaining mission of PCD (USACE, 2017).

On December 16, 2013, the Army declared 15,847 acres of PCD as surplus property, retaining approximately 7,000 acres for demilitarization operations (USACE, 2017). The 7,000 acres includes the Pueblo Chemical Agent Destruction Pilot Plant, cantonment area, and sanitary waste treatment evaporation lagoons. The property declared surplus remains under U.S. Government ownership and control (Appendix C).

According to a 2016 redevelopment plan, the surplus property will be transferred via an Economic Development Conveyance to the Local Redevelopment Authority (LRA), known as PuebloPlex. The LRA has a goal of revitalizing the surplus property to create viable land uses for the redevelopment of the property, including industries, businesses, residents, and visitors (Matrix Design Group [Matrix], 2016). A portion of the surplus property is already being leased by the LRA, as referenced in the Master Lease for PCD (Appendix C).

2.3 BASEWIDE ENVIRONMENTAL SETTING

2.3.1 Physiographic and Geologic Setting

Located on a terrace in the western part of the Colorado Piedmont section of the Great Plains physiographic province, the topography of PCD is broadly rolling, having steep scarps at the edges of the terrace. The surface altitude of the terrace ranges from 4,810 feet at the northern boundary of PCD to 4,650 feet at the southern boundary along 6 miles. The result is an average slope of 27 feet per mile. The southern edge of the terrace is 150 feet above the adjacent Arkansas River Valley (U.S. Geological Survey [USGS], 1996).

The moderate permeable terrace alluvium is composed of stratified, unconsolidated clayey or silty sand, fine to coarse sand, sand and fine gravel, and a few thin beds of gravel. This sequence of lithologies is not constant throughout the area; the upper part of the terrace alluvium is fine-grained and grades downward into coarser, cleaner material (USGS, 1971).

The terrace alluvium under PCD is as thick as 77 feet and lies on an irregular southward-sloping surface eroded on the Upper Cretaceous Pierre Shale. The nearly impermeable Pierre Shale is an extensive geologic unit in eastern Colorado that underlies all of PCD. It is composed of a gray marine clay shale and sandy shale more than 1,000 feet thick. Below the Pierre Shale is a sequence of low permeability shale and limestone deposits underlain by the Dakota Sandstone (USGS, 1971; USGS, 1989).

The PCD near-surface soil profile is as follows (USACE, 1994):

- 0 to 4 inches below ground surface – light brownish gray, clayey, silty sand with organics
- 4 to 14 inches below ground surface – brown, clayey, silty sand with organics
- 14 to 60 inches below ground surface – pale brown, sandy, silty clay with organics

The soils of Chico Creek are poorly- to well-drained fine sandy loams and silty clays. Soils associated with Boone Creek are well- to excessively-drained gravelly sandy loams. The remaining soils at PCD are associated with soils found on plains. The western portion of the property includes excessively-drained loamy sands and sands. The central portion of the property is characterized by soils that are well-drained loams, clay loams, sandy loams, and silty clay loams. The eastern portions of PCD include deep to shallow, well-drained silty clays, silty clay loams, and clay (Matrix, 2016).

2.3.2 Hydrogeologic Setting

PCD is underlain by two alluvial aquifers. The terrace alluvial aquiver is a southernmost, downgradient part of an erosional remnant of an extensive terrace deposit. The Chico Creek alluvial aquifer is a smaller alluvial system along Chico Creek. These aquifers consist primarily of sand separated by clay layers and are underlain by the almost impermeable Pierre Shale of Upper Cretaceous age (USGS, 1996).

The bedrock surface of the terrace alluvial aquifer has an average slope of 28 feet per mile to the south-southeast and is mostly regular beneath the northern two-thirds of the terrace deposits at PCD. It forms an irregular surface of troughs, hills, and ridges in the southwestern part of the terrace alluvium. The saturated thickness of the terrace aquifer ranges from 0 to 45 feet. Water in the terrace alluvial aquifer flows southward, except in the southwestern part where flow directions are complex. Measured hydraulic conductivity ranges from 0.4 to 400 feet per day. Precipitation is subject to rapid evaporation and, as a result, the potential for recharge to the terrace alluvial aquifer under PCD is small (USGS, 1996).

The bedrock surface beneath the Chico Creek aquifer slopes 31 feet per mile to the south. The saturated thickness of the Chico Creek alluvium ranges from 0 to 30 feet but is mostly less than 15 feet. The total thickness of the Chico Creek alluvium in the saturated area ranges from 16 to 41 feet. Water in Chico Creek alluvial aquifer flows southward to the Arkansas River alluvium with a measured hydraulic conductivity ranging from 14 to 310 feet per day (USGS, 1996).

2.3.3 Hydrologic Setting

PCD is drained by Chico Creek on the west, Boone Creek on the southeast, and Haynes Creek on the east. As shown on Figure 2.1, several other smaller drainages are present and feed into these primary creeks. All three creeks flow southward to the Arkansas River Valley. Chico Creek is perennial north of a point 2.5 miles upstream from its intersection with the Arkansas River Valley. The creek flows during the winter south of this point. Boone Creek receives waters from a perennial spring, the discharge of which disappears into colluvium and alluvium within a short distance. The creek generally flows only in response to rainfall runoff or snowmelt. Haynes Creek is intermittent but usually flows during the winter (USGS, 1996). However, evapotranspiration is

high and runoff water is limited (NUS Corporation [NUS], 1987). Chico and Haynes Creek have floodplains that occur within the boundaries of PCD (Pueblo County, 2018).

In addition to the naturally occurring creeks, manmade east-west drainageways provide drainage at PCD to the creeks. Surface water bodies at PCD include Linda Ann Reservoir, Ammunition Workshop Pond, and an unnamed pond north of Linda Ann Reservoir. The Linda Ann Reservoir is on bedrock and is recharged by Boone Creek during heavy rainfall and by nearby springs that occur at the contact between the alluvial terrace aquifer and underlying bedrock. The Ammunition Workshop Pond is also on bedrock and is supplied by springs at the bedrock-alluvium interface. The unnamed pond receives waters from Chico Creek. Three manmade lagoons holding industrial wastewater are also present at PCD. No surface water body named above is associated with the potable water system (Jacobs Engineering Group [Jacobs], 1991; USACE, 1994).

According to Don Anderson, PCD Public Works, PCD has two separate water supply areas: one in the northern part of PCD and one in the southern portion near the Building 500s area (Appendix C). Eleven wells supplied domestic, industrial and irrigation waters to PCD beginning in 1942. The wells were developed to depths ranging from 48 to 70 feet below ground surface. Two wells developed in 1970 each had depths of 75 feet below ground surface (PCD, 1972). As of July 2011, eleven permitted water supply wells remain at PCD as shown in Table 2.1 and Figure 2.2 (PCD, 2011; CDWR, 2018; Colorado Information Marketplace [CIM], 2018).

Table 2.1
PCD Water Supply Wells

Well Permit No.	PCD Well ID	Latitude	Longitude	Approximate Screen Interval (feet bgs)	Approximate Well Depth (feet bgs)
15720R	Well 1	38.288260	-104.323866	44-64	70
15721R	Well 2	38.288268	-104.322139	47-67	70
15722R	Well 3	38.289651	-104.322858	39-63	63
15723RR	Well 12	38.288279	-104.339920	55-75	75
15724R	Well 5	38.286914	-104.321183	41-70	70
15725RR	Well 6	38.285175	-104.342372	43-73	75
15726RR	Well 17	38.349093	-104.326924	44-64	68
15727R	Well 4	38.287583	-104.322122	44-55	55
15728RR	Well 16	38.341142	-104.326923	44-64	68
15729RR	Well 14	38.344055	-104.326945	47-67	71
15730RR	Well 15	38.346657	-104.326939	48-68	75

2.3.4 Ecological Receptors

Ecological receptors include any living organisms other than humans, the habitat that supports such organisms, or natural resources that could be adversely affected by environmental contaminations resulting from a release at or migration from an identified location.

The primary surface water features at PCD include Chico Creek, Boone Creek, Haynes Creek, Linda Ann Reservoir, Ammunition Workshop Pond, and an unnamed pond. These surface water features and associated plant and animal species are primary ecological receptors at PCD. The Arkansas River is the nearest surface water intake to potentially receive surface water migrating

off PCD, though, as indicated above, evapotranspiration rates are very high and limited surface waters reach the Arkansas River.

There are no designated wilderness areas or wildlife preserves within a mile of PCD; however, PCD does support populations of pronghorn antelope, coyote, various rodents, and reptiles (U.S. Department of Agriculture [USDA], 2018; Matrix, 2016). According to the U.S. Fish and Wildlife Service (USFWS) and Colorado Parks and Wildlife, the following federally- and state-listed endangered species have the potential to exist in Pueblo County, Colorado (Colorado Department of Natural Resources [CDNR], 2018; USFWS 2018a).

Table 2.2
Endangered Species

BIRDS
Least Tern (FE, SE)
Southwestern Willow Flycatcher (FE, SE)
Whooping Crane (FE, SE)
MAMMALS
Black-footed ferret (FE, SE)

FE = federally endangered
SE = state endangered

The aforementioned endangered species are listed for Pueblo County and therefore have the potential to exist within the boundaries of PCD. In addition to the listed species, numerous wetlands identified within the PCD boundaries as sensitive environmental receptors are located along the creek drainage pathways (USFWS, 2018b). Examples of the wetland types found at PCD are:

- Palustrine, emergent, persistent, temporary flooded (PEM1A);
- Palustrine, emergent, persistent, temporary flooded, diked/ impounded (PEM1Ah);
- Palustrine, emergent, persistent, seasonally saturated (PEM1B);
- Palustrine, emergent, persistent, seasonally flooded (PEM1C);
- Palustrine, emergent, persistent, seasonally flooded, diked/ impounded (PEM1Ch);
- Palustrine, emergent, persistent, seasonally flooded, excavated (PEM1Cx);
- Palustrine, emergent, persistent, semi-permanently flooded, diked/ impounded (PEM1Fh);
- Palustrine, forested, temporary flooded (PFoA);
- Palustrine, scrub-shrub, temporary flooded (PSSA); and
- Palustrine, scrub-shrub, seasonally saturated (PSSB).

2.4 PFAS INFORMATION

PFAS are a complex family of more than 3,000 manmade fluorinated organic chemicals that have been produced since the mid-20th century and used in non-stick coatings, textiles, paper products, some firefighting foams, and many other products. These compounds have many manufacturing and product applications because they repel oil and water, resist temperature extremes, and reduce friction. PFAS include compounds that vary in molecular weight and can have multiple structures and functional groups. Perfluorooctanoic Acid (PFOA) and Perflourooctanesulfonic Acid (PFOS) have been the most extensively produced and studied of these chemicals. PFOA and PFOS are no

longer manufactured in the United States. However, they are still produced internationally and can be imported into the United States in consumer goods such as carpet, leather and apparel, textiles, paper and packaging, coatings, rubber, and plastics (ITRC, 2017).

There are four major sources of PFAS: fire training/fire response sites, industrial sites, landfills, and wastewater treatment plants/biosolids. Other point and diffuse sources of PFAS exist, and may be significant locally, but generally are expected to be small by comparison to these main four sources (ITRC, 2018). The primary potential sources associated with historical PCD operations is fire training/response activities and potential use of AFFF.

The fate and transport of PFAS in the environment is complicated and varies amongst PFAS compounds. In general, PFAS with shorter alkyl chain length are more water soluble than those with longer lengths. Adsorption to soil surfaces has been shown to be greater for PFASs with longer alkyl chain length. High solubility in water and low to moderate sorption to soils leads to PFAS often migrating to groundwater or surface water. Based on their chemical structure and composition, PFAS are resistant to biological and chemical degradation, and persist in the environment (ITRC, 2018).

There is evidence that exposure to PFAS can lead to adverse health outcomes in humans. If humans, or animals, ingest PFAS, the PFAS are absorbed, and can accumulate in the body. PFAS stay in the human body for long periods of time. As a result, as people get exposed to PFAS from different sources over time, the level of PFAS in their bodies may increase to the point where they suffer from adverse health effects. Studies indicate that PFOA and PFOS can cause reproductive and developmental, liver and kidney, and immunological effects in laboratory animals. Both chemicals have caused tumors in animal studies. The most consistent findings from human epidemiology studies are increased cholesterol levels among exposed populations, with more limited findings related to infant birth weights, immune system effects, and thyroid hormone disruption. Some PFAS (e.g., PFOA) may be carcinogens (EPA, 2019).

In 2012, the USEPA, under the Safe Drinking Water Act (SDWA), published the Third Unregulated Contaminant Monitoring Rule (UCMR3), which required public water supplies across the country to sample for a list of 30 unregulated contaminants, including 6 PFAS:

- Perflourooctane Sulfonate (PFOS)
- Perfluorooctanoic Acid (PFOA)
- Perfluorobutane sulfonate (PFBS)
- Perfluorononanoic acid (PFNA)
- Perfluoroheptanoic acid (PFHpA); and
- Perfluorohexane sulfonate (PFHxS

Results of the UCMR3 indicated detections of PFAS at numerous locations, including several near DoD facilities. PFAS have been extensively manufactured and used worldwide for a variety of purposes. PFAS are commonly used as additives to paper, packaging, clothing, carpets, sporting equipment, non-stick cookware, cleaners, pesticides/herbicides, adhesives, paints, varnishes, sealants, hydraulic fluid, and surfactants to enhance product performance. Due to the ubiquitous nature of PFOS/PFOA, its likely use, storage, and incidental releases of other PFOS/PFOA-containing products in small quantities occurred during the operational history of SVDA. However, in general, PFAS detections related to DoD facilities are often linked to the use of aqueous film-forming foam (AFFF), which contains various PFAS. AFFF was

used as a firefighting agent to suppress fires involving petroleum hydrocarbons. PFAS are emerging contaminants and historically have not been analyzed during site characterizations; therefore, minimal sampling data exist for most sites.

In 2016, USEPA issued a drinking water health advisory (HA) for PFOS and PFOA. The LHA is 70 nanograms per liter (ng/L) for each compound and the combined total of PFOS and PFOA. When AFFF is released to the environment, PFAS can migrate into soil and groundwater. Once in the environment, the compounds are persistent and may migrate through airborne transport, surface water, groundwater, and/or biologic uptake. The amount of PFAS that enters the environment depends on the type and amount of AFFF used, where and when it was used, the type of soil, and other factors. If private or public wells are located nearby, they could potentially be affected by PFAS. Similarly, surface water features may be impacted and may convey PFAS to downgradient receptors.

In accordance with the June 10, 2016, Department of the Army policy regarding PFOS/PFOA contamination assessment (Department of the Army 2016), the Army sampled PCD water supply wells in November 2016. Of the six water supply wells sampled, none was found to have detectable concentrations of the PFAS analytes (see Section 2.5). The groundwater production wells provide the sole source of potable water for PCD. Completion details for the production wells are provided in Section 2.3.3. The six UCMR3 PFAS compounds were analyzed for and not detected (Appendix A).

One Fire Training Area (FTA) and five non FTAs were investigated as part of this preliminary assessment investigation because they were historically potentially used as FTAs. This PA Report presents the results of groundwater investigations and evaluation for the potential of the six UCMR3 PFAS compounds in groundwater. The scope and objectives for this PA are defined in Section 1.1. A description of the Installation is provided in Section 1.1 and 1.2, descriptions of the FTAs and non FTAs are presented in Section 1.2 and 2.6, and the organization of the remainder of the report is summarized in Section 1.4.

2.5 PREVIOUS PFAS INVESTIGATIONS

2.5.1 2016 Water Supply Well Sampling

In November 2016, PCD sampled water supply wells on the installation for six PFAS. Sampling occurred at Wells 12 through 17. These wells are located at varying distances from the various potential release locations (Figure 2.2). Water supply well samples were analyzed for the following PFAS analytes at the corresponding method detection limits:

- Perfluorobutanesulfonic Acid (PFBS) (0.042 micrograms per liter [µg/L])
- Perfluoroheptanoic Acid (PFHpA) (0.0040 µg/L)
- Perfluorohexanesulfonic Acid (PFHxS) (0.010 µg/L)
- Perfluorononanoic Acid (PFNA) (0.0099 µg/L)
- PFOS (0.014 µg/L)
- PFOA (0.0083 µg/L)

Of the six water supply wells sampled, none was found to have detectable concentrations of the PFAS analytes listed above (TestAmerica, 2016). The limits of quantitation (LOQs) for non-detected PFOS and PFOA are less than the current health advisory level (70 parts per trillion [ppt], combined). Appendix B provides the sampling data, which were generated by TestAmerica Laboratories under contract to Tetrahedron, Inc.

2.5.2 2018 Exit Strategy Investigation

The 2018 first quarter South Central Terrace and interim corrective action groundwater remediation system status report included an exit strategy investigation to determine if PFAS are present in groundwater at SWMUs 14 and 28 at PCD. Groundwater sampling and PFAS analysis occurred at two piezometers in January 2018 at each of the SWMUs (TLI Solutions, Inc. [TLI], 2018).

At SWMU 14, two piezometers near the centers of the two largest and most contaminated burn pits were sampled and analyzed for the 18 PFAS analytes listed in Table 2.3. Groundwater was non-detect for all 18 analytes at sample location LFPIEZ005A. Perfluorooctane sulfonamide (PFOSA) and perfluoropentanoic acid (PFPeA) were detected below the LOQ and just above the LOQ, respectively, at sample location LFPIEZ001 (TLI, 2018). As shown in Table 2.3, screening values are not available for these PFAS compounds. LOQs for PFOS and PFOA (20 ppt) were less than the current health advisory level (70 ppt, combined).

Two piezometers were also selected for sampling and analysis for 18 PFAS analytes at SWMU 28. Both samples were located at the head of the SWMU 28 ditch. Groundwater samples were non-detect for all 18 PFAS analytes at both sample locations, as summarized in Table 2.3 (TLI, 2018). LOQs for PFOS and PFOA (20 ppt) were less than the current health advisory level (70 ppt, combined). Appendix B provides the sampling data. Additional information regarding these sampling activities are presented in Sections 4.3.1 and 4.4.1.

Table 2.3
2018 SWMUs 14 and 28 PFAS Results

Analyte	SWMU 14 (µg/L)		SWMU 28 (µg/L)		LOQ (µg/L)
	LFPIEZ005A	LFPIEZ001	DDPIEZ0038B	DDPIEZ0038A	
6:2 Fluorotelomer sulfonate	ND	ND	ND	ND	0.020
8:2 Fluorotelomer sulfonate	ND	ND	ND	ND	0.020
Perfluorobutanoic acid	ND	ND	ND	ND	0.020
Perfluorobutane Sulfonate (PFBS)	ND	ND	ND	ND	0.020
Perfluorodecane Sulfonate	ND	ND	ND	ND	0.020
Perfluoroheptanoic Acid (PFHpA)	ND	ND	ND	ND	0.020
Perfluorohexanoic Acid (PFHxA)	ND	ND	ND	ND	0.020
Perflorohexane Sulfonate (PFHxS)	ND	ND	ND	ND	0.020
Perfluorononanoic Acid (PFNA)	ND	ND	ND	ND	0.020
Perfluorooctane Sulfonamide (PFOSA)	ND	0.020 J	ND	ND	0.020

Table 2.3 (Continued)
2018 SWMUs 14 and 28 PFAS Results

Analyte	SWMU 14 (µg/L)		SWMU 28 (µg/L)		LOQ
	LFPIEZ005A	LFPIEZ001	DDPIEZ0038B	DDPIEZ0038A	
Perfluoropentanoic Acid (PFPeA)	ND	0.022	ND	ND	0.020
Perfluorotetradecanoic Acid	ND	ND	ND	ND	0.020
Perfluorotridecanoic Acid	ND	ND	ND	ND	0.020
Perfluoroundecanoic Acid (PFUnA)	ND	ND	ND	ND	0.020
Perfluorodecanoic Acid (PFDA)	ND	ND	ND	ND	0.020
Perfluorododencanoic Acid (PFDoA)	ND	ND	ND	ND	0.020
Perfluoro-n-Octanoic Acid (PFOA)*	ND	ND	ND	ND	0.020
Perfluorooctane Sulfonate (PFOS)*	ND	ND	ND	ND	0.020

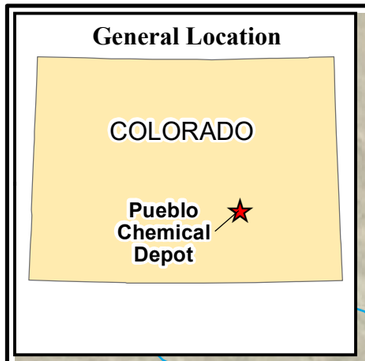
* The State of Colorado has proposed a groundwater standard of 0.07 µg/L for PFOS and PFOA, combined, though the standard is to be site-specific in El Paso County, Colorado (CDPHE, 2016).
(https://www.colorado.gov/pacific/sites/default/files/WQ_GWStandard_PFOA_100417%20FINAL.pdf).
This groundwater standard is consistent with the 2014 EPA health advisory level for PFOS/PFOA (combined).
LOQ = Limit of Quantitation
ND = non-detect

2.6 AREAS OF INVESTIGATION

Based on a review of the historical documentation, the following list of potential release locations were identified (Figure 2.2). These consist of FTAs (Section 3.0) and non-FTAs (Section 4.0).

- FTAs
  - SWMU 29 – Fire Protection Training Area
- Non-FTAs
  - Fire Station Building 3
  - Fire Station Building 61
  - Fire Station Building 62
  - SWMU 28 – Plating Waste Drainage Ditch and Former Building 539
  - SWMU 14 – Landfill

Figure 2.1
Pueblo Chemical Depot Location



Legend

- Surface Water Course
- Surface Water Course Flow Direction
- Surface Water Body
- Installation Boundary

Note:
GIS information for MW networks was not available, and the MW networks are not shown.

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Source: HGL,
ArcGIS Online Imagery

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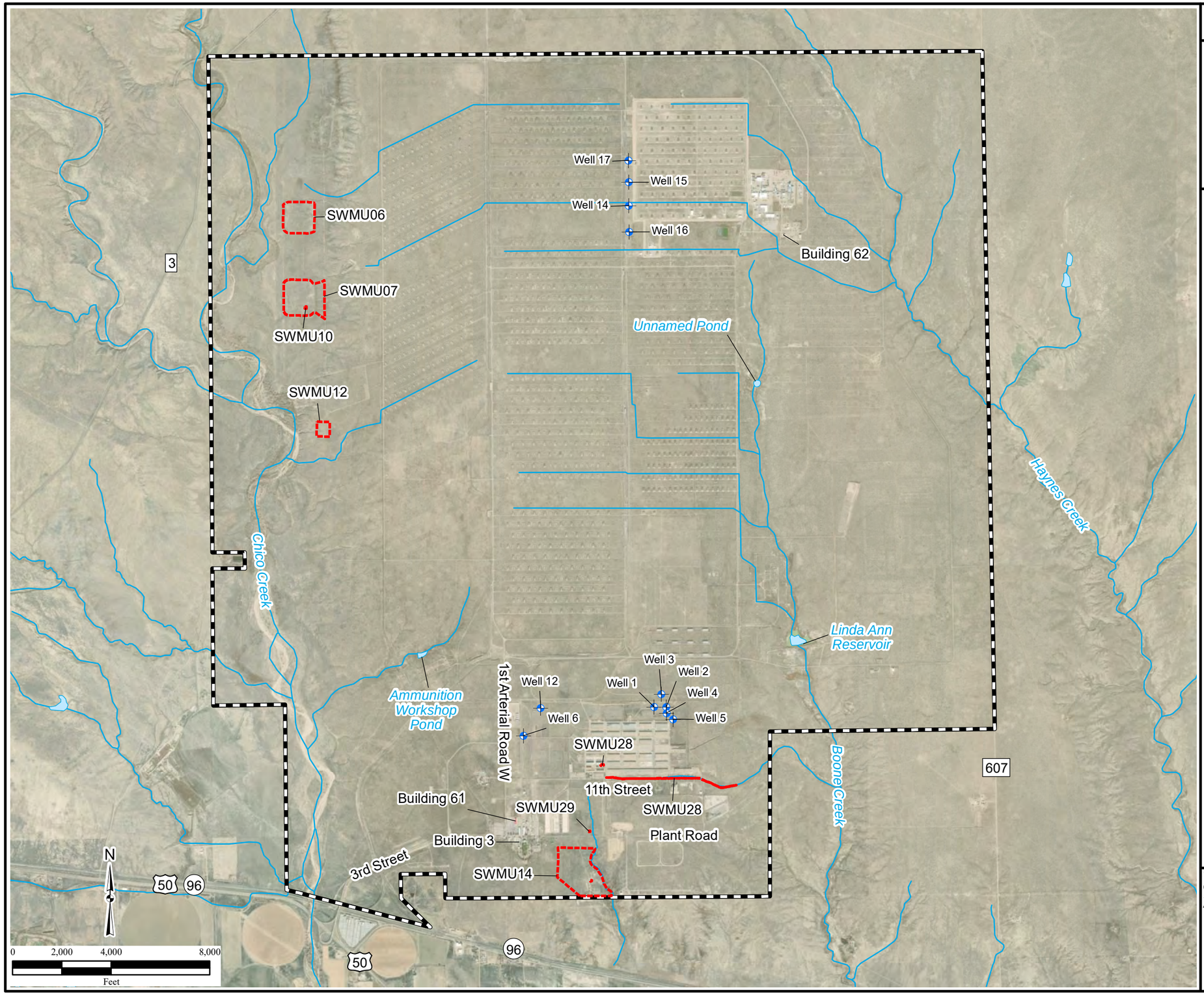
Figure 2.2
Pueblo Chemical Depot
Water Supply Well Locations



Legend

- Water Supply Well
- Surface Water Course
- Surface Water Body
- SWMU Boundary
- Installation Boundary

Notes:
GIS information for MW networks was not available, and the MW networks are not shown.
SWMU=solid waste management unit

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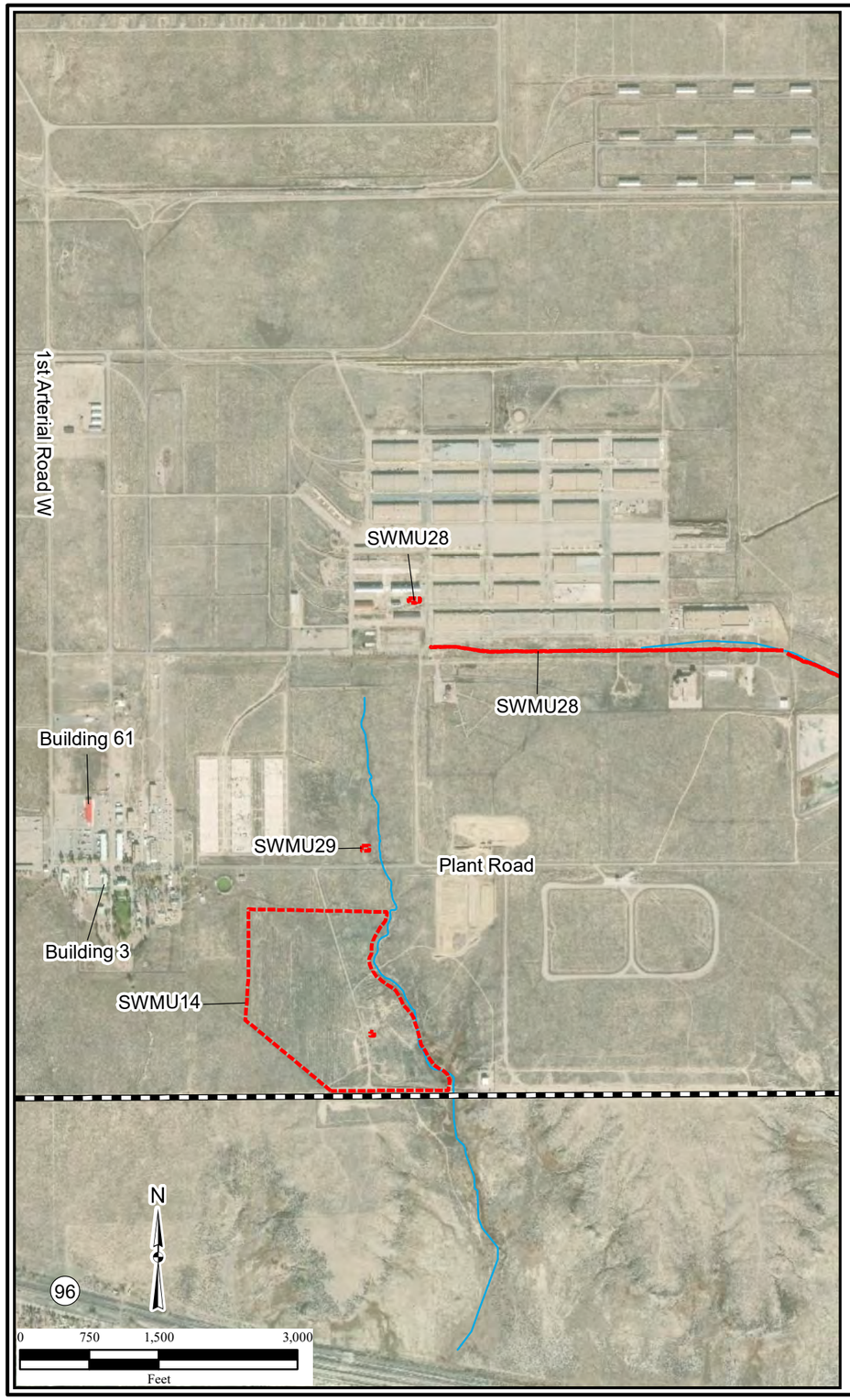
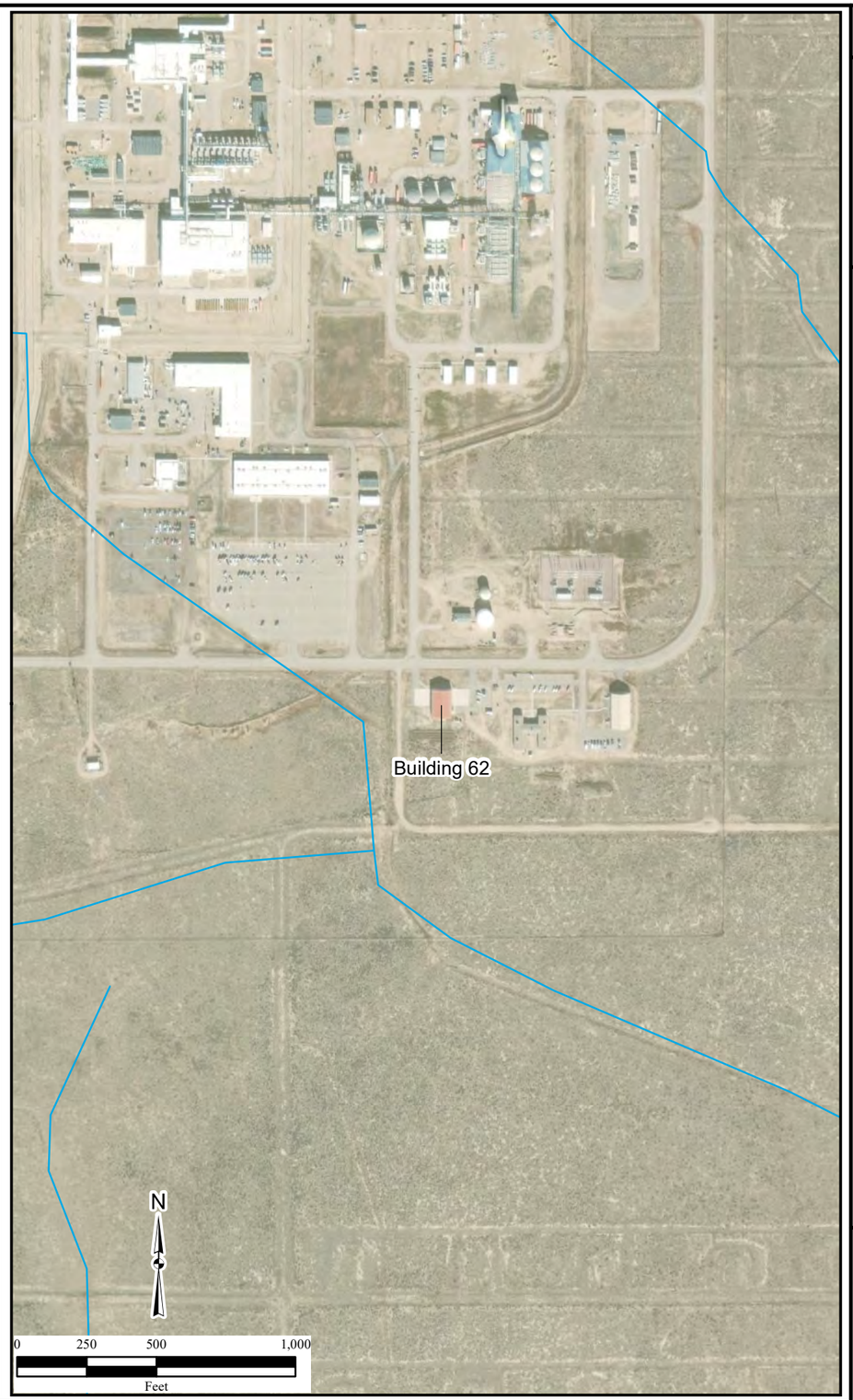
10/8/2019 JG
Source: HGL,
ArcGIS Online Imagery

HGL HydroGeoLogic, Inc

Figure 2.3
Pueblo Chemical Depot
Potential Release Locations

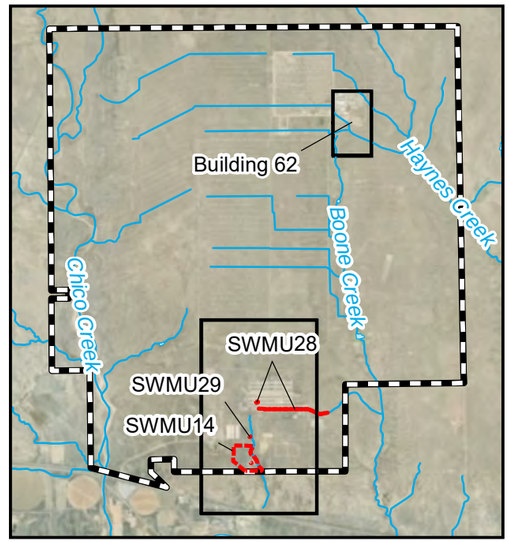




Legend

- Surface Water Course
- Surface Water Body
- SWMU Boundary
- Installation Boundary

Notes:
GIS information for MW networks was not available, and the MW networks are not shown.
SWMU=solid waste management unit



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10/8/2019 JG
Source: HGL, ArcGIS Online Imagery

HGL HydroGeoLogic, Inc

3.0 FIRE TRAINING AREAS

FTAs can be a location of a potential release to the environment, particularly if regular training activities were conducted and included AFFF usage. Based on a review of available historical information, one FTA, SWMU 29, has been identified as potentially having been impacted by the use of AFFF at PCD, and is discussed below.

Interviews with available personnel indicate that annual fire training is required and is completed at Building 532. However, only water is used to extinguish fires during these training exercises and regular AFFF training has never been a requirement of PCD fire personnel. Building 532 is not considered to be a potential release location. PCD has never been used by non-PCD fire department personnel for training activities (Appendix C).

3.1 SWMU 29 – FIRE PROTECTION TRAINING AREA

The Fire Protection Training Area (SWMU 29) is in the southern part of PCD north of SWMU 14 near the intersection of Third Street and Burma Road (see Figure 3.1). SWMU 29 consisted of a shallow depression approximately 24 feet wide by 25 feet long and 1.5 feet deep. The area surrounding SWMU 29 is mostly flat and grassy and slopes slightly to the east. A small, unnamed north-south trending drainage channel is 350 feet east of the site. Groundwater at SWMU 29 is found at a depth of 25 feet with a flow direction to the southeast (PCD, 2006; TLI, 2016).

According to historical documentation, this area was used for fire training exercises twice in the 1980s. These exercises consisted of burning off-specification oil and diesel in a lined pit and extinguishing the fire. The depression was lined with a synthetic liner, covered with soil and gravel, and surrounded by an earthen berm. After completion of fire exercises, the soil from the lined pit was removed, and the old liner was replaced. Components of firefighting fluids/extinguishers included, but were not limited to, magnesium silicate, mono-ammonium phosphate, and ammonium sulfate (PCD, 2006). The historical document review found no records of AFFF usage during these training activities.

Removal actions conducted in 2006 at SWMU 29 removed 127 cubic yards of polycyclic aromatic hydrocarbon contaminated soil from the fire training pit and 183 cubic yards from the drainage channel to the east. A second removal action in 2006 removed 8 cubic yards of soil from the drainage channel (PCD, 2006). Following the removal actions and confirmation sampling, SWMU 29 was issued no further action under the facility Resource Conservation and Recovery Act (RCRA) permit (USACE, 2017).

The current fire chief, Wes Huntley, began working at PCD in 1999. When Mr. Huntley began working at PCD, AFFF was stored in a tank on a single fire truck and no AFFF training program was in place. The AFFF was no longer usable at that time because it was over three years old and had gelled up. Mr. Huntley could not say when AFFF storage and potential use at PCD began but stated that AFFF training was never a requirement of PCD fire personnel throughout his tenure (Appendix C). Mr. Huntley has no knowledge of the fire protection training area (SWMU 29) identified as having been used twice for fire training exercises in the 1980s.

Information on the use of AFFF during fire training exercises in the 1980s could not be confirmed from available documents. Before 1999, AFFF is confirmed to have been stored in a tank on a single fire truck and the date of first storage or potential use of AFFF at PCD is unknown. Trucks that use and/or store AFFF often test their spray equipment semi-regularly to make sure the AFFF is being mixed properly. Information indicating if or where this may have occurred at PCD could not be located, although fire training areas have typically been used at other DoD installations for these operations. As a result, it is possible that AFFF may have been used at SWMU 29 before 1999 during fire training exercises or for equipment checks.

As indicated above, the fire training pit was lined with a synthetic liner, covered with soil and gravel, and surrounded by an earthen berm. Removal actions conducted in 2006 removed polycyclic aromatic hydrocarbon contaminated soil from the fire training pit and an adjacent drainage channel. Despite the removal actions, the potential remains that the immediate area surrounding the fire training pit and the drainage channel may have been impacted by the use of AFFF during fire training exercises at SWMU 29.

Figure 3.1
SWMU 29
Fire Protection
Training Area

Legend

Surface Water Course

SWMU Boundary

Notes:
GIS information for MW networks was not available, and the MW networks are not shown.
SWMU=solid waste management unit

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Source: HGL, ArcGIS Online Imagery

HGL HydroGeoLogic, Inc

4.0 NON-FIRE TRAINING AREAS

4.1 FIRE STATIONS

Three fire stations have served PCD during its operational history based on historical documentation and interviews (Appendix C): a former fire station at Building 3 and current fire stations at Buildings 61 and 62. Fire stations can be potential release locations, because they are often where AFFF was stored, mixed, transferred, and/or where training activities occurred. Each fire station is discussed in the subsections below.

4.1.1 Building 3

Based on the interview with Mr. Huntley, before Building 61 was built in the late 1980s, Building 3 served as the PCD fire station (Figure 4.1). No information is available regarding potential AFFF usage or storage at Building 3 from the early 1970s (when DoD AFFF usage began) to the late 1980s. Building 3 is the oldest known fire station at PCD (Appendix C). Building 3 is currently the location of an exercise gym and administrative offices.

4.1.2 Building 61

The current south fire station (Building 61) was built in the late 1980s and is northwest of the intersection of 4th Street and Ordnance Lane (Figure 4.2). The fire station is surrounded by paved areas to the west, east and south. A grassy area and baseball field is immediately north of the fire station.

The majority of the information for Building 61 is from the interview with Mr. Huntley (see Appendix C). Mr. Huntley took over as Fire Chief in 1999. After taking over at PCD, Mr. Huntley inquired as to the current AFFF plan at PCD. At the time, the only AFFF stored by the PCD fire department was in a tank on a single fire truck. Additional information relative to the AFFF storage or usage of AFFF in this single tank before 1999 is not available. Per additional information received from Mr. Huntley in January 2020, the stored AFFF was three percent concentrate intended to be mixed at time of use for either training or firefighting.

At the beginning of Mr. Huntley's tenure in 1999, the AFFF in the tank described above was over three years old, had gelled up, and was not usable. Mr. Huntley stated it required a significant cleanout of the tank given the gelled material could not be turned back into a liquid. The AFFF gel was drummed and disposed of by PCD environmental, though the method of disposal is unknown. Cleanout of the tank occurred in the parking lot on the northwest side of Building 61 and could have resulted in a release of a low mass of AFFF concentrate into the environment (Appendix C).

After 1999, PCD fire department purchased and began storing approximately ten, 5-gallon buckets of 3M® AFFF). The buckets were stored in the north bay of Building 61 and/or carried on fire trucks. This continued until 2008 when the AFFF supply was disposed of (via PCD environmental). During the 1999 to 2008 timeframe, no AFFF was used as part of fire department

activities, including training and spray-testing. Since 2008, the PCD fire department has switched to a product called Cold Fire™ that is not a foam (Appendix C).[1]

Information on AFFF usage at Building 61 before 1999 is limited. Because the PCD fire department did not regularly use or train with AFFF, it is unlikely that significant AFFF mixing or transferring (and associated potential release) would have occurred at Building 61. It is more likely that AFFF would have been purchased, stored for long periods of time, and changed out periodically. This is supported by the fact that the existing AFFF was observed to be past its expiration date and gelled at the start of Mr. Huntley's tenure in 1999. However, based on the above, known potential releases of AFFF include the gelled AFFF removal and cleanout on the northwest side of Building 61. Given the gelled nature of the AFFF and the single occurrence, it is likely that a release at this location would have been a low mass of AFFF.

4.1.3 Building 62

Building 62 is the north fire station at PCD and was constructed in 2011 (Figure 4.3). According to fire department personnel, AFFF has never been stored or used at the north fire station. As indicated above, AFFF was eliminated from use in 2008 and PCD currently uses a product called Cold Fire™ (Appendix C). It is unlikely that a release of AFFF occurred at Building 62.

4.2 EMERGENCY RESPONSE

Only anecdotal information on the use of AFFF for emergency responses is available at PCD. Mr. Huntley has no knowledge of AFFF usage before 1999, other than AFFF reportedly being used to fight a small wildfire at an unknown location before his employment as Fire Chief. Mr. Huntley could not provide an approximate date of when this may have occurred. To his knowledge, there have never been any crashes or fires requiring AFFF during his tenure or before 1999 (Appendix C).

4.3 OTHER AREAS

Because of personnel changes and the length of time of PCD operations, information on the historical use of AFFF at PCD is limited. Interviews with current personnel indicate there is no information identifying releases of AFFF or PFAS to the sanitary sewer system. A sanitary treatment facility operated in the past but closed in the late 1960s. Currently, lagoons are used for sanitary waste treatment. There is also no knowledge of AFFF ever having been used for dust suppression purposes at PCD and no evidence of its use in fire suppression systems in buildings at PCD (Appendix C).

PCD has a list of approved pesticides/herbicides for use that are applied regularly. A review of the pesticides/herbicides approved and used at PCD do not show any containing PFAS (Appendix C).

[1] A review of the Cold Fire™ material safety data sheet indicates that the components of the foam are a classified trade secret. The material safety data sheet states "no components are believed to be hazardous or listed in the National Institute for Occupational Safety and Health Recommendations for Occupational Safety and Health Standards, 1988, or are listed as hazardous by the Superfund Amendments and Reauthorization Act, CERCLA, or RCRA." The fire suppressing agent is composed of natural water-based surfactants and other natural plant-based ingredients.

4.3.1 SWMU 28 – Plating Waste Drainage Ditch and Former Building 539

The Plating Waste Drainage Ditch (SWMU 28), north of Plant Road, runs east to west along the southern boundary of the warehouse area and dissipates to the east (Figure 4.4). The ditch received operation wastes from the former Metal Plating Shop, Building 539, and the Metal Surface Treatment Shop. Metal plating operations were conducted in Building 539 until 1973 when the building was demolished. Operations in these shops required the use of chromic, sulfuric, hydrochloric, nitric, and phosphoric acids; sodium hydroxide; copper and cadmium cyanides; and nickel and zinc solutions (USACE, 2017).

A review of available building drawings and interviews with PCD personnel did not identify any systems containing PFAS in use at Building 539. It remains unknown if PFAS were used as a vapor suppressant during plating operations. In 2010, chromium and lead contaminated soils were removed from 15 excavation cells along the length (approximately 750 feet) of the former drainage ditch. Approximately 1,700 cubic yards of contaminated soil were removed and included the top 2 feet of soil in the drainage ditch. Soils were disposed of off-site (Shaw, 2013).

As indicated in Section 2.4.2, first quarter 2018 groundwater sampling at SWMU 28 included analyzing groundwater for PFAS. Sampling occurred at two wells sited at the head of the SWMU 28 drainage ditch (DDPIEZ003A and DDPIEZ003B). Earlier investigations have identified that contaminant loading is expected to be greatest at the head of the ditch and decrease as water flowed east through the ditch. Groundwater samples were analyzed for 18 PFAS analytes that were found to not be present in groundwater. LOQs for non-detected PFOS and PFOA (20 ppt for each) were less than the current health advisory level (70 ppt, combined). Groundwater depths at SWMU 28 range from 30 to 56 feet below ground surface (USACE 2017; TLI, 2018; Versar, 2003).

4.3.2 SWMU 14 – Landfill

The landfill (SWMU 14) is along the southern boundary of PCD and occupies 153 acres (Figure 4.5). The landfill is divided by Post Engineer Dump Road with the eastern portion of the landfill bounded by a natural ditch. According to a 1979 installation assessment, the eastern section of the landfill was used from 1941 to 1967 for disposing of general post wastes, including paper, cans, and building rubble. The combustible material was open burned. As residue accumulated, it was pushed by bulldozer toward the drainage ditch. From 1967 to 1979, the installation assessment reported that ash from the boiler plants was still “dumped over the entire area of this section” (Army, 1979; Ebasco Environmental, 1990).

The west side of the landfill was used from 1967 to 1992 for the disposal of installation waste. Trash was placed in trenches and covered with earth, starting at Post Engineer Dump Road, and working to the west. According to the 1979 installation assessment, both the east and west sections of the landfill received industrial wastes from the metal plating and metal surface treatment shops that were dumped until 1973. After 1973, the material was containerized and stored in the open at the landfill awaiting final disposal (Army, 1979; USACE, 2017).

Fire training exercises reportedly occurred at SWMU 14 during its operational period (Rust, 1996), but interviewees were not aware of any fire training exercises occurring at SWMU 14.

Remediation of chlorinated solvent impacted soil, groundwater, and surface water at SWMU 14 is ongoing (USACE, 2017; Appendix C).

The 2018 first quarter South Central Terrace and interim corrective action groundwater remediation system status report included an exit strategy investigation to determine if PFAS are present in groundwater (encountered between 29 and 38 feet below ground surface) at SWMU 14. Two wells near the centers of the two largest and most contaminated burn pits in the eastern portion of the landfill were sampled and analyzed for 18 PFAS analytes, as listed in Table 2.3. Groundwater was non-detect for all 18 analytes at sample location LFPIEZ005A. At sample location LFPIEZ001 (Figure 4.5), PFOSA and PFPeA were detected below the LOQ and just above the LOQ, respectively (TLI, 2018). As described in Section 2.4.2, screening values are not available for these PFAS compounds. LOQs for non-detected PFOS and PFOA (20 ppt for each) were less than the current health advisory level (70 ppt, combined).

Figure 4.1
Former Fire Station
Building 3

Note:
GIS information for MW networks was not available, and the MW networks are not shown.

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Source: HGL, ArcGIS Online Imagery

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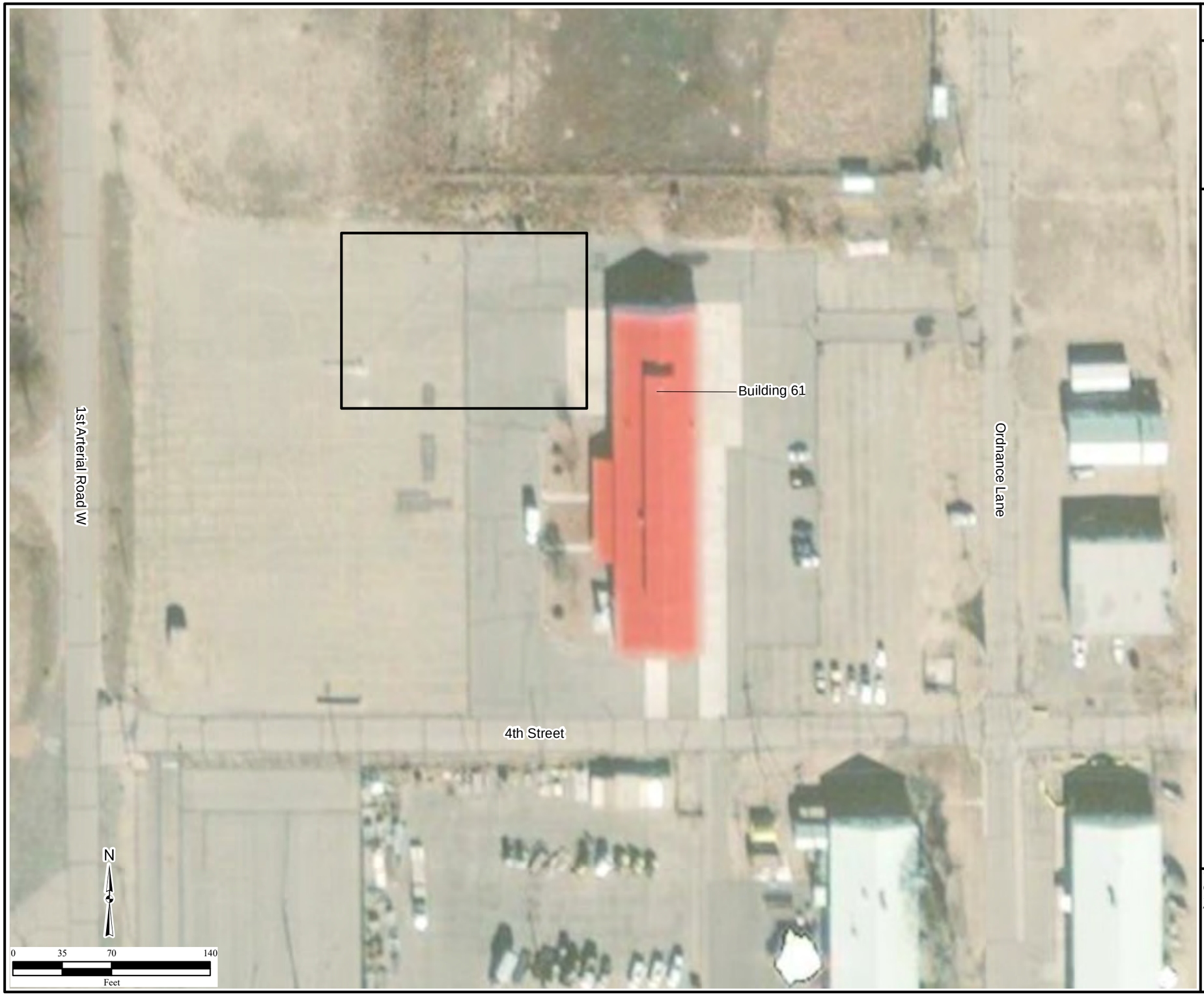
Figure 4.2
South Fire Station
Building 61



Legend

Approximate AFFF Release Location

Note:
GIS information for MW networks was not available, and the MW networks are not shown.

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Source: HGL, ArcGIS Online Imagery

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Figure 4.3
North Fire Station
Building 62

Legend

Surface Water Course

Note:
GIS information for MW networks was not available, and the MW networks are not shown.

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Source: HGL, ArcGIS Online Imagery

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Figure 4.4
SWMU 28
Plating Waste
Drainage Ditch and
Former Building 539

Legend

- Piezometer
- Surface Water Course
- SWMU Boundary

Notes:
GIS information for MW networks was not available, and the MW networks are not shown.
SWMU=solid waste management unit

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Source: HGL, ArcGIS Online Imagery

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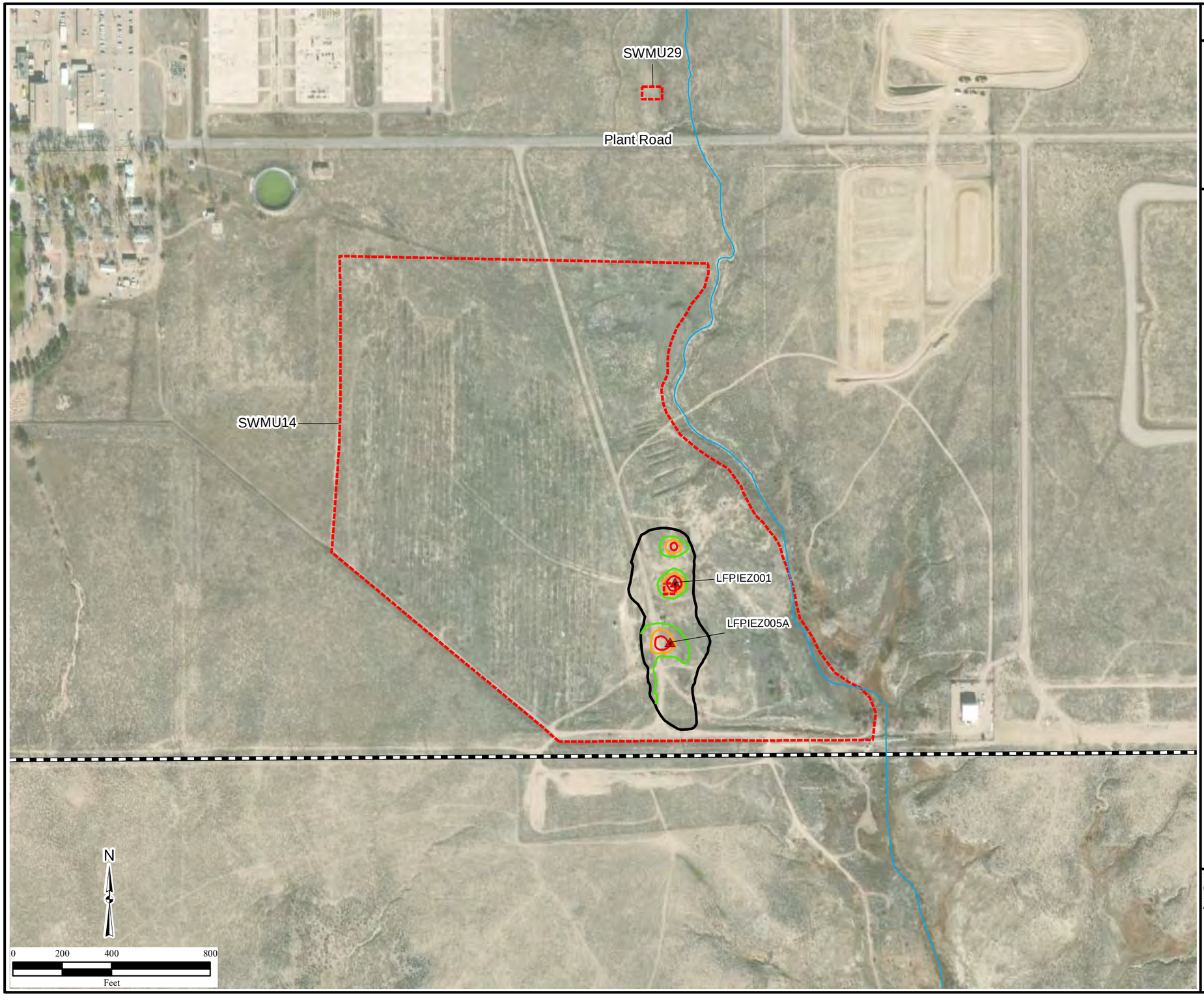
Figure 4.5
SWMU 14
Landfill



Legend

- Piezometer

Total VOC Isoconcentrations in 2016 Soil Gas

- 15000 ng
- 30000 ng
- 45000 ng
- Surface Water Course
- Extent of 2016 Passive Soil Gas Survey
- SWMU Boundary
- Installation Boundary

Notes:
GIS information for MW networks was not available, and the MW networks are not shown.
ng=nanogram
SWMU=solid waste management unit
VOC=volatile organic compound

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Source: HGL, ArcGIS Online Imagery

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5.0 SUMMARY AND CONCLUSIONS

5.1 SUMMARY

5.1.1 Fire Training Areas

The Fire Protection Training Area (SWMU 29) in the southern part of PCD was reportedly used for fire training exercises twice in the 1980s. These exercises consisted of burning off-specification oil and diesel in a lined pit and extinguishing the fire. Available documentation does not indicate that AFFF was used during these training exercises. The depression was lined with a synthetic liner, covered with soil and gravel, and surrounded by an earthen berm.

Information on the use of AFFF during fire training exercises in the 1980s could not be confirmed from available documents. Before 1999, AFFF is confirmed to have been stored in a tank on a single fire truck, but the date of first use of AFFF at PCD is unknown. Trucks that use and/or store AFFF often test their spray equipment semi-regularly to make sure that the AFFF is being mixed properly. Information could not be located to indicate if or where this may have occurred at PCD, although FTAs have typically been used at other DoD installations for these operations. As a result, it is possible that AFFF may have been used at SWMU 29 before 1999 during fire training exercises or for equipment checks.

Removal actions conducted in 2006 removed polycyclic aromatic hydrocarbon contaminated soil from the fire training pit and an adjacent drainage channel. Despite the removal actions, it is possible that the immediate area surrounding the fire training pit and the drainage channel may have been impacted by the use of AFFF during undocumented fire training exercises or spray testing at SWMU 29.

5.1.2 Non-Fire Training Areas

Fire Stations

PCD has one historical fire station (Building 3) and two active fire stations (Buildings 61 and 62). Building 3 that served as fire stations before Building 61 was constructed in the 1980s. No information was available regarding potential AFFF usage or storage at Building 3, and there are no documented releases of AFFF at Building 3.

Only one active fire station, Building 61, contained equipment that used and/or stored AFFF from the 1980s to 2008. In 1999, when the current fire chief began his tenure, stored AFFF was over three years old, had gelled up in a tank on a fire truck, and was not usable. A significant cleanout of the tank was required to remove the AFFF. The AFFF gel was drummed and disposed of by PCD environmental though the method of disposal is unknown. Cleanout of the tank occurred in the parking lot on the northwest side of Building 61 and could have released a low mass of PFAS to the environment. From 1999 through 2008, PCD fire department stored approximately 10 5-gallon buckets of AFFF (3M AFFF) and AFFF was no longer stored in tanks. The buckets were stored in the north bay of Building 61 and carried on fire trucks. No usage of this AFFF occurred from 1999 through 2008, when all AFFF was removed from PCD.

Building 62 is the north fire station at PCD and was constructed in 2011. AFFF has never been stored or used at the north fire station.

Emergency Response

According to anecdotal information from interviewees, AFFF was used to fight a small wildfire at an unknown location some time before 1999. No details regarding this potential release of AFFF could be located. Interviewees indicated that, otherwise, there have never been any crashes or fires requiring AFFF (Appendix C).

Other Areas

A review of available building drawings and interviews with PCD personnel did not identify any systems containing PFAS in use at Building 539 that may have resulted in PFAS impacting the environmental media at SWMU 28, the Plating Waste Drainage Ditch. It remains unknown if PFAS were used as a vapor suppressant during plating operations. In 2010, chromium and lead contaminated soils were removed from 15 excavation cells along the length (approximately 750 feet) of the former drainage ditch. Approximately 1,700 cubic yards of contaminated soil were removed and included the top 2 feet of soil in the drainage ditch (Shaw, 2013). Groundwater samples from 2 wells at SWMU 28 were analyzed for 18 PFAS analytes in 2018. All PFAS analytes were non-detect in groundwater at SWMU 28 (TLI, 2018) and LOQs for non-detected PFOS and PFOA (both 20 ppt) were less than the current health advisory level (70 ppt, combined).

The landfill (SWMU 14) operated between 1941 and 1992 for the disposal of installation waste. Fire training exercises reportedly occurred at SWMU 14 during its operational period (Rust, 1996) though interviewees were not aware of any fire training exercises occurring at SWMU 14 (Appendix C).

Groundwater sampling at two former burn pits in 2018 was conducted to determine if PFAS are present in groundwater at SWMU 14. Two wells near the centers of the two largest and most contaminated burn pits at the landfill were sampled and analyzed for 18 PFAS analytes. PFOSA and PFPeA were detected below the LOQ and just above the LOQ, respectively, at LFPIEZ001. Screening values are not available for these PFAS compounds. LOQs for non-detected PFOS and PFOA (20 ppt for each) were less than the current health advisory level (70 ppt, combined).

5.2 CONCLUSIONS

Table 5.1 summarizes the findings from the PA report and presents possible future management decisions on the identified locations. These locations are identified as areas of possible PFAS contamination as a result of a potential release to the environment. The following locations are categorized by "group" in Table 5.1 as follows:

- Group 1 – High mass of AFFF released and probability of groundwater contamination.
- Group 2 – Unknown mass or medium of AFFF released.
- Group 3 – Low mass of AFFF released.
- Group 4 – No AFFF released.

Based on the "group" designation and rationale for each identified location, recommendations are provided in Table 5.1. In accordance with the EPA, CERCLA, PA, and site inspection guidance documents, each of the identified locations is recommended for the following: implement removal action due to imminent threat; close out of the identified location because of no release; initiate a Remedial Investigation; or initiate a Site Inspection. Definitions of the recommended actions are as follows:

- Removal action, as defined in CERCLA Section 104, are actions taken to eliminate, control, or otherwise mitigate a threat posed to public health or the environment due to a release or threatened release of hazardous substances (EPA, 1991).
- Close out or no further remedial action planned is defined as a site disposition decision that further response under the Federal Superfund is not necessary (EPA, 1991).
- Remedial Investigation is defined as a field investigation to characterize the nature and extent of contamination at a site. The Remedial Investigation supports development, evaluation, and selection of the appropriate response alternative (EPA, 1991).
- Site Inspection is defined as an investigation to collect and analyze waste and environmental samples to support a site evaluation (EPA, 1991).

Table 5.1
Preliminary Assessment Report Summary and Findings

Location	Group	Rationale	Recommendations
Fire Protection Training Area (SWMU 29)	2	• Operational Period: 1980s • Unknown quantity of AFFF released. • AFFF available for use on a fire truck potentially during operational period. • If AFFF spray testing or training occurred historically, the fire training area would be most likely location. • Unnamed drainage feature 350 feet east of site.	Initiate a Site Inspection, to include soil and groundwater.
Fire Station, Building 3	4	• Operational Period: Unknown to late 1980s • No documented releases of AFFF. • No information on storage or use of AFFF at Building 3.	Close out with no additional investigation.
Fire Station, Building 61	3	• Operational Period: Late 1980s to present. • Before 1999, AFFF stored in a tank on a fire truck. • Gelled AFFF cleaned out of tank northwest of the building in 1999. Low mass of AFFF potentially released during tank clean out. • No documented AFFF use or release after 1999.	Close out with no additional investigation.
Fire Station, Building 62	4	• Operational Period: 2011 to present • AFFF never stored or used at this fire station.	Close out with no additional investigation.
Plating Waste Drainage Ditch (SWMU 28)	4	• Operational Period: 1940s to 1973 • No known releases. • No records found of PFAS used as a vapor suppressant. • Groundwater sampling did not detect 18 PFAS analytes. LOQs for non-detected PFOS and PFOA were less than current health advisory level.	Close out with no additional investigation.

Table 5.1 (Continued)
Preliminary Assessment Report Summary and Findings

Location	Group	Rationale	Recommendations
Landfill (SWMU 14)	2	• Operational Period: 1941 to 1992 • Fire training activities reportedly occurred. • Unknown quantity of AFFF released. • Groundwater sampling detected PFOSA and PFPeA at approximately 20 ppt. LOQs for non-detected PFOS and PFOA were less than current health advisory level.	Close out with no additional investigation.

6.0 REFERENCES

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APPENDIX A

PHOTO DOCUMENTATION

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Photograph 1 **Location**: PCD **Date**: 11/29/2018 Building 3, Facing East	
Photograph 2 **Location**: PCD **Date**: 11/29/2018 Building 3, Facing North	

Photograph 3 **Location**: PCD **Date**: 11/29/2018 Building 3, Facing Northwest	
Photograph 4 **Location**: PCD **Date**: 11/29/2018 Building 3, Facing Southeast	

Photograph 5 **Location**: PCD **Date**: 11/29/2018 Building 3, Facing Southeast	
Photograph 6 **Location**: PCD **Date**: 11/29/2018 Building 3, Facing South	

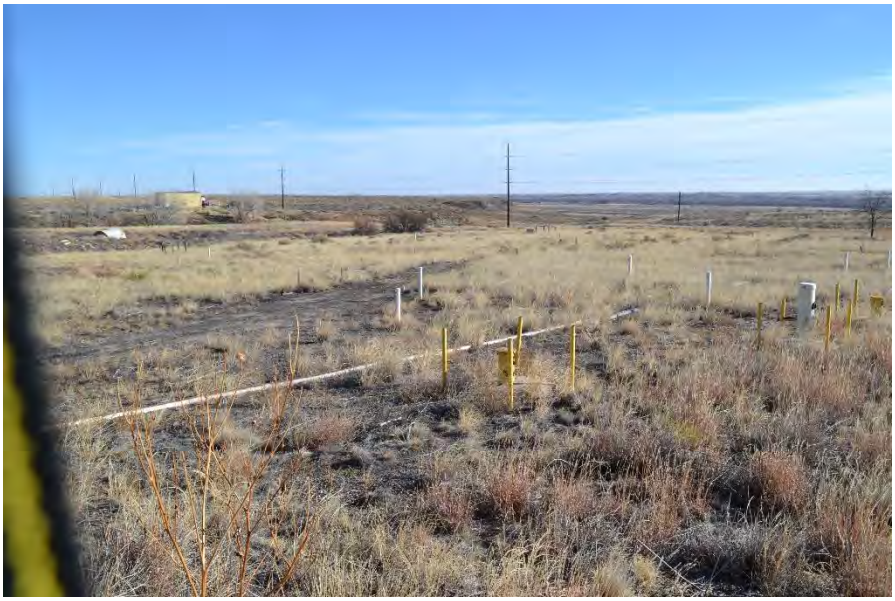
Photograph 7 **Location**: PCD **Date**: 11/29/2018 Building 3, Facing South	
Photograph 8 **Location**: PCD **Date**: 11/29/2018 Building 3, Facing Southwest	

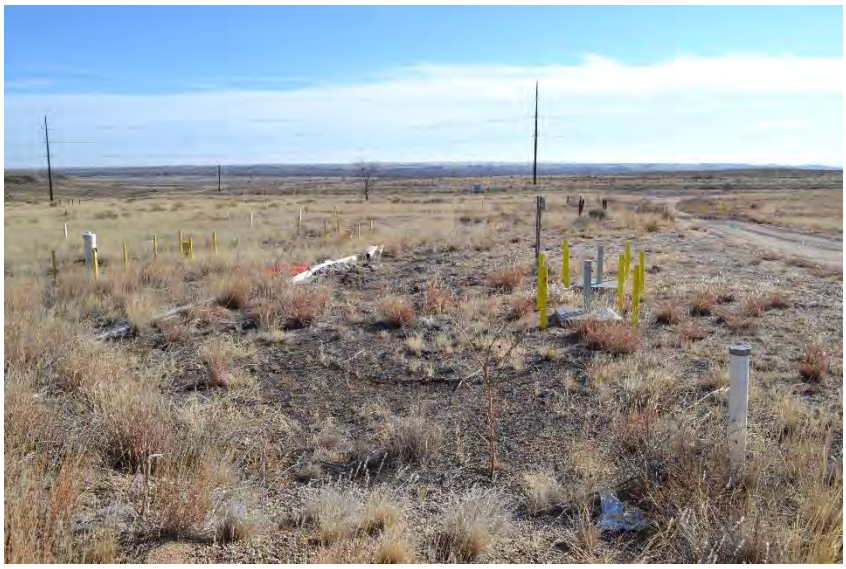
Photograph 9 **Location**: PCD **Date**: 11/29/2018 Building 3, Facing West	
Photograph 10 **Location**: PCD **Date**: 11/29/2018 Building 61, Fire Station Bays, Facing East	

Photograph 11 **Location**: PCD **Date**: 11/29/2018 Building 61, Facing East	
Photograph 12 **Location**: PCD **Date**: 11/29/2018 SWMU 14 (Landfill), Wells	

Photograph 13 **Location**: PCD **Date**: 11/29/2018 SWMU 14 (Landfill), Wells	
Photograph 14 **Location**: PCD **Date**: 11/29/2018 SWMU 14 (Landfill), Facing Northwest	

Photograph 15 **Location**: PCD **Date**: 11/29/2018 SWMU 14 (Landfill), Facing Southwest	
Photograph 16 **Location**: PCD **Date**: 11/29/2018 SWMU 14 (Landfill), Wells, Facing North	

Photograph 17 **Location**: PCD **Date**: 11/29/2018 SWMU 14 (Landfill), Wells, Facing North	
Photograph 18 **Location**: PCD **Date**: 11/29/2018 SWMU 14 (Landfill), Wells, Facing Southeast	

Photograph 19 **Location**: PCD **Date**: 11/29/2018 SWMU 14 (Landfill), Wells, Facing South	
Photograph 20 **Location**: PCD **Date**: 11/29/2018 SWMU 28 (Plating Waste Drainage Ditch and Former Building 539), Building North of Ditch	

Photograph 21 **Location**: PCD **Date**: 11/29/2018 SWMU 28 (Plating Waste Drainage Ditch and Former Building 539), Drainage Ditch, Facing East	
Photograph 22 **Location**: PCD **Date**: 11/29/2018 SWMU 28 (Plating Waste Drainage Ditch and Former Building 539), Drainage Ditch, Facing East	

Photograph 23 **Location**: PCD **Date**: 11/29/2018 SWMU 28 (Plating Waste Drainage Ditch and Former Building 539), West End, Facing East	
Photograph 24 **Location**: PCD **Date**: 11/29/2018 SWMU 28 (Plating Waste Drainage Ditch and Former Building 539), Facing West	

Photograph 25 **Location**: PCD **Date**: 11/29/2018 SWMU 28 (Plating Waste Drainage Ditch and Former Building 539), Facing East	
Photograph 26 **Location**: PCD **Date**: 11/29/2018 SWMU 28 (Plating Waste Drainage Ditch and Former Building 539), Former Building, Facing West	

Photograph 27 **Location**: PCD **Date**: 11/29/2018 SWMU 28 (Plating Waste Drainage Ditch and Former Building 539), Wells, Facing Northwest	
Photograph 28 **Location**: PCD **Date**: 11/29/2018 SWMU 29 (Fire Protection Training Area), Facing North	

Photograph 29 **Location**: PCD **Date**: 11/29/2018 SWMU 29 (Fire Protection Training Area), Ditch, Facing North	
Photograph 30 **Location**: PCD **Date**: 11/29/2018 SWMU 29 (Fire Protection Training Area), Ditch South of Road	

Photograph 31 **Location**: PCD **Date**: 11/29/2018 SWMU 29 (Fire Protection Training Area), Ditch Facing Southeast	
Photograph 32 **Location**: PCD **Date**: 11/29/2018 SWMU 29 (Fire Protection Training Area), Facing North-Northeast	

Photograph 33 **Location**: PCD **Date**: 11/29/2018 SWMU 29 (Fire Protection Training Area), Facing North	
Photograph 34 **Location**: PCD **Date**: 11/29/2018 SWMU 29 (Fire Protection Training Area), Facing Southeast	

Photograph 35	
Location: PCD	
Date: 11/29/2018	
SWMU 29 (Fire Protection Training Area), Facing South	

APPENDIX B

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
Tel: (916)373-5600

TestAmerica Job ID: 320-23545-1
Client Project/Site: Pueblo Chemical Depot

For:
Tetrahedron Inc
1414 Key Highway
Suite B
Baltimore, Maryland 21230

Attn: Waqi Alam

Karen Dahl

Authorized for release by:
12/6/2016 11:53:37 AM

Karen Dahl, Senior Project Manager
(916)374-4384
karen.dahl@testamericainc.com

Table of Contents

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Job ID: 320-23545-1

Laboratory: TestAmerica Sacramento

Narrative

Comments
No additional comments.

Receipt
The samples were received on 11/15/2016 9:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.8° C.

LCMS
Method(s) 537: The internal standard (ISTD) responses were outside control limits for the following samples: WELL 12 (320-23545-1), WELL 14 (320-23545-5) and FIELD REAGENT BLANK 3 (320-23545-6). The samples were re-analyzed with concurring results. The original results have been reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Organic Prep
Method(s) 537: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with batch 320-139313.

Method(s) 537: The following samples had a pH of 9: WELL 12 (320-23545-1), FIELD REAGENT BLANK 1 (320-23545-2), WELL 13 (320-23545-3), FIELD REAGENT BLANK 2 (320-23545-4), WELL 14 (320-23545-5), FIELD REAGENT BLANK 3 (320-23545-6), WELL 15 (320-23545-7), FIELD REAGENT BLANK 4 (320-23545-8), WELL 16 (320-23545-9), FIELD REAGENT BLANK 5 (320-23545-10), WELL 17 (320-23545-11), FIELD REAGENT BLANK 6 (320-23545-12), EPO 21 (320-23545-13), FIELD REAGENT BLANK 7 (320-23545-14), EPO 23 (320-23545-15), & FIELD REAGENT BLANK 8 (320-23545-16).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: Tetrahedron Inc
Project/Site: Pueblo Chemical Depot

TestAmerica Job ID: 320-23545-1

Client Sample ID: WELL 12 — **Lab Sample ID: 320-23545-1**

No Detections.

Client Sample ID: FIELD REAGENT BLANK 1 — **Lab Sample ID: 320-23545-2**

No Detections.

Client Sample ID: WELL 13 — **Lab Sample ID: 320-23545-3**

No Detections.

Client Sample ID: FIELD REAGENT BLANK 2 — **Lab Sample ID: 320-23545-4**

No Detections.

Client Sample ID: WELL 14 — **Lab Sample ID: 320-23545-5**

No Detections.

Client Sample ID: FIELD REAGENT BLANK 3 — **Lab Sample ID: 320-23545-6**

No Detections.

Client Sample ID: WELL 15 — **Lab Sample ID: 320-23545-7**

No Detections.

Client Sample ID: FIELD REAGENT BLANK 4 — **Lab Sample ID: 320-23545-8**

No Detections.

Client Sample ID: WELL 16 — **Lab Sample ID: 320-23545-9**

No Detections.

Client Sample ID: FIELD REAGENT BLANK 5 — **Lab Sample ID: 320-23545-10**

No Detections.

Client Sample ID: WELL 17 — **Lab Sample ID: 320-23545-11**

No Detections.

Client Sample ID: FIELD REAGENT BLANK 6 — **Lab Sample ID: 320-23545-12**

No Detections.

Client Sample ID: EPO 21 — **Lab Sample ID: 320-23545-13**

No Detections.

Client Sample ID: FIELD REAGENT BLANK 7 — **Lab Sample ID: 320-23545-14**

No Detections.

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Tetrahedron Inc
Project/Site: Pueblo Chemical Depot

TestAmerica Job ID: 320-23545-1

Client Sample ID: EPO 23 — **Lab Sample ID: 320-23545-15**

No Detections.

Client Sample ID: FIELD REAGENT BLANK 8 — **Lab Sample ID: 320-23545-16**

No Detections.

This Detection Summary does not include radiochemical test results.

Client Sample ID: WELL 12

Lab Sample ID: 320-23545-1
Matrix: Water
Date Collected: 11/14/16 09:10
Date Received: 11/15/16 09:30

Method: 537 DW - Perfluorinated Alkyl Acids (LC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid	ND		0.079	0.042	ug/L		11/23/16 11:24	12/01/16 18:50	1
Perfluoroheptanoic acid	ND		0.0088	0.0040	ug/L		11/23/16 11:24	12/01/16 18:50	1
Perfluorohexanesulfonic acid	ND		0.026	0.010	ug/L		11/23/16 11:24	12/01/16 18:50	1
Perfluorononanoic acid	ND		0.018	0.0099	ug/L		11/23/16 11:24	12/01/16 18:50	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.035	0.014	ug/L		11/23/16 11:24	12/01/16 18:50	1
Perfluorooctanoic acid (PFOA)	ND		0.018	0.0083	ug/L		11/23/16 11:24	12/01/16 18:50	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*100*		*70 - 130*	*11/23/16 11:24*	*12/01/16 18:50*	*1*
13C2 PFHxA	*110*		*70 - 130*	*11/23/16 11:24*	*12/01/16 18:50*	*1*

Client Sample ID: FIELD REAGENT BLANK 1

Lab Sample ID: 320-23545-2
Matrix: Water
Date Collected: 11/14/16 09:10
Date Received: 11/15/16 09:30

Method: 537 DW - Perfluorinated Alkyl Acids (LC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid	ND		0.081	0.043	ug/L		11/23/16 11:24	12/03/16 07:09	1
Perfluoroheptanoic acid	ND		0.0089	0.0041	ug/L		11/23/16 11:24	12/03/16 07:09	1
Perfluorohexanesulfonic acid	ND		0.027	0.011	ug/L		11/23/16 11:24	12/03/16 07:09	1
Perfluorononanoic acid	ND		0.018	0.010	ug/L		11/23/16 11:24	12/03/16 07:09	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.036	0.014	ug/L		11/23/16 11:24	12/03/16 07:09	1
Perfluorooctanoic acid (PFOA)	ND		0.018	0.0084	ug/L		11/23/16 11:24	12/03/16 07:09	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*95*		*70 - 130*	*11/23/16 11:24*	*12/03/16 07:09*	*1*
13C2 PFHxA	*114*		*70 - 130*	*11/23/16 11:24*	*12/03/16 07:09*	*1*

Client Sample ID: WELL 13

Lab Sample ID: 320-23545-3
Matrix: Water
Date Collected: 11/14/16 08:57
Date Received: 11/15/16 09:30

Method: 537 DW - Perfluorinated Alkyl Acids (LC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid	ND		0.079	0.042	ug/L		11/23/16 11:24	12/01/16 19:49	1
Perfluoroheptanoic acid	ND		0.0088	0.0041	ug/L		11/23/16 11:24	12/01/16 19:49	1
Perfluorohexanesulfonic acid	ND		0.026	0.010	ug/L		11/23/16 11:24	12/01/16 19:49	1
Perfluorononanoic acid	ND		0.018	0.010	ug/L		11/23/16 11:24	12/01/16 19:49	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.035	0.014	ug/L		11/23/16 11:24	12/01/16 19:49	1
Perfluorooctanoic acid (PFOA)	ND		0.018	0.0083	ug/L		11/23/16 11:24	12/01/16 19:49	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*97*		*70 - 130*	*11/23/16 11:24*	*12/01/16 19:49*	*1*
13C2 PFHxA	*105*		*70 - 130*	*11/23/16 11:24*	*12/01/16 19:49*	*1*

Client Sample ID: FIELD REAGENT BLANK 2

Lab Sample ID: 320-23545-4

Date Collected: 11/14/16 08:57
Matrix: Water
Date Received: 11/15/16 09:30

Method: 537 DW - Perfluorinated Alkyl Acids (LC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid	ND		0.080	0.042	ug/L		11/23/16 11:24	12/01/16 20:18	1
Perfluoroheptanoic acid	ND		0.0088	0.0041	ug/L		11/23/16 11:24	12/01/16 20:18	1
Perfluorohexanesulfonic acid	ND		0.027	0.010	ug/L		11/23/16 11:24	12/01/16 20:18	1
Perfluorononanoic acid	ND		0.018	0.010	ug/L		11/23/16 11:24	12/01/16 20:18	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.035	0.014	ug/L		11/23/16 11:24	12/01/16 20:18	1
Perfluorooctanoic acid (PFOA)	ND		0.018	0.0083	ug/L		11/23/16 11:24	12/01/16 20:18	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*98*		*70 - 130*	*11/23/16 11:24*	*12/01/16 20:18*	*1*
13C2 PFHxA	*107*		*70 - 130*	*11/23/16 11:24*	*12/01/16 20:18*	*1*

Client Sample ID: WELL 14

Lab Sample ID: 320-23545-5

Date Collected: 11/14/16 10:03
Matrix: Water
Date Received: 11/15/16 09:30

Method: 537 DW - Perfluorinated Alkyl Acids (LC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid	ND		0.081	0.043	ug/L		11/23/16 11:24	12/01/16 20:48	1
Perfluoroheptanoic acid	ND		0.0090	0.0041	ug/L		11/23/16 11:24	12/01/16 20:48	1
Perfluorohexanesulfonic acid	ND		0.027	0.011	ug/L		11/23/16 11:24	12/01/16 20:48	1
Perfluorononanoic acid	ND		0.018	0.010	ug/L		11/23/16 11:24	12/01/16 20:48	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.036	0.014	ug/L		11/23/16 11:24	12/01/16 20:48	1
Perfluorooctanoic acid (PFOA)	ND		0.018	0.0084	ug/L		11/23/16 11:24	12/01/16 20:48	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*102*		*70 - 130*	*11/23/16 11:24*	*12/01/16 20:48*	*1*
13C2 PFHxA	*109*		*70 - 130*	*11/23/16 11:24*	*12/01/16 20:48*	*1*

Client Sample ID: FIELD REAGENT BLANK 3

Lab Sample ID: 320-23545-6

Date Collected: 11/14/16 10:03
Matrix: Water
Date Received: 11/15/16 09:30

Method: 537 DW - Perfluorinated Alkyl Acids (LC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid	ND		0.080	0.042	ug/L		11/23/16 11:24	12/01/16 21:18	1
Perfluoroheptanoic acid	ND		0.0089	0.0041	ug/L		11/23/16 11:24	12/01/16 21:18	1
Perfluorohexanesulfonic acid	ND		0.027	0.011	ug/L		11/23/16 11:24	12/01/16 21:18	1
Perfluorononanoic acid	ND		0.018	0.010	ug/L		11/23/16 11:24	12/01/16 21:18	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.036	0.014	ug/L		11/23/16 11:24	12/01/16 21:18	1
Perfluorooctanoic acid (PFOA)	ND		0.018	0.0084	ug/L		11/23/16 11:24	12/01/16 21:18	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*92*		*70 - 130*	*11/23/16 11:24*	*12/01/16 21:18*	*1*
13C2 PFHxA	*93*		*70 - 130*	*11/23/16 11:24*	*12/01/16 21:18*	*1*

Client: Tetrahedron Inc
Project/Site: Pueblo Chemical Depot

TestAmerica Job ID: 320-23545-1

Client Sample ID: WELL 15

Lab Sample ID: 320-23545-7
Matrix: Water
Date Collected: 11/14/16 10:17
Date Received: 11/15/16 09:30

Method: 537 DW - Perfluorinated Alkyl Acids (LC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid	ND		0.080	0.042	ug/L		11/23/16 11:24	12/01/16 21:47	1
Perfluoroheptanoic acid	ND		0.0089	0.0041	ug/L		11/23/16 11:24	12/01/16 21:47	1
Perfluorohexanesulfonic acid	ND		0.027	0.011	ug/L		11/23/16 11:24	12/01/16 21:47	1
Perfluorononanoic acid	ND		0.018	0.010	ug/L		11/23/16 11:24	12/01/16 21:47	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.036	0.014	ug/L		11/23/16 11:24	12/01/16 21:47	1
Perfluorooctanoic acid (PFOA)	ND		0.018	0.0084	ug/L		11/23/16 11:24	12/01/16 21:47	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*99*		*70 - 130*	*11/23/16 11:24*	*12/01/16 21:47*	*1*
13C2 PFHxA	*105*		*70 - 130*	*11/23/16 11:24*	*12/01/16 21:47*	*1*

Client Sample ID: FIELD REAGENT BLANK 4

Lab Sample ID: 320-23545-8
Matrix: Water
Date Collected: 11/14/16 10:17
Date Received: 11/15/16 09:30

Method: 537 DW - Perfluorinated Alkyl Acids (LC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid	ND		0.079	0.042	ug/L		11/23/16 11:24	12/01/16 23:46	1
Perfluoroheptanoic acid	ND		0.0088	0.0040	ug/L		11/23/16 11:24	12/01/16 23:46	1
Perfluorohexanesulfonic acid	ND		0.026	0.010	ug/L		11/23/16 11:24	12/01/16 23:46	1
Perfluorononanoic acid	ND		0.018	0.0099	ug/L		11/23/16 11:24	12/01/16 23:46	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.035	0.014	ug/L		11/23/16 11:24	12/01/16 23:46	1
Perfluorooctanoic acid (PFOA)	ND		0.018	0.0083	ug/L		11/23/16 11:24	12/01/16 23:46	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*97*		*70 - 130*	*11/23/16 11:24*	*12/01/16 23:46*	*1*
13C2 PFHxA	*106*		*70 - 130*	*11/23/16 11:24*	*12/01/16 23:46*	*1*

Client Sample ID: WELL 16

Lab Sample ID: 320-23545-9
Matrix: Water
Date Collected: 11/14/16 09:50
Date Received: 11/15/16 09:30

Method: 537 DW - Perfluorinated Alkyl Acids (LC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid	ND		0.083	0.044	ug/L		11/23/16 11:24	12/02/16 00:15	1
Perfluoroheptanoic acid	ND		0.0092	0.0042	ug/L		11/23/16 11:24	12/02/16 00:15	1
Perfluorohexanesulfonic acid	ND		0.028	0.011	ug/L		11/23/16 11:24	12/02/16 00:15	1
Perfluorononanoic acid	ND		0.018	0.010	ug/L		11/23/16 11:24	12/02/16 00:15	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.037	0.014	ug/L		11/23/16 11:24	12/02/16 00:15	1
Perfluorooctanoic acid (PFOA)	ND		0.018	0.0087	ug/L		11/23/16 11:24	12/02/16 00:15	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*97*		*70 - 130*	*11/23/16 11:24*	*12/02/16 00:15*	*1*
13C2 PFHxA	*105*		*70 - 130*	*11/23/16 11:24*	*12/02/16 00:15*	*1*

Client Sample ID: FIELD REAGENT BLANK 5

Lab Sample ID: 320-23545-10

Date Collected: 11/14/16 09:50
Matrix: Water
Date Received: 11/15/16 09:30

Method: 537 DW - Perfluorinated Alkyl Acids (LC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid	ND		0.081	0.043	ug/L		11/23/16 11:24	12/02/16 00:45	1
Perfluoroheptanoic acid	ND		0.0090	0.0042	ug/L		11/23/16 11:24	12/02/16 00:45	1
Perfluorohexanesulfonic acid	ND		0.027	0.011	ug/L		11/23/16 11:24	12/02/16 00:45	1
Perfluorononanoic acid	ND		0.018	0.010	ug/L		11/23/16 11:24	12/02/16 00:45	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.036	0.014	ug/L		11/23/16 11:24	12/02/16 00:45	1
Perfluorooctanoic acid (PFOA)	ND		0.018	0.0085	ug/L		11/23/16 11:24	12/02/16 00:45	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*97*		*70 - 130*	*11/23/16 11:24*	*12/02/16 00:45*	*1*
13C2 PFHxA	*109*		*70 - 130*	*11/23/16 11:24*	*12/02/16 00:45*	*1*

Client Sample ID: WELL 17

Lab Sample ID: 320-23545-11

Date Collected: 11/14/16 10:33
Matrix: Water
Date Received: 11/15/16 09:30

Method: 537 DW - Perfluorinated Alkyl Acids (LC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid	ND		0.081	0.043	ug/L		11/23/16 11:24	12/02/16 01:14	1
Perfluoroheptanoic acid	ND		0.0090	0.0042	ug/L		11/23/16 11:24	12/02/16 01:14	1
Perfluorohexanesulfonic acid	ND		0.027	0.011	ug/L		11/23/16 11:24	12/02/16 01:14	1
Perfluorononanoic acid	ND		0.018	0.010	ug/L		11/23/16 11:24	12/02/16 01:14	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.036	0.014	ug/L		11/23/16 11:24	12/02/16 01:14	1
Perfluorooctanoic acid (PFOA)	ND		0.018	0.0085	ug/L		11/23/16 11:24	12/02/16 01:14	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*96*		*70 - 130*	*11/23/16 11:24*	*12/02/16 01:14*	*1*
13C2 PFHxA	*108*		*70 - 130*	*11/23/16 11:24*	*12/02/16 01:14*	*1*

Client Sample ID: FIELD REAGENT BLANK 6

Lab Sample ID: 320-23545-12

Date Collected: 11/14/16 10:33
Matrix: Water
Date Received: 11/15/16 09:30

Method: 537 DW - Perfluorinated Alkyl Acids (LC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid	ND		0.079	0.042	ug/L		11/23/16 11:24	12/02/16 01:44	1
Perfluoroheptanoic acid	ND		0.0088	0.0040	ug/L		11/23/16 11:24	12/02/16 01:44	1
Perfluorohexanesulfonic acid	ND		0.026	0.010	ug/L		11/23/16 11:24	12/02/16 01:44	1
Perfluorononanoic acid	ND		0.018	0.0099	ug/L		11/23/16 11:24	12/02/16 01:44	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.035	0.014	ug/L		11/23/16 11:24	12/02/16 01:44	1
Perfluorooctanoic acid (PFOA)	ND		0.018	0.0083	ug/L		11/23/16 11:24	12/02/16 01:44	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*99*		*70 - 130*	*11/23/16 11:24*	*12/02/16 01:44*	*1*
13C2 PFHxA	*110*		*70 - 130*	*11/23/16 11:24*	*12/02/16 01:44*	*1*

Client Sample ID: EPO 21

Lab Sample ID: 320-23545-13

Date Collected: 11/14/16 12:33

Matrix: Water

Date Received: 11/15/16 09:30

Method: 537 DW - Perfluorinated Alkyl Acids (LC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid	ND		0.081	0.043	ug/L		11/23/16 11:24	12/02/16 02:14	1
Perfluoroheptanoic acid	ND		0.0090	0.0041	ug/L		11/23/16 11:24	12/02/16 02:14	1
Perfluorohexanesulfonic acid	ND		0.027	0.011	ug/L		11/23/16 11:24	12/02/16 02:14	1
Perfluorononanoic acid	ND		0.018	0.010	ug/L		11/23/16 11:24	12/02/16 02:14	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.036	0.014	ug/L		11/23/16 11:24	12/02/16 02:14	1
Perfluorooctanoic acid (PFOA)	ND		0.018	0.0085	ug/L		11/23/16 11:24	12/02/16 02:14	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*100*		*70 - 130*	*11/23/16 11:24*	*12/02/16 02:14*	*1*
13C2 PFHxA	*109*		*70 - 130*	*11/23/16 11:24*	*12/02/16 02:14*	*1*

Client Sample ID: FIELD REAGENT BLANK 7

Lab Sample ID: 320-23545-14

Date Collected: 11/14/16 12:33

Matrix: Water

Date Received: 11/15/16 09:30

Method: 537 DW - Perfluorinated Alkyl Acids (LC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid	ND		0.079	0.042	ug/L		11/23/16 11:24	12/02/16 02:43	1
Perfluoroheptanoic acid	ND		0.0088	0.0040	ug/L		11/23/16 11:24	12/02/16 02:43	1
Perfluorohexanesulfonic acid	ND		0.026	0.010	ug/L		11/23/16 11:24	12/02/16 02:43	1
Perfluorononanoic acid	ND		0.018	0.0099	ug/L		11/23/16 11:24	12/02/16 02:43	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.035	0.014	ug/L		11/23/16 11:24	12/02/16 02:43	1
Perfluorooctanoic acid (PFOA)	ND		0.018	0.0083	ug/L		11/23/16 11:24	12/02/16 02:43	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*97*		*70 - 130*	*11/23/16 11:24*	*12/02/16 02:43*	*1*
13C2 PFHxA	*106*		*70 - 130*	*11/23/16 11:24*	*12/02/16 02:43*	*1*

Client Sample ID: EPO 23

Lab Sample ID: 320-23545-15

Date Collected: 11/14/16 08:35

Matrix: Water

Date Received: 11/15/16 09:30

Method: 537 DW - Perfluorinated Alkyl Acids (LC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid	ND		0.078	0.041	ug/L		11/23/16 11:24	12/02/16 03:13	1
Perfluoroheptanoic acid	ND		0.0087	0.0040	ug/L		11/23/16 11:24	12/02/16 03:13	1
Perfluorohexanesulfonic acid	ND		0.026	0.010	ug/L		11/23/16 11:24	12/02/16 03:13	1
Perfluorononanoic acid	ND		0.017	0.0098	ug/L		11/23/16 11:24	12/02/16 03:13	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.035	0.013	ug/L		11/23/16 11:24	12/02/16 03:13	1
Perfluorooctanoic acid (PFOA)	ND		0.017	0.0082	ug/L		11/23/16 11:24	12/02/16 03:13	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*99*		*70 - 130*	*11/23/16 11:24*	*12/02/16 03:13*	*1*
13C2 PFHxA	*108*		*70 - 130*	*11/23/16 11:24*	*12/02/16 03:13*	*1*

Client: Tetrahedron Inc
Project/Site: Pueblo Chemical Depot

TestAmerica Job ID: 320-23545-1

Client Sample ID: FIELD REAGENT BLANK 8
Date Collected: 11/14/16 08:35
Date Received: 11/15/16 09:30

Lab Sample ID: 320-23545-16
Matrix: Water

Method: 537 DW - Perfluorinated Alkyl Acids (LC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid	ND		0.083	0.044	ug/L		11/23/16 12:24	12/02/16 03:42	1
Perfluoroheptanoic acid	ND		0.0092	0.0042	ug/L		11/23/16 12:24	12/02/16 03:42	1
Perfluorohexanesulfonic acid	ND		0.028	0.011	ug/L		11/23/16 12:24	12/02/16 03:42	1
Perfluorononanoic acid	ND		0.018	0.010	ug/L		11/23/16 12:24	12/02/16 03:42	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.037	0.014	ug/L		11/23/16 12:24	12/02/16 03:42	1
Perfluorooctanoic acid (PFOA)	ND		0.018	0.0087	ug/L		11/23/16 12:24	12/02/16 03:42	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*99*		*70 - 130*	*11/23/16 12:24*	*12/02/16 03:42*	*1*
13C2 PFHxA	*110*		*70 - 130*	*11/23/16 12:24*	*12/02/16 03:42*	*1*

Surrogate Summary

Client: Tetrahedron Inc
Project/Site: Pueblo Chemical Depot

TestAmerica Job ID: 320-23545-1

Method: 537 DW - Perfluorinated Alkyl Acids (LC/MS)

Matrix: Water | **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)	
Lab Sample ID	Client Sample ID	3C2 PFDA (70-130)	3C2 PFHx (70-130)
320-23545-1	WELL 12	100	110
320-23545-2	FIELD REAGENT BLANK 1	95	114
320-23545-3	WELL 13	97	105
320-23545-4	FIELD REAGENT BLANK 2	98	107
320-23545-5	WELL 14	102	109
320-23545-6	FIELD REAGENT BLANK 3	92	93
320-23545-7	WELL 15	99	105
320-23545-8	FIELD REAGENT BLANK 4	97	106
320-23545-9	WELL 16	97	105
320-23545-10	FIELD REAGENT BLANK 5	97	109
320-23545-11	WELL 17	96	108
320-23545-12	FIELD REAGENT BLANK 6	99	110
320-23545-13	EPO 21	100	109
320-23545-14	FIELD REAGENT BLANK 7	97	106
320-23545-15	EPO 23	99	108
320-23545-16	FIELD REAGENT BLANK 8	99	110
LCS 320-139313/2-A	Lab Control Sample	102	110
LCSD 320-139313/3-A	Lab Control Sample Dup	107	117
MB 320-139313/1-A	Method Blank	106	113

Surrogate Legend

13C2 PFDA = 13C2 PFDA
13C2 PFHxA = 13C2 PFHxA

Method: 537 DW - Perfluorinated Alkyl Acids (LC/MS)

Lab Sample ID: MB 320-139313/1-A
Matrix: Water
Analysis Batch: 140245

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 139313

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid	ND		0.090	0.048	ug/L		11/23/16 11:24	12/01/16 17:21	1
Perfluoroheptanoic acid	ND		0.010	0.0046	ug/L		11/23/16 11:24	12/01/16 17:21	1
Perfluorohexanesulfonic acid	ND		0.030	0.012	ug/L		11/23/16 11:24	12/01/16 17:21	1
Perfluorononanoic acid	ND		0.020	0.011	ug/L		11/23/16 11:24	12/01/16 17:21	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.040	0.016	ug/L		11/23/16 11:24	12/01/16 17:21	1
Perfluorooctanoic acid (PFOA)	ND		0.020	0.0094	ug/L		11/23/16 11:24	12/01/16 17:21	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*106*		*70 - 130*	*11/23/16 11:24*	*12/01/16 17:21*	*1*
13C2 PFHxA	*113*		*70 - 130*	*11/23/16 11:24*	*12/01/16 17:21*	*1*

Lab Sample ID: LCS 320-139313/2-A
Matrix: Water
Analysis Batch: 140245

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 139313

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorobutanesulfonic acid	0.359	0.321		ug/L		89	70 - 130
Perfluoroheptanoic acid	0.0407	0.0401		ug/L		99	70 - 130
Perfluorohexanesulfonic acid	0.121	0.111		ug/L		91	70 - 130
Perfluorononanoic acid	0.0786	0.0814		ug/L		104	70 - 130
Perfluorooctanesulfonic acid (PFOS)	0.160	0.151		ug/L		94	70 - 130
Perfluorooctanoic acid (PFOA)	0.0811	0.0727		ug/L		90	70 - 130

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFDA	*102*		*70 - 130*
13C2 PFHxA	*110*		*70 - 130*

Lab Sample ID: LCSD 320-139313/3-A
Matrix: Water
Analysis Batch: 140245

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 139313

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid	0.359	0.328		ug/L		91	70 - 130	2	30
Perfluoroheptanoic acid	0.0407	0.0407		ug/L		100	70 - 130	1	30
Perfluorohexanesulfonic acid	0.121	0.111		ug/L		92	70 - 130	0	30
Perfluorononanoic acid	0.0786	0.0826		ug/L		105	70 - 130	1	30
Perfluorooctanesulfonic acid (PFOS)	0.160	0.153		ug/L		96	70 - 130	1	30
Perfluorooctanoic acid (PFOA)	0.0811	0.0746		ug/L		92	70 - 130	3	30

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFDA	*107*		*70 - 130*
13C2 PFHxA	*117*		*70 - 130*

LCMS

Prep Batch: 139313

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-23545-1	WELL 12	Total/NA	Water	537 DW	
320-23545-2	FIELD REAGENT BLANK 1	Total/NA	Water	537 DW	
320-23545-3	WELL 13	Total/NA	Water	537 DW	
320-23545-4	FIELD REAGENT BLANK 2	Total/NA	Water	537 DW	
320-23545-5	WELL 14	Total/NA	Water	537 DW	
320-23545-6	FIELD REAGENT BLANK 3	Total/NA	Water	537 DW	
320-23545-7	WELL 15	Total/NA	Water	537 DW	
320-23545-8	FIELD REAGENT BLANK 4	Total/NA	Water	537 DW	
320-23545-9	WELL 16	Total/NA	Water	537 DW	
320-23545-10	FIELD REAGENT BLANK 5	Total/NA	Water	537 DW	
320-23545-11	WELL 17	Total/NA	Water	537 DW	
320-23545-12	FIELD REAGENT BLANK 6	Total/NA	Water	537 DW	
320-23545-13	EPO 21	Total/NA	Water	537 DW	
320-23545-14	FIELD REAGENT BLANK 7	Total/NA	Water	537 DW	
320-23545-15	EPO 23	Total/NA	Water	537 DW	
320-23545-16	FIELD REAGENT BLANK 8	Total/NA	Water	537 DW	
MB 320-139313/1-A	Method Blank	Total/NA	Water	537 DW	
LCS 320-139313/2-A	Lab Control Sample	Total/NA	Water	537 DW	
LCSD 320-139313/3-A	Lab Control Sample Dup	Total/NA	Water	537 DW	

Analysis Batch: 140245

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-23545-1	WELL 12	Total/NA	Water	537 DW	139313
320-23545-3	WELL 13	Total/NA	Water	537 DW	139313
320-23545-4	FIELD REAGENT BLANK 2	Total/NA	Water	537 DW	139313
320-23545-5	WELL 14	Total/NA	Water	537 DW	139313
320-23545-6	FIELD REAGENT BLANK 3	Total/NA	Water	537 DW	139313
320-23545-7	WELL 15	Total/NA	Water	537 DW	139313
MB 320-139313/1-A	Method Blank	Total/NA	Water	537 DW	139313
LCS 320-139313/2-A	Lab Control Sample	Total/NA	Water	537 DW	139313
LCSD 320-139313/3-A	Lab Control Sample Dup	Total/NA	Water	537 DW	139313

Analysis Batch: 140247

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-23545-8	FIELD REAGENT BLANK 4	Total/NA	Water	537 DW	139313
320-23545-9	WELL 16	Total/NA	Water	537 DW	139313
320-23545-10	FIELD REAGENT BLANK 5	Total/NA	Water	537 DW	139313
320-23545-11	WELL 17	Total/NA	Water	537 DW	139313
320-23545-12	FIELD REAGENT BLANK 6	Total/NA	Water	537 DW	139313
320-23545-13	EPO 21	Total/NA	Water	537 DW	139313
320-23545-14	FIELD REAGENT BLANK 7	Total/NA	Water	537 DW	139313
320-23545-15	EPO 23	Total/NA	Water	537 DW	139313
320-23545-16	FIELD REAGENT BLANK 8	Total/NA	Water	537 DW	139313

Analysis Batch: 140418

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-23545-2	FIELD REAGENT BLANK 1	Total/NA	Water	537 DW	139313

Lab Chronicle

Client: Tetrahedron Inc
Project/Site: Pueblo Chemical Depot

TestAmerica Job ID: 320-23545-1

Client Sample ID: WELL 12

Lab Sample ID: 320-23545-1
Matrix: Water
Date Collected: 11/14/16 09:10
Date Received: 11/15/16 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537 DW			284 mL	1.00 mL	139313	11/23/16 11:24	JER	TAL SAC
Total/NA	Analysis	537 DW		1			140245	12/01/16 18:50	JRB	TAL SAC

Client Sample ID: FIELD REAGENT BLANK 1

Lab Sample ID: 320-23545-2
Matrix: Water
Date Collected: 11/14/16 09:10
Date Received: 11/15/16 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537 DW			279.4 mL	1.00 mL	139313	11/23/16 11:24	JER	TAL SAC
Total/NA	Analysis	537 DW		1			140418	12/03/16 07:09	JRB	TAL SAC

Client Sample ID: WELL 13

Lab Sample ID: 320-23545-3
Matrix: Water
Date Collected: 11/14/16 08:57
Date Received: 11/15/16 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537 DW			283.5 mL	1.00 mL	139313	11/23/16 11:24	JER	TAL SAC
Total/NA	Analysis	537 DW		1			140245	12/01/16 19:49	JRB	TAL SAC

Client Sample ID: FIELD REAGENT BLANK 2

Lab Sample ID: 320-23545-4
Matrix: Water
Date Collected: 11/14/16 08:57
Date Received: 11/15/16 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537 DW			282.8 mL	1.00 mL	139313	11/23/16 11:24	JER	TAL SAC
Total/NA	Analysis	537 DW		1			140245	12/01/16 20:18	JRB	TAL SAC

Client Sample ID: WELL 14

Lab Sample ID: 320-23545-5
Matrix: Water
Date Collected: 11/14/16 10:03
Date Received: 11/15/16 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537 DW			279 mL	1.00 mL	139313	11/23/16 11:24	JER	TAL SAC
Total/NA	Analysis	537 DW		1			140245	12/01/16 20:48	JRB	TAL SAC

Client Sample ID: FIELD REAGENT BLANK 3

Lab Sample ID: 320-23545-6
Matrix: Water
Date Collected: 11/14/16 10:03
Date Received: 11/15/16 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537 DW			280.1 mL	1.00 mL	139313	11/23/16 11:24	JER	TAL SAC
Total/NA	Analysis	537 DW		1			140245	12/01/16 21:18	JRB	TAL SAC

Lab Chronicle

Client: Tetrahedron Inc
Project/Site: Pueblo Chemical Depot

TestAmerica Job ID: 320-23545-1

Client Sample ID: WELL 15

Lab Sample ID: 320-23545-7
Matrix: Water
Date Collected: 11/14/16 10:17
Date Received: 11/15/16 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537 DW			281.3 mL	1.00 mL	139313	11/23/16 11:24	JER	TAL SAC
Total/NA	Analysis	537 DW		1			140245	12/01/16 21:47	JRB	TAL SAC

Client Sample ID: FIELD REAGENT BLANK 4

Lab Sample ID: 320-23545-8
Matrix: Water
Date Collected: 11/14/16 10:17
Date Received: 11/15/16 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537 DW			285.3 mL	1.00 mL	139313	11/23/16 11:24	JER	TAL SAC
Total/NA	Analysis	537 DW		1			140247	12/01/16 23:46	JRB	TAL SAC

Client Sample ID: WELL 16

Lab Sample ID: 320-23545-9
Matrix: Water
Date Collected: 11/14/16 09:50
Date Received: 11/15/16 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537 DW			272 mL	1.00 mL	139313	11/23/16 11:24	JER	TAL SAC
Total/NA	Analysis	537 DW		1			140247	12/02/16 00:15	JRB	TAL SAC

Client Sample ID: FIELD REAGENT BLANK 5

Lab Sample ID: 320-23545-10
Matrix: Water
Date Collected: 11/14/16 09:50
Date Received: 11/15/16 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537 DW			276.3 mL	1.00 mL	139313	11/23/16 11:24	JER	TAL SAC
Total/NA	Analysis	537 DW		1			140247	12/02/16 00:45	JRB	TAL SAC

Client Sample ID: WELL 17

Lab Sample ID: 320-23545-11
Matrix: Water
Date Collected: 11/14/16 10:33
Date Received: 11/15/16 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537 DW			276.9 mL	1.00 mL	139313	11/23/16 11:24	JER	TAL SAC
Total/NA	Analysis	537 DW		1			140247	12/02/16 01:14	JRB	TAL SAC

Client Sample ID: FIELD REAGENT BLANK 6

Lab Sample ID: 320-23545-12
Matrix: Water
Date Collected: 11/14/16 10:33
Date Received: 11/15/16 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537 DW			285 mL	1.00 mL	139313	11/23/16 11:24	JER	TAL SAC
Total/NA	Analysis	537 DW		1			140247	12/02/16 01:44	JRB	TAL SAC

Lab Chronicle

Client: Tetrahedron Inc
Project/Site: Pueblo Chemical Depot

TestAmerica Job ID: 320-23545-1

Client Sample ID: EPO 21

Lab Sample ID: 320-23545-13
Matrix: Water
Date Collected: 11/14/16 12:33
Date Received: 11/15/16 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537 DW			277.9 mL	1.00 mL	139313	11/23/16 11:24	JER	TAL SAC
Total/NA	Analysis	537 DW		1			140247	12/02/16 02:14	JRB	TAL SAC

Client Sample ID: FIELD REAGENT BLANK 7

Lab Sample ID: 320-23545-14
Matrix: Water
Date Collected: 11/14/16 12:33
Date Received: 11/15/16 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537 DW			285.4 mL	1.00 mL	139313	11/23/16 11:24	JER	TAL SAC
Total/NA	Analysis	537 DW		1			140247	12/02/16 02:43	JRB	TAL SAC

Client Sample ID: EPO 23

Lab Sample ID: 320-23545-15
Matrix: Water
Date Collected: 11/14/16 08:35
Date Received: 11/15/16 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537 DW			287.1 mL	1.00 mL	139313	11/23/16 11:24	JER	TAL SAC
Total/NA	Analysis	537 DW		1			140247	12/02/16 03:13	JRB	TAL SAC

Client Sample ID: FIELD REAGENT BLANK 8

Lab Sample ID: 320-23545-16
Matrix: Water
Date Collected: 11/14/16 08:35
Date Received: 11/15/16 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537 DW			272 mL	1.00 mL	139313	11/23/16 12:24	JER	TAL SAC
Total/NA	Analysis	537 DW		1			140247	12/02/16 03:42	JRB	TAL SAC

Laboratory References:
TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Certification Summary

Client: Tetrahedron Inc
Project/Site: Pueblo Chemical Depot

TestAmerica Job ID: 320-23545-1

Laboratory: TestAmerica Sacramento

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	DoD ELAP		2928-01	01-31-17
Alaska (UST)	State Program	10	UST-055	12-18-16
Arizona	State Program	9	AZ0708	08-11-17
Arkansas DEQ	State Program	6	88-0691	06-17-17
California	State Program	9	2897	01-31-18
Colorado	State Program	8	CA00044	08-31-17
Connecticut	State Program	1	PH-0691	06-30-17
Florida	NELAP	4	E87570	06-30-17
Hawaii	State Program	9	N/A	01-31-17
Illinois	NELAP	5	200060	03-17-17
Kansas	NELAP	7	E-10375	10-31-17
Louisiana	NELAP	6	30612	06-30-17
Maine	State Program	1	CA0004	04-18-18
Michigan	State Program	5	9947	01-31-18
Nevada	State Program	9	CA00044	07-31-17
New Jersey	NELAP	2	CA005	06-30-17
New York	NELAP	2	11666	04-01-17
Oregon	NELAP	10	4040	01-29-17
Pennsylvania	NELAP	3	68-01272	03-31-17
Texas	NELAP	6	T104704399	07-31-17
US Fish & Wildlife	Federal		LE148388-0	10-31-17
USDA	Federal		P330-11-00436	12-30-17
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-17
Virginia	NELAP	3	460278	03-14-17
Washington	State Program	10	C581	05-05-17
West Virginia (DW)	State Program	3	9930C	12-31-16
Wyoming	State Program	8	8TMS-L	01-29-17

Method Summary

Client: Tetrahedron Inc
Project/Site: Pueblo Chemical Depot

TestAmerica Job ID: 320-23545-1

Method	Method Description	Protocol	Laboratory
537 DW	Perfluorinated Alkyl Acids (LC/MS)	EPA	TAL SAC

Protocol References:

EPA = US Environmental Protection Agency

Laboratory References:

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Sample Summary

Client: Tetrahedron Inc
Project/Site: Pueblo Chemical Depot

TestAmerica Job ID: 320-23545-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-23545-1	WELL 12	Water	11/14/16 09:10	11/15/16 09:30
320-23545-2	FIELD REAGENT BLANK 1	Water	11/14/16 09:10	11/15/16 09:30
320-23545-3	WELL 13	Water	11/14/16 08:57	11/15/16 09:30
320-23545-4	FIELD REAGENT BLANK 2	Water	11/14/16 08:57	11/15/16 09:30
320-23545-5	WELL 14	Water	11/14/16 10:03	11/15/16 09:30
320-23545-6	FIELD REAGENT BLANK 3	Water	11/14/16 10:03	11/15/16 09:30
320-23545-7	WELL 15	Water	11/14/16 10:17	11/15/16 09:30
320-23545-8	FIELD REAGENT BLANK 4	Water	11/14/16 10:17	11/15/16 09:30
320-23545-9	WELL 16	Water	11/14/16 09:50	11/15/16 09:30
320-23545-10	FIELD REAGENT BLANK 5	Water	11/14/16 09:50	11/15/16 09:30
320-23545-11	WELL 17	Water	11/14/16 10:33	11/15/16 09:30
320-23545-12	FIELD REAGENT BLANK 6	Water	11/14/16 10:33	11/15/16 09:30
320-23545-13	EPO 21	Water	11/14/16 12:33	11/15/16 09:30
320-23545-14	FIELD REAGENT BLANK 7	Water	11/14/16 12:33	11/15/16 09:30
320-23545-15	EPO 23	Water	11/14/16 08:35	11/15/16 09:30
320-23545-16	FIELD REAGENT BLANK 8	Water	11/14/16 08:35	11/15/16 09:30

TestAmerica Sacramento
880 Riverside Parkway

West Sacramento, CA 95605-1500
phone 916 373.5600 fax 303.467.7248

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Regulatory Program: ☑ DW ☐ NPDES ☐ RCRA ☐ Other:

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: Waqi Alam	Site Contact:	Date:	COC No:
Your Company Name here - Pueblo Chemical Depot	Tel/Fax: 410-837-0512	Lab Contact: Karen Dahl	Carrier: FedEx	of COCs
Address 45825 Highway 96 East	Analysis Turnaround Time			Sampler:
City/State/Zip - Pueblo/Colorado/81006-9330	☐ CALENDAR DAYS ☐ WORKING DAYS			For Lab Use Only:
(719) 549-4340 Phone	TAT if different from Below			Walk-in Client:
(719) 549-4340 FAX (719) 549-4423	☐ 2 weeks			Lab Sampling:
Project Name: PFC DW Quality Assessment at AMC Installations	☐ 1 week			
Site:	☐ 2 days			Job / SDG No.:
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	PFAS by Method 537 (UCMR List)	Sample Specific Notes:
Sample Location 1: Well 12	14/11/2016	0910	G	DW	2			X	
Field Reagent Blank 1:	14/11/2016	0910	G	DW	1			X	
Sample Location 2: Well 13	14/11/2016	0857	G	DW	2			X	
Field Reagent Blank 2	14/11/2016	0857	G	DW	1			X	
Sample Location 3: Well 14	14/11/2016	1003	G	DW	2			X	
Field Reagent Blank 3	14/11/2016	1003	G	DW	1			X	
Sample Location 4: Well 15	14/11/2016	1017	G	DW	2			X	
Field Reagent Blank 4	14/11/2016	1017	G	DW	1			X	
Sample Location 5: Well 16	14/11/2016	0950	G	DW	2			X	
Field Reagent Blank 5	14/11/2016	0950	G	DW	1			X	
Sample Location 6: Well 17	14/11/2016	1033	G	DW	2			X	
Field Reagent Blank 6	14/11/2016	1033	G	DW	1			X	

320-23545 Chain of Custody

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return to Client ☐ Disposal by Lab ☐ Archive for ____ Months

Special Instructions/QC Requirements & Comments: tea other

Custody Seals Intact: ☐ Yes ☐ No	Custody Seal No.:		Cooler Temp. (°C): Obs'd: 2.8 Corr'd: 2.8		Therm ID No.: AK
Relinquished by: Ken Crook	Company: PCD	Date/Time: 14-nov-16	Received by: [signature] Thy G. Turp	Company: TAS	Date/Time: 11/15/16 09:30
Relinquished by:	Company:	Date/Time: 1330	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Form No. CA-C-WI-002, Rev. 4.9, dated 2/2/2016

TestAmerica Sacramento
880 Riverside Parkway
West Sacramento, CA 95605-1500
phone 916.373.5600 fax 303.467.7248

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Regulatory Program: ☑DW ☐NPDES ☐RCRA ☐Other:

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: Waqi Alam	Site Contact:	Date:	COC No:
Your Company Name here - Pueblo Chemical Depot	Tel/Fax: 410-837-0512	Lab Contact: Karen Dahl	Carrier: FedEx	____ of ____ COCs
Address 45825 Highway 96 East	Analysis Turnaround Time			Sampler:
City/State/Zip - Pueblo/Colorado/81006-9330	☐ CALENDAR DAYS ☐ WORKING DAYS			For Lab Use Only:
(719) 549-4340 Phone	TAT if different from Below ____			Walk-in Client:
Phone (719) 549-4340 FAX (719) 549-4423	☐ 2 weeks			Lab Sampling:
Project Name: PFC DW Quality Assessment at AMC Installations	☐ 1 week			
Site:	☐ 2 days			Job / SDG No.:
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	PFAS by Method 537 (UCMR List)	Sample Specific Notes:
Sample Location 7: EPO 21	14/11/2016	1233	G	DW	1			X	
Field Reagent Blank 7	14/11/2016	1233	G	DW	1			X	
Sample Location 8: EPO 23	14/11/2016	0835	G	DW	1			X	
Field Reagent Blank 8	14/11/2016	0835	G	DW	1			X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other ____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.
☑Non-Hazard ☐Flammable ☐Skin Irritant ☐Poison B ☐Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐Return to Client ☐Disposal by Lab ☐Archive for ____ Months

Special Instructions/QC Requirements & Comments: ice only

Custody Seals Intact: ☐ Yes ☐ No	Custody Seal No.:		Cooler Temp. (°C): Obs'd: 2.8 Corr'd: 2.8		Therm ID No.: AIC	
Relinquished by: KEN CROOK	Company: PCD	Date/Time: 14-NOV-16	Received by: Troy Gilmpson	Company: TAS	Date/Time: 11/15/16	09:30
Relinquished by:	Company:	Date/Time: 1330	Received by:	Company:	Date/Time:	
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:	

Form No. CA-C-WI-002, Rev. 4.9, dated 2/2/2016

Login Sample Receipt Checklist

Client: Tetrahedron Inc

Job Number: 320-23545-1

Login Number: 23545
List Number: 1
Creator: Nelson, Kym D

List Source: TestAmerica Sacramento

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Draft Final
FIRST QUARTER 2018 – SOUTH CENTRAL TERRACE AND THE INTERIM CORRECTIVE ACTION GROUNDWATER REMEDIATION SYSTEM STATUS REPORT

U.S. ARMY PUEBLO CHEMICAL DEPOT
PUEBLO, COLORADO

Prepared for:

U.S. Army Pueblo Chemical Depot
Under Contract W9128F-08-D-0022
U.S. Army Corps of Engineers

Prepared by:

TLI Solutions, Inc.
112 North Rubey Drive, Suite 200
Golden, Colorado 80403

May 2018

Attachment 6
SCT Exit Strategy Investigation Summary

SWMU 14 Exit Strategy Investigation Summary

Polyfluoroalkyl substances (PFAS) sampling to identify if PFAS is present in groundwater at SWMU 14 was completed during the first quarter of 2018. The presence of PFAS in groundwater at SWMU 14 could influence the selection of remedial technologies for treatment of SWMU 14 groundwater and would affect upcoming pilot studies.

Two wells (Figure 1) were selected (LFPIEZ001 and LFPIEZ005A) as they are located near the centers of the two largest and most contaminated burn pits. Groundwater samples were collected in January and analyzed for 18 PFAS analytes (Table 1). Groundwater at LFPIEZ005A was non-detect for all 18 analytes. LFPIEZ001 was non-detect with the exception of Perfluorooctane Sulfonamide (PFOSA) which was detected below the limit of quantitation (LOQ) and Perfluoropentanoic Acid (PFPeA) which was detect just above the LOQ. The very small amount of PFAS that was detected is not likely to influence the selection of remedial technologies.

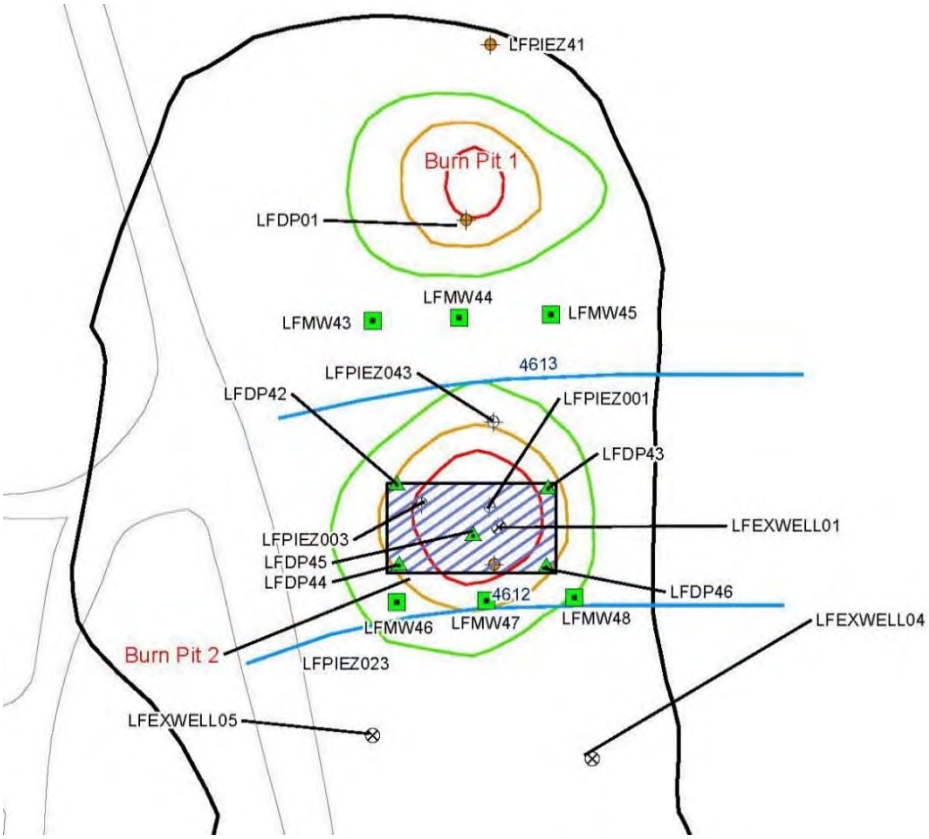


Figure 1: SWMU 14 PFAS Sample Locations

Table 1: SWMU 14 PFAS Sampling Results

Analyte	UNITS	Ambient Blank	Equipment Blank	LFPIEZ005A	LFPIEZ001	DL	LOD	LOQ
6:2 Fluorotelomer sulfonate	ug/L	ND	ND	ND	ND	0.0066	0.015	0.020
8:2 Fluorotelomer sulfonate	ug/L	ND	ND	ND	ND	0.0066	0.015	0.020
Perfluorobutanoic acid	ug/L	ND	ND	ND	ND	0.0055	0.015	0.020
Perfluorobutane Sulfonate (PFBS)	ug/L	ND	ND	ND	ND	0.0054	0.015	0.020
Perfluorodecane Sulfonate	ug/L	ND	ND	ND	ND	0.0060	0.015	0.020
Perfluoroheptanoic Acid (PFHpA)	ug/L	ND	ND	ND	ND	0.0074	0.015	0.020
Perfluorohexanoic Acid (PFHxA)	ug/L	ND	ND	ND	ND	0.0035	0.010	0.020
Perfluorohexane Sulfonate (PFHxS)	ug/L	ND	ND	ND	ND	0.0056	0.015	0.020
Perfluorononanoic Acid (PFNA)	ug/L	ND	ND	ND	ND	0.0087	0.018	0.020
Perfluorooctane Sulfonamide (PFOSA)	ug/L	ND	ND	ND	0.020 J	0.0034	0.010	0.020
Perfluoropentanoic Acid (PFPeA)	ug/L	ND	ND	ND	0.022	0.0075	0.018	0.020
Perfluorotetradecanoic Acid	ug/L	ND	ND	ND	ND	0.0027	0.010	0.020
Perfluorotridecanoic Acid	ug/L	ND	ND	ND	ND	0.0038	0.010	0.020
Perfluoroundecanoic Acid (PFUnA)	ug/L	ND	ND	ND	ND	0.0025	0.010	0.020
Perfluorodecanoic Acid (PFDA)	ug/L	ND	ND	ND	ND	0.0061	0.015	0.020
Perfluorododecanoic Acid (PFDoA)	ug/L	ND	ND	ND	ND	0.0050	0.010	0.020
Perfluoro-n-Octanoic Acid (PFOA)	ug/L	ND	ND	ND	ND	0.0033	0.010	0.020
Perfluorooctane Sulfonate (PFOS)	ug/L	ND	ND	ND	ND	0.0060	0.015	0.020

DL = Detection Limit
LOD = Limit of Detection
LOQ = Limit of Quantitation
ND = Non-detect

SWMU 28 Exit Strategy Investigation Summary

The presence of PFAS in groundwater at SWMU 28 will influence selection of remedial technologies for treatment of SWMU 28 groundwater and thus will affect proposed pilot studies. Two wells (Figure 2) were selected (DDPIEZ003A and DDPIEZ003B) for PFAS sampling as they are located at the head of the SWMU 28 ditch and contain higher concentrations of TCE. Groundwater samples were collected in January and analyzed for 18 PFAS analytes (Table 2). Groundwater in DDPIEZ003A and DDPIEZ003B was non- detect for all 18 analytes. PFAS will not be considered during the selection of remedial technologies due to no PFAS detections at SWMU 28.

Figure 2: SWMU 28 PFAS Sampling Locations.

Table 2: SWMU 28 PFAS Results

Analyte	UNITS	DDPIEZ003B	DDPIEZ003A	Ambient Blank	DL	LOD	LOQ
6:2 Fluorotelomer sulfonate	ug/L	ND	ND	ND	0.0066	0.015	0.020
8:2 Fluorotelomer sulfonate	ug/L	ND	ND	ND	0.0066	0.015	0.020
Perfluorobutanoic acid	ug/L	ND	ND	ND	0.0055	0.015	0.020
Perfluorobutane Sulfonate (PFBS)	ug/L	ND	ND	ND	0.0054	0.015	0.020
Perfluorodecane Sulfonate	ug/L	ND	ND	ND	0.0060	0.015	0.020
Perfluoroheptanoic Acid (PFHpA)	ug/L	ND	ND	ND	0.0074	0.015	0.020
Perfluorohexanoic Acid (PFHxA)	ug/L	ND	ND	ND	0.0035	0.010	0.020
Perfluorohexane Sulfonate (PFHxS)	ug/L	ND	ND	ND	0.0056	0.015	0.020
Perfluorononanoic Acid (PFNA)	ug/L	ND	ND	ND	0.0087	0.018	0.020
Perfluorooctane Sulfonamide (PFOSA)	ug/L	ND	ND	ND	0.0034	0.010	0.020
Perfluoropentanoic Acid (PFPeA)	ug/L	ND	ND	ND	0.0075	0.018	0.020
Perfluorotetradecanoic Acid	ug/L	ND	ND	ND	0.0027	0.010	0.020
Perfluorotridecanoic Acid	ug/L	ND	ND	ND	0.0038	0.010	0.020
Perfluoroundecanoic Acid (PFUnA)	ug/L	ND	ND	ND	0.0025	0.010	0.020
Perfluorodecanoic Acid (PFDA)	ug/L	ND	ND	ND	0.0061	0.015	0.020
Perfluorododecanoic Acid (PFDoA)	ug/L	ND	ND	ND	0.0050	0.010	0.020
Perfluoro-n-Octanoic Acid (PFOA)	ug/L	ND	ND	ND	0.0033	0.010	0.020
Perfluorooctane Sulfonate (PFOS)	ug/L	ND	ND	ND	0.0060	0.015	0.020

DL = Detection Limit
LOD = Limit of Detection
LOQ = Limit of Quantitation
ND = Non-detect

TCE was not analyzed at SWMU 28 during the first quarter of 2018. The distribution of TCE in groundwater at SWMU 28 suggests that the clay is not a source for TCE groundwater

contamination, and that the contamination at SWMU 28 originates from upgradient (SWMU 36). Investigation activities will be focused upgradient of SWMU 28 in 2018 to better identify the pathway.

SWMU 36 Exit Strategy Investigation Summary

A total of twelve boreholes with temporary wells were installed using Direct Push Technology (DPT) in December 2017 (Figure 3). Six boreholes (FCVDP78 through FCVDP83) were drilled in order to better characterize the soil under the concrete slab that was removed in June 2017 where an underlying tank containing TCE was also removed. Lithology logs and soil samples were collected in December 2017 from the borings, and soil was analyzed for VOCs using EPA method SW8260B (Figure 3). TCE concentrations in the soil samples were non-detect or less than 15 ug/kg with only three samples having concentrations greater than 50 ug/kg (FCVDP79, 80, and 83). The highest TCE concentration was150 ug/kg at location FCVDP79 at a depth of 38.5 – 39 feet below ground surface (bgs). A groundwater sample was collected from each temporary well in January 2018 and analyzed for VOCs using EPA method SW8260B. TCE concentrations in the groundwater ranged from 1.5 ug/L at FCVDP78 to 75 ug/L at FCVDP83 (Figure 3).

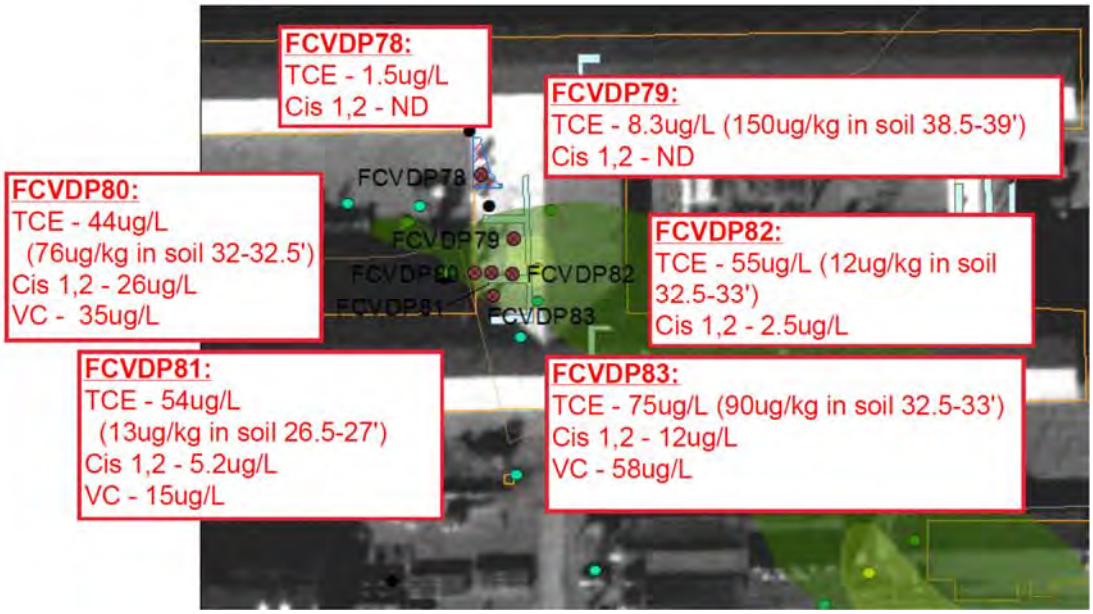


Figure 3: SWMU 36 Source

The remaining six borehole locations (FCVDP73 through FCVDP77 and FCVDP84) were drilled using DPT, and temporary wells were installed in December 2017 to further define the TCE plume between SWMU 36 and 28. No soil samples or lithology logs were completed at these locations as the primary reason for the wells is SWMU 36 plume delineation in the area upgradient of SWMU 28, but the data are expected to assist in identifying other possible sources of contamination for subsequent characterization. A groundwater sample was collected from each temporary well in January 2018 and analyzed for VOCs using EPA method SW8260B. TCE concentrations in the groundwater ranged from ND at FCVDP74 to 49 ug/L at FCVDP84

(Figure 3). Temporary well FCVDP77 was not sampled as the well was damaged above the water table.

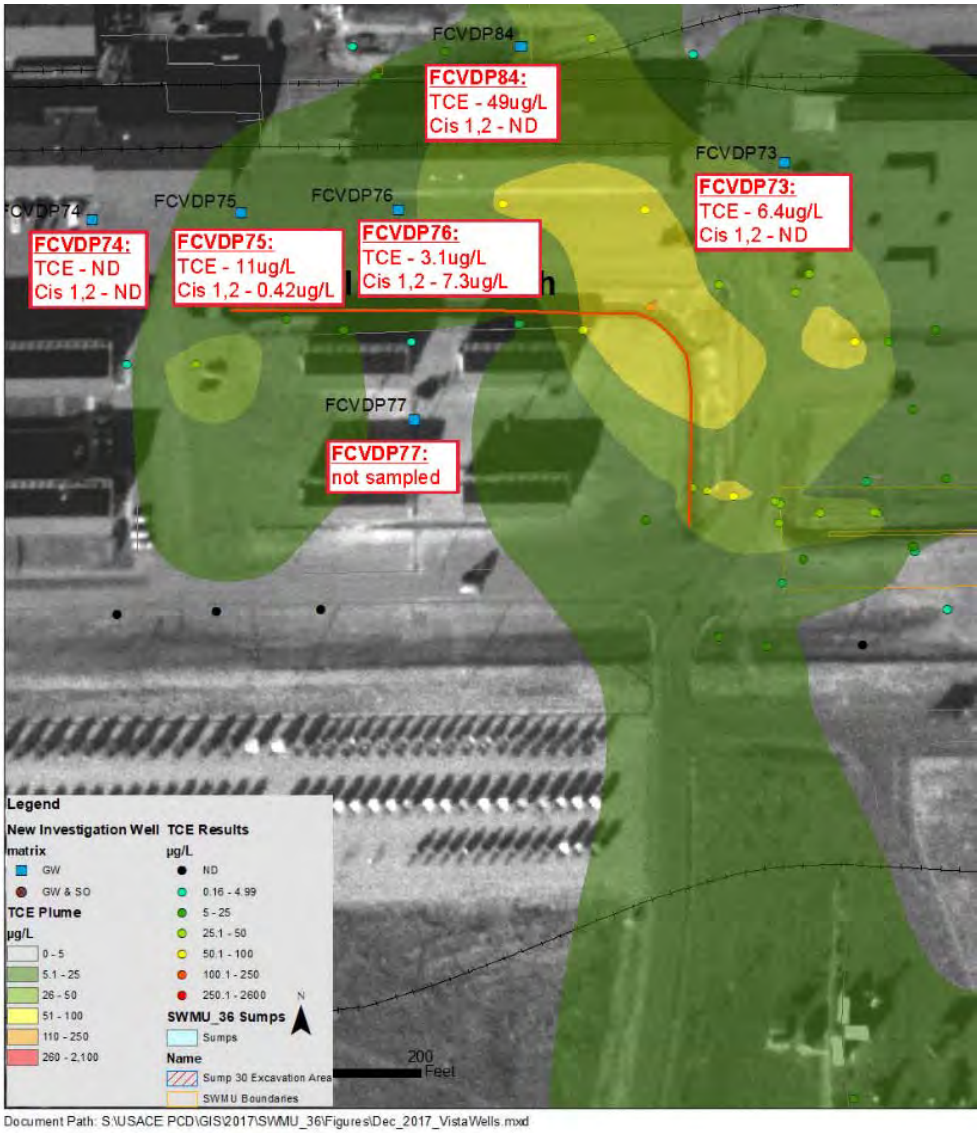


Figure 4: SWMU 36 Boreholes and Temporary Wells

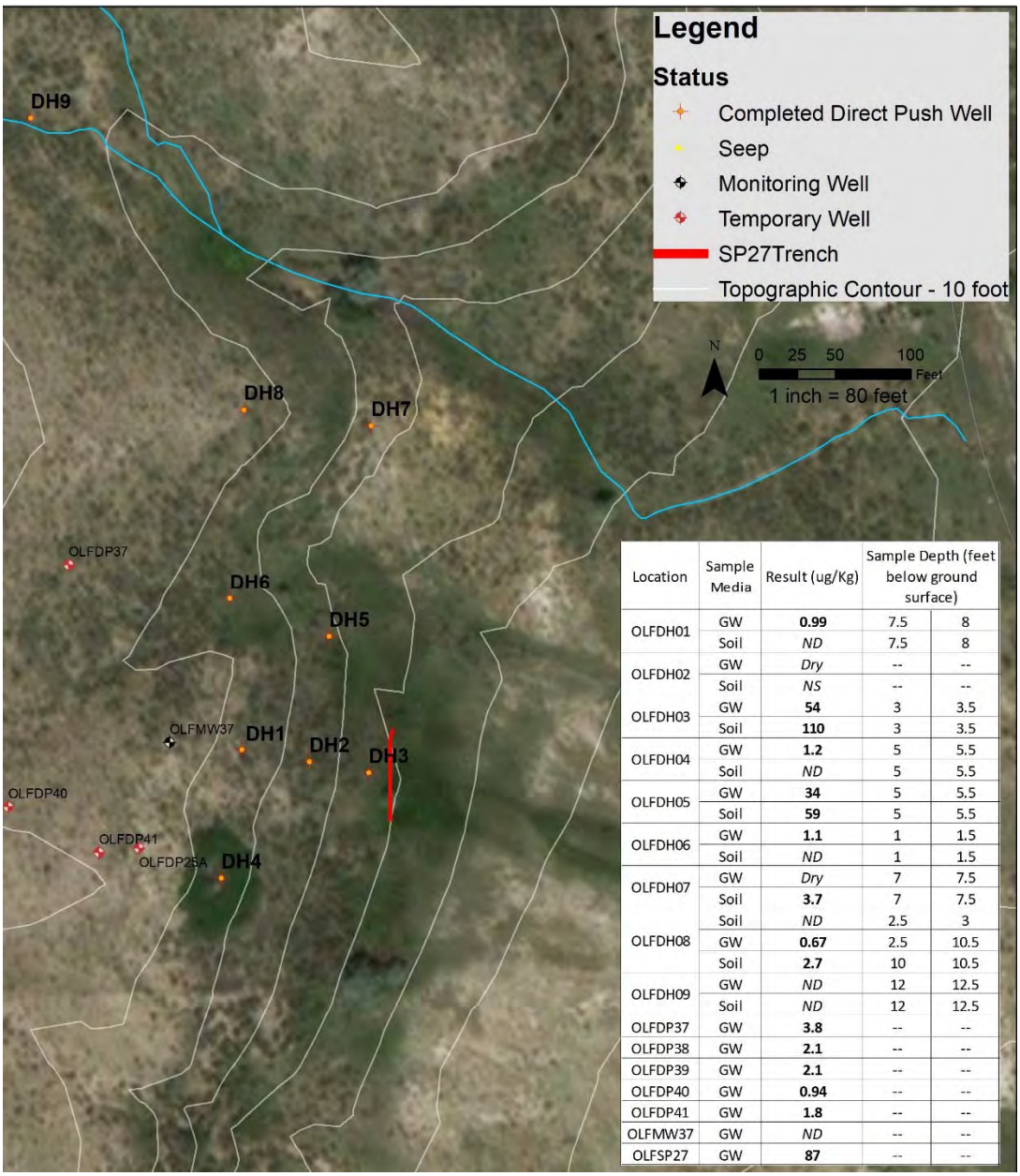
Eastern Mid-Plume Exit Strategy Investigation Summary

No new sampling was conducted during the first quarter of 2018 at the EMP.

Western Seeps Exit Strategy Investigation Summary

In the vicinity of seep OLFSP27, nine new boreholes (DH-1 through DH-9) were drilled using DPT, and temporary wells were installed in December 2017 (Figure 5). Prior to this investigation, very little geologic or chemical data had been collected immediately upgradient of the seep. The geologic and chemical data will help refine a conceptual site model (CSM) that may be used for all seeps requiring remediation, and thus an exit strategy approach. Data from the investigation will help determine if TCE in the soils near OLFSP27 is back-diffusing into groundwater or if TCE in groundwater is migrating into the area from an upgradient source via a preferred pathway. Soil sample locations were selected using professional judgment based on visual assessments, encountered geology, and the PID readings, with a focus on the soil near the water table and capillary fringe where back diffusion could occur. Soil samples were analyzed for VOCs using EPA method SW8260B. TCE was non-detect in soil at DH-1, DH-4, DH-6, and DH-9 (Figure 5). TCE concentrations ranged from 2.7 ug/kg at DH-8 to 110 ug/kg at DH-3.

A temporary well was set at each of the nine borehole locations (DH-1 – DH-9), and a groundwater sample was collected during the first quarter of 2018 and analyzed for VOCs using EPA method SW8260B. TCE in groundwater was detected at DH-1, DH-3, DH-4, DH-5, DH-6, and DH-8 (Figure 5). Locations DH-2 and DH-7 were dry and therefore not sampled. Concentrations of TCE in both groundwater and soil are lower on top of the terrace than down the slope near the seeps. Locations DH-1, DH-8, and DH-9 are located on top of the terrace. TCE in groundwater is less than 1 ug/L at all three locations and soil was 2.7 ug/kg at DH-8 and non-detect at DH-1 and DH-9. Conversely samples collected off the terrace, near the seeps at DH-3 and DH-5 have TCE concentrations in groundwater of 54 and 34 ug/L and in soil 110 and 59 ug/kg respectively. This seems to imply that TCE concentrations at the seep is a result of back-diffusion rather than an upgradient source. Additional investigation of the soil in and around seep OLFSP27 is planned during the second quarter.



Location	Sample Media	Result (ug/Kg)	Sample Depth (feet below ground surface)	
OLFDH01	GW	**0.99**	7.5	8
	Soil	*ND*	7.5	8
OLFDH02	GW	*Dry*	--	--
	Soil	*NS*	--	--
OLFDH03	GW	**54**	3	3.5
	Soil	**110**	3	3.5
OLFDH04	GW	**1.2**	5	5.5
	Soil	*ND*	5	5.5
OLFDH05	GW	**34**	5	5.5
	Soil	**59**	5	5.5
OLFDH06	GW	**1.1**	1	1.5
	Soil	*ND*	1	1.5
OLFDH07	GW	*Dry*	7	7.5
	Soil	**3.7**	7	7.5
	Soil	*ND*	2.5	3
OLFDH08	GW	**0.67**	2.5	10.5
	Soil	**2.7**	10	10.5
OLFDH09	GW	*ND*	12	12.5
	Soil	*ND*	12	12.5
OLFDP37	GW	**3.8**	--	--
OLFDP38	GW	**2.1**	--	--
OLFDP39	GW	**2.1**	--	--
OLFDP40	GW	**0.94**	--	--
OLFDP41	GW	**1.8**	--	--
OLFMW37	GW	*ND*	--	--
OLFSP27	GW	**87**	--	--

Figure 5: Western seep soil and groundwater sample locations and results.

SWMU 41 and 1,4-Dioxane Exit Strategy Investigation Summary

Two direct push wells (MFDP69, MFDP70) were installed in December 2017. Both wells were installed in order to better define the edge of the SCT aquifer (Figure 6). Wells MFDP32, 59, 67, and 68 were initially dry; however, groundwater was observed during groundwater level monitoring in August, months after the wells were installed. Groundwater samples from MFDP70, MFDP32, 59, 67, 68, and a conformation sample at MFDP46 were collected in January and analyzed for 1,4-dioxane using EPA method UM91. MFDP69 was dry and no groundwater sample was collected. 1,4-Dioxane concentrations at the six wells ranged from non-detect at MFDP32 to 18.65 ug/L at MFDP46 (Figure 6). Insufficient water was collected from MFDP32 and MFDP70 which resulted in a higher detection limit. Groundwater collection in the western edge of SWMU 41 was difficult due to the lack of water in the temporary wells and the slow recharge. The edge of saturation in the northern portion of this area may be defined by MFDP69. Additional wells are planned to the southeast of MFDP59 to better define the western edge of 1,4 dioxane plume and the SCT aquifer.

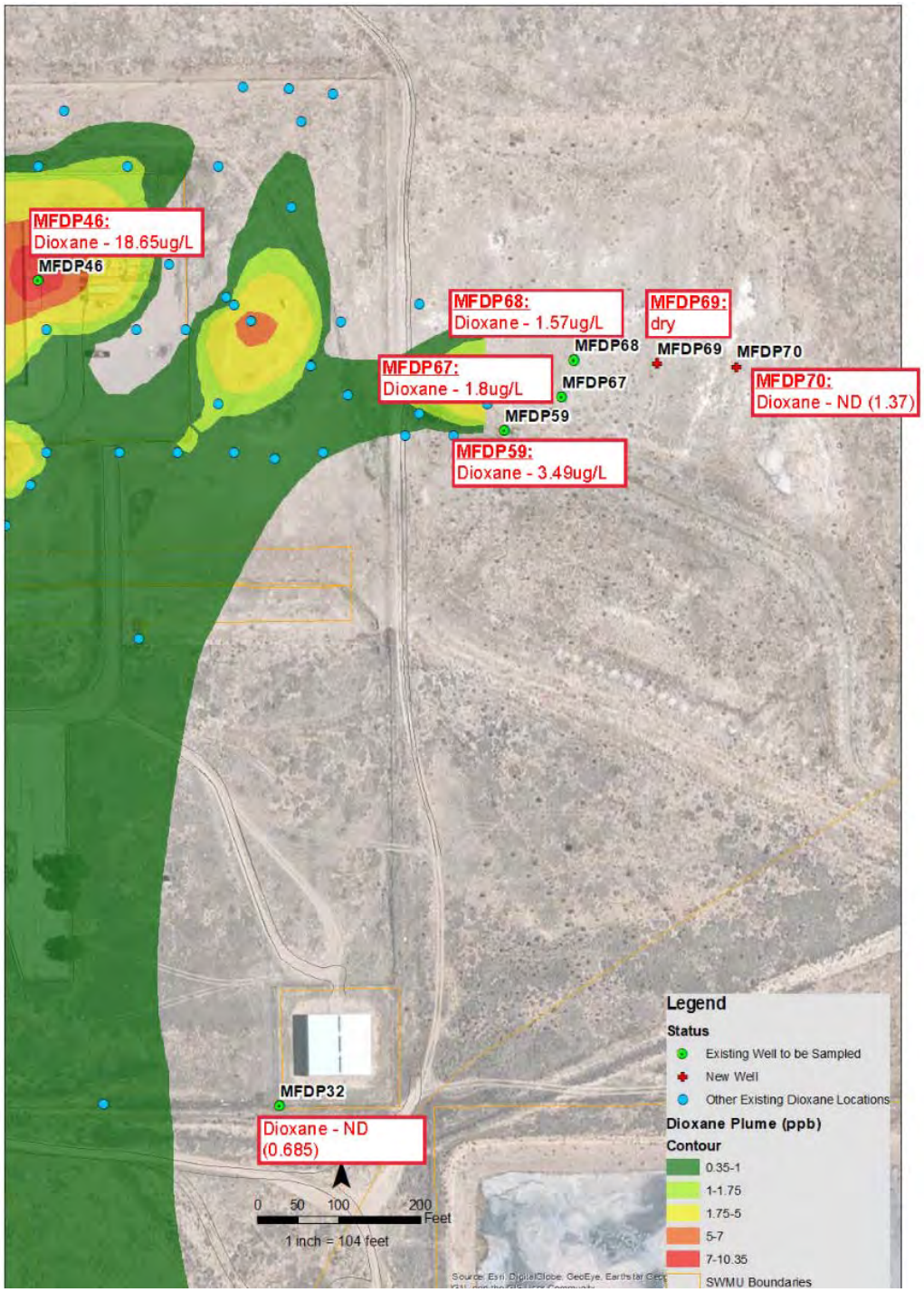


Figure 6: SWMU 41 Temporary Wells

SWMU 58 Exit Strategy Pilot Study and Investigation Summary

During the first quarter of 2018, groundwater samples were collected from the three air sparge wells (CP7, CP8, and OLFDP20) and (LFMW08, CM1MW1, and CM1), to evaluate the air sparging system performance. The groundwater samples were analyzed for volatile organic

compounds, including vinyl chloride. While VC has been below the cleanup goals for the last two sampling events at LFMW08, it is still above the cleanup goal at CM1 and CM1MW1 which are further downgradient from the three sparge wells.

The February monitoring well groundwater samples will also be analyzed for Soluble Methane Monooxygenase (sMMO), Ethene Monooxygenase (ETnC), and Epoxyalkane Transferase (ETnE) to look for evidence of biological degradation of vinyl chloride in addition to air stripping removal:

- Methane Monooxygenase (sMMO) - a bacterial enzyme that is generally believed to support faster cometabolism of TCE.
- Ethene Monoxygenase (ETnC) - an enzyme involved in ethene utilization and vinyl chloride (co)metabolism.
- Epoxyalkane Transferase (ETnE) - an enzyme involved in ethene utilization and vinyl chloride (co)metabolism.

sMMO, ETnC, and ETnE were detected at cell counts of 10^2-10^3 cells/mL in LFMW08 and 10^1 cells/mL in sparge well CP7 but not in sparge well CP8. Additionally sMMO and ETnE was detected at cell counts of 10^1-10^2 cells/mL in CM1MW1 and CM1 downgradient monitoring wells but ETnC was not detected. These results suggest the presence of bacteria that could contribute to Vinyl Chloride remediation but are not indicative of microbial populations doing remediation ‘work’.

The pilot air sparging system at SWMU 58 (Figure 7) was shutdown March 13th, groundwater samples will be collected from the three air sparge wells as well as the three air sparging monitoring wells on a quarterly basis through the end of 2018. The groundwater samples will be analyzed for volatile organic compounds. The recovery data will be evaluated to characterize any vinyl chloride rebound, which will be useful in developing a full scale air sparging remedy for the exit strategy.

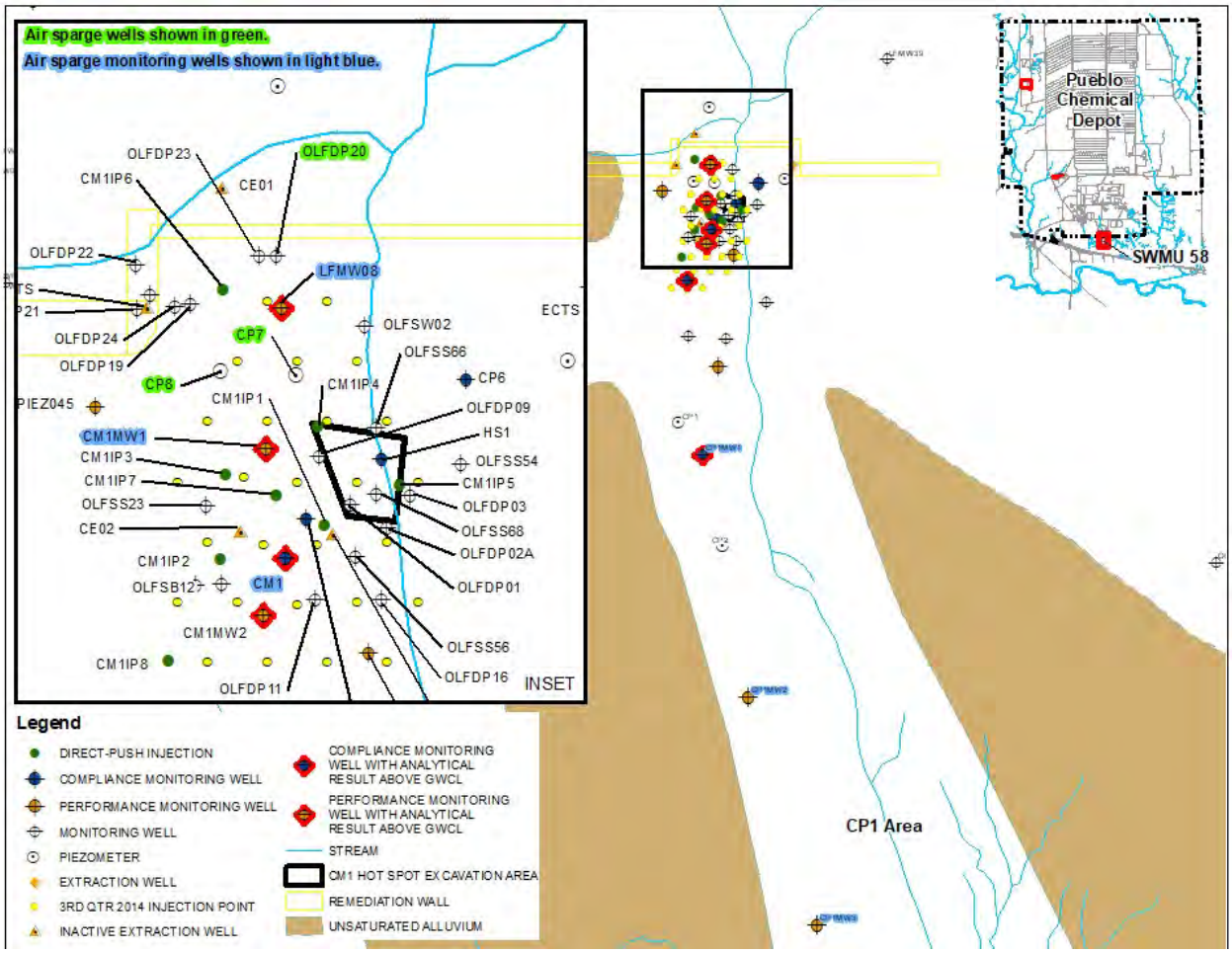


Figure 7: SWMU 58 Pilot Study Area

Based on the groundwater sample analytical data, the pilot system appears to have been effective at reducing concentrations of vinyl chloride throughout the first quarter at LFMW08, CM1MW1, and CM1 (Figures 8 through 10). The groundwater samples will be analyzed for volatile organic compounds. The data will be evaluated to characterize any vinyl chloride rebound, which will be useful in developing a full scale air sparging remedy for the exit strategy. The groundwater samples will also be analyzed for Ethene Monooxygenase (ETN) and Soluble Methane Monooxygenase (sMMO) to look for evidence of biological degradation of vinyl chloride in addition to air stripping removal:

- ETN enumerates key functional genes (etnC and etnE) involved in ethene utilization and vinyl chloride (co)metabolism.
- sMMO targets the soluble methane monooxygenase gene. Soluble methane monooxygenases are generally believed to support faster cometabolism of TCE.

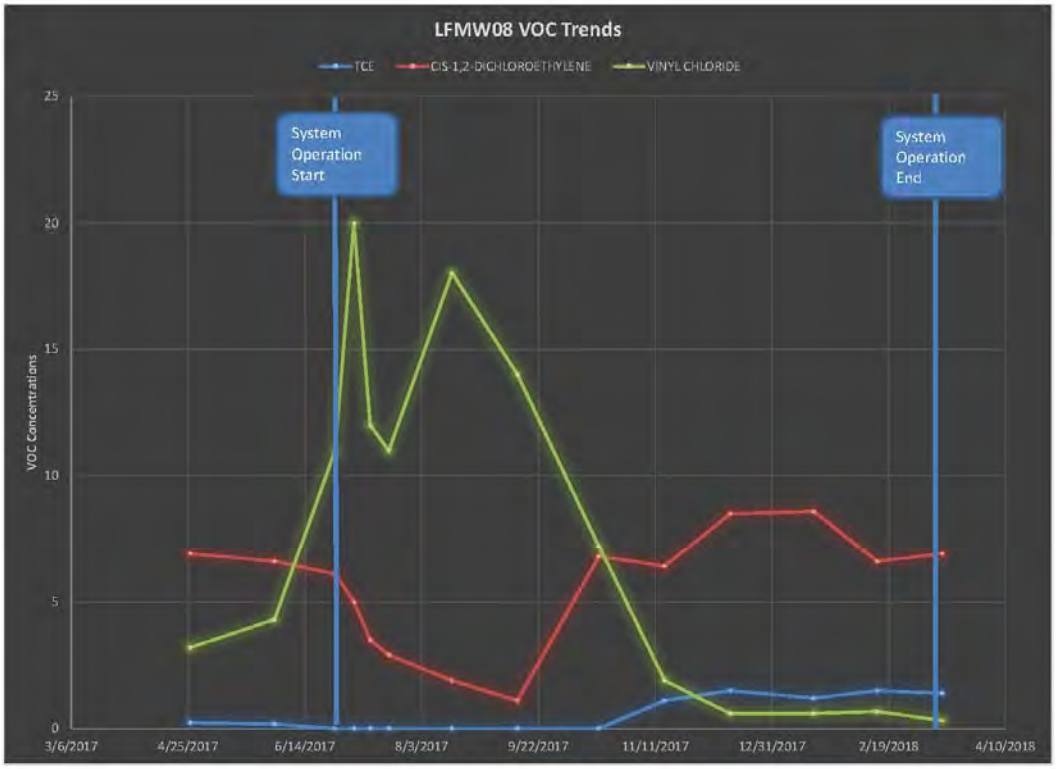


Figure 8: LFMW08 VOC Trends

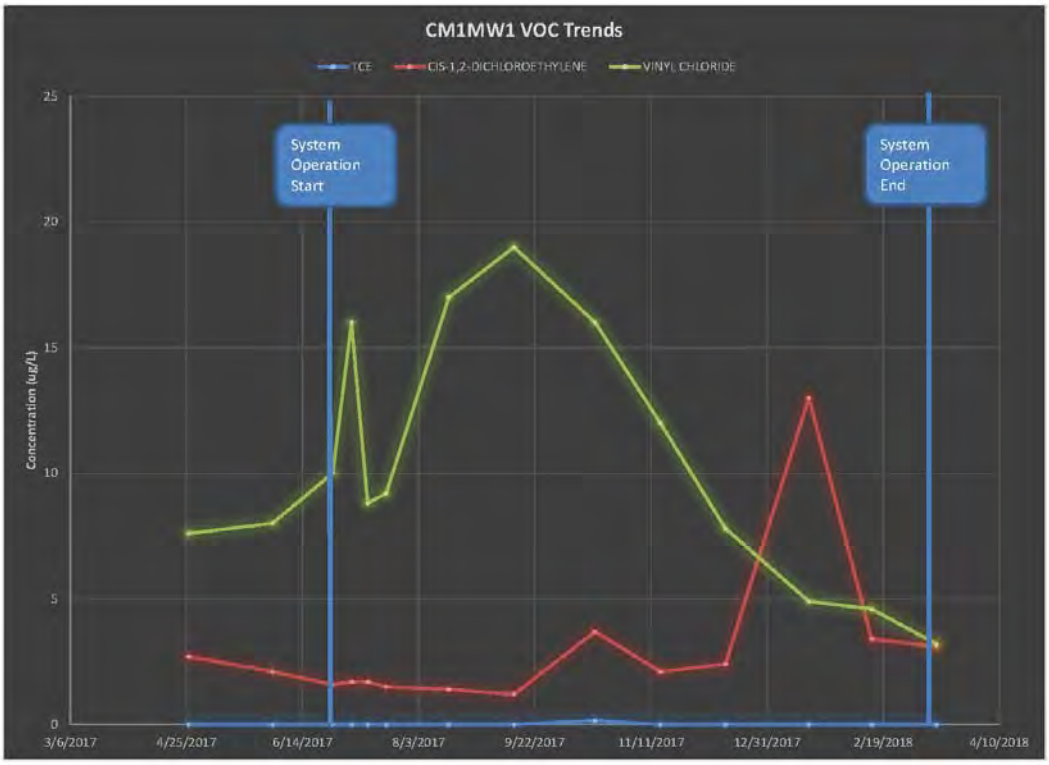


Figure 9: CM1MW1 VOC Trends

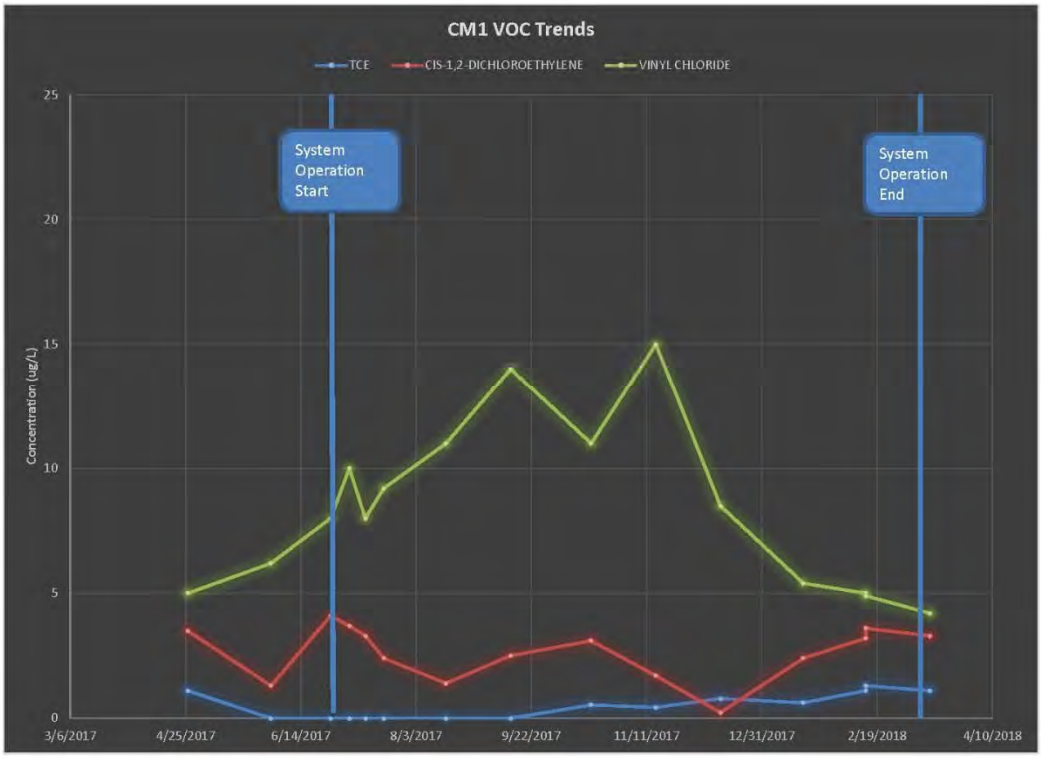


Figure 10: CM1 VOC Trends

SWMU 61 Investigation Summary

No new sampling was conducted during the first quarter of 2018 at SWMU 61. Additional characterization of this area is being planned under a separate task order during the SWMU 61 RFI.

APPENDIX C

RECORDS OF COMMUNICATIONS

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Pueblo Chemical Depot Interview

Wes Huntley (wesley.b.huntley.civ@mail.mil)
Pueblo Chemical Depot Fire Department (Chief)
Employee at PCD since: 1999

The interview was conducted on November 29, 2018 with Mr. Huntley and HGL personnel (Ryan Sullivan and Megan Matteazzi). The interview began with a general discussion of PFAS and the potential sources, primarily AFFF. Specific discussion points are summarized below.

Mr. Huntley took over as Fire Chief in 1999. Previously, Mr. Huntley worked at several USAF installations, so he stated he was very familiar with AFFF. After taking over at PCD, Mr. Huntley inquired as to the current AFFF plan at PCD. At the time, the only AFFF stored by PCD fire department was in a tank on a single fire truck and was over three years old. The AFFF had gelled up and was not usable and required a significant cleanout of the tank. Mr. Huntley stated the AFFF gel was drummed and disposed of by PCD environmental. Cleanout of the tank occurred in the parking lot on the northwest side of the fire station (Building 61).

After 1999, PCD fire department switched to storing approximately 10, 5-gallon buckets of AFFF (3M AFFF) and AFFF was no longer stored in tanks. The buckets were stored in the north bay of the south fire station (Building 61) and were also carried on trucks. This continued until 2008 when the AFFF supply was disposed of (via PCD environmental). During the 1999 to 2008 timeframe, no AFFF was used as part of fire department activities. This includes training, as periodic training of AFFF was not required. Since 2008, the PCD fire department has switched to a product called Cold Fire that is not a foam.

Mr. Huntley has no knowledge of AFFF usage prior to 1999, other than AFFF was reportedly used to fight a small wildland fire at an unknown location prior to his time as Fire Chief. Mr. Huntley could not offer an approximate date. The only AFFF storage prior to 1999 was in the tank referenced above. An approximate date of when AFFF began being stored at PCD was not available.

No structures currently contain, or previously contained, fire suppression systems using AFFF (only water and/or chem-dry).

AFFF training has never been completed or required at PCD. Annual fire training is required and is completed at Building 532, but only water is used. PCD has not been used by non-PCD fire department personnel for training activities.

There have never been any crashes or fires requiring AFFF during Mr. Huntley's tenure nor prior to 1999, to his knowledge.

Fire Stations

Currently, there are two fire stations: the north fire station (Building 62) and the south fire station (Building 61). AFFF has never been stored or used at the north fire station, which was built in 2011. The south fire station was built in the late 1980s.

Prior to the late 1980s, the fire station was at Building 3. No information was available relative to potential AFFF usage or storage at Building 3. Building 3 is the oldest known fire station location at PCD.

Pueblo Chemical Depot Interview

Don Anderson (don.f.anderson5.civ@mail.mil)
Pueblo Chemical Depot Public Works
Employee at PCD since: 2011

The interview was conducted on November 29, 2018 with Mr. Anderson and HGL personnel (Ryan Sullivan and Megan Matteazzi). The interview began with a general discussion of PFAS and the potential sources, primarily AFFF. Specific discussion points are summarized below.

Mr. Anderson is unaware of any AFFF usage or storage at PCD, other than he believes the Fire Department has one truck carrying AFFF.

There is no information relative to AFFF or PFAS in the sanitary sewer system at PCD. A sanitary treatment facility operated in the past but closed in the late 1960s. Currently, lagoons are used for treatment.

Mr. Anderson has no knowledge of plating operations and/or building specifications for Building 539 (SWMU 28). He stated he was not aware plating activities were ever performed at PCD.

Relative to pesticides/herbicides use, Mr. Anderson stated PCD does regularly use pesticides and herbicides, and that a list of currently used chemicals could be provided. Derrick Trehill is the primary pesticides Point of Contact at PCD; the environmental department also has a list of all pesticides used and stored at PCD. HGL personnel will follow up and provide Mr. Anderson a list of trade names associated with PFAS. Mr. Anderson will follow up with additional staff to determine if any of the pesticides of interest are used/stored at PCD. HGL received a list of pesticides approved for use at PCD (included as Attachment 1).

PCD is on its own water supply and the water supply was analyzed for PFAS approximately two years ago (2016). The results were non-detect for PFAS. Ann Mead stated that she could provide this data to HGL. Two separate water supply areas are at PCD: one in the northern portion and one in the southern portion near the BLDG #500s area. Well information is included as Attachment 2 to this appendix.

Mr. Anderson had no knowledge of AFFF being used for dust suppression purposes at PCD.

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Pueblo Chemical Depot Interview

Terri Maxwell (terri.j.maxwell2.civ@mail.mil)
Pueblo Chemical Depot Real Property
Employee at PCD since: April 2018

The interview was conducted on November 29, 2018 with Ms. Maxwell and HGL personnel (Ryan Sullivan and Megan Matteazzi). The interview began with a general discussion of PFAS and the potential sources, primarily AFFF. Specific discussion points are summarized below.

Ms. Maxwell is unaware of any AFFF usage or storage at PCD or any facilities with fire suppression systems that use materials other than water (including facility alterations to add or remove fire suppression systems). She stated that most suppression systems were in buildings that have since been abandoned and all were water only, but she will look in her records to verify and will follow up. HGL personnel also requested any information specific to Building 539 (SWMU 28)) and the potential vapor suppression system.

Ms. Maxwell later followed up while HGL personnel were in the map room and stated that no additional information of AFFF suppression systems was available. A floor plan of the abandoned Building 539 was found in the map room, but it does not show information related to PFAS sources/uses. No additional information regarding abandoned Building 539 was available.

After being asked for a general rundown on PCD redevelopment and PuebloPlex, Ms. Maxwell stated:

- The redevelopment/PuebloPlex plan is underway and some of the BLDG #500 area buildings (Parcel 5) are currently being leased for industrial/commercial use.
- Redevelopment is split into several areas, as described in the Master Lease document.
- She was unsure whether the potential presence of PFAS had impacted redevelopment but stated that she assumed it likely would have.

The Pueblo Chemical Depot boundary remains accurate, as shown on maps from historical documentation.

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Attachment 1

Pesticides List

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AMC PESTICIDE USE PROPOSAL (18 December 2017)

Installation Name: Pueblo Chemical Depot

IPMC Name/Email: Angus MacKelvey/ Donald.J.MacKelvey.civ@mail.mil

PMC Reviewer: Jeff Muehlmann, jeffrey.r.muehlmann.civ@mail.mil, (256) 450-7482 (DSN 320)

Revision:12

Pesticide Trade Name	EPA Registration No	Active Ingredients	% Active Ingredient	Target Pest
Advance 360A Dual Choice	499-496	Abamectin B_1	0.011	Ants (Indoor/Outdoor)
Advance Granules	499-370	Abamectin B1	0.011	Ants (Outdoor)
Advion Ant Gel	100-1498	Indoxacarb	0.05	Ants (Outdoor)
Advion Roach Gel	352-652	Indoxcarb	0.6	General Household Pests
Alligare Ecomazapyr 2L	81927-22	Isopropylamine salt of Imazapy	27.8	All Vegetation
Alligare Imazapyr 2L	81927-23	Imazapyr	27.8	All Vegetation
AllPro Aqualuer 20-20	769-985	Permethrin / Piperonyl Butoxide	40	Mosquito
Altosid 30 Day Briquets	2724-375	S-Methoprene	8.62	Mosquito
Altosid XR Briquets	2724-421	S-Methoprene	2.1	Mosquito
Amdro Fire Ant Bait	73342-1	Hydramethylnon	0.73	Ants (Outdoor)
Ant Block Home Perimeter (24 oz.)	73342-2	Hydramethylnon	0.88	Ants (Outdoor)
AQUABac (200g)	62637-3	Bacillus Thuringiensis	2.86	Mosquito
Aqua-Control 30-30	73748-11	Permethrin / Piperonyl Butoxide	60	Mosquito
Arilon	100-1501 / 352-776	Indoxcarb	20	Termites, Other Wood Destroying Pests
Arsenal Powerline	241-431	Imazapyr	26.7	All Vegetation
Avitrol	11649-7	4-Aminopyridine	0.5	Birds-MBTA Species
B.T.I. Briquets	6218-47	Bacillus thuringiensis	10.31	Mosquito
Barricade 4FL	100-1139	Prodiamine	40.7	Selective Weeds
BASF Plateau	241-365	Imazapic	23.6	Grasses
Bifen I/T	53883-118	Bifenthren	7.9	Termites, Other Wood Destroying Pests
Boot Hill Pellets Place Packs	7173-188	Bromadiolone	0.005	Rodents

AMC PESTICIDE USE PROPOSAL (18 December 2017)

Burn Out II	Citric Acid and Eugenol (Clove Oil) are exempted from FIFRA requirements	Citric Acid/Clove Oil	32	Selective Weeds
Clorox® Hydrogen Peroxide Disinfecting Cleaner (BLONDIE)	67619-24	None	0	Disinfection
Contrac All-Weather Cake	12455-34	Bromadiolone	0.005	Rodents
Contrac Bait Box	12455-79	Bromadiolone	0.005	Rodents
Cornbelt 4 Lb. Amine	11773-2	2,4-dichlorophenoxyacetic acid	46.3	Broadleaf
Cy-Kick	499-470	Cyfluthrin	0.1	General Household Pests
Cy-Kick CS	499-304	Cyfluthrin	6.0	General Household Pests
Demand CS	100-1066	Lambda-cyhalothrin	9.7	Bees, Hornets, Wasps
Dimension 2EW	62719-542	Dithiopyr	24	Selective Weeds
DITRAC All-Weather Blox	12455-80	Diphacinone	0.005	Rodenticide
Dr. T's Bat Scat	58630-2	Naphthalene	99.95	Bat Repellant
Dr. T's Snake-A-Way	58630-1	Naphthalene Sulfur	35	Snake Repellant
Dragnet SFR	279-3062	Permethrin	36.8	Termites, Other Wood Destroying Pests
Dupont Oust XP	352-601	Sulfometuron methyl	75	Annual Weeds
Dupont Perspective	352-846	Aminocyclopyrachlor/Chlorsulfuron	55.3	Perienniel Weeds
Essentria IC	25(b) exempt	Rosemary oil/Geraniol/Peppermint oil	17	Mosquito
Escalade2	228-442	2,4-D/Fluroxypyr/Dicamba	49.53	Selective Weeds
Esplanade 200	432-1516	Indaziflam	19.05	All Vegetation
First Strike Bait	7132-258	Difethialone	0.0025	Ants
Formula 3021	464-426-8540	2,2-Dibromo-3-nitrilopropionamide	20	Water Treatment
Fresh Cab	82016-1	Balsam Fir Oil	2	Rodents
Garlon 4	62719-40	Triclopyr	61.6	All vegetation

AMC PESTICIDE USE PROPOSAL (18 December 2017)

Gentrol Aerosol	2724-484	S-Hydroprene	0.36	General Household Pests
gentrol IGR Concentrate	2724-351	S-Hydroprene	9	General Household Pests
GLY STAR Plus	42750-61	Glyphosate	41	All Vegetation
Hot Shot Flying Insect (10 oz)	46515-48-8845	Permethrin/ d-trans Allethrin	0.4	Bees, Hornets, Wasps
Imazuron	228-654	Imazapyr/Diuron	70	All Vegetation
Insecticide, aerosol d-Phenothrin	901-82	3-phenoxybenzyl cyclopropanecarboxylate	2.0	Mosquito
Intice Ant Granules	73079-2	Boric Acid	5	Ants (Outdoor)
JT Eaton Repellant	8254-5-56	Polybutene	93	Birds-MBTA Species
Kaput Mouse Blocks	72500-7	Warfarin	0.025	Rodents
Kaput Vole	72500-6	Warfarin	0.025	Rodents
Kaput-D	72500-9	Diphacinone	0.005	Rodents
Krovar I DF	352-505	Bromacil Diuron	80	Annual Weeds
Landmaster BW	42750-62	2,4-D Glyphosate	33.5	Annual Weeds
Maki Mini Blocks	7173-202	Bromadiolone	0.005	Rodents
MaxForce Ant Killer	64248-2	Hydramethylnon	1	Ants (Outdoor)
Maxforce Complete Granules	432-1255	Hydramethylnon	1	Ants (Outdoor)
Maxforce FC Magnum	432-1460	Fipronil	0.05	Cockroaches
Maxforce FC Select	432-1259	Fipronil	0.01	Cockroaches
Maxxthor	81824-5	Bifenthren	7.9	Termites, Other Wood Destroying Pests
Merit 2F	432-1312	Imidacloprid	21.4	Bees, Hornets, Wasps
Method	432-1565	Potassium salt of aminocyclopyrachlor	25	All Vegetation
Milestone	62719-519	Aminopyralid	40.6	Broadleaf Weed
Mosquito Dunks	6218-47	Bacillus thuringiensis subspecies israelensis Strain BMP 144	10.31	Mosquito

AMC PESTICIDE USE PROPOSAL (18 December 2017)

NALCO 2840	464-624-1706	2,2-Dibromo-3-nitrilopropionamide	40	Fungicide
Nufarm Proclipse 65 WDG	228-434	Prodiamine	65	Selective Weeds
Nufarm Vanquish	228-397	Dicamba Diglycolamine Salt	56.8	Weed, brush
Off! Deep Woods Inspect Spray	4822-167	DEET	25	Mosquito
Onslaught	1021-1815	Esfenvalerate	6.40	General Household Pests
Orthene	499-373	Acephate	1	Insect
Ortho Home Defense Max	239-2663	Bifenthrin	0.05	Insect
Ortho Hornet & Wasp Killer	1021-1806-239	Tetramethrin/Sumithrin (Phenothrin)	0.3	Bees, Hornets, Wasps
Parrot-DF	6622-51	Diuron	80	Selective Weeds
Pendulum	241-341	Pendimethalin	37.4	Grasses
Permethrin Arthropod Repellant (6840-01-278-1336)	50404-5	Permethrin	0.50	Mosquito
Phostoxin	72959-4	Aluminum Phosphide	55	Rodents and Vermin
Premise 75	432-1332	Imidacloprid	75	Termites, Other Wood Destroying Pests
Premise Foam	432-1391	Imidacloprid	0.05	Termites, Other Wood Destroying Pests
Premise Granules	432-1385	Imidacloprid	0.5	Termites, Other Wood Destroying Pests
Premise2	432-1331	Imidacloprid	21.4	Termites, Other Wood Destroying Pests
ProControl Plus	499-462	Pyrethrins / Cyfluthrin / Technical Piperonyl Butoxide	1.6	General Household Pests
PROKoZ Glyphosate Pro 4	72112-4	Glyphosate	41	All Vegetation

AMC PESTICIDE USE PROPOSAL (18 December 2017)

Prothor SC 2	83923-4	Imidacloprid	21.4	Termites, Other Wood Destroying Pests
Quicksilver T&O Herbicide	279-3265	Carfentrazone-ethyl	21.3	Broadleaf
Quincept	228-531	2,4-D/Quinclorac/Dicamba	22.87	Selective Weeds
Raid Ant Baits II	4822-472	Abamectin	0.05	Ants (indoor)
Raid Flying Insect Killer	4822-513	d-trans-Allethrin Permethrin Tetramethrin	0.55	Bees, Hornets, Wasps
RazorPro	228-366	Glyphosate	41	All Vegetation
Resolv	7173-297	Bromadiolone	0.005	Rodents
Rodeo	62719-324	Glyphosate	53.8	All Vegetation
Roundup Pro	524-475	Glyphosate	41	All Vegetation
Roundup ProMax	524-579	Glyphosate	48.7	All Vegetation
Sahara DG	241-372	Diuron Imazapyr	70	All Vegetation
SP 857 Blast'em (16 oz)	67603-11-64695	Tetramethrin/permethrin/piperonyl butoxide, technical	0.4	Bees, Hornets, Wasps
SpectracidePRO® Wasp & Hornet Killer	9688-141-8845	Tetramethrin Permethrin Piperonyl Butoxide	0.85	Bees, Hornets, Wasps
Spectricide Wasp and Hornet Killer	9688-190-8845	Prallethrin Lambda Cyhalothrin	0.035	Bees, Hornets, Wasps
Suspend Polyzone	432-1514	Deltamethrin	4.75	Ants
Telar XP	352-654	Chlorsulfuron	75	Annual Weeds
Tempo SC Dust	432-1373	Cyfluthrin	1	General Household Pests
Tempo SC Ultra	432-1363	Beta-cyfluthrin	11.8	General Household Pests
Temprid SC Ultra	432-1483	Imidacloprid / B-Clyfluthrin	31.5	General Household Pests
TENKoZ Detonate	7969-137-55467	Dicamba Diglycolamine Salt	58.1	Weed, brush

AMC PESTICIDE USE PROPOSAL (18 December 2017)

Termidor SC	7969-210	Fipronil	9.1	Termites, Other Wood Destroying Pests
Terminix AllClear Mosquito Solution	25B Exempt	Garlic Oil	0.4	Mosquito
Tomcat Mouse Killer 1 (16 per bx)	12455-120-3240	Bromethalin	<0.01	Rodents
Tomcat Mouse Killer 2 (4 per bx)	12455-123-3240	Bromethalin	<0.01	Rodents
Transport Mikron	8033-109-279	Acetamiprid / Bifenthren	11	Termites, Other Wood Destroying Pests
Tri-Power	228-262	MCPA/MECOPROP/Dicamba	52.38	Broadleaf
TruPower3	228-551	2,4-D/MECOPROP-p/Dicamba	58.71	Broadleaf
Ultrathon Insect Repellant	58007-1	DEET	34.4	Mosquito
Valent Sureguard	59639-120	Flumioxazin	51	Annual Weeds
Vanquish	228-397	Diglycolamine	56.8	Annual Weeds
VectroBac G	73049-10	Bacillus thuringiensis	2.80	Mosquito
Vessel 3-Way	2217-656-72112	2,4-D MCPP-p Dicamba	41.5	Broadleaf
Victor Roach Magnet	NA	Poison free (pheromone)	Not hazardous material as defined in 29 CFR 1910.1200	Insect

PHASED OUT- NO LONGER APPROVED FOR NEW PURCHASES

D-Con Bait Pellets (6 per bx)	3282-66	Brodifacoum	<0.01	Rodents
D-Con Mouse Prufe II	3282-65	Brodifacoum	0.01	Rodents
Wasp-Freeze	499-362	d-trans allethrin / Phenothrin	0.249	Bees, Hornets, Wasps

Attachment 2

Well Data

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Current Satus of Water Supply Wells as of July 2011

Permit number in regards to Well number

WDID	Well Number	Origanal Permit Number	Abandoned	New well Number	New Permit Number	Location
1406128	Well #1	15720R	b	Same	Same	current location
1406129	Well #2	15721R	b	Same	Same	current location
1406232	Well #3	15722R	b	Same	Same	current location
1406130	Well #4	15723R	c	Well #4	15727R	origanal location new permit # (old well #8)
1406131	Well #5	15724R	b	Same	Same	current location
1406126	Well #6	15725R	a	Well #13	15725RR	relocation of well #6 to current location
1406136	Well #7	15726R	1971	Well #17	15726RR	moved to current location of well #17
1406130	Well #8	15727R	2011	Well #4	15727R	Permit # moved to Well # 4 location
1406133	Well #9	15728R	1971	Well #16	15728RF	moved to current location of well #16
1406134	Well #10	15729R	1971	Well #14	15729RF	moved to current location of well #14
1406135	Well #11	15730R	1971	Well #15	15730RF	moved to current location of well #15
1406127	Well #12	15723RR	b	Same	15723RR	current location of well #12 (well #4 permit #)

a: Well #6 still exists under permit number 15725R and is not abandoned. Permit #15725RR was used in well #13.

b: Well still exists and have not changed in location or permit number.

c: Well #4 was never abandoned and was given Well number 8 's permits number ending in RR

NOTE: Well #6 permit number 15725RR will be abandoned when SWMU 43's NFA is approved

Attn: Larry Woods

Pueblo Army Depot
Pueblo, Colorado

Tabulation of Water Wells

Colorado Registration	Pueblo Army Depot Well No.	Bldg No.	Yield gpm(1)	Depth Feet	Use(2)	Date of Work By Test Survey and Construction	Quantity to be Claimed gpm	cfs	Location All in Twp 20S Rge 62W 6th PM
15720	1	610	51	70	D, I & Irr	24 March 1942	157	.349	NE 1/4 NW 1/4 Section 27
15721	2	611	43	66.5	D, I & Irr	24 March 1942	168	.373	NW 1/4 NE 1/4 Section 27
15722	3	612	100	61	D, I & Irr	24 March 1942	157	.349	SE 1/4 SW 1/4 Section 22
15723 (3)	4	621	110	66	D, I & Irr	24 March 1942	157	.349	NW 1/4 NE 1/4 Section 27
15724	5	620	55	52.6	D, I & Irr	24 March 1942	157	.349	NW 1/4 NE 1/4 Section 27
15725 (4)	6	622	40	64	D, I & Irr	24 March 1942	80	.178	NW 1/4 NE 1/4 Section 27
15726	8	623 Lembke	50	57	Irr	24 March 1942	50	.111	NW 1/4 NE 1/4 Section 27
15727	7	725 McDowell	50	52	D, I & Irr	24 March 1942	50	.111	NW 1/4 SE 1/4 Section 22
15728	9	Driscoll	22	48	Irr	24 March 1942	22	.049	SE 1/4 NW 1/4 Section 3
15729	10	Midwest	40	56.4	Irr	24 March 1942	40	.089	SW 1/4 NW 1/4 Section 9
15730	11		40	50	Standby	24 March 1942	40	.089	SW 1/4 SW 1/4 Section 9
RF953	12	195	100	75	D, I & Irr	1 April 1970	-	-	NW 1/4 NE 1/4 Section 28
RF954	13	190	40	75	D, I & Irr	1 April 1970	-	-	NE 1/4 NW 1/4 Section 28
							1078	2.396	

(1) Yield - Gallons per minute used on Colorado Registration Applications
(2) D - Domestic, I - Industrial, Irr - Irrigation
(3) Original well replaced by RF953
(4) Original well replaced by RF954

450 gpm = 1 second foot
Pueblo Army Depot, Pueblo County, Colorado Water Division 2 District 14

305-1

EXHIBIT 9
3 April 1972