FINAL
Preliminary Assessment Report Wyoming Army National Guard Army Aviation Support Facility Cheyenne, Wyoming

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

January 2021

Prepared for:

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

UNCLASSIFIED

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Acronyms and Abbreviations

AASF	Army Aviation Support Facility
AECOM	AECOM Technical Services, Inc.
AFB	Air Force Base
AFFF	aqueous film forming foam
AOI	area of interest
ARNG	Army National Guard
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
EDR™	Environmental Data Resources, Inc.™
FTA	Fire Training Area
HA	Health Advisories
PA	Preliminary Assessment
PFAS	per- and poly-fluoroalkyl substances
PFBS	Perflourobutane sulfonate
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
RI	Remedial Investigation
SI	Site inspection
UCMR3	Unregulated Contaminant Rule 3
U.S.	United States
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
WYARNG	Wyoming Army National Guard

Executive Summary

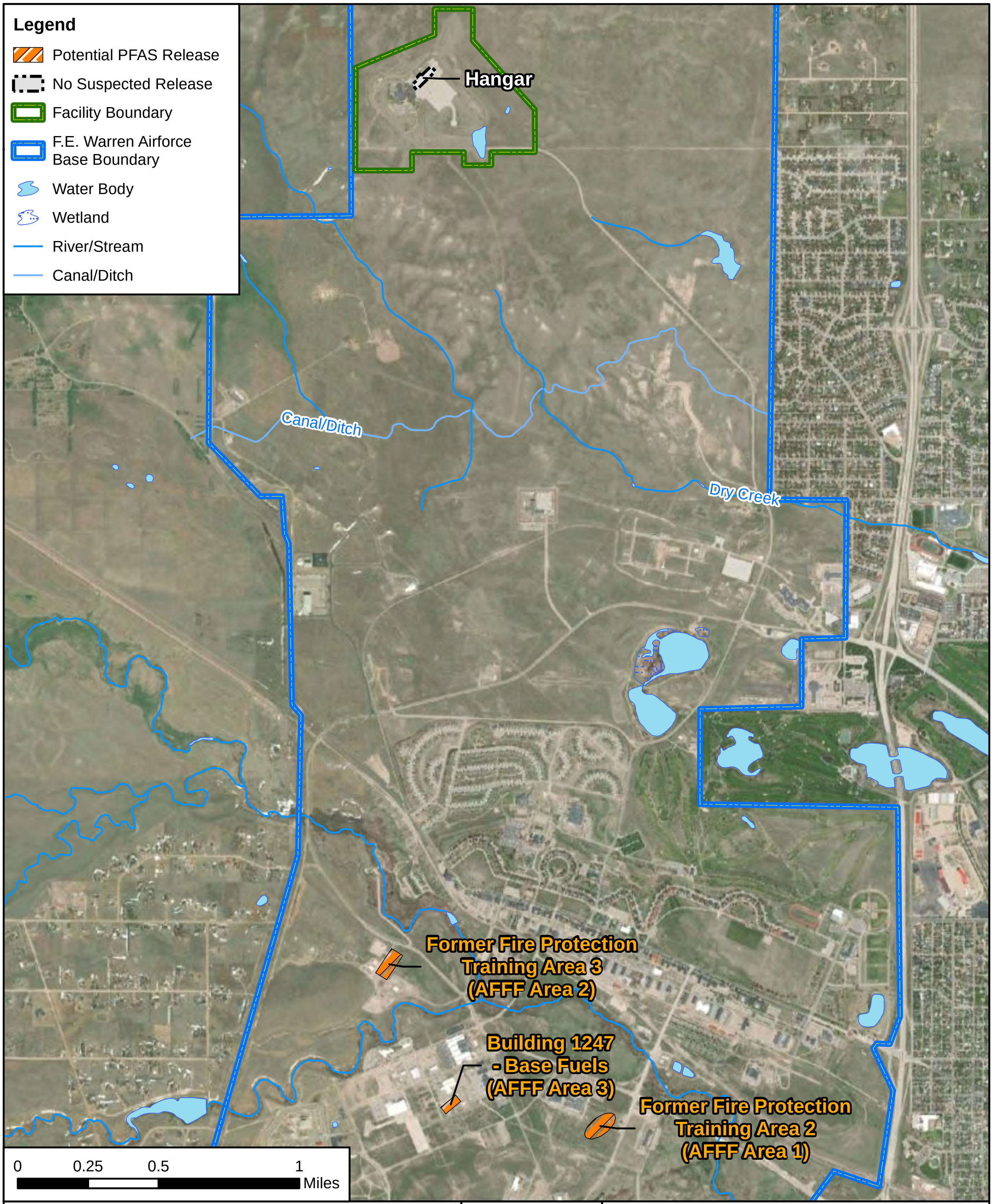
The Army National Guard (ARNG) is performing *Preliminary Assessments (PAs) and Site Inspections (SIs) for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) Impacted Sites at ARNG Facilities Nationwide*. A PA for per- and polyfluoroalkyl substances (PFAS)-containing materials was completed for Wyoming Army National Guard (WYARNG) Army Aviation Support Facility (AASF). The AASF is which is located on F.E. Warren Air Force Base (AFB), Cheyenne, Wyoming. The AASF is owned by the WYARNG and used to provide full-time maintenance support to the Wyoming aviation units. The WYARNG AASF encompasses approximately 44 acres of F.E. Warren AFB and was constructed in 2010. The performance of this PA included the following tasks:

- Reviewed available administrative record documents and Environmental Data Resources, Inc. (EDR)™ report packages to obtain information relevant to potential PFAS releases, such as: drinking water well locations, historical aerial photographs, Sanborn maps, and environmental compliance actions in the area surrounding the facility;
- Conducted a site visit on 8 May 2018 and completed visual site inspections at locations where PFAS-containing materials were suspected of being stored, used, or disposed; and
- Interviewed current WYARNG AASF personnel during the site visit.

No Areas of Interest related to potential PFAS releases was identified at WYARNG AASF during the PA. The summary of PA findings is shown on **Figure ES-1**.

Based on the United States Environmental Protection Agency Unregulated Contaminant Monitoring Rule 3 (UCMR 3) data, it was indicated that no PFAS were detected in a public water system above the United States Environmental Protection Agency (USEPA) Health Advisory level within 20 miles of the facility (USEPA, 2015). PFAS analyses performed in 2016 had method detection limits that were higher than currently achievable. Thus, it is possible that low concentrations of PFAS were not detected during the UCMR3 but might be detected if analyzed today.

Based on the documented absence of the use/release of PFAS-containing materials at the AASF, evidence does not support current or former WYARNG activities having contributed to PFAS contamination in soil, groundwater, surface water or sediment at the AASF or adjacent areas. Therefore, the AASF will not move forward in the Comprehensive Environmental, Response, Compensation, and Liability Act process.



CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at WYARNG AASF, WY			
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SCALE	1:31,680	CHK BY	VK	1/11/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	1/11/2021

Summary of Findings

AECOM
12420 Milestone Center Drive
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Figure ES-1

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1. Introduction

1.1 Authority and Purpose

The Army National Guard (ARNG) G9 is the lead agency in performing *Preliminary Assessments (PAs) and Site Inspections (SIs) for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) at Impacted Sites at ARNG Facilities Nationwide*. This work is supported by the United States (US) Army Corps of Engineers (USACE) Baltimore District and their contractor AECOM Technical Services, Inc. (AECOM) under Contract Number W912DR-12-D-0014, Task Order W912DR17F0192, issued 11 August 2017.

The ARNG is assessing potential effects on human health related to processes at their facilities that used per-and poly-fluoroalkyl substances (PFAS) (a suite of related chemicals), primarily releases of aqueous film forming foam released during firefighting activities or training, although other sources of PFAS are possible. In addition, the ARNG is assessing businesses or operations adjacent to the ARNG facility (not under the control of ARNG) that could potentially be responsible for a PFAS release.

PFAS are classified as emerging environmental contaminants that are garnering increasing regulator interest due to their potential risks to human health and the environment. PFAS formulations contain highly diverse mixtures of compounds. Thus, the fate of PFAS compounds in the environment varies. The regulatory framework at both federal and state levels continues to evolve. The U.S. Environmental Protection Agency (USEPA) issued Drinking Water Health Advisories (HAs) for PFOA and PFOS in May 2016, but there are currently no promulgated national standards regulating PFAS in drinking water.

This report presents findings of a PA for PFAS-containing materials at the Wyoming Army National Guard (WYARNG) Army Aviation Support Facility (AASF) in Cheyenne, Wyoming, in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, the National Oil and Hazardous Substances Pollution Contingency Plan (40 Code of Federal Regulations Part 300), and Department of the Army requirements and guidance.

This PA Report documents where PFAS may have been released into the environment. The term PFAS will be used throughout this report to encompass all PFAS chemicals being evaluated, including PFOS and PFOA, which are key aqueous film forming foam (AFFF) components.

1.2 Preliminary Assessment Methods

The performance of this PA included the following tasks:

- Reviewed available administrative record documents and Environmental Data Resources, Inc. (EDR)™ report packages to obtain information relevant to potential PFAS releases, such as: drinking water well locations, historical aerial photographs, Sanborn maps, and environmental compliance actions in the area surrounding the facility;
- Conducted a site visit on 8 May 2018 and completed visual site inspections at locations where PFAS-containing materials were suspected of being stored, used, or disposed; and
- Interviewed current WYARNG AASF personnel during the site visit.

1.3 Report Organization

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

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

1.4 Facility Location and Description

The WYARNG AASF covers approximately 44 acres within the boundaries of the F.E. Warren Air Force Base (AFB). F.E. Warren AFB, originally Fort D.A. Russell, was established in 1867 on the branch of the South Platte River. Originally named in honor of Civil War Brigadier General David A. Russell, F.E. Warren AFB is the oldest continuously active military installation in the Air Force. It's home to the 90th Missile Wing and Headquarters, 20th Air Force, of Air Force Global Strike Command (Aerostar, 2018).

The WYARNG AASF encompasses approximately 41 acres of F.E. Warren AFB and was constructed in 2010. The AASF is owned by the WYARNG and used to provide full-time maintenance support to the Wyoming aviation units. The WYARNG AASF is in southeastern Wyoming approximately 7 miles west of Cheyenne, Wyoming. (**Figure 1-1**). Land use surrounding F.E. Warren AFB ranges from agricultural to residential housing with Cheyenne to the east, and primarily agricultural areas to the north and west (Aerostar, 2018).

1.5 Facility Environmental Setting

Environmental information found in Section 1.5 for this PA was adapted in part from the Final Preliminary Assessment Report for Perfluorinated Compounds at F.E. Warren Air Force Base Wyoming (CH2M Hill, 2015).

1.5.1 Geology

As indicated in the 2019 EDR™ report (**Appendix A**), most of the region is underlain by tertiary units that are of sedimentary origin and consist of sand, gravel, clay, siltstone, and limestone. These units are overlain by Quaternary sediments that include alluvial terrane and floodplain deposits. These sediments are generally unconsolidated and consist of lenticular beds of clay, silt, sand, gravel, and boulders.

Beneath the installation, the late Miocene-aged Ogallala unit can be described as a heterogeneous mixture of sand and gravel beds, silt, clay, and thin limestone units. The beds are sometimes cemented by calcium carbonate, Lenses of sand and gravel are generally sporadic, but consistently occur from the surface to a depth of about 10 feet below ground surface (bgs) in the southwestern part of F.E. Warren AFB. Below this depth, the predominant sediments are fine-grained, but sand and gravel still occur. The Ogallala is about 300 feet thick in the northern part of the installation, thinning to the south to approximately 30 feet in the valley where it has been deeply eroded (CH2M Hill, 2015).

1.5.2 Hydrogeology

The unconfined High Plains aquifer is the principal source for water supply wells in the area surrounding F.E. Warren AFB. Numerous wells near the AFB are used for domestic and livestock water supply. Depth to the water table in this area is variable, being at the land surface near streams that act as discharge areas and increasing in depth with distance from discharge areas. In the southern portion of the installation, the depth to the water table generally ranges from about 10 to 40 feet bgs. The direction of groundwater flow in the shallow aquifer zone is generally toward the discharge areas of Crow Creek, Diamond Creek, and the unnamed tributary to Crow Creek **(Figure 1-2)**. Groundwater beneath the AFB is recharged locally by some areal infiltration of precipitation despite the relatively dry climate. Groundwater is discharged via evapotranspiration in the riparian areas, flow into streams, and springs and seeps near the streams.

Drinking water at F.E. Warren AFB is obtained from the Cheyenne Public Utilities, which uses both groundwater and surface water sources. The City owns and operates about 35 groundwater wells located west and northwest of Cheyenne. The wells pump from the Ogallala and White River Aquifers. Surface water is collected from the Douglas Creek Drainage, located in the Snowy Range Mountains, about 75 miles west of Cheyenne. Surface water is also collected from the Crow Creek Drainage, located in the Pole Mountain/Vedauwoo area, about 30 miles west of Cheyenne (Board of Public Utilities, 2014). All drinking water sources used by the City of Cheyenne are located upstream or upgradient of the F.E. Warren watershed. No active or contingent drinking water wells are located on the installation (CH2M Hill, 2015). Based on the United States Environmental Protection Agency (USEPA) Unregulated Contaminant Monitoring Rule 3 (UCMR3) data, it was indicated that no PFAS were detected in a public water system above the USEPA Lifetime Health Advisory level within 20 miles of the facility (USEPA, 2015). PFAS analyses performed in 2016 had method detection limits that were higher than currently achievable. Thus, it is possible that low concentrations of PFAS were not detected during the UCMR3 but might be detected if analyzed today.

1.5.3 Hydrology

Surface water at F.E. Warren AFB occurs as stream flow, seeps, and lakes. Stream flow results from groundwater discharge and from rainfall and snowmelt runoff. Crow Creek is the major perennial stream that drains southern areas of the AFB and a gaining stream (that is, receives groundwater discharge). Two tributaries to Crow Creek also drain the southern part of the AFB: an unnamed tributary and Diamond Creek **(Figure 1-3)**. The unnamed tributary is an interrupted stream, with alternating reaches that are perennial, intermittent, or ephemeral. Diamond Creek, the second largest stream on F.E. Warren AFB, is perennial along most of its length, with low flows maintained by groundwater discharge. The upper reach of Diamond Creek, covering the first 300 yards, is intermittent. Diamond Creek is also a gaining creek across the AFB except in periods of loss during the warmer months of July through September. These stream discharge losses are likely due to evaporation. Seeps contribute to stream flows in Crow Creek and its unnamed tributary throughout the year (CH2M Hill, 2015).

1.5.4 Climate

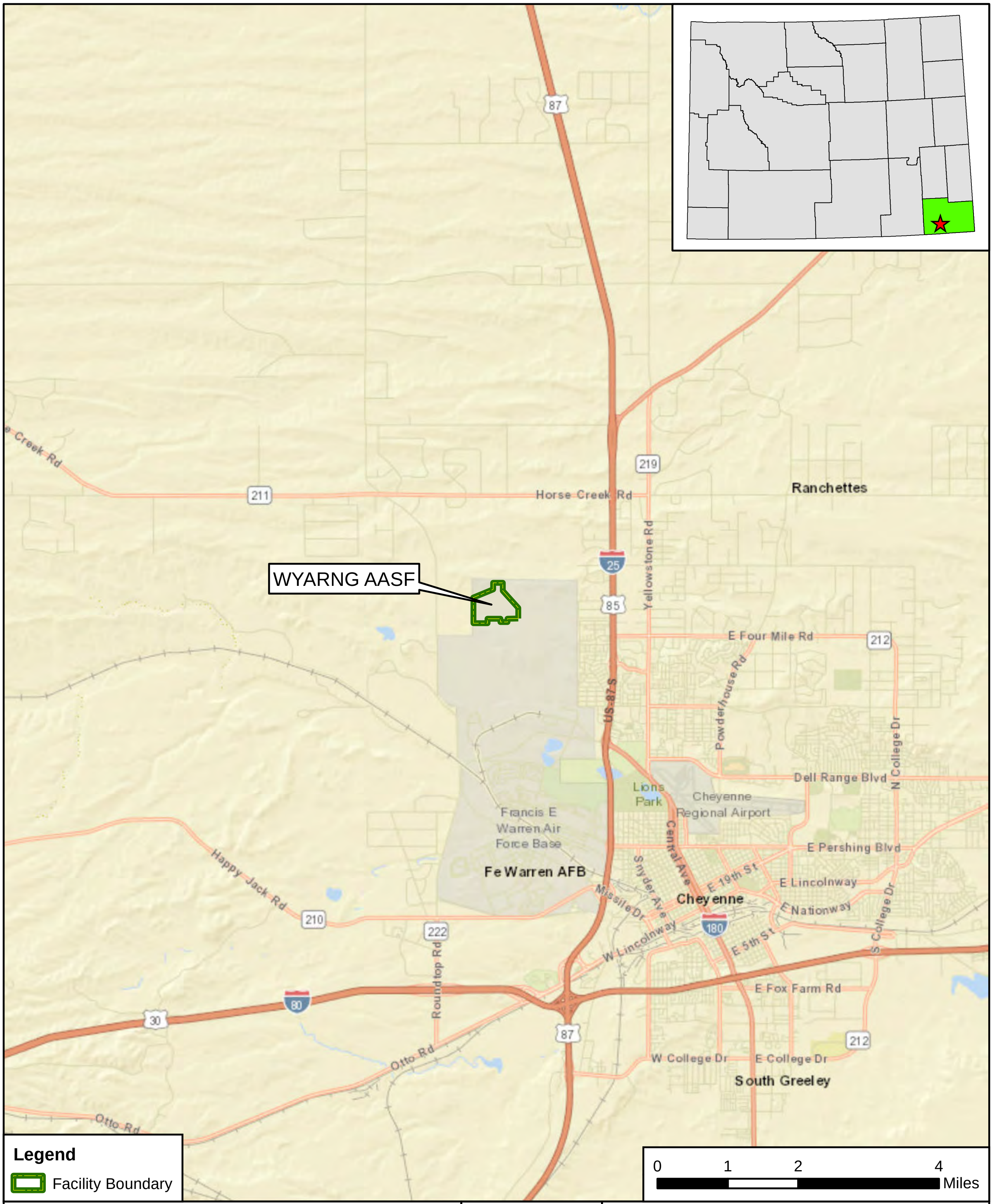
F.E. Warren AFB is near the Front Range of the Rocky Mountains and on the high plains. Located in a fairly dry region of the country, the AFB receives about 14 inches of moisture per year in the form of rain or snowmelt and has an average winter snowfall of 52 inches. Snowfall is common nine months out of the year due to the high plains environment (more than 6,000 feet above sea level.) The first snowfall of the season typically occurs in late September and the last snowfall occurs in May.

Winter months are usually dry and windy with wind gusts commonly more than 50 mph. Blowing and drifting snow create particularly hazardous conditions for winter travel. All of the major highways leading through Cheyenne occasionally close due to severe winter weather. Average winter temperatures range from the 30s during the day to teens overnight. Cold snaps that can plunge temperatures and wind chills below zero are typically short lived.

Spring and summer seasons are the wettest times of the year with more than two inches of moisture per month from April to July. Severe thunderstorms occur in the late spring to summer months and can result in flash flooding conditions, large hail and even occasional tornadoes. The peak of the tornado season along the Front Range is June, while the greatest flash flooding potential exists in July and August. Average summer temperatures are pleasant, due in part to the low humidity, with most days in the low 80s for highs and 50s for overnight lows. (F.E. Warren, 2017).

1.5.5 Current and Future Land Use

The WYARNG AASF serves as a year-round maintenance facility to support WYARNG aviation units. The facility is developed with several buildings and related infrastructure including paved roadways and parking areas. Access to the facility is controlled, and land use surrounding the facility is owned and operated by the U.S. Air Force. Reasonably anticipated future land use is not expected to change from the current land use, which ranges from agricultural to residential housing with Cheyenne to the east, and primarily agricultural areas to the north and west (Aerostar, 2018) .



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Base Map: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI,		PM	RG	3/29/2019

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Facility Location

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Figure 1-1

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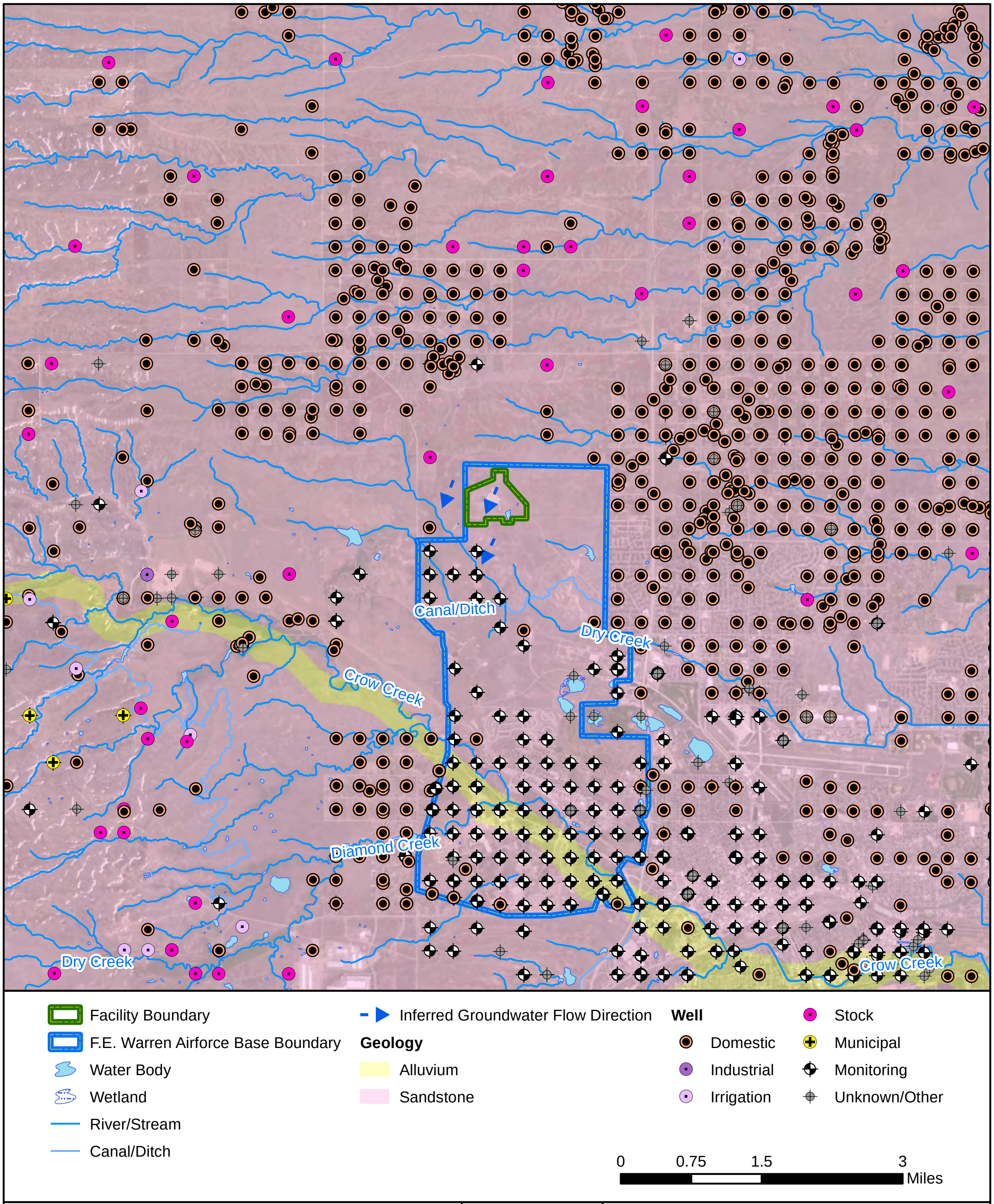

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Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	9/9/2020

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Groundwater Features

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Figure 1-2

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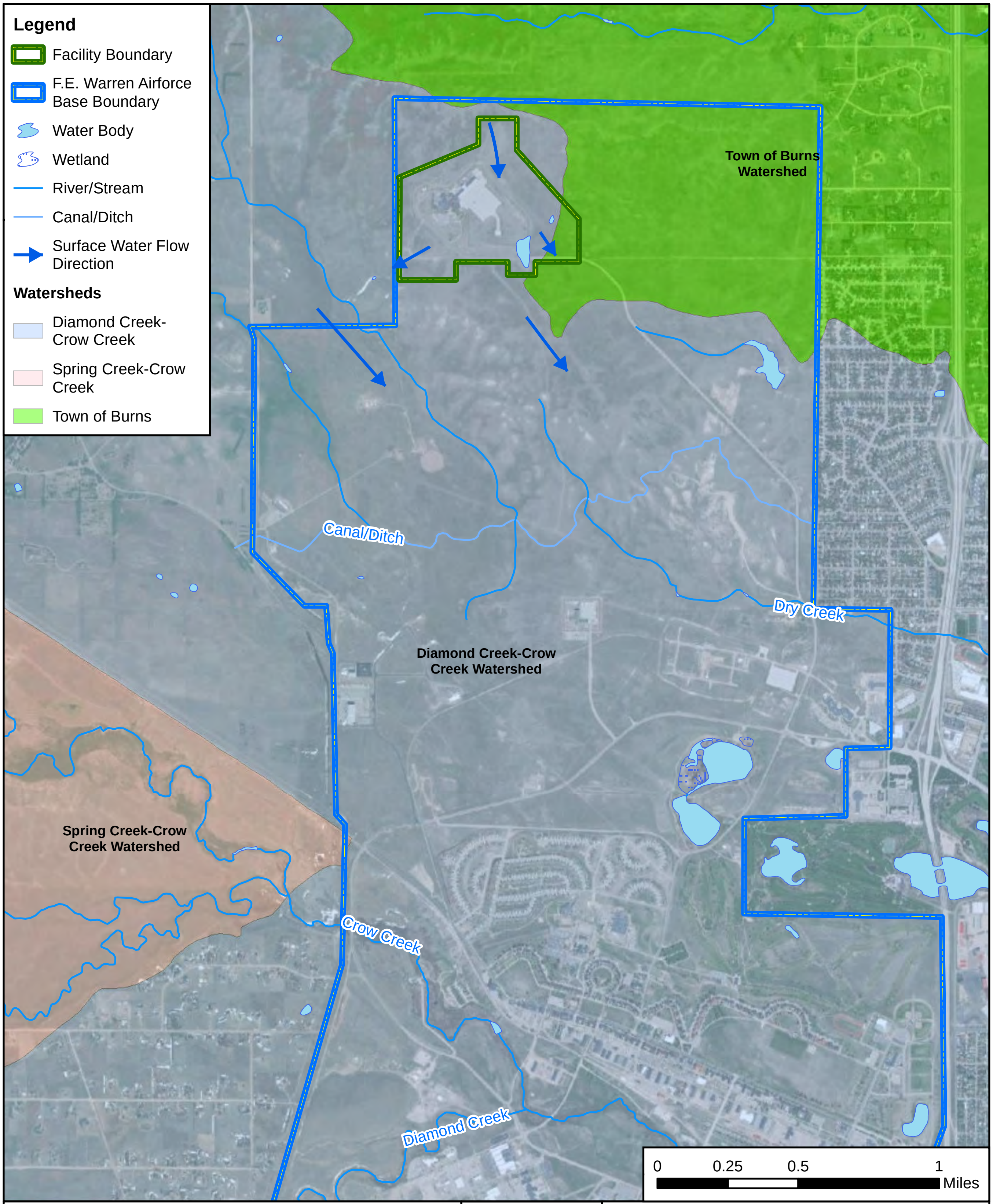

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Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	9/9/2020

Surface Water Features

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Figure 1-3

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2. Fire Training Areas

No FTAs were identified at the WYARNG AASF during this PA.

3. Non-Fire Training Areas

In addition to FTAs, the PA evaluated areas where PFAS-containing materials may have been broadly used, stored, or disposed. This may include buildings with fire suppression systems, paint booths, AFFF storage areas, and areas of compliance demonstrations. Information on these features obtained during the PA are included in **Appendices A** and **B**. One non-FTA where Jet-X was potentially released at the AASF was identified during this PA. A description of the non-FTA is presented below and shown on **Figure 3-1**.

3.1 WYARNG Army Aviation Support Facility Hangar

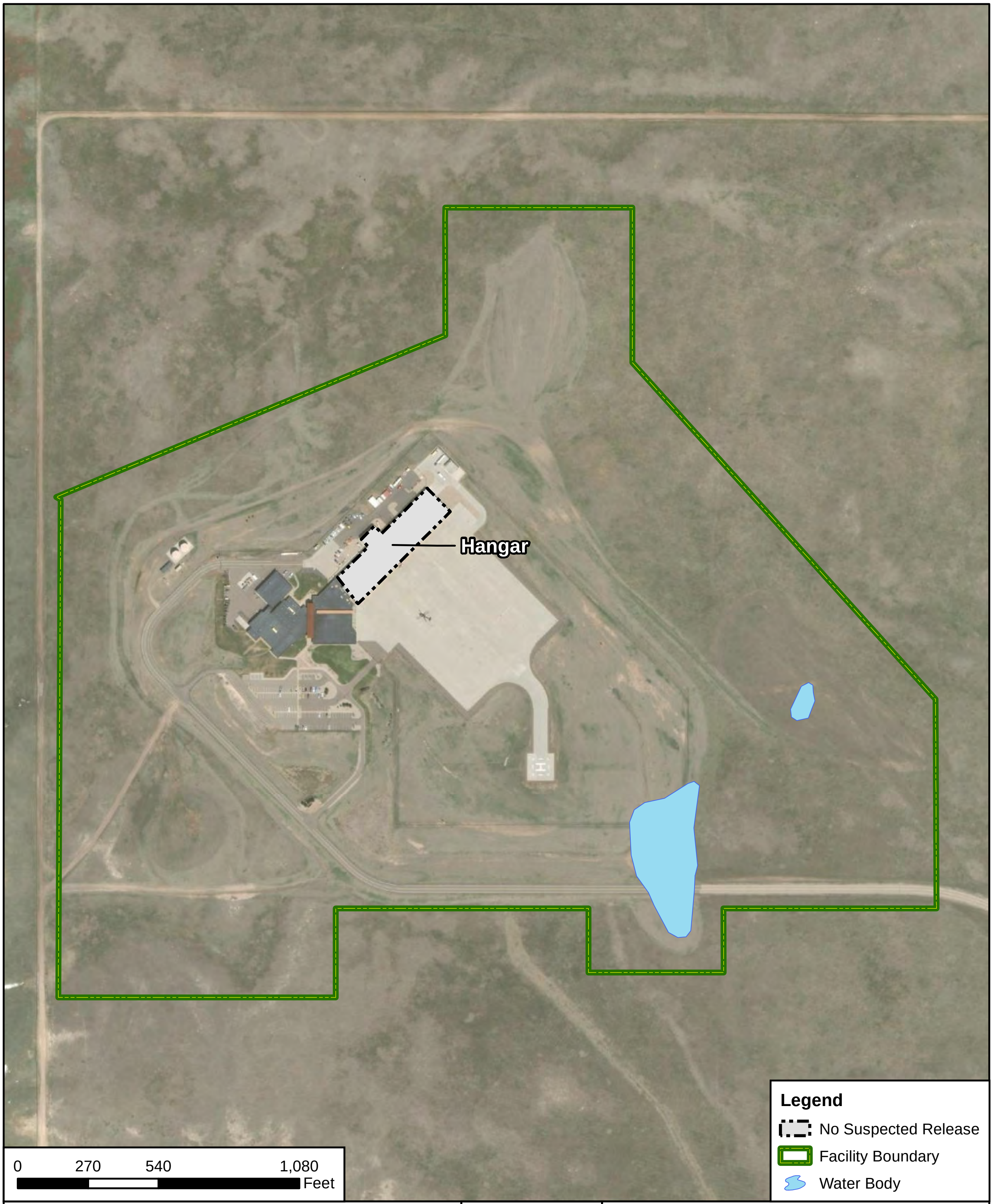
Construction of the AASF was completed in 2010. The geographic coordinates are 41°11'45.5"N and 104°52'14.0"W. The Hangar is equipped with a fire suppression system that includes a 55-gallon tank containing Jet-X 2.75%. A full system release during facility commissioning on 2 April 2010. The Jet-X released within the hangar was allowed to dissipate through the floor drains and surrounding drains outside the hangar doors onto the tarmac and surrounding area.

A second release occurred on 11 June 2011, at the east hangar and was a full system release leaving approximately 5-feet of foam. Personnel opened the hangar doors and the foam was moved outside the hangar and allowed to dissipate on the ramp. surrounding area. The internal floor drains were blocked, but the drains by the hangar doors were open.

A third release occurred on 8 August 2011 when a contractor crushed a thermal wire. A minimal amount of foam was released from the fire suppression system and discharged to the floor drain.

Release areas that were allowed to dissipate, along with stormwater within the perimeter of the AASF, flow via catch basins to the oil water separator, then on to the local septic system, and finally to the Cheyenne Municipal Wastewater Treatment Facility.

According to the manufacturer’s technical specifications, Jet-X 2.75% is a hydrocarbon surfactant, and therefore does not contain PFAS. Additionally, it is unclear if any AFFF containing PFAS was ever stored, used, or released at WYARNG AASF. However, in the absence of known PFAS-containing materials, the Hangar is not considered a suspected PFAS release area.



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Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	1/11/2021

Non-Fire Training Areas

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Figure 3-1

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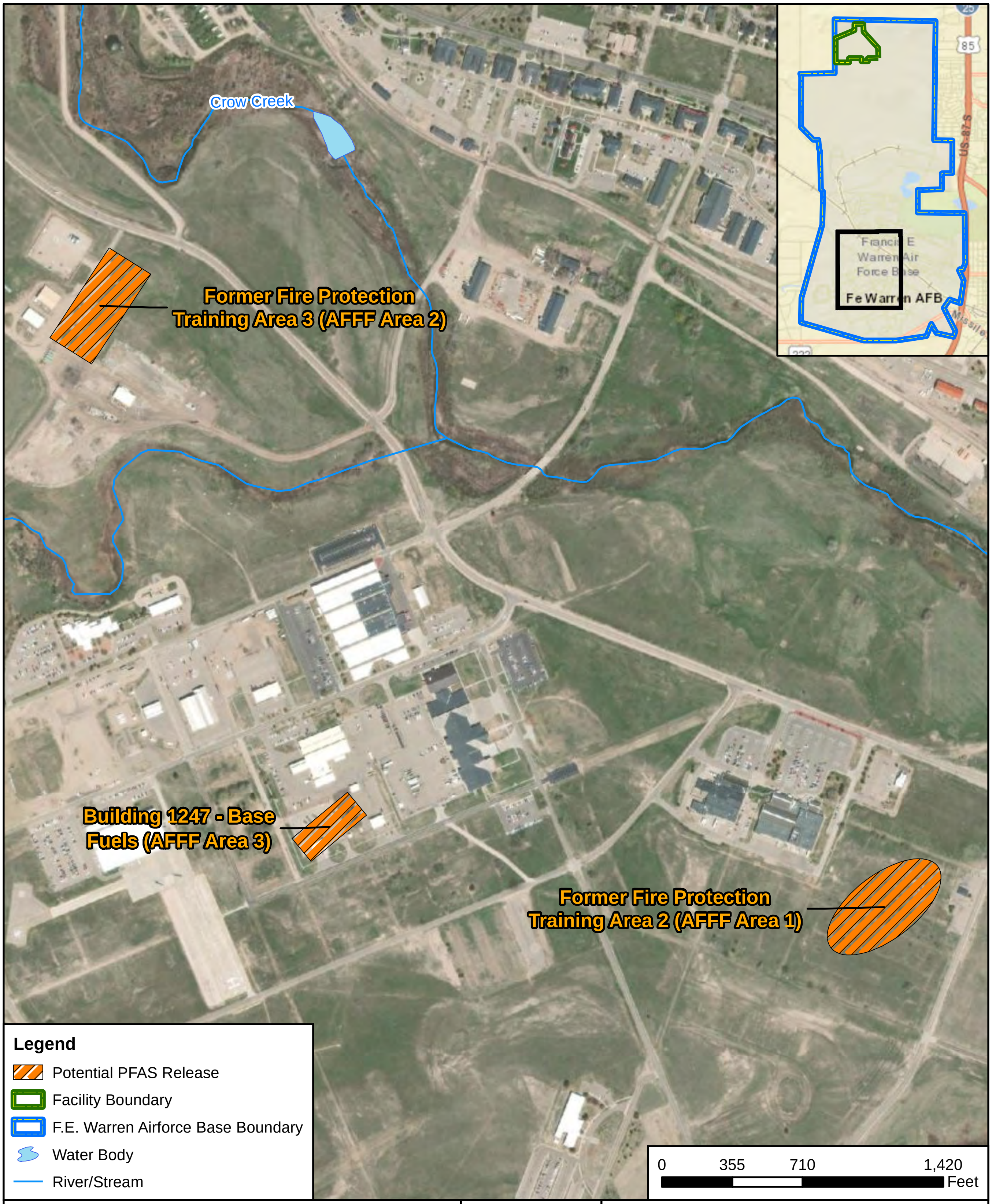
4. Emergency Response Areas

No instances of emergency response areas were identified at or adjacent to the WYARNG AASF during the PA through interviews or EDR™ Reports. All emergency services are provided by F.E. Warren AFB. The F. E. Warren AFB emergency service records were not reviewed during the PA to determine if there were any emergencies responses adjacent to the WYARNG AASF.

5. Adjacent Sources

The Air Force conducted both a PFAS PA (CH2M Hill, 2015) and a SI (Aerostar. 2018) at F.E. Warren AFB (**Appendix A**). During the PA, 10 potential release areas were identified; however, only three locations were recommended for an SI. The locations included the Former Fire Protection Training Area 2 (AFFF Area 1), Former Fire Protection Training Area 3 (AFFF Area 2) and Building 1247 (AFFF Area 3) (**Figure 5-1**). Based on the findings of the SI, PFOA and PFOS groundwater concentrations were reported above the USEPA HAs (70 parts per trillion) at all three locations. In addition, surface soil concentrations at the Protection Training Area 2 (AFFF Area 1) and Building 1247 (AFFF Area 3) exceeded the USEPA regional screening levels for soil.

All three sites were recommended for an expanded SI as well as a Remedial Investigation for further investigation under the CERCLA process. Based on groundwater flow, these sites are located downgradient of the WYARNG AASF and the documented PFAS releases should not have an impact on the WYARNG AASF.



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Adjacent Sources

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Figure 5-1

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6. Preliminary Conceptual Site Model

Based on the PA findings, no AOIs were identified at the AASF. A conceptual site model identifies the three components necessary for a potentially complete exposure pathway: (1) source, (2) pathway, and (3) receptor. If any of these elements are missing, the pathway is considered incomplete.

Based on the findings of this PA, no PFAS sources originated at the AASF or from activities associated with the AASF; therefore, there is no complete exposure pathway to potential receptors.

7. Conclusions

This report presents a summary of available information gathered during the PA on the use and storage of AFFF at the AASF. The PA findings are based on the information presented in **Appendix A** and **Appendix B**.

7.1 Findings

Based on information obtained during interviews conducted with facility personnel who have been familiar with the facility since 2010 and reviewed documentation, no AOIs related to PFAS releases were identified at the AASF. While adjacent sources were identified, evidence obtained during the PA does not support that current or former ARNG facility activities have contributed to PFAS contamination in soil, groundwater, surface water, or sediment. Therefore, the pathways to all human receptors are incomplete. A summary of the PA findings are presented on **Figure 7-1**.

7.2 Uncertainties

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

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

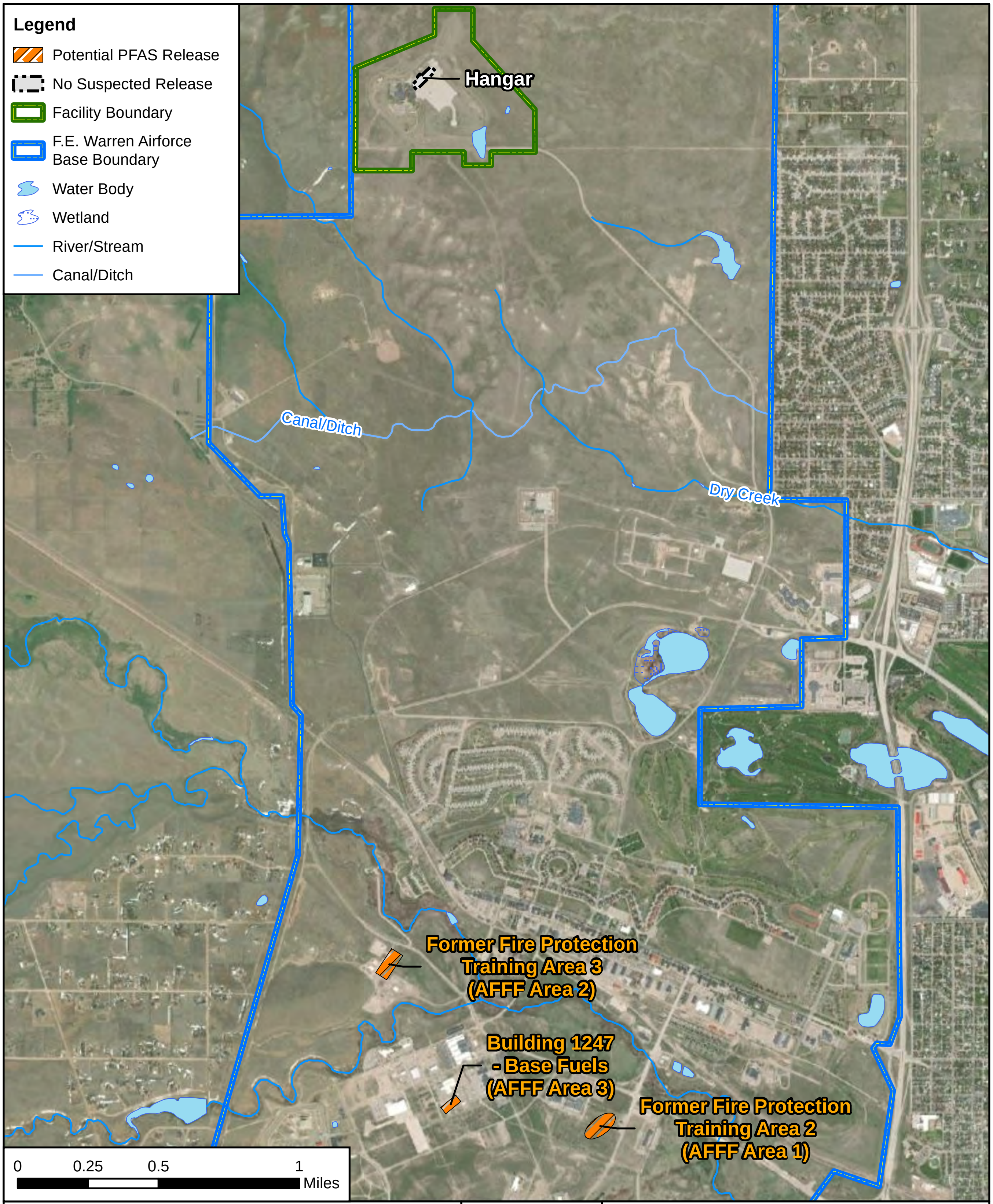
In order to minimize the level of uncertainty, readily available data regarding the use and storage of PFAS were reviewed, current personnel were interviewed, multiple personnel were interviewed for the same potential source area, and potential source areas were visually inspected. The uncertainties associated with the PA are summarized in **Table 7-1**.

Table 7-1: Uncertainties

Area of Interest	Source of Uncertainty
AOI 1 WYARNG AASF	It is unclear if any AFFF containing PFAS was ever stored, used, or released at WYARNG AASF.

7.3 Potential Future Actions

Based on the documented absence (2010 to present) of the storage, use or release of PFAS-containing materials at the AASF, no AOIs were identified during the PA. Evidence does not support that current or former ARNG activities have contributed to PFAS contamination to soil, groundwater, surface water, or sediment at the facility or adjacent areas. Therefore, the facility will not move forward in the CERCLA process.



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Summary of Findings

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Figure 7-1

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USEPA. 2015. *2013-2015 Environmental Occurrence Data for the Unregulated Contaminant Monitoring Rule (UCMR)* https://www.epa.gov/dwucmr/occurrence-data-unregulated-contaminant-monitoring-rule#3.

USEPA. 1991. *Guidance for Performing Preliminary Assessments under CERCLA*. EPA/540/G-91/013. September 1991.

Appendix A
Data Resources

Data Resources will be provided separately on CD. Data Resources for WYARNG AASF include:

Previous Investigations Completed at F.E. Warren Air Force Base

- Final Preliminary Assessment Report for Perfluorinated Compounds at F.E. Warren Air Force Base Wyoming. December 2015
- Final Site Inspection Report of Aqueous Film Forming Foam Areas at F.E. Warren Air Force Base Laramie County, Wyoming. August 2018.

WYARNG AASF EDR Report

- 2019 WYARNG AASF EDR Report

Final
Site Inspection Report
of Aqueous Film Forming Foam Areas at
F.E. Warren Air Force Base
Laramie County, Wyoming

August 2018

Submitted to:

Air Force Civil Engineer Center
3515 General McMullen Suite 155
San Antonio, Texas 78226-2018

Submitted by:

U.S. Army Corps of Engineers
Omaha District
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Omaha, Nebraska 68102-4901

Prepared by:

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under
Contract No. W9128F-15-D-0051
Delivery Order No. 0003

Final
Site Inspection Report
of
Aqueous Film Forming Foam Areas
at
F.E. Warren Air Force Base
Laramie County, Wyoming

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Acronyms and Abbreviations

#	number
%	percent
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
AFB	Air Force Base
AFCEC	Air Force Engineering Center
AFFF	aqueous film forming foam
amsl	above mean sea level
ASL	Aerostar SES LLC
bgs	below ground surface
btoc	below top of casing
CSM	conceptual site model
DW	drinking water
EPA	Environmental Protection Agency
EZ	exclusion zone
ft	foot/feet
FPTA	fire protection training area
GPS	global positioning system
GW	groundwater
HA	health advisory
HDPE	high-density polyethylene
HQ	hazard quotient
ID	identification
IRP	Installation Restoration Program
J	Reported concentration is an estimated value.
JP-4	jet propellant fuel number 4
MDL	method detection limit
mg/kg	milligrams per kilogram
ML	silt
N/A	not applicable
ND	not detected
NL	not listed
OU	operable unit
OWS	oil/water separator
PA	preliminary assessment
PFAS	per- and polyfluorinated alkyl substances
PFBS	perfluorobutane sulfonate
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
pH	potential of hydrogen
PID	photoionization detector
PPE	personal protective equipment
QAPP	quality assurance project plan
QC	quality control
RI	remedial investigation
RSL	Regional Screening Level
SD	sediment
SI	site inspection
SM	silty sand

SO	subsurface soil
SS	surface soil
SW	surface water
TCE	trichloroethylene
TCLP	toxicity characteristic leaching procedure
TOC	total organic carbon
U	Analyte was not detected above the reported value.
U.S.	United States
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USCS	Unified Soil Classification System
WSEO	Wyoming State Engineer's Office

1.0 INTRODUCTION

Aerostar SES LLC (ASL), under contract to the United States (U.S.) Army Corps of Engineers (USACE) Omaha District (Contract No. W9128F-15-D-0051, Deliver Order No. 0003), conducted screening-level site inspections (SIs) at three suspected aqueous film forming foam (AFFF) release areas at F.E. Warren Air Force Base (AFB), Laramie County, Wyoming (Figure 1, Appendix A). The purpose of the inspections is to determine the presence or absence of perfluorooctanoic acid (PFOA), perfluorobutane sulfonate (PFBS), and perfluorooctane sulfonate (PFOS) in the environment at these areas. The SIs were conducted in accordance with contract requirements (USACE, July 2015), the quality assurance project plan (QAPP) (ASL, March 2016), and the F.E. Warren AFB site-specific addendum to the QAPP (ASL, August 2017). The QAPP and the QAPP addendum were prepared in accordance with U.S. Environmental Protection Agency (EPA) guidance (EPA, March 2012) and Air Force Civil Engineer Center (AFCEC) requirements.

PFOA and PFOS are in a class of synthetic fluorinated chemicals used in industrial and consumer products, including defense-related applications. This class of compounds is also referred to as per- and polyfluorinated alkyl substances (PFAS). In 1970, the U.S. Air Force (USAF) began using AFFF (firefighting agents containing PFOA and PFOS) to extinguish petroleum fires. Releases of AFFF to the environment routinely occured during fire training, equipment maintenance, storage, and use. Although manufacturers have reformulated AFFF to eliminate PFOS, the EPA continues to permit the use of PFOS-based AFFF, and the USAF maintains a significant inventory of PFOS-based AFFF. As of this report, the USAF is actively removing PFOS-based AFFF from its inventory and replacing it with formulations based on shorter carbon chains, which may be less persistent and bioaccumulative in the environment.

The objectives of the SI were to

- determine if a confirmed release of PFOS, PFOA, and PFBS has occurred at the area selected for inspection;
- determine if PFOS and/or PFOA are present in groundwater or surface water at the inspection area at concentrations exceeding the EPA lifetime health advisory (HA) for drinking water (EPA, May 2016a; EPA, May 2016b);
- determine if PFBS, PFOA, and/or PFOS are present in soil or sediment at the inspection area at concentrations exceeding calculated screening levels; and
- identify potential receptor pathways with immediate impacts to human health (immediate impact to human health is considered consumption of drinking water with PFOS or PFOA above the EPA HAs or PFBS above the regional screening level [RSL]) (EPA, May 2018).

The objectives of the SI were to identify any releases of AFFF that resulted in PFOS, PFOA, and/or PFBS contamination in the environment above the project screening levels and identify any possible human exposure to drinking water above the HA levels. This report does not include assessment of ecological exposure pathways, receptors, or risk from PFAS impacts to the environment. Confirmed releases may require further investigation to fully delineate the extent of contamination and perform a complete risk assessment that includes ecological receptors.

After publication of the site-specific QAPP addendum (ASL, August 2017), the USAF determined that more conservative screening levels were appropriate. Therefore, screening levels for PFOS and PFOA in soil and sediment were calculated using the EPA RSL calculator with a target hazard quotient (HQ) of 0.1. Appendix F presents the RSL calculations for soil and sediment based on a Tier 3 toxicity value reference dose of 0.00002 milligrams per kilogram per day derived by EPA in its drinking water HAs for

PFOA (EPA, May 2016a) and PFOS (EPA, May 2016b). Screening levels for PFOS and PFOA in groundwater and surface water are based on EPA lifetime drinking water HAs for PFOA (EPA, May 2016a) and PFOS (EPA, May 2016b). A release was considered confirmed when exceedances of the following concentrations were identified.

PFOS:

- 0.07 micrograms per liter (µg/L) in groundwater (combined with PFOA value).
- 0.07 µg/L in surface water (combined with PFOA value).
- 126 micrograms per kilogram (µg/kg) in soil (calculated RSL values).
- 126 µg/kg in sediment (calculated RSL values).

PFOA:

- 0.07 µg/L in groundwater (combined with PFOS value).
- 0.07 µg/L in surface water (combined with PFOS value).
- 126 µg/kg in soil (calculated RSL).
- 126 µg/kg in sediment (calculated RSL).

Although PFOS and PFOA are the focus of the HA and provide specific targets for the USAF to address in this SI, the EPA has also derived RSLs for PFBS for which there is a Tier 2 toxicity value (Provisional Peer Reviewed Toxicity Value). The USAF also considers a release to be confirmed when exceedances of the following RSL concentrations (HQ = 0.1) are identified:

PFBS:

- 40 µg/L in groundwater/surface water.
- 130,000 µg/kg in residential soil/sediment.
- 13 µg/kg in soil leaching to groundwater.

PFOA, PFOS, and PFBS are herein referred to collectively as PFAS compounds.

Table 1 presents the screening values used for comparing the analytical results for each of the PFAS compounds.

Table 1 Regulatory Screening Values

Parameter	Chemical Abstracts Number	EPA Regional Screening Level Table (May 2018 HQ=0.1)[a]			Calculated Regional Screening Levels for Soil and Sediment[b] (µg/kg)	EPA Health Advisory for Drinking Water (Surface Water or Groundwater) (µg/L)[c]
		Residential Soil (µg/kg)	Soil Leaching to Ground-water (µg/kg)	Tap Water (µg/L)		
Perfluorobutane sulfonate (PFBS)	29420-43-3	130,000	13	40	NL	NL
Perfluorooctanoic acid (PFOA)	335-67-1	NL	NL	NL	126	0.07[d]
Perfluorooctane sulfonate (PFOS)	1763-23-1	NL	NL	NL	126	

[a] EPA Regional Screening Levels (May 2018) (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables).
[b] Screening levels were calculated using the EPA Regional Screening Level calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search). [c] EPA, May 2016a. *Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA)* and EPA, May 2016b. *Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS)*. [d] When both PFOA and PFOS are present and the combined concentration of PFOA and PFOS are compared with the 0.07 µg/L health advisory level.

µg/kg = micrograms per kilogram	µg/L = micrograms per liter	EPA = Environmental Protection Agency
HQ = hazard quotient	NL = not listed	

A preliminary assessment (PA) conducted in August 2015 identified two locations at F.E. Warren AFB where releases of AFFF may have occurred and further investigation was needed, as summarized on Table 2 (CH2M Hill, December 2015). An additional area that was identified in the PA but not recommended for inspection was also included in the SI at the request of AFCEC personnel. AFFF areas are discussed in Section 2.0 and are shown on Figure 2 in Appendix A. Media evaluated from the AFFF areas included surface soil, subsurface soil (collected in the vadose zone immediately above the water saturated-unsaturated soil interface), groundwater, surface water, and sediment.

Unless otherwise noted, this SI was conducted in accordance with the QAPP (ASL, March 2016) and the F.E. Warren AFB site-specific addendum to the QAPP (ASL, August 2017).

Table 2 AFFF Area and Selection Rationale for Site Inspections at F.E. Warren AFB

AFFF Area Number	AFFF Inspection Area	Associated Existing IRP Site ID	Rationale
1	Former FPTA 2	FT009	• Two bermed training pits where AFFF was used to extinguish training fires. • Training pits were unlined. • No retention ponds present.
2	Former FPTA 3	N/A	• One lined pit connected to an OWS and lined retention pond. • AFFF was used to extinguish training fires in the lined pit. • Liner beneath the training pit leaked.
3	Building 1247–Base Fuels	N/A	• Building has an active AFFF system with overhead lines. • Floor drains in the building flow via underground pipes to an OWS then to the sanitary sewer and can be diverted from the OWS to a lined containment pond northeast of the building. • A known release of AFFF occurred inside the building bay, but it is unclear if the AFFF went to the OWS or the lined containment pond. • In the past, when the containment pond has filled with stormwater, water is pumped from the pond onto the grassy and gravel-covered areas surrounding the pond.

AFB = Air Force Base
ID = identification
OWS = oil/water separator
AFFF = aqueous film forming foam
IRP = Installation Restoration Program
FPTA = fire protection training area
N/A = not applicable

2.0 AFFF AREA DESCRIPTIONS

The following installation information, geologic information, and site descriptions are taken from the QAPP addendum (ASL, August 2017). F.E. Warren AFB is west of Cheyenne in Laramie County, Wyoming. Cheyenne is the capital of Wyoming and has an estimated population of 60,000 residents, making it the largest city in the state. Topography in the area is characterized by rolling hills that are typical of the transition area between the eastern slope of the Rocky Mountains on the west and the high plains on the east. Land use surrounding the base ranges from agricultural to residential housing with Cheyenne to the east, and primarily agricultural areas to the north and west. The High Plains Aquifer is the principal source of water in the area. The base the Ogallala Formation comprises the upper part of the High Plains Aquifer.

F.E. Warren AFB, originally Fort D.A. Russell, was established in 1867 on the branch of the South Platte River, 3 miles west of what is today Cheyenne. Originally named in honor of Civil War Brigadier General David A. Russell, F.E. Warren AFB is the oldest continuously active military installation in the Air Force. It's home to the 90th Missile Wing and Headquarters, 20th Air Force, of Air Force Global Strike Command (ASL, August 2017).

Today, the Mighty Ninety operates 150 Minuteman III Intercontinental Ballistic Missiles on full alert 24 hours a day, 365 days a year. The 90th Missile Wing employs approximately 3,361 military members and 964 civilian employees. Family members of assigned military members add another approximately 5,445 to the local population. Also, approximately 5,000 military retirees reside in the area (ASL, August 2017).

Regional Geology

The majority of the region is underlain by Tertiary units of sedimentary origin that generally consist of sand, gravel, clay, siltstone, and limestone. These units are overlain by Quaternary sediments that include alluvial terrace and floodplain deposits. These sediments are generally unconsolidated and consist of lenticular beds of clay, silt, sand, gravel, and boulders (CH2M Hill, December 2015).

Beneath the base, the Tertiary-age (late Miocene) Ogallala unit is a heterogeneous mixture of sand and gravel beds, silt, clay, and thin limestone units. The beds are sometimes cemented by calcium carbonate. Lenses of sand and gravel are generally sporadic but consistently occur from the surface to a depth of about 10 feet below ground surface (bgs) in the southwestern part of the base. Below this depth, the predominant sediments are fine-grained, but sand and gravel still occur. The Ogallala is about 300 feet thick in the northern part of the base, thinning to the south to approximately 30 feet in valleys where it has been deeply eroded (CH2M Hill, December 2015).

2.1 FORMER FIRE PROTECTION TRAINING AREA 2 (AFFF AREA 1)

Former Fire Protection Training Area (FPTA) 2 (also known as Installation Restoration Program [IRP] Site FT009 and Operable Unit [OU]-5) is in the central portion of the base, southeast of the intersection of Old Glory Road and Missile Drive. It is approximately 0.25 miles south of Crow Creek. A trichloroethylene (TCE) plume associated with OU-5 is beneath the area. FPTA 2 consisted of two unlined, bermed training pits that were used from 1965 to 1989. No retention ponds were present. Waste oils, solvents, hydraulic fluid, and other combustible liquids were used in training exercises until 1974. After that year, only jet propellant fuel number 4 (JP-4) was used in the training exercises. No fuel storage facilities were located at the area. Fire training exercises occurred twice per month and 300 to 400 gallons of JP-4 were used during each exercise. AFFF and water were used to extinguish fires from 1972 until the FPTA was closed in 1989. This site was considered to need no remedial action, as presented in *Final Record of Decision for Operable Unit 5* (USAF, September 1994). The location of Former FPTA 2 (AFFF Area 1) is included as Figure 3, Appendix A.

2.2 FORMER FIRE PROTECTION TRAINING AREA 3 (AFFF AREA 2)

Former FPTA 3 is in the southwestern portion of the base and was active from 1990 to 2000. Former FPTA 3 consisted of an aircraft carcass in a polyethylene-lined training pit and a lined retention pond. The training pit was connected to an oil/water separator (OWS) and water was piped from the OWS to the lined retention pond. Former FPTA 3 was shut down in 2000 because one of the liners beneath the training pit developed a leak. AFFF was used in a limited capacity at Former FPTA 3. The liners for the pit and retention pond have been removed and the retention pond was filled in (CH2M Hill, December 2015). The location of the Former FPTA 3 is included as Figure 4 in Appendix A.

2.3 BUILDING 1247–BASE FUELS (AFFF AREA 3)

Building 1247 is in the southwestern corner of the base on Post Road and Wyoming Avenue. Building 1247–Base Fuels was built in 1995 and has an active AFFF system with overhead lines. The AFFF tank size is unknown, but it is estimated it to be 200 to 300 gallons. A former TCE plume associated with OU-2 and OU-9 is beneath the area, as shown on Figure 5. Building 1247 is connected to a polyethylene-lined containment pond between Buildings 1240 and 1242 and spills can be diverted to this pond, as necessary. The pond liner was replaced with a new polyethylene liner in approximately 2013. When rainwater filled the pond, it was pumped out on to the grassy areas nearby (CH2M Hill, December 2015).

An AFFF leak occurred in the bay of Building 1247 when a pipe in the fire suppression system froze and broke; however, the year of the leak is not known. All AFFF was contained inside the hangar. Floor drains in this building discharge to an OWS and then to the sanitary sewer (which flows to a publicly owned treatment works) unless manually diverted to the containment pond. It is not clear if the valve to the containment pond was opened during the spill; however, the AFFF entered either the OWS and the sanitary sewer or the containment pond, where it would have been left to evaporate. The location of Building 1247–Base Fuels (AFFF Area 3) is shown on Figure 5, Appendix A.

3.0 FIELD ACTIVITIES AND FINDINGS

A readiness review (Appendix E) was conducted for all field personnel prior to mobilizing to the site. The readiness review covered anticipated hazards, types and proper use of equipment needed for the field activities, sampling procedures, and procedures to be used to prevent cross-contamination of samples with PFAS-containing compounds.

3.1 FIELD ACTIVITIES AND SAMPLING PROCEDURES

ASL completed soil sampling and groundwater monitoring well installation at former FE Warren between August 28, 2017, and September 6, 2017.

Soil borings were advanced with a track-mounted, compact sonic drill rig. Soil cores were collected by advancing a 4-inch, inner core barrel to the desired sample depth and overdrilling with a 6-inch outer casing. The core barrel and soil core were-retrieved, leaving the 6-inch outer casing to maintain the integrity of the borehole. Soil cores were then vibrated from the core barrel into plastic sleeves for logging, field screening, and sample collection. Prior to logging, slits were cut in the sample sleeve and the soil cores screened with a photoionization detector (PID). After recording the PID readings on the boring log, the soil core was measured and the recovered length recorded in the boring log. The sample sleeve was then opened and the core visually logged. All borings were logged by a trained geologist (with a degree from an accredited university) experienced in describing soil cores and overseen by a senior geologist. The soil descriptions were assigned in accordance with the *Geology Supplement to the Scope of Services* (USACE, June 2013) and followed this general format:

- Color (using Munsell soil color charts);
- Soil type (fat clay, lean clay, sand, silty gravel, etc.);
- Grading, grain size, consistency/density, moisture content, cementing;
- Other notable features (staining, organics, fossils, odors, etc.); and
- Unified Soil Classification System symbol (CH, CL, SP, GM, etc.).

Surface soil samples were collected from 0 to 6 inches bgs with stainless steel hand augers and stainless steel spoons. Surface soil samples were only analyzed for physiochemical parameters because the surface soil is fill material related to the construction of the paved driveway leading to the tractor-trailer parking lot. Subsurface soil samples were collected from the soil core generated during sonic drilling, immediately above the water saturated/unsaturated soil interface. Composite surface and subsurface soil samples were submitted to CT Laboratories of Baraboo, Wisconsin, for physiochemical analyses. The physiochemical analyses included soil potential of hydrogen (pH) (EPA Method 9045D), particle size analysis (American Society for Testing and Materials D422), percent solids, and total organic carbon (TOC) content in soil (EPA Lloyd Kahn Method).

Nine groundwater monitoring wells were installed for this SI. The wells were constructed with 2-inch diameter, 10-foot-long Schedule 40 polyvinyl chloride (PVC) screens (continuous wrap 0.010-inch slot) and risers with flush-threaded joints. Sand filter packs were installed by tremieing sand through the outer sonic casing and vibrating it in place. Boring logs and well construction diagrams are included in Appendix E. Bentonite seals were allowed to hydrate for at least 24 hours (and typically up to 48 hours) before development. Each monitoring well was developed until the column of water in the well was free of visible sediment, and/or pH, temperature, turbidity, and specific conductivity stabilized. Well development was completed after bentonite seal hydration and before grouting. Well development logs are in Appendix E. Construction details for the new and existing wells are summarized in Table F-1 in Appendix F. Groundwater sampling was completed at least 24 hours after development.

Groundwater samples were collected with a peristaltic pump and disposable polyvinyl tubing using low-flow sampling methodology from two existing wells and the nine newly installed wells. Sediment samples were collected using a combination of dip samplers and stainless steel spoons. Surface water samples were collected directly from surface water bodies into the sample containers. Well development logs, groundwater sampling logs, and sample collection forms are included in Appendix E.

Surface water samples were collected directly from surface water bodies into the sample containers. At AFFF Area 2, one of the planned surface water samples (sample location FEWRN02-005) could not be collected because of dry conditions; therefore, the co-located sediment sample (FEWRN02-005-SD-001) was collected as a surface soil sample (FEWRN02-005-SS-001). Sediment samples were collected using stainless steel spoons. Surface water and sediment sampling forms are including in Appendix E.

Environmental samples were submitted via overnight courier to Maxxam Analytics International Corporation of Mississauga, Ontario, Canada, under chain of custody procedures. The samples were analyzed by modified EPA Method 537, *Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS)*. Eighteen PFAS compounds are included in this analysis. Analytical results and a full list of the 18 compounds are in Appendix C. However, only the three analytes listed below have health-based screening levels associated with them.

Analyte	**CAS Number**
• Perfluorobutane sulfonate (PFBS)	29420-43-3
• Perfluorooctanoic acid (PFOA)	335-67-1
• Perfluorooctane sulfonate (PFOS)	1763-23-1

CAS = Chemical Abstracts Service

Field duplicate samples were collected at a frequency of one for every 10 samples for each sample media. Matrix spike/matrix spike duplicate samples were collected at a frequency of one per every 20 samples for each media. Third-party Stage 2B validation was completed on 100% of the analytical data, and Stage 4 validation was completed on 10% of the results. Data validation qualifiers were applied, as needed, to the data. All results were evaluated as usable, and no determinations for the AFFF area were changed as a result of quality control (QC)-qualified data. The data validation report and laboratory data sheets (which include analytical results for all 18 PFAS compounds) are in Appendix C.

Land survey was used to record the coordinates and surface elevations of the soil borings and the surface elevations and top-of-casing elevations of the groundwater monitoring wells. Survey data from a licensed surveyor provides an accuracy of one-hundredth of a foot (horizontal and vertical) for the soil borings and monitoring wells. Northing and easting coordinates were recorded in U.S. survey feet using the Wyoming State Plane East Zone 83-2011 coordinate system. Elevations were recorded referenced to the North American Vertical Datum 1988. Surface water and sediment sample locations were recorded with a Trimble® Geo 7X handheld global positioning system (GPS) unit. Post-processed horizontal data collected with the Trimble® Geo 7X is accurate to sub-meter intervals. Survey data for the monitoring wells are included in Table F-1. Locations collected with the handheld GPS are included in Table F-2.

Sample locations, area-specific lithology, groundwater flow direction, analytical results, and conclusions for AFFF Area 1 are presented in Section 3.3.

3.2 PFAS CROSS-CONTAMINATION AVOIDANCE PROCEDURES

Field personnel complied with PFAS cross-contamination avoidance procedures and considerations, which are included in ASL Standard Operating Procedure 028, *Field Sampling Protocols to Avoid Cross-Contamination at Perfluorinated Compounds (PFCs) Sites*.

3.2.1 Field Equipment

- Teflon®-containing materials (Teflon® tubing, bailers, tape, plumbing paste, or other Teflon® materials) were not used because Teflon® contains fluorinated compounds.
- High-density polyethylene (HDPE) and silicon materials are acceptable.
- Peristaltic pumps were used to sample groundwater for all wells at FE Warren.
- Field notes were recorded in a bound logbook that did not have waterproof paper.
- All personnel changed gloves between recording and sampling activities to prevent cross-contamination.
- Post-It Notes® were not allowed on site.
- Only Sharpie® brand markers were used. Pens were used to document field activities in the logbooks and on field forms, to label sample containers, and to prepare the chains of custody.
- Chemical (blue) ice packs were not used to store samples, food, or drinks.

3.2.2 Field Clothing and Personal Protective Equipment (PPE)

- The sampling personnel wore field clothing made of synthetic and natural fibers (preferably cotton). The clothing had to have been laundered at least six times without using a fabric softener since it was purchased. New clothing was not allowed because it could contain PFAS-related treatments.
- Only rain gear made from polyurethane and wax-coated materials was allowed.
- Clothing or boots containing Gore-Tex™ was not allowed because it consists of a PFAS membrane.
- Tyvek® clothing was not allowed on-site because it contains fluorinated compounds.
- Disposable nitrile gloves were worn at all times when field activities were being conducted, and a new pair was donned prior to the following activities at each sample location:
    - Decontamination of reusable sampling equipment;

    - Contact with sample bottles or water containers;
    - Insertion of anything into the well (HDPE tubing, HydraSleeve® bailer, etc.);
    - Insertion of silicon tubing into the peristaltic pump;
    - Completion of monitor well purging;
    - Sample collection; and
    - Handling of any quality assurance/QC samples, including field blanks and equipment blanks.
- A new pair of nitrile gloves were worn after handling any non-dedicated sampling equipment, after contact with surfaces that had not been decontaminated, or when field personnel thought it was necessary.

3.2.3 Sample Containers

- All samples were collected in polypropylene or HDPE bottles with screw caps made of the same materials. The liners of lined screw caps were not made of Teflon® and did not contain PFAS.
- Glass sample containers were not used.
- Container labels were completed using a Sharpie® pen after the caps had been placed on each bottle.

3.2.4 Wet Weather

- Field personnel who were sampling during wet weather (such as rainfall or snowfall) wore appropriate clothing that did not pose a risk of cross-contamination. Sampling personnel avoided synthetic gear treated with water-repellant finishes containing PFAS. Only rain gear made from polyurethane and wax-coated materials was allowed.
- Field personnel wore gloves when erecting or moving a gazebo tent overtop used for protection from rain at sampling locations because the canopy material may have been treated with a PFAS-based coating. Gloves were changed immediately after handling the tent, and any further contact with the tent was avoided until all sampling activities were finished and the team was ready to move on to the next sample location.

3.2.5 Equipment Decontamination

Field sampling equipment, including oil/water interface meters and water level indicators, were decontaminated using Alconox® or Liquinox® soap. Decon 90® was not used during decontamination activities. Laboratory-certified PFAS-free water was used for the final decontamination rinse of sampling equipment. Larger equipment, such as drill rigs, was decontaminated using potable water and a high-pressure washer and then rinsed with potable water.

3.2.6 Personnel Hygiene

- Field personnel did not use cosmetics, moisturizers, hand cream, or other related products as part of their personal hygiene routine before a sampling event because these products may contain surfactants and be a potential source of PFAS.
- Because many manufactured sunblock and insect repellants contain PFAS, only sunblock and insect repellants that contain 100% natural ingredients were allowed.
- For restroom breaks, field personnel left the exclusion zone (EZ) before removing PPE. Before returning to the EZ, field personnel washed as normal, allowing extra time to rinse with water after using soap. Field personnel used a mechanical dryer to avoid using paper towels if possible.

3.2.7 Food Considerations

Field personnel did not eat or drink inside the EZ.

3.2.8 Visitors

Site visitors remained outside the EZ during all sampling activities.

3.3 FORMER FIRE PROTECTION TRAINING AREA 2 (AFFF AREA 1)

3.3.1 Sample Locations

Surface and subsurface soil samples were collected from three boring locations, two within the perimeter of the former unlined burn pit in the northeast portion of the AFFF area and the other within the perimeter of southwestern former unlined burn pit. Two groundwater monitoring wells (FEWRN01-MW001 and FEWRN01-MW002) were installed in borings FEWRN01-001 and FEWRN01-003, respectively. Groundwater samples were collected from the newly installed wells and two existing wells (MW-070 and MW-071) located north and west, respectively, of FPTA 2. Surface water and sediment samples were collected from two locations northeast of Former FPTA 2: one from the inlet to a drainage culvert that drains surface water from Former FPTA 2 northeast to Crow Creek, and one from the confluence of the drainage ditch and Crow Creek. Sampling locations for AFFF Area 1 are shown on Figure 3 (Appendix A).

3.3.2 Lithology and Soil Description

Borings FEWRN01-001, FEWRN01-002, and FEWRN01-003 were drilled to total depths of 20.0 feet bgs, 20.0 feet bgs, and 21.0 feet bgs, respectively. The overlying unconsolidated soils are primarily very pale brown, clayey, fine-to-medium sands (SC) with varying soil depths; sandy lean clay interbedded with sand (CL); and fine- to coarse-grained, clayey gravel (GC) overlying medium- to coarse-grained sandstone. During drilling bedrock was encountered at 13 feet bgs in FEWRN01-001 and at 20 feet bgs in FEWRN01-003. Bedrock was not encountered in FEWRN01-002. Detailed boring logs for AFFF Area 1 are included in Appendix E.

3.3.3 Groundwater Flow

Groundwater depths were measured at AFFF Area 1 on September 5, 2017, as summarized on Table G-1 in Appendix G. Based on depth-to-groundwater measurements in monitoring wells FEWRN01-MW001, FEWRN01-MW002, MW-070, and MW-071, the groundwater elevations were calculated at 6117.48 feet above mean sea level (amsl), 6121.44 feet amsl, 6120.92 feet amsl, and 6114.21 feet amsl, respectively. Depth to groundwater ranges between 9.63 and 13.99 feet below top of casing (btoc). Groundwater flow is to the north-northeast, as shown on Figure 3 in Appendix A.

3.3.4 Analytical Results

Groundwater

PFBS, PFOA, and PFOS were detected in the four primary groundwater samples and one field duplicate groundwater sample collected from four monitoring wells (FEWRN01-MW001, FEWRN01-MW003, MW-070, and MW-071). PFBS concentrations in all five samples were below the screening level. PFOA, PFOS, and the combined PFOA and PFOS concentrations exceeded the screening levels in all five samples. Groundwater analytical results are summarized in Table 3 and are shown on Figure 6 in Appendix A.

Table 3 AFFF Area 1 – Former Fire Protection Training Area 2, Groundwater Analytical Results

Analyte	Sample ID	FEWRN01-001-GW-015	FEWRN01-003-GW-015	FEWRN01-003-GW-915 (duplicate)	FEWRN01-MW-070-GW-020	FEWRN01-MW071-GW-020
	Screening Level (µg/L)	**Result (µg/L)**	**Result (µg/L)**	**Result (µg/L)**	**Result (µg/L)**	**Result (µg/L)**
Perfluorobutane sulfonate (PFBS)	40[a]	**11**	**0.97**	**1.1**	**1.7**	**0.39**
Perfluorooctanoic acid (PFOA)	0.07[b]	**72**	**0.43**	**0.48**	**5.4**	**0.24**
Perfluorooctane sulfonate (PFOS)	0.07[b]	**64**	**2.5**	**3.2**	**6.0**	**0.35**
PFOS + PFOA[c]	0.07[b]	**136**	**2.93**	**3.68**	**11.4**	**0.59**

Bold values indicate analyte detected at concentration indicated.
Shaded values indicate analyte detected above screening level.
[a] EPA regional screening level for tap water, May 2018 (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables).
[b] Screening level listed in *Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA)* (EPA, May 2016a) and *Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS)* (EPA, May 2016b).
[c] EPA recommends comparing the combined analytical results for PFOA and PFOS when both are present.
µg/L = micrograms per liter
GW = groundwater
ID = identification

Surface Water

Two primary and one duplicate surface water samples were collected from downgradient drainage locations. PFBS, PFOA, and PFOS were detected in all three samples, but the concentrations of PFBS did not exceed the screening levels in any of the samples. PFOA and PFOS concentrations exceeded the screening level in FEWRN01-005-SW-001 and its field duplicate. The combined PFOA and PFOS concentrations exceeded screening levels in all three samples. Surface water sample analytical results are summarized in Table 4 and are shown on Figure 6 in Appendix A.

Table 4 AFFF Area 1 – Former Fire Protection Training Area 2, Surface Water Analytical Results

Analyte	Sample ID	FEWRN01-004-SW-001	FEWRN01-005-SW-001	FEWRN01-005-SW-901 (duplicate)
	Screening Level (µg/L)	**Result (µg/L)**	**Result (µg/L)**	**Result (µg/L)**
Perfluorobutane sulfonate (PFBS)	40[a]	**0.013 J**	**0.13**	**0.13**
Perfluorooctanoic acid (PFOA)	0.07[b]	**0.043**	**0.33**	**0.33**
Perfluorooctane sulfonate (PFOS)	0.07[b]	**0.045**	**1.2**	**1.2**
PFOS + PFOA[c]	0.07[b]	**0.088**	**1.53**	**1.53**

Bold values indicate analyte detected at concentration indicated.
Shaded cells indicate analyte detected above screening level.
[a] EPA regional screening level for tap water, May 2018 (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables).
[b] Screening level listed in *Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA)* (EPA, May 2016a) and *Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS)* (EPA, May 2016b).
[c] EPA recommends comparing the combined analytical results for PFOA and PFOS when both are present.
µg/L = micrograms per liter
ft = foot
ID = identification
J = reported concentration is an estimated value
SW = surface water

Surface Soil

Three primary and one field duplicate surface soil samples were collected from three boring locations. PFBS was detected in the three primary samples and exceeded the soil leaching to groundwater screening level at FEWRN01-001-SS-001. PFOA was detected in all three primary and one duplicate samples. The PFOA concentration in the primary sample FEWRN01-001-SS-001 was detected above the screening level. PFOS was also detected in all four samples and the concentrations in FEWRN01-001-SS-001 and FEWRN01-002-SS-001 were detected above the screening level. Surface soil analytical results are summarized in Table 5 and shown on Figure 7 in Appendix A.

Table 5 AFFF Area 1 – Former Fire Protection Training Area 2, Surface Soil Analytical Results

Analyte	**Sample ID**	**FEWRN01-001-SS-001**	**FEWRN01-002-SS-001**	**FEWRN01-003-SS-001**	**FEWRN01-003-SS-901 (duplicate)**
	Depth (ft)	**0–0.5**	**0–0.5**	**0–0.5**	**0–0.5**
	Screening Level (µg/kg)	**Result (µg/kg)**	**Result (µg/kg)**	**Result (µg/kg)**	**Result (µg/kg)**
Perfluorobutane sulfonate (PFBS)	13[c] 130,000[a]	**3,600**	**0.59 J**	**0.59 J**	0.52 U
Perfluorooctanoic acid (PFOA)	126[b]	**50,000**	**2.2**	**2.2**	**2.0**
Perfluorooctane sulfonate (PFOS)	126[b]	**3,400**	**140**	**62**	**71**

Bold values indicate analyte detected at concentration indicated.

Shaded values indicate analyte detected above screening level.

[a] EPA regional screening levels for residential soil, May 2018 (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables).

[b] Screening levels were calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search).

[c] EPA regional screening levels for soil protective of groundwater (May 2018) (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables).

µg/kg = micrograms per kilogram

ID = identification

SS = surface soil

ft = foot/feet

J = Reported concentration is an estimated value.

U = Analyte was not detected above the reported value.

Subsurface Soil

Three primary subsurface samples and one duplicate sample were collected from three soil borings. PFBS, PFOA, and PFOS were detected in the three primary samples at concentrations below the screening level. PFOS was detected in the duplicate sample below the screening level. Subsurface soil analytical results are summarized in Table 6 and shown on Figure 7 in Appendix A.

Table 6 AFFF Area 1 – Former Fire Protection Training Area 2, Subsurface Soil Analytical Results

Analyte	Sample ID	FEWRN01-001-SO-018	FEWRN01-002-SO-018	FEWRN01-003-SO-016	FEWRN01-003-SO-916 (duplicate)
	Depth (ft)	**18–19**	**18–19**	**16–17**	**16–17**
	Screening Level (µg/kg)	**Result (µg/kg)**	**Result (µg/kg)**	**Result (µg/kg)**	**Result (µg/kg)**
Perfluorobutane sulfonate (PFBS)	13[c] 130,000[a]	**0.64 J**	**1.3**	**0.65 J**	0.66 U
Perfluorooctanoic acid (PFOA)	1,26[b]	**2.8**	**6.0**	**0.94 J**	0.66 U
Perfluorooctane sulfonate (PFOS)	1,26[b]	**4.0**	**20**	**0.80 J**	**0.51 J**

Bold values indicate analyte detected at concentration indicated.

[a]EPA regional screening levels for residential soil, May 2018 (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables).

[b]Screening levels were calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search).

[c]EPA regional screening levels for soil protective of groundwater (May 2018) (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables).

µg/kg = micrograms per kilogram ft = foot/feet ID = identification J = Reported concentration is an estimated value.

SO = subsurface soil U = Analyte was not detected above the reported value.

Soil Physiochemical Analyses

One composite surface soil sample and one composite subsurface soil sample were collected from soil borings completed at AFFF Area 1 and analyzed for pH, TOC, percent solids, and grain size. The surface soil sample FEWRN01-006-SS-001 was composed of equal aliquots of soil collected from borings FEWRN01-001, FEWRN01-002, and FEWRN01-003 from the 0–6-inch interval. Similarly, the subsurface soil sample FEWRN01-006-SO-017 was composed of equal aliquots of soil collected from soil borings FEWRN01-001, FEWRN01-002, and FEWRN01-003 from 16 feet bgs to 19 feet bgs. Table D-1 (summarizing physiochemical data) and laboratory data sheets are included in Appendix D.

Sediment

Two primary and one duplicate sediment samples were collected from downgradient drainage locations. PFBS was not detected in the samples. PFOA was detected in the primary and field duplicate samples collected from FEWRN01-005 at concentrations below the screening level. PFOS was detected in all three samples at concentrations below the screening level. Sediment sample analytical results are summarized in Table 7 and shown on Figure 7 in Appendix A.

Table 7 AFFF Area 1 – Former Fire Protection Training Area 2, Sediment Analytical Results

Analyte	Sample ID	FEWRN01-004-SD-001	FEWRN01-005-SD-001	FEWRN01-005-SD-901 (duplicate)
	Depth (ft)	0–0.5	0–0.5	0–0.5
	Screening Level (µg/kg)	Result (µg/kg)	Result (µg/kg)	Result (µg/kg)
Perfluorobutane sulfonate (PFBS)	13[c] 130,000[a]	0.72 U	0.66 U	0.84 U
Perfluorooctanoic acid (PFOA)	126[b]	0.72 U	**0.63 J**	**0.56 J**
Perfluorooctane sulfonate (PFOS)	126[b]	**1.1 J**	**5.2 J**	**1.9 J**

Bold values indicate analyte detected at concentration indicated.

[a] EPA Regional Screening Levels for Resident Soil, May 2018 (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables). [b] Screening levels calculated using the EPA Regional Screening Level calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search). [c] EPA Regional Screening Levels for soil protective of groundwater (May 2018) (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables).

µg/kg = micrograms per kilogram
ft = feet
ID = identification
J = Reported concentration is an estimated value.
SD = sediment
U = Analyte was not detected above the reported value.

3.3.5 Conclusions

Operations at the Former FPTA 2 have resulted in detections of PFAS in surface soil, subsurface soil, groundwater, surface water, and sediment. However, only PFAS concentrations in surface soil, groundwater, and surface water exceeded the screening levels.

3.4 FORMER FIRE PROTECTION TRAINING AREA 3 (AFFF AREA 2)

3.4.1 Sample Locations

Surface soil samples were not collected from the soil boring locations at former FPTA 3 because the area had been filled with a soil-gravel mix after operations at the FPTA had been ceased. Subsurface soil samples were collected from soil borings at four locations at Former FPTA 3. One boring, FEWRN02-001, is on the western side of the FPTA 3. Location FEWRN02-002 is within the perimeter of the former training pit in the southern portion of the AFFF area. Boring FEWRN02-003 is located on eastern side of Former FPTA 3 and FEWRN02-004 is within the footprint of the retention pond. A monitoring well was installed in each boring and groundwater samples were collected from these newly installed wells (FEWRN02-MW001, FEWRN02-MW002, FEWRN02-MW003, and FEWRN02-MW004). Surface water and sediment samples (location FEWRN02-006) were collected from Crow Creek, northeast of Former FPTA 2. Surface water was not present at FEWRN02-005 at the inlet to a culvert that drains FPTA 3 northeast to Crow Creek; therefore, a surface soil sample was collected at this location in lieu of a sediment/surface water sample. Sampling locations for AFFF Area 2are shown on Figure 4 (Appendix A).

3.4.2 Lithology and Soil Description

Borings FEWRN02-001, FEWRN02-002, FEWRN02-003, and FEWRN02-004 were drilled to total depths of 30.0 feet bgs, 40.0 feet bgs, 35.0 feet bgs, and 30.0 feet bgs, respectively. The soils varied from sandy, lean clay (CL); clayey sand (SC); and fat clay (CH). Detailed boring logs for AFFF Area 2 are included in Appendix E.

3.4.3 Groundwater Flow

Groundwater depths were measured at AFFF Area 2 on September 5, 2017, as summarized on Table G-1 in Appendix G. Based on depth-to-groundwater measurements in monitoring wells FEWRN02-MW001, FEWRN02-MW002, FEWRN02-MW003, and FEWRN02-MW004, the groundwater elevations were calculated at 6136.13 feet amsl, 6136.64 feet amsl, 6132.90 feet amsl, and 6132.74 feet amsl, respectively. Depth to groundwater ranges between 13.78 and 15.84 feet btoc. Groundwater flow is to the southeast, as shown on Figure 4 in Appendix A.

3.4.4 Analytical Results

Groundwater

PFBS, PFOA, and PFOS were detected in the four primary groundwater samples collected from four monitoring wells (FEWRN02-MW001, FEWRN02-MW002, FEWRN02-MW003, and FEWRN02-MW004). PFBS concentrations in all four samples were below the screening level. PFOA concentrations in two samples (FEWRN02-003-GW-030 and FEWRN02-004-GW-024) exceeded the screening level. PFOS and the combined PFOA and PFOS concentrations exceeded the screening levels in all four samples. Groundwater analytical results are summarized in Table 8 and are shown on Figure 8 in Appendix A.

Table 8 AFFF Area 2 – Former Fire Protection Training Area 3, Groundwater Analytical Results

Analyte	Sample ID	FEWRN02-001-GW-025	FEWRN02-002-GW-033	FEWRN02-003-GW-030	FEWRN02-004-GW-024
	Screening Level (µg/L)	Result (µg/L)	Result (µg/L)	Result (µg/L)	Result (µg/L)
Perfluorobutane sulfonate (PFBS)	40[a]	**0.074**	**0.022**	**3.2**	**3.7**
Perfluorooctanoic acid (PFOA)	0.07[b]	**0.031**	**0.029**	**0.95**	**1.1**
Perfluorooctane sulfonate (PFOS)	0.07[b]	**0.72**	**0.91**	**17**	**19**
PFOS + PFOA[c]	0.07[b]	**0.751**	**0.939**	**17.95**	**20.1**

Bold values indicate analyte detected at concentration indicated. Shaded values indicate analyte detected above screening level.

[a] EPA regional screening level for tap water, May 2018 (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables).

[b] Screening Level listed in *Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA)* (EPA, May 2016a) and *Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS)* (EPA, May 2016b).

[c] EPA recommends comparing the combined analytical results for PFOA and PFOS when both are present.

µg/L = micrograms per liter GW = groundwater ID = identification

Surface Water

According to the QAPP, two surface water samples were planned to be collected from the AFFF area; however, one location (FEWRN-02-005) was dry. PFAS were not detected in the samples above the laboratory method detection limit (MDL). Surface water sample analytical results are summarized in Table 9 and shown on Figure 8 in Appendix A.

Table 9 AFFF Area 2 – Former Fire Protection Training Area 3, Surface Water Analytical Results

Analyte	Sample ID	FEWRN02-006-SW-001
	Depth (ft)	0–0.5
	Screening Level (µg/L)	Result (µg/L)
Perfluorobutane sulfonate (PFBS)	40[a]	0.010 U
Perfluorooctanoic acid (PFOA)	0.07[b]	0.010 U
Perfluorooctane sulfonate (PFOS)	0.07[b]	0.010 U
PFOS + PFOA[c]	0.07[b]	ND

[a] EPA regional screening level for tap water, May 2018 (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables).

[b] Screening level listed in *Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA)* (EPA, May 2016a) and *Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS)* (EPA, May 2016b).

[c] EPA recommends comparing the combined analytical results for PFOA and PFOS when both are present.

µg/L = micrograms per liter
ID = identification
SW = surface water
ft = foot/feet
ND = not detected
U = Analyte was not detected above the reported value.

Surface Soil

The QAPP called for the collection of both a surface water and sediment sample to be obtained at sample location FEWRN02-005; however, the surface water sample location was dry. Because of the field condition change, the sample matrix was re-categorized as a surface soil sample (FEWRN02-005-SS-001). PFBS, PFOA, and PFOS were detected in this sample at concentrations below the screening level. Surface soil analytical results are summarized in Table 10 and shown on Figure 9 in Appendix A.

Table 10 AFFF Area 2 – Former Fire Protection Training Area 3, Surface Soil Analytical Results

Analyte	Sample ID	FEWRN02-005-SS-001
	Depth (ft)	0–0.5
	Screening Level (µg/kg)	Result (µg/kg)
Perfluorobutane sulfonate (PFBS)	13[c] 130,000[a]	**2.9**
Perfluorooctanoic acid (PFOA)	126[b]	**2.0**
Perfluorooctane sulfonate (PFOS)	126[b]	**38**

Bold values indicate analyte detected at concentration indicated.

[a] EPA regional screening levels for residential soil, May 2018 (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables).

[b] Screening levels were calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search).

[c] EPA regional screening levels for soil protective of groundwater (May 2018) (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables).

µg/kg = micrograms per kilogram   ft = foot/feet   ID = identification   SS = surface soil

Subsurface Soil

Four primary subsurface samples were collected from four soil borings. PFBS was detected in two primary samples at concentrations below the screening level. PFOA was also detected in two primary samples at concentrations below the screening level. PFOS was detected in three primary samples below the screening level. Subsurface soil analytical results are summarized in Table 11 and shown on Figure 9 in Appendix A.

Table 11 AFFF Area 2 – Former Fire Protection Training Area 3, Subsurface Soil Analytical Results

Analyte	Sample ID	FEWRN02-001-SO-028	FEWRN02-002-SO-031	FEWRN02-003-SO-031	FEWRN02-004-SO-013
	Depth (ft)	**28–29**	**31–32**	**31–32**	**13–14**
	Screening Level (µg/kg)	**Result (µg/kg)**	**Result (µg/kg)**	**Result (µg/kg)**	**Result (µg/kg)**
Perfluorobutane sulfonate (PFBS)	13[c] 130,000[a]	0.66 U	0.66 U	**0.76 J**	**1.1 J**
Perfluorooctanoic acid (PFOA)	126[b]	0.66 U	0.66 U	**0.45 J**	**0.98 J**
Perfluorooctane sulfonate (PFOS)	126[b]	0.66 U	**0.80 J**	**3.2**	**82**

Bold values indicate analyte detected at concentration indicated.

[a] EPA regional screening levels for residential soil, May 2018 (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables).

[b] Screening levels were calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search).

[c] EPA regional screening levels for soil protective of groundwater (May 2018) (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables).

µg/kg = micrograms per kilogram
ID = identification
SO = subsurface soil
ft = foot/feet
J = Reported concentration is an estimated value.
U = Analyte was not detected above the reported value.

Soil Physiochemical Analyses

A composite subsurface soil sample was collected from soil borings completed at AFFF Area 2 and analyzed for pH, TOC, percent solids, and grain size. The soil sample FEWRN02-007-SS-031 was composed of equal aliquots of soil collected from borings FEWRN02-001, FEWRN02-002, FEWRN02-003, and FEWRN02-004 from 13 feet bgs to 32 feet bgs. A composite surface soil sample was not collected from AFFF Area 2 boring locations because when this FPTA was decommissioned in 2007, the retention pond and OWS were excavated and the area backfilled. Table D-1 (summarizing physiochemical data) and laboratory data sheets are included in Appendix D.

Sediment

One primary sediment sample was collected from a downgradient drainage location. PFAS were not detected in the samples above the laboratory MDL. Sediment sample analytical results are summarized in Table 12 and shown on Figure 9 in Appendix A.

Table 12 AFFF Area 2 – Former Fire Protection Training Area 3, Sediment Analytical Results

Analyte	Sample ID	FEWRN02-006-SD-001
	Depth (ft)	0–0.5
	Screening Level (µg/kg)	Result (µg/kg)
Perfluorobutane sulfonate (PFBS)	13[c] 130,000[a]	0.66 U
Perfluorooctanoic acid (PFOA)	126[b]	0.66 U
Perfluorooctane sulfonate (PFOS)	126[b]	0.66 U

[a]EPA regional screening levels for resident soil, May 2018 (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables)

[b]Screening levels calculated using the EPA Regional Screening Level calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search).

[c] EPA regional screening levels for soil protective of groundwater (May 2018) (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables).

µg/kg = micrograms per kilogram
ft = foot/feet
ID = identification
SD = sediment
U = Analyte was not detected above the reported value.

3.4.5 Conclusions

Operations at Former FPTA 3 have resulted in detections of PFAS in surface soil, subsurface soil, and groundwater. However, only PFAS concentrations in groundwater exceeded the screening levels.

3.5 BUILDING 1247–BASE FUELS (AFFF AREA 3)

3.5.1 Sample Locations

Surface and subsurface soil samples were collected from soil borings at four locations around the retention pond that holds Building 1247 floor drainage. The retention pond is northeast of the building. The borings were located roughly at the corners of the retention pond starting at the southwest corner (FEWRN03-001) and continuing counterclockwise (FEWRN03-002, southeast corner; FEWRN03-003, northeast corner) to the northwest corner (FEWRN03-004). Monitoring wells FEWRN03-MW001, FEWRN03-MW002, and FEWRN03-MW003 were installed in three of the borings of corresponding boring holes, and groundwater samples were collected from the newly installed wells. Sampling locations for AFFF Area 3 are shown on Figure 5 (Appendix A).

3.5.2 Lithology and Soil Description

Borings FEWRN03-001, FEWRN03-002, FEWRN03-003, and FEWRN03-004 were drilled to total depths of 26.1 feet bgs, 26.0 feet bgs, 35.0 feet bgs, and 30.0 feet bgs, respectively. The soils varied from sandy, lean clay (CL) and clayey sand (SC). Detailed boring logs for AFFF Area 3 are included in Appendix E.

3.5.3 Groundwater Flow

Groundwater depths were measured at AFFF Area 3 on September 5, 2017, as summarized on Table G-1 in Appendix G. Based on depth-to-groundwater measurements in monitoring wells FEWRN03-MW001, FEWRN03-MW002, and FEWRN03-MW003, the groundwater elevations were calculated at 6146.04

feet amsl, 6145.15 feet amsl, and 6145.53 feet amsl, respectively. Depth to groundwater ranges between 8.42 and 9.44 feet btoc. Groundwater flow is to the east, as shown on Figure 5 in Appendix A.

3.5.4 Analytical Results

Groundwater

PFBS, PFOA, and PFOS were detected in the three primary and one field duplicate groundwater samples collected from three monitoring wells (FEWRN03-MW001, FEWRN03-MW002, and FEWRN03-MW003). PFBS concentrations in all four samples were below the screening level. PFOA, PFOS, and the combined PFOA and PFOS concentrations in all four samples exceeded the screening levels. Groundwater analytical results are summarized in Table 13 and are shown on Figure 10 in Appendix A.

Table 13 AFFF Area 3 – Building 1247–Base Fuels, Groundwater Analytical Results

Analyte	**Sample ID**	**FEWRN03-001-GW-020**	**FEWRN03-002-GW-020**	**FEWRN03-003-GW-020**	**FEWRN03-003-GW-920 (duplicate)**
	Screening Level (µg/L)	**Result (µg/L)**	**Result (µg/L)**	**Result (µg/L)**	**Result (µg/L)**
Perfluorobutane sulfonate (PFBS)	40[a]	**0.16 J**	**0.38**	**0.31**	**0.36**
Perfluorooctanoic acid (PFOA)	0.07[b]	**0.16 J**	**0.26**	**0.59**	**0.66**
Perfluorooctane sulfonate (PFOS)	0.07[b]	**0.82**	**0.72**	**1.3**	**1.7**
PFOS + PFOA[c]	0.07[b]	**0.98 J**	**0.98**	**1.89**	**2.36**

Bold values indicate analyte detected at concentration indicated. Shaded values indicate analyte detected above screening level.

[a] EPA regional screening level for tap water, May 2018 (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables).

[b] Screening level listed in *Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA)* (EPA, May 2016a) and *Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS)* (EPA, May 2016b).

[b] EPA regional screening levels for soil protective of groundwater (May 2018) (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables).

[c] EPA recommends comparing the combined analytical results for PFOA and PFOS when both are present.

µg/L = micrograms per liter
GW = groundwater
ID = identification
J = Reported concentration is an estimated value.

Surface Soil

Four primary surface soil samples were collected from four boring locations. PFBS was detected in three samples at concentrations below the screening level. PFOA was detected in all four primary samples at concentrations below the screening level. PFOS was also detected in the four samples, and the concentrations in FEWRN03-001-SS-001 and FEWRN03-004-SS-001 were detected above the screening level. Surface soil analytical results are summarized in Table 14 and shown on Figure 11 in Appendix A.

Table 14 AFFF Area 3 – Building 1247–Base Fuels, Surface Soil Analytical Results

Analyte	Sample ID	FEWRN03-001-SS-001	FEWRN03-002-SS-001	FEWRN03-003-SS-001	FEWRN03-004-SS-001
	Depth (ft)	0–0.5	0–0.5	0–0.5	0–0.5
	Screening Level (µg/kg)	Result (µg/kg)	Result (µg/kg)	Result (µg/kg)	Result (µg/kg)
Perfluorobutane sulfonate (PFBS)	13[c] 130,000[a]	**0.35 J**	0.53 U	**0.41 J**	**7.6 J**
Perfluorooctanoic acid (PFOA)	126[b]	**0.64 J**	**0.38 J**	**1.5**	**8.7 J**
Perfluorooctane sulfonate (PFOS)	126[b]	**130**	**22**	**73**	**1,600**

Bold values indicate analyte detected at concentration indicated. Shaded values indicate analyte detected above screening level.

[a]EPA regional screening levels for residential soil, May 2018 (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables).

[b]Screening levels were calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search).

[c] EPA regional screening levels for soil protective of groundwater (May 2018) (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables).

µg/kg = micrograms per kilogram
ID = identification
SS = surface soil
ft = foot/feet
J = Reported concentration is an estimated value.

Subsurface Soil

Four primary subsurface samples and one field duplicate sample were collected from four soil borings. PFBS was detected in three primary samples and the field duplicate at concentrations below the screening level. PFOA was detected in the two primary samples and the field duplicate sample at concentrations below the screening level. PFOS was detected in one primary sample below the screening level. Subsurface soil analytical results are summarized in Table 15 and shown on Figure 11 in Appendix A.

Table 15 AFFF Area 3 – Building 1247–Base Fuels, Subsurface Soil Analytical Results

Analyte	Sample ID	FEWRN03-001-SO-008	FEWRN03-002-SO-007	FEWRN03-003-SO-008	FEWRN03-003-SO-908 (duplicate)	FEWRN03-004-SO-008
	Depth (ft)	8–9	7–8	8–9	8–9	8–9
	Screening Level (µg/kg)	Result (µg/kg)	Result (µg/kg)	Result (µg/kg)	Result (µg/kg)	Result (µg/kg)
Perfluorobutane sulfonate (PFBS)	13[c] 130,000[a]	**0.43 J**	0.53 U	**0.55 J**	**0.81 J**	**0.37 J**
Perfluorooctanoic acid (PFOA)	126[b]	0.66 U	**0.34 J**	**0.53 J**	**0.50 J**	0.53 U
Perfluorooctane sulfonate (PFOS)	126[b]	0.66 U	**11**	0.78 U	0.72 U	0.53 U

Bold values indicate analyte detected at concentration indicated.

[a]EPA regional screening levels for residential soil, May 2018 (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables). [b]Screening levels were calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search).

[c] EPA regional screening levels for soil protective of groundwater (May 2018) (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables).

µg/kg = micrograms per kilogram ft = foot/feet ID = identification J = Reported concentration is an estimated value.
SO = subsurface soil U = Analyte was not detected above the reported value.

Soil Physiochemical Analyses
A composite surface soil sample was collected from soil borings completed at AFFF Area 3 and analyzed for pH, TOC, percent solids, and grain size. The soil sample FEWRN03-005-SS-001 was composed of equal aliquots of soil collected from borings FEWRN03-001, FEWRN03-002, FEWRN03-003, and FEWRN03-004 from the 0–6-inch interval. Similarly, the subsurface soil sample FEWRN03-005-SO-008 was composed of equal aliquots of soil collected from soil borings FEWRN03-001, FEWRN03-002, FEWRN03-003, and FEWRN03-004 from 7 feet bgs to 9 feet bgs. Table D-1 (summarizing physiochemical data) and laboratory data sheets are included in Appendix D.

3.5.5 Conclusions

Operations at the Building 1247–Base Fuels have resulted in detections of PFAS in surface soil, subsurface soil, and groundwater. However, only PFAS concentrations in surface soil and groundwater exceeded the screening levels.

3.6 INVESTIGATION-DERIVED WASTE

The USAF has awarded a separate contract to others for the removal and proper disposal of soil and water investigation-derived waste generated during this SI. Waste soil and water generated during soil boring installation and monitoring well purging were placed in Department of Transportation-approved steel drums (twelve drums of soil and twelve drums of water) and stored at the base hazardous waste storage facility at Building 944 for waste sampling and proper disposal. A representative sample was collected from each media, submitted to CT Laboratories, and analyzed for PFAS, total petroleum hydrocarbons, toxicity (using the Toxicity Characteristic Leaching Procedure [TCLP] for the full TCLP list of analytes), flashpoint, pH, cyanide, and sulfide. These analytical results have been submitted to the USAF electronically

Construction Waste
Construction waste—such as paper, plastic, trash, and PPE—was placed in plastic garbage bags and placed in an on-site dumpster for disposal.

4.0 GROUNDWATER PATHWAY

4.1 F.E. WARREN AIR FORCE BASE HYDROGEOLOGY

The unconfined High Plains aquifer is the principal source for water supply wells in the area surrounding F.E. Warren AFB. Numerous wells near the base are used for domestic and livestock water supply. Depth to the water table in this area is variable, being at the land surface near streams that act as discharge areas and increasing in depth with distance from discharge areas (ASL, August 2017). In the southern portion of the base, the depth to the water table generally ranges from 10 to 40 feet bgs. The direction of groundwater flow in the shallow aquifer zone is generally toward Crow Creek, Diamond Creek, and the unnamed tributary to Crow Creek.

Groundwater beneath the base is recharged locally by some areal infiltration of precipitation despite the relatively dry climate. Groundwater is discharged into nearby streams via springs and seeps (CH2M Hill, December 2015).

Drinking water at the F.E. Warren AFB is obtained from the Cheyenne Public Utilities, which uses both groundwater and surface water sources. The city owns and operates about 35 groundwater wells west and northwest of Cheyenne. The wells pump from the Ogallala and White River Aquifers. Surface water is collected from the Douglas Creek Drainage in the Snowy Range Mountains, about 75 miles west of Cheyenne. Surface water is also collected from the Crow Creek Drainage in the Pole Mountain/ Vedauwoo area, about 30 miles west of Cheyenne. All drinking water sources used by the city of Cheyenne are upstream or upgradient of the F.E. Warren AFB watershed. There are 11 domestic water wells on-base and 733 wells within four miles downgradient of F.E. Warren—643 of which are designated for domestic use (Wyoming State Engineer's Office [WSEO], 2017a). Figure 12 (Appendix A) is a generalized geologic map of F.E. Warren AFB.

4.2 FORMER FIRE PROTECTION TRAINING AREA 2 (AFFF AREA 1)

As presented in Table 5 (Section 3.3.4), analytical results for one or more groundwater samples had combined PFOA and PFOS concentrations exceeding the screening level. These results indicate that the shallow groundwater at AFFF Area 1 has been impacted by the release of AFFF.

The population within a 4-mile radius of the location is approximately 32,580 (CH2M Hill, December 2015). The shallow groundwater at AFFF Area 1 generally flows to the northeast towards Crow Creek. There are multiple downgradient domestic water wells within a 4-mile radius of the base. The nearest downgradient drinking water well (Richardson Well #P36060.0W) is 1.21 miles east-northeast (side-downgradient) from AFFF Area 1 and is 24 feet deep. There are also six domestic wells less than 0.75 miles from the Former FPTA 2 (Permit Numbers P22531.0P, P29389.0W, P35731.0W, P48322.0W, P49156.0W, and P85408.0W) but are cross-gradient of the AFFF area. These wells have screened intervals ranging from 60 to 165 ft bgs. The nearest downgradient domestic wells are screened at approximately 20 feet bgs within the unconfined aquifer; therefore, the groundwater exposure pathway may potentially be complete. Because of the proximity of nearby domestic-use water wells (less than 4 miles), PFAS concentrations in groundwater at AFFF Area 1 may pose an immediate risk to human health.

4.3 FORMER FIRE PROTECTION TRAINING AREA 3 (AFFF AREA 2)

As presented in Table 10 (Section 3.4.4), analytical results for one or more groundwater samples had combined PFOA and PFOS concentrations exceeding the screening levels. These results indicate that the shallow groundwater at AFFF Area 2 has been impacted by the release of AFFF.

The population within a 4-mile radius of the location is approximately 32,580 (CH2M Hill, December 2015). The shallow groundwater at AFFF Area 2 generally flows to the southeast. There are six downgradient domestic wells approximately 1.7 miles from the Former FPTA 3 (Permit Numbers P22531.0P, P29389.0W, P35731.0W, P48322.0W, P49156.0W, and P85408.0W) and multiple downgradient domestic water wells within a 4-mile radius of the base. Although the downgradient domestic wells are screened between 60 and 165 feet bgs, deeper than the new monitoring wells at FPTA 3, the aquifer in which they are completed is unconfined; therefore, the groundwater exposure pathway may potentially be complete. Because of the proximity of nearby domestic-use water wells (less than four miles), PFAS concentrations in groundwater at AFFF Area 2 may pose an immediate risk to human health.

4.4 BUILDING 1247–BASE FUELS (AFFF AREA 3)

As presented in Table 13 (Section 3.5.4), analytical results for one or more groundwater samples had combined PFOA and PFOS concentrations exceeding the screening levels. These results indicate that the shallow groundwater at AFFF Area 3 has been impacted by the release of AFFF.

The population within a 4-mile radius of the location is approximately 32,580 (CH2M Hill, December 2015). The shallow groundwater at AFFF Area 3 generally flows to the east. There are six downgradient domestic wells approximately 1.2 miles from Building 1247 (Permit Numbers P22531.0P, P29389.0W, P35731.0W, P48322.0W, P49156.0W, and P85408.0W) and multiple downgradient domestic water wells within a 4-mile radius of the base. Although the downgradient domestic wells are screened between 60 and 165 feet bgs, deeper than the new monitoring wells at AFFF Area 3, the aquifer in which they are completed is unconfined; therefore, the groundwater exposure pathway may potentially be complete. Because of the close proximity of nearby domestic-use water wells (less than four miles), PFAS concentrations in groundwater at AFFF Area 3 may pose an immediate risk to human health.

5.0 SURFACE WATER PATHWAY

Surface water at F.E. Warren AFB occurs as stream flow, seeps, and lakes. Stream flow results from groundwater discharge and from rainfall and snowmelt runoff. Crow Creek is the major perennial stream that drains southern areas of the base. Overall, Crow Creek is a gaining stream (that is, receives groundwater discharge) through the base area. Two tributaries to Crow Creek also drain the southern part of the base: an unnamed tributary and Diamond Creek. The unnamed tributary is an interrupted stream with alternating reaches that are perennial, intermittent, or ephemeral. Diamond Creek, the second largest stream on F.E. Warren AFB, is perennial along most of its length, with low flows maintained by groundwater discharge. The upper reach of Diamond Creek, approximately covering the first 300 yards on the base, is intermittent. Diamond Creek is also a gaining creek across the base except in periods of loss during the warmer months of July through September. These stream discharge losses are likely because of evaporation. Seeps contribute to stream flows in Crow Creek and its unnamed tributary throughout the year (ASL, August 2017).

The surface water at FPTA 2 and FPTA 3 either infiltrates the soil within these AFFF areas or via overland flow into the open ditches and stormwater control system surrounding the locations. Surface water collected in the open ditches and stormwater control systems flow into Crow Creek, approximately 1,100 feet northeast of FPTA 2 (AFFF Area 1) and less than 400 feet north of FPTA 3 (AFFF Area 2). Surface water is not a medium of concern at Building 1247 (AFFF Area 3).

There are 23 active surface water intake locations from Crow Creek within 15 miles downstream from the nearest AFFF area at F.E. Warren AFB. Of those 23 intakes, 10 are used for irrigation, seven for industrial purposes, four intakes for unknown purposes, one is temporary, and one is used for domestic purposes (WSEO, 2017b). The domestic-use intake, WSEO permit number P34840.0D, is located about 1,250 feet downstream from the base boundary.

5.1 FORMER FIRE PROTECTION TRAINING AREA 2 (AFFF AREA 1)

As presented in Table 4 (Section 3.3.4) and shown on Figure 6, analytical results for one or more surface water samples had combined PFOA and PFOS concentrations exceeding the screening levels. These results indicate that the surface water at AFFF Area 1 has been impacted by the release of AFFF.

The surface water either infiltrates the soil of former FPTA 2 or migrates via overland flow into the open ditches and stormwater control system located to the northeast of the AFFF area. The ditch system empties into Crow Creek, which is approximately 1,100 feet away from the AFFF area. A domestic surface water intake is 1.6 miles downstream of the confluence of the ditch outfall and Crow Creek. Therefore, the human health exposure pathway for surface water may potentially be complete. Because of the close proximity of nearby domestic-use surface water intakes (less than 15 miles downstream), PFAS concentrations in surface water at AFFF Area 1 may pose an immediate risk to human health.

5.2 FORMER FIRE PROTECTION TRAINING AREA 3 (AFFF AREA 2)

As presented in Table 9 (Section 3.4.4) and shown on Figure 8, PFAS were not detected above the laboratory detection level in the surface water sample at AFFF Area 2; therefore, the surface water exposure pathway is incomplete.

5.3 BUILDING 1247–BASE FUELS (AFFF AREA 3)

Surface water was not a medium of concern at AFFF Area 3 because the release that occurred at Building 1247 was fully contained with the building and was either sent to the OWS and then through the sanitary sewer to a publicly owned sewer treatment plant or diverted to a lined retention pond and left to evaporate (ASL August, 2017). Additionally, there was no surface water body identified at or near AFFF Area 3.

6.0 SOIL, SEDIMENT, AND AIR PATHWAYS

The objective of SI soil and sediment sampling was to determine if these media in the individual areas had been impacted by the release of AFFF and whether PFAS concentrations remain in the soil or sediments at concentrations above the human health-based screening levels. Screening levels for soils are based on the residential exposure with an HQ of 0.1.

6.1 FORMER FIRE PROTECTION TRAINING AREA 2 (AFFF AREA 1)

As presented in Tables 5, 6, and 7 (Section 3.3.4) and shown on Figure 7, analytical results for one or more surface soil samples for PFOA and PFOS concentrations exceeded the screening levels. PFBS also exceeded the soil leaching to groundwater limit; however, as described in Section 4.2, PFBS was not detected at levels above screening levels in groundwater. In subsurface soil and sediment samples at AFFF Area 1, PFAS was detected but at concentrations below the screening level. These results indicate that the surface soil, subsurface soil, and sediment at AFFF Area 1 have been impacted by the release of AFFF. The surface soil and air pathways at AFFF Area 1 are potentially complete. Site workers could be at risk for exposure from inhalation of surface soils.

6.2 FORMER FIRE PROTECTION TRAINING AREA 3 (AFFF AREA 2)

Surface soil samples were not planned for collection at AFFF Area 2 because surface soil was determined not to be a medium of concern due to the placement of new soil and gravel throughout the area. However, at the time of the field sampling, surface water was not present in the storm sewer culvert—one of two surface water/sediment sampling locations. In accordance with the QAPP, a surface soil sample (FEWRN02-005-SS-001) was collected within the dry culvert in lieu of the surface water/sediment sample.

As presented in Tables 10, 11, and 12 (Section 3.4.4) and shown on Figure 9, PFAS concentrations were below the screening levels or below the laboratory detection levels in the soil and sediment samples. These results indicate that the surface soil, subsurface soil, and sediments at AFFF Area 2 have not been impacted above screening levels by the release of AFFF. In the absence of PFAS concentrations above the screening levels, the soil, sediment, and air exposure pathways at AFFF Area 2 are incomplete.

6.3 BUILDING 1247–BASE FUELS (AFFF AREA 3)

As presented in Tables 14 and 15 (Section 3.5.4) and shown in Figure 11, PFAS concentrations for one or more surface soil samples exceeded the screening level. This result indicates that the surface soil at AFFF

Area 3 has been impacted by the release of AFFF. These results indicate that the surface soil and subsurface soil AFFF Area 3 have been impacted by the release of AFFF. The surface soil and air pathways at AFFF Area 3 are potentially complete. Site workers could be at risk for exposure from inhalation of surface soils. Analytical results for subsurface soil was either below the screening level or below the laboratory detection limits. Sediments were not a medium of concern at AFFF Area 3.

7.0 UPDATES TO CONCEPTUAL SITE MODELS

The following sections summarize updated conceptual site models (CSMs) based on human health exposure pathways present in Sections 4, 5, and 6.

7.1 FORMER FIRE PROTECTION TRAINING AREA 2 (AFFF AREA 1)

The CSM for Former FPTA 2 presented in the QAPP addendum (ASL, August 2017) identified surface soil, subsurface soil, groundwater, surface water, and sediment as media potentially impacted by previous releases of AFFF.

Based on the findings discussed in Sections 3.3.4 and 4.2, groundwater at the Former FPTA 2 has been impacted by PFOA and PFOS at concentrations above the screening level. Therefore, PFAS impacted-groundwater represents a potentially complete human ingestion pathway due to the proximity of private domestic water wells.

In addition, based on findings discussed in Sections 3.3.4 and 5.1, surface water at the Former FPTA 2 has been impacted by PFOA and PFOS at concentrations above the screening level. Therefore, PFAS-impacted surface water represents a potentially complete human ingestion pathway due to the presence of domestic surface water intakes downstream on Crow Creek.

Based on findings discussed in Sections 3.3.4 and 6.1, surface soil at the Former FPTA 2 has also been impacted by PFOA and PFOS at concentrations above the screening level. Therefore, PFAS-impacted surface soil represents a potentially complete pathway. Because the area is vegetated and not heavily trafficked, the air pathway is incomplete at this area. Subsurface soil and sediment at the Former FPTA 2 were not impacted by PFAS above screening levels.

7.2 FORMER FIRE PROTECTION TRAINING AREA 3 (AFFF AREA 2)

The CSM for the Former FPTA 3 presented in the QAPP addendum (ASL, August 2017) identified groundwater, subsurface soil, surface water, and sediment as media potentially impacted by previous releases of AFFF. Surface soil was sampled at one location in lieu of a surface water and sediment sample because the planned sampling location was dry.

Based on the findings discussed in Sections 3.4.4 and 4.3, groundwater at the Former FPTA 3 has been impacted by PFOA and PFOS at concentrations above the EPA HA. Therefore, PFAS-impacted groundwater represents a potentially complete human ingestion pathway due to the proximity of private domestic water wells.

In addition, based on findings discussed in Sections 3.4.4, 5.2, and 6.2, surface water, surface soil, subsurface soil, and sediment at the Former FPTA 3 have not been impacted by PFOA and PFOS at concentrations above screening levels and the pathways are incomplete.

7.3 BUILDING 1247–BASE FUELS (AFFF AREA 3)

The CSM for Building 1247–Base Fuels presented in the QAPP addendum (ASL, August 2017) identified groundwater, surface soil, and subsurface soil as media potentially impacted by previous release of AFFF.

Based on the findings discussed in Sections 3.5.4 and 4.4, groundwater at Building 1247–Base Fuels has been impacted by PFOA and PFOS at concentrations above the screening level. Therefore, PFAS-impacted groundwater represents a potentially complete human ingestion pathway due to the proximity of private domestic water wells.

In addition, based on findings discussed in Sections 3.5.4 and 6.3, surface soil at Building 1247–Base Fuels has been impacted by PFOS at concentrations above the screening level. Therefore, surface soil represents a potentially complete pathway. Because the area is vegetated and not heavily trafficked, the air pathway is incomplete at this area. Subsurface soil at Building 1247–Base Fuels was not impacted by PFAS above screening levels.

8.0 SUMMARY AND CONCLUSIONS

The objectives of the SI were to

- determine if a confirmed release of PFOS, PFOA, and PFBS has occurred at the area selected for inspection;
- determine if PFOS and/or PFOA are present in groundwater or surface water at the inspection area at concentrations exceeding the EPA lifetime health advisory (HA) for drinking water (EPA, May 2016a; EPA, May 2016b);
- determine if PFBS, PFOA, and/or PFOS are present in soil or sediment at the inspection area at concentrations exceeding calculated screening levels; and
- identify potential receptor pathways with immediate impacts to human health (immediate impact to human health is considered consumption of drinking water with PFOS or PFOA above the EPA HAs or PFBS above the regional screening level [RSL]) (EPA, May 2018).

Selected sample media included surface soil, subsurface soil, groundwater, sediment, and surface water. Sampling locations focused on immediate release areas and were biased toward locations most likely to have been impacted by releases of AFFF.

The areas inspected included the following:

- AFFF Area 1 – Former Fire Protection Training Area 2,
- AFFF Area 2 – Former Fire Protection Training Area 3, and
- AFFF Area 3 – Building 1247–Base Fuels.

Selected sample media varied across the three areas but included groundwater, surface water, surface soil, subsurface soil, and sediment. Sampling was primarily limited to the immediate areas of known or suspected AFFF releases and biased toward locations most likely to have been impacted by the releases.

All samples were analyzed for PFBS, PFOA, and PFOS using modified EPA Method 537. Analytical results for PFOA and PFOS in groundwater and surface water were compared to the screening level of 0.07 µg/L. The combined concentrations of PFOA and PFOS was also compared to this screening level. Analytical results for PFBS in groundwater and surface water were compared to the published EPA RSL of 40 µg/L. Analytical results for PFOA and PFOS in soil and sediment were compared to calculated

RSLs (126 µg/kg for both PFOA and PFOS). Analytical results for PFBS in soil and sediment were compared to the published EPA RSLs (130,000 µg/kg).

Table 16 summarizes detected concentrations of PFBS, PFOA, and PFOS for each media at the three AFFF areas. A brief summary of key findings and conclusions, as well as recommendations for follow-on activities, are provided in Sections 8.1, 8.2, and 8.3.

Table 16 Summary of PFBS, PFOA, and PFOS Detections and Screening Level Exceedances

AFFF Area	IRP ID	Parameter	Maximum Detected Concentration	Unit	Screening Level	Number of Samples/ Number of Exceedances[1]	Exceeds Screening Value	Potentially Complete DW Exposure Pathway	Recommendation
Former Fire Protection Training Area 2 (AFFF Area 1)	FT009	Groundwater						Yes	Initiate Expanded SI, Advance Area to RI
		PFBS	11	µg/L	40	4/0	No		
		PFOA	**72**	µg/L	0.07	**4/4**	**Yes**		
		PFOS	**64**	µg/L	0.07	**4/4**	**Yes**		
		PFOA + PFOS[2]	**136**	µg/L	0.07	**4/4**	**Yes**		
		Surface Water							
		PFBS	0.013 J	µg/L	40	2/0	No		
		PFOA	**0.33**	µg/L	0.07	**2/1**	**Yes**		
		PFOS	**1.2**	µg/L	0.07	**2/1**	**Yes**		
		PFOA + PFOS	**1.53**	µg/L	0.07	**2/2**	**Yes**		
		Surface Soil							
		PFBS	**3,600**	µg/kg	130,000 13[3]	**3/1**	**Yes**		
		PFOA	**50,000**	µg/kg	126	**3/1**	**Yes**		
		PFOS	**3,400**	µg/kg	126	**3/2**	**Yes**		
		Subsurface Soil							
		PFBS	1.3	µg/kg	130,000 13[3]	3/0	No		
		PFOA	6.0	µg/kg	126	3/0	No		
		PFOS	20	µg/kg	126	3/0	No		
		Sediment							
		PFBS	ND	µg/kg	130,000 13[3]	2/0	No		
		PFOA	0.63 J	µg/kg	126	2/0	No		
		PFOS	5.2 J	µg/kg	126	2/0	No		

AFFF Area	**IRP ID**	**Parameter**	**Maximum Detected Concentration**	**Unit**	**Screening Level**	**Number of Samples/ Number of Exceedances[1]**	**Exceeds Screening Value**	**Potentially Complete DW Exposure Pathway**	**Recommendation**
Former Fire Protection Training Area 3 (AFFF Area 2)		Groundwater							
		PFBS	3.7	µg/L	40	4/0	No	Yes	Initiate Expanded SI, Advance Area to RI
		PFOA	**1.1**	µg/L	0.07	**4/2**	**Yes**		
		PFOS	**19**	µg/L	0.07	**4/4**	**Yes**		
		PFOA + PFOS	**20.1**	µg/L	0.07	**4/4**	**Yes**		
		Surface Water							
		PFBS	ND	µg/L	40	1/0	No		
		PFOA	ND	µg/L	0.07	1/0	No		
		PFOS	ND	µg/L	0.07	1/0	No		
		PFOA + PFOS	ND	µg/L	0.07	1/0	No		
		Surface Soil							
		PFBS	2.9	µg/kg	130,000 13[3]	1/0	No		
		PFOA	2.0	µg/kg	126	1/0	No		
		PFOS	38	µg/kg	126	1/0	No		
		Subsurface Soil							
		PFBS	1.1 J	µg/kg	130,000 13[3]	4/0	No		
		PFOA	0.98 J	µg/kg	126	4/0	No		
		PFOS	82	µg/kg	126	4/0	No		
		Sediment							
		PFBS	ND	µg/kg	130,000 13[3]	1/0	No		
		PFOA	ND	µg/kg	126	1/0	No		
		PFOS	ND	µg/kg	126	1/0	No		

Building 1247– Base Fuels (AFFF Area 3)		Groundwater							
		PFBS	0.38	µg/kg	40	3/0	No	Yes	Initiate Expanded SI, Advance Area to RI
		PFOA	**0.66**	µg/kg	0.07	**3/3**	**Yes**		
		PFOS	**1.7**	µg/kg	0.07	**3/3**	**Yes**		
		PFOA + PFOS	**2.36**	µg/L	0.07	**3/3**	**Yes**		
		Surface Soil							
		PFBS	7.6 J	µg/kg	130,000 13^3	4/0	No		
		PFOA	8.7 J	µg/kg	126	4/0	No		
		PFOS	**1,600**	µg/kg	126	**4/2**	**Yes**		
		Subsurface Soil							
		PFBS	0.55 J	µg/kg	130,000 13^3	4/0	No		
		PFOA	0.53 J	µg/kg	126	4/0	No		
		PFOS	11	µg/kg	126	4/0	No		

[1] Only primary sample results are included unless an exceedance occurred only in a duplicate sample, in which case, only the duplicate sample was included.

[2] Maximum PFOA + PFOS concentration shown is the highest combined PFOA and PFOS concentration detected in a specific groundwater sample and in this instance is not the sum of the individual maximum PFOA and PFOS concentrations listed as they occurred in two separate samples.

[3] EPA regional screening levels for soil protective of groundwater (May 2018) (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables).

Bold values exceed screening levels.

µg/kg = microgram per kilogram
AFFF = aqueous film forming foam
ID = identification
J = Reported concentration is an estimated value.
PFBS = perfluorobutane sulfonate
PFOS = perfluorooctane sulfonate
SI = site inspection

µg/L = micrograms per liter
DW = drinking water
IRP = Installation Restoration Program
ND = not detected
PFOA = perfluorooctanoic acid
RI = remedial inspection

8.1 FORMER FIRE PROTECTION TRAINING AREA 2 (AFFF AREA 1)

Former FPTA 2 (IRP Site FT009) is located towards the central portion of the base southwest of the intersection of Old Glory Road and Missile Drive. The two unlined, bermed training pits at the area were used from 1965 to 1989. Fire training exercises from 1965 to 1974 used waste oils, solvents, hydraulic fluid, and other combustible liquids. From 1974 to 1989, only JP-4 was used. AFFF and water were used to extinguish fires from 1972 to 1989. A TCE plume associated with OU-5 is beneath the area.

As indicated on Table 16, PFOA, PFOS, and the combined concentrations PFOA and PFOS were detected at concentrations above screening levels in groundwater and surface water. PFBS, PFOA, and PFOS were detected at concentrations above screening levels in surface soil (PFBS exceeded the soil leaching to groundwater screening level). Analytical results confirm that a release of AFFF occurred at the Former FPTA 2 that has affected these media to an extent that could create complete exposure pathways.

Because of the close proximity of nearby domestic-use water wells (less than four miles) and domestic-use surface water intakes, PFAS concentrations in groundwater and surface water at AFFF Area 1 may pose an immediate risk to human health due to the potential ingestion scenario. PFAS concentrations in surface soil also pose a potential risk to on-site excavation workers through inhalation.

Based on the PFAS impacts to groundwater and surface water with a potentially complete pathway to water users, an expanded SI is recommended. In addition, a remedial investigation (RI) is recommended to further assess the extent of contamination and the impacts to groundwater, surface soil, and surface water at AFFF Area 1.

8.2 FORMER FIRE PROTECTION TRAINING AREA 3 (AFFF AREA 2)

Former FPTA 3 is located in the southern portion of the base. It was active from 1990 to 2000 and consisted of a polyethylene-lined training pit and a lined retention pond. The training pit was connected to an OWS and water was piped from the OWS to the lined retention pond. One of the liners beneath the training pit was found to be leaking. The liners for the pit and retention pond were removed and the retention pond filled in. AFFF was used in a limited capacity at Former FPTA 3.

As indicated on Table 16, PFOA, PFOS, and the combined concentrations PFOA and PFOS were detected at concentrations above screening levels in groundwater. Analytical results confirm that a release of AFFF occurred at the Former FPTA 3 that has affected this medium to an extent that could create a complete exposure pathway.

Because of the close proximity of nearby domestic-use water wells (less than four miles), PFAS concentrations in groundwater at AFFF Area 2 may pose an immediate risk to human health due to the potential ingestion scenario.

Based on the PFAS impacts to groundwater with a potentially complete pathway to water users, an expanded SI is recommended. In addition, an RI is recommended to further assess the extent of contamination and the impacts to groundwater at AFFF Area 2.

8.3 BUILDING 1247–BASE FUELS (AFFF AREA 3)

Building 1247 is in the southwestern corner of the base on Post Road and Wyoming Avenue. This structure was built in 1995 and has an active AFFF system with overhead lines with an associated 200- to 300-gallon tank. The building is connected to a polyethylene-lined containment pond (added in 2013) and spills can be diverted to this pond. In the past, when the pond has filled with rainwater, it was pumped out to the nearby grassy area. A failure of the fire suppression system leaked an unknown quantity of AFFF inside the building, which either flowed through an OWS and a sanitary sewer system or to the containment pond. A former TCE plume associated with OU-2 and OU-9 is beneath the area.

As indicated on Table 16, PFOA, PFOS, and the combined concentrations PFOA and PFOS were detected at concentrations above screening levels in groundwater. PFOS was detected at concentrations above screening levels in surface soil. Analytical results confirm that a release of AFFF occurred at the Building 1247–Base Fuels that have affected these media to an extent that could create complete exposure pathways.

Because of the close proximity of nearby domestic-use water wells (less than four miles), PFAS concentrations in groundwater at AFFF Area 3 may pose an immediate risk to human health based on the ingestion scenario. PFOS concentrations in surface soil also pose a potential risk to on-site excavation workers through inhalation.

Based on the PFAS impacts to soil and groundwater and the potentially complete pathway to water users, an expanded SI is recommended. In addition, an RI is recommended to further assess the extent of contamination and the impacts to groundwater at AFFF Area 3.

9.0 REFERENCES

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Appendix A

Figures

G:\M2027.0003_Omaha\F_E_Warren\MXD\SI Report\Figure_1_Location_of_F_E_Warren.mxd; Date: 1/5/2018

Figure 1
Location of F. E. Warren Air Force Base
Laramie County, Wyoming

Legend

▭ Installation Boundary

Service Layer Credits: Esri StreetMap North America

Drawn: T Morse

Date: 1/5/2018

0 0.5 1 Mile

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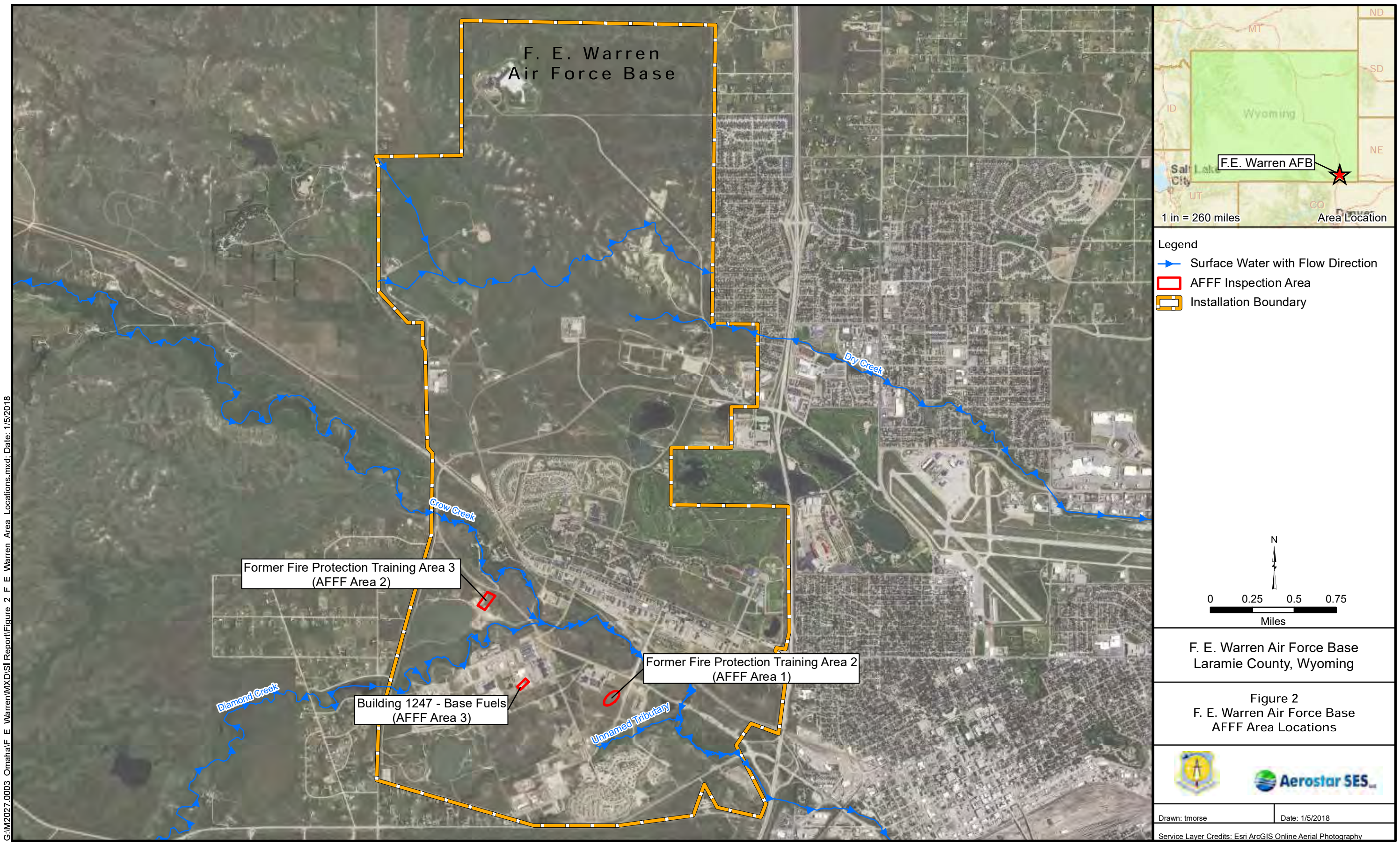


F. E. Warren Air Force Base
Laramie County, Wyoming

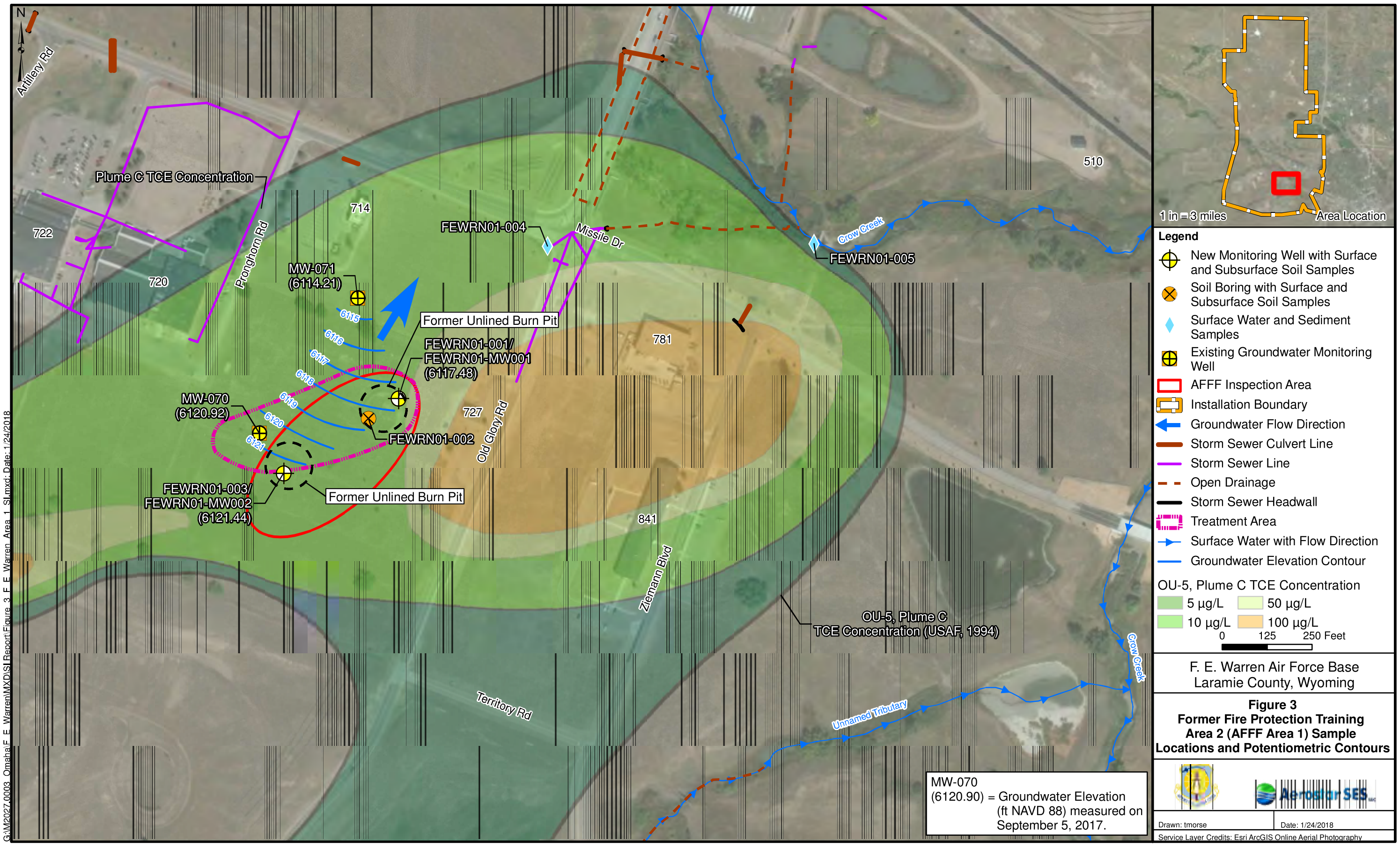
Figure 2
F. E. Warren Air Force Base
AFFF Area Locations

Drawn: tmorse

Date: 1/5/2018

Service Layer Credits: Esri ArcGIS Online Aerial Photography

G:\M2027.0003 Omaha\F E Warren\MXDs\SI Report\Figure 2 F E Warren Area Locations.mxd; Date: 1/5/2018



Legend

- ⊕ New Monitoring Well with Surface and Subsurface Soil Samples
- ⊗ Soil Boring with Surface and Subsurface Soil Samples
- ◆ Surface Water and Sediment Samples
- ⊕ Existing Groundwater Monitoring Well
- ▭ AFFF Inspection Area
- ▭ Installation Boundary
- ← Groundwater Flow Direction
- — Storm Sewer Culvert Line
- — Storm Sewer Line
- - - Open Drainage
- — Storm Sewer Headwall
- ▭ Treatment Area
- → Surface Water with Flow Direction
- — Groundwater Elevation Contour

OU-5, Plume C TCE Concentration

🟩 5 µg/L	▨ 50 µg/L
🟩 10 µg/L	🟧 100 µg/L

0 125 250 Feet

MW-070
(6120.90) = Groundwater Elevation (ft NAVD 88) measured on September 5, 2017.

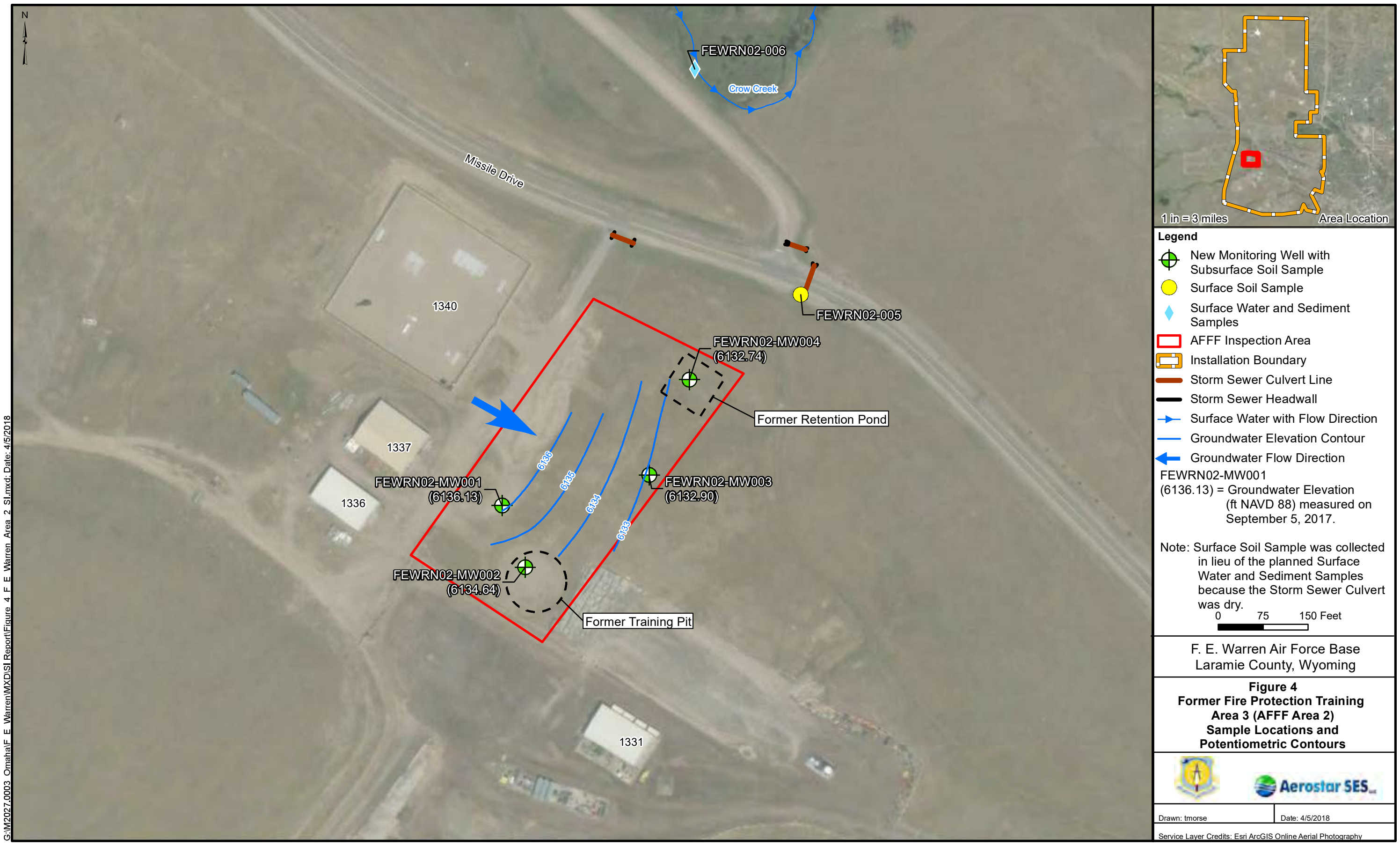
F. E. Warren Air Force Base
Laramie County, Wyoming

Figure 3
Former Fire Protection Training Area 2 (AFFF Area 1) Sample Locations and Potentiometric Contours

Drawn: tmorse
Date: 1/24/2018

Service Layer Credits: Esri ArcGIS Online Aerial Photography

G:\M2027.0003 Omaha\F E Warren\MXD\SI Report\Figure 3 F E Warren Area 1 SI.mxd; Date: 1/24/2018



F. E. Warren Air Force Base
Laramie County, Wyoming

Figure 4
Former Fire Protection Training Area 3 (AFFF Area 2) Sample Locations and Potentiometric Contours

Drawn: tmorse
Date: 4/5/2018

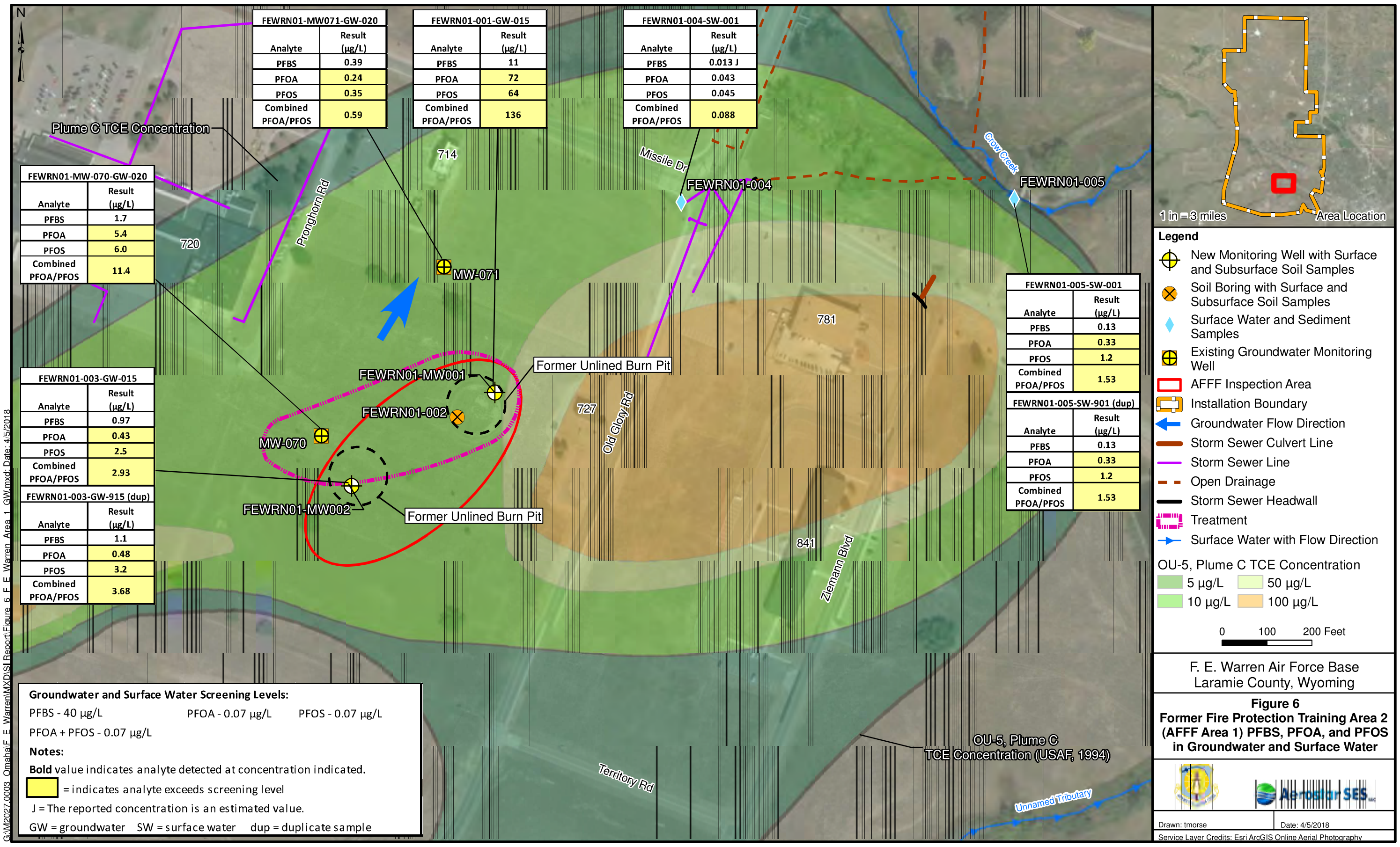
Service Layer Credits: Esri ArcGIS Online Aerial Photography

G:\M2027.0003 Omaha\F E Warren\MXD\SI Report\Figure 4 F E Warren Area 2 SI.mxd; Date: 4/5/2018

F. E. Warren Air Force Base
Laramie County, Wyoming

Figure 5
Building 1247 - Base Fuels
(AFFF Area 3) Sample Locations
and Potentiometric Contours

G:\M2027.0003 Omaha\F E Warren\MXD\SI Report\Figure 5 F E Warren Area 3 SI.mxd; Date: 1/23/2018



FEWRN01-MW071-GW-020	
Analyte	Result (µg/L)
PFBS	0.39
PFOA	0.24
PFOS	0.35
Combined PFOA/PFOS	0.59

FEWRN01-001-GW-015	
Analyte	Result (µg/L)
PFBS	11
PFOA	72
PFOS	64
Combined PFOA/PFOS	136

FEWRN01-004-SW-001	
Analyte	Result (µg/L)
PFBS	0.013 J
PFOA	0.043
PFOS	0.045
Combined PFOA/PFOS	0.088

FEWRN01-MW-070-GW-020	
Analyte	Result (µg/L)
PFBS	1.7
PFOA	5.4
PFOS	6.0
Combined PFOA/PFOS	11.4

FEWRN01-003-GW-015	
Analyte	Result (µg/L)
PFBS	0.97
PFOA	0.43
PFOS	2.5
Combined PFOA/PFOS	2.93

FEWRN01-003-GW-915 (dup)	
Analyte	Result (µg/L)
PFBS	1.1
PFOA	0.48
PFOS	3.2
Combined PFOA/PFOS	3.68

FEWRN01-005-SW-001	
Analyte	Result (µg/L)
PFBS	0.13
PFOA	0.33
PFOS	1.2
Combined PFOA/PFOS	1.53

FEWRN01-005-SW-901 (dup)	
Analyte	Result (µg/L)
PFBS	0.13
PFOA	0.33
PFOS	1.2
Combined PFOA/PFOS	1.53

Legend

⊕	New Monitoring Well with Surface and Subsurface Soil Samples
⊗	Soil Boring with Surface and Subsurface Soil Samples
◆	Surface Water and Sediment Samples
⊕	Existing Groundwater Monitoring Well
🟥	AFFF Inspection Area
▭	Installation Boundary
←	Groundwater Flow Direction
━	Storm Sewer Culvert Line
━	Storm Sewer Line
- -	Open Drainage
━	Storm Sewer Headwall
▭	Treatment
→	Surface Water with Flow Direction

OU-5, Plume C TCE Concentration

🟩 5 µg/L	50 µg/L
🟩 10 µg/L	🟧 100 µg/L

Groundwater and Surface Water Screening Levels:

PFBS - 40 µg/L PFOA - 0.07 µg/L PFOS - 0.07 µg/L

PFOA + PFOS - 0.07 µg/L

Notes:

Bold value indicates analyte detected at concentration indicated.

🟨 = indicates analyte exceeds screening level

J = The reported concentration is an estimated value.

GW = groundwater SW = surface water dup = duplicate sample

F. E. Warren Air Force Base
Laramie County, Wyoming

Figure 6
Former Fire Protection Training Area 2 (AFFF Area 1) PFBS, PFOA, and PFOS in Groundwater and Surface Water

Aerostar SES

Drawn: tmorse Date: 4/5/2018

Service Layer Credits: Esri ArcGIS Online Aerial Photography

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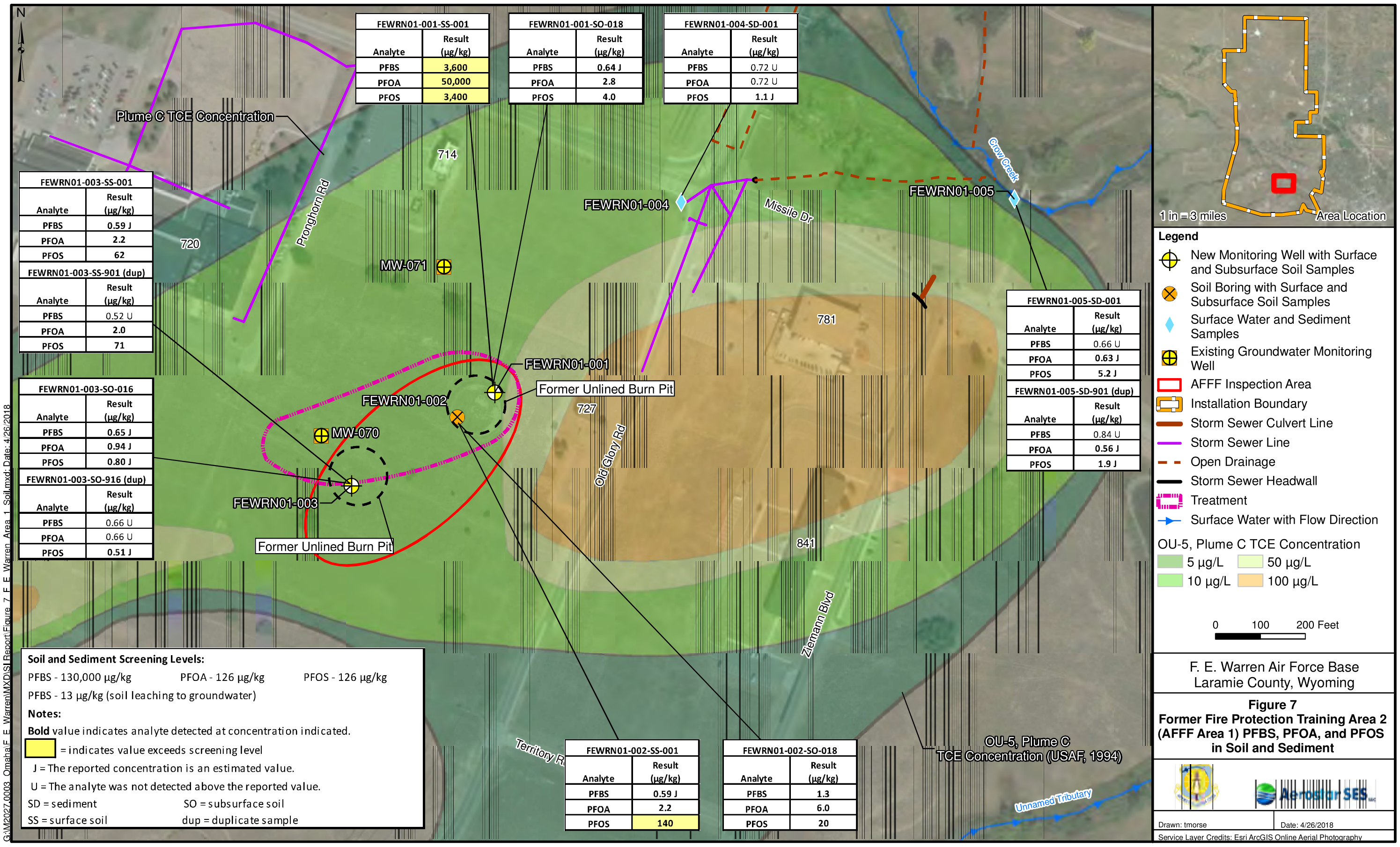

FEWRN01-001-SS-001	
Analyte	Result (µg/kg)
PFBS	**3,600**
PFOA	**50,000**
PFOS	**3,400**

FEWRN01-001-SO-018	
Analyte	Result (µg/kg)
PFBS	**0.64 J**
PFOA	**2.8**
PFOS	**4.0**

FEWRN01-004-SD-001	
Analyte	Result (µg/kg)
PFBS	0.72 U
PFOA	0.72 U
PFOS	**1.1 J**

FEWRN01-003-SS-001	
Analyte	Result (µg/kg)
PFBS	**0.59 J**
PFOA	**2.2**
PFOS	**62**

FEWRN01-003-SS-901 (dup)	
Analyte	Result (µg/kg)
PFBS	0.52 U
PFOA	**2.0**
PFOS	**71**

FEWRN01-003-SO-016	
Analyte	Result (µg/kg)
PFBS	**0.65 J**
PFOA	**0.94 J**
PFOS	**0.80 J**

FEWRN01-003-SO-916 (dup)	
Analyte	Result (µg/kg)
PFBS	0.66 U
PFOA	0.66 U
PFOS	**0.51 J**

FEWRN01-005-SD-001	
Analyte	Result (µg/kg)
PFBS	0.66 U
PFOA	**0.63 J**
PFOS	**5.2 J**

FEWRN01-005-SD-901 (dup)	
Analyte	Result (µg/kg)
PFBS	0.84 U
PFOA	**0.56 J**
PFOS	**1.9 J**

FEWRN01-002-SS-001	
Analyte	Result (µg/kg)
PFBS	**0.59 J**
PFOA	**2.2**
PFOS	**140**

FEWRN01-002-SO-018	
Analyte	Result (µg/kg)
PFBS	**1.3**
PFOA	**6.0**
PFOS	**20**

Soil and Sediment Screening Levels:

PFBS - 130,000 µg/kg PFOA - 126 µg/kg PFOS - 126 µg/kg

PFBS - 13 µg/kg (soil leaching to groundwater)

Notes:

Bold value indicates analyte detected at concentration indicated.

🟨 = indicates value exceeds screening level

J = The reported concentration is an estimated value.

U = The analyte was not detected above the reported value.

SD = sediment SO = subsurface soil

SS = surface soil dup = duplicate sample

F. E. Warren Air Force Base
Laramie County, Wyoming

Figure 7
Former Fire Protection Training Area 2 (AFFF Area 1) PFBS, PFOA, and PFOS in Soil and Sediment

Drawn: tmorse
Date: 4/26/2018

Service Layer Credits: Esri ArcGIS Online Aerial Photography

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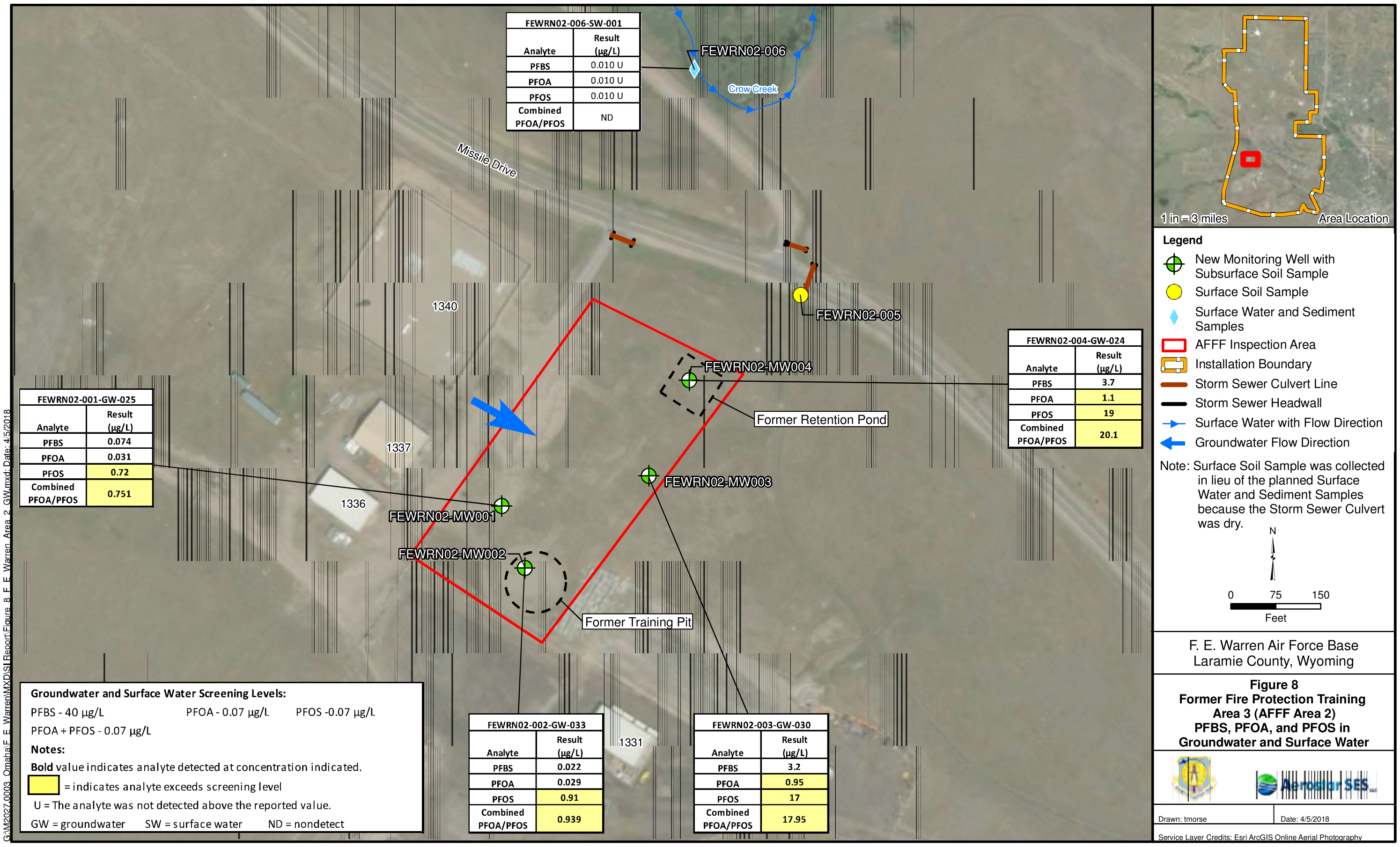


FEWRN02-006-SW-001	
Analyte	Result (µg/L)
PFBS	0.010 U
PFOA	0.010 U
PFOS	0.010 U
Combined PFOA/PFOS	ND

FEWRN02-004-GW-024	
Analyte	Result (µg/L)
PFBS	**3.7**
PFOA	**1.1**
PFOS	**19**
Combined PFOA/PFOS	**20.1**

FEWRN02-001-GW-025	
Analyte	Result (µg/L)
PFBS	**0.074**
PFOA	**0.031**
PFOS	**0.72**
Combined PFOA/PFOS	**0.751**

FEWRN02-002-GW-033	
Analyte	Result (µg/L)
PFBS	**0.022**
PFOA	**0.029**
PFOS	**0.91**
Combined PFOA/PFOS	**0.939**

FEWRN02-003-GW-030	
Analyte	Result (µg/L)
PFBS	**3.2**
PFOA	**0.95**
PFOS	**17**
Combined PFOA/PFOS	**17.95**

Groundwater and Surface Water Screening Levels:

PFBS - 40 µg/L PFOA - 0.07 µg/L PFOS -0.07 µg/L

PFOA + PFOS - 0.07 µg/L

Notes:

Bold value indicates analyte detected at concentration indicated.

🟨 = indicates analyte exceeds screening level

U = The analyte was not detected above the reported value.

GW = groundwater SW = surface water ND = nondetect

Legend

- ⊕ New Monitoring Well with Subsurface Soil Sample
- ● Surface Soil Sample
- ♦ Surface Water and Sediment Samples
- ▭ AFFF Inspection Area
- ▭ Installation Boundary
- — Storm Sewer Culvert Line
- — Storm Sewer Headwall
- → Surface Water with Flow Direction
- ⬅ Groundwater Flow Direction

Note: Surface Soil Sample was collected in lieu of the planned Surface Water and Sediment Samples because the Storm Sewer Culvert was dry.

F. E. Warren Air Force Base
Laramie County, Wyoming

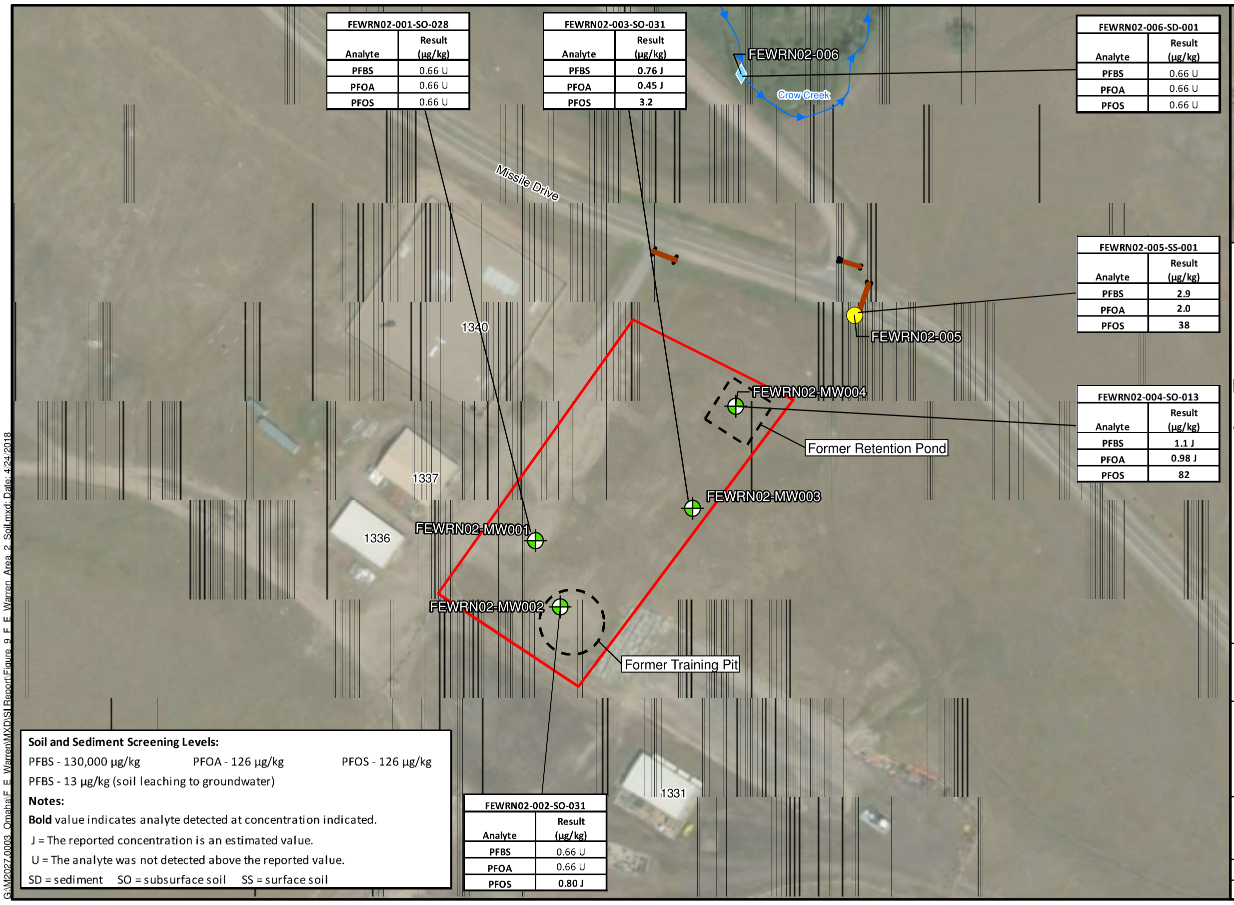
Figure 8
Former Fire Protection Training Area 3 (AFFF Area 2) PFBS, PFOA, and PFOS in Groundwater and Surface Water

Drawn: tmorse

Date: 4/5/2018

Service Layer Credits: Esri ArcGIS Online Aerial Photography

G:\M2027.0003 Omaha\F E Warren\MXD\SI Report\Figure 8 F E Warren Area 2 GW.mxd; Date: 4/5/2018



FEWRN02-001-SO-028	
Analyte	Result (µg/kg)
PFBS	0.66 U
PFOA	0.66 U
PFOS	0.66 U

FEWRN02-003-SO-031	
Analyte	Result (µg/kg)
PFBS	**0.76 J**
PFOA	**0.45 J**
PFOS	**3.2**

FEWRN02-006-SD-001	
Analyte	Result (µg/kg)
PFBS	0.66 U
PFOA	0.66 U
PFOS	0.66 U

FEWRN02-005-SS-001	
Analyte	Result (µg/kg)
PFBS	**2.9**
PFOA	**2.0**
PFOS	**38**

FEWRN02-004-SO-013	
Analyte	Result (µg/kg)
PFBS	**1.1 J**
PFOA	**0.98 J**
PFOS	**82**

FEWRN02-002-SO-031	
Analyte	Result (µg/kg)
PFBS	0.66 U
PFOA	0.66 U
PFOS	**0.80 J**

Soil and Sediment Screening Levels:

PFBS - 130,000 µg/kg PFOA - 126 µg/kg PFOS - 126 µg/kg

PFBS - 13 µg/kg (soil leaching to groundwater)

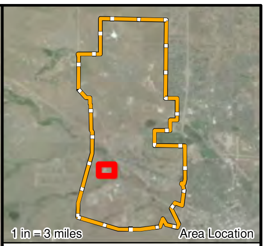
Notes:

Bold value indicates analyte detected at concentration indicated.

J = The reported concentration is an estimated value.

U = The analyte was not detected above the reported value.

SD = sediment SO = subsurface soil SS = surface soil



Legend

- ⊕ New Monitoring Well with Subsurface Soil Sample
- ● Surface Soil Sample
- ♦ Surface Water and Sediment Samples
- 🟥 AFFF Inspection Area
- ▭ Installation Boundary
- → Surface Water with Flow Direction
- ━ Storm Sewer Culvert Line
- ━ Storm Sewer Headwall

Note: Surface Soil Sample was collected in lieu of the planned Surface Water and Sediment Samples because the Storm Sewer Culvert was dry.

N

0 75 150
Feet

F. E. Warren Air Force Base
Laramie County, Wyoming

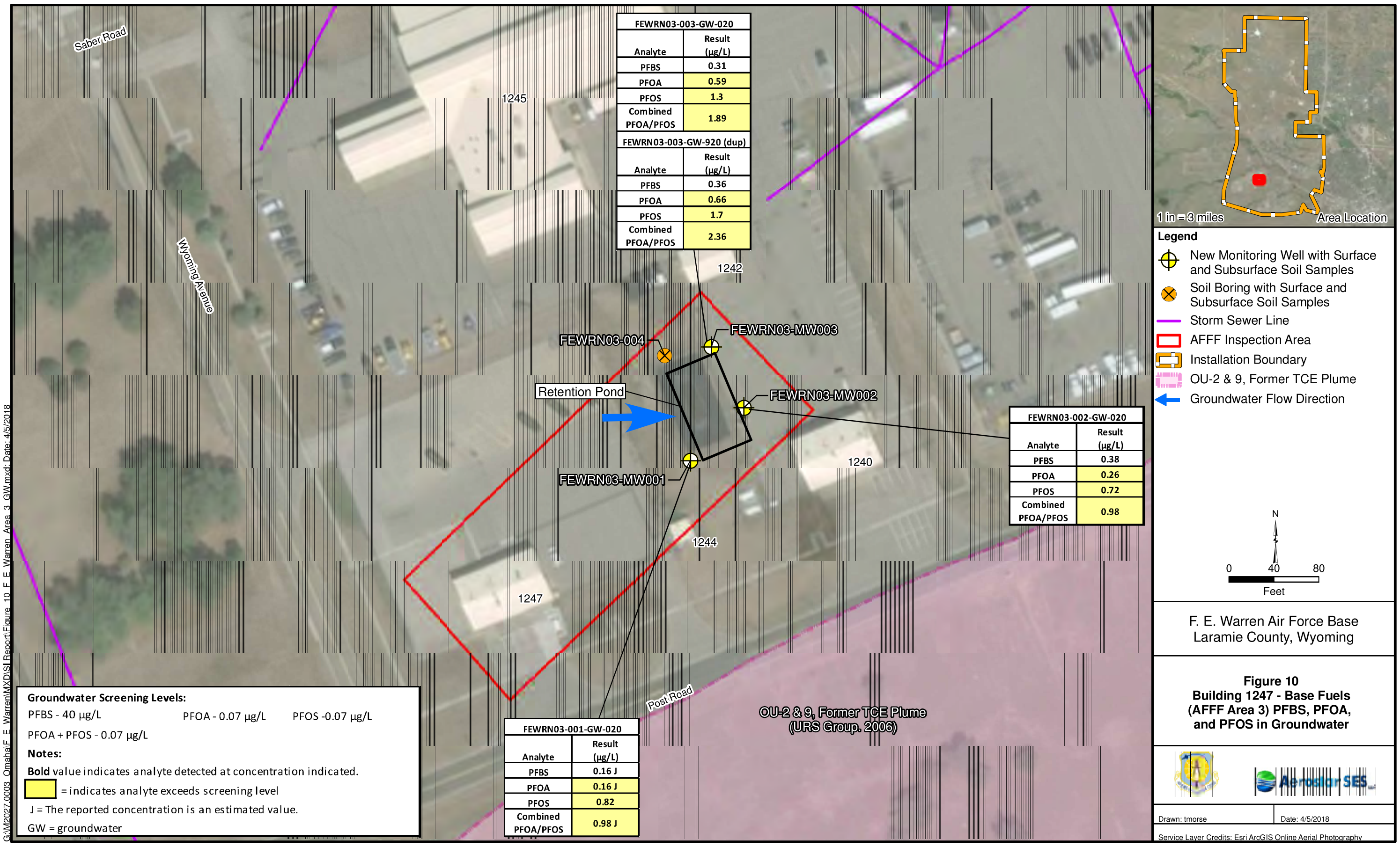
Figure 9
Former Fire Protection Training Area 3 (AFFF Area 2) PFBS, PFOA, and PFOS in Soil and Sediment

Drawn: tmorse

Date: 4/24/2018

Service Layer Credits: Esri ArcGIS Online Aerial Photography

G:\M2027.0003_Omaha\F_E_Warren\MXD\SI Report\Figure_9_F_E_Warren_Area_2_Soil.mxd; Date: 4/24/2018



FEWRN03-003-GW-020

Analyte	Result (µg/L)
PFBS	0.31
PFOA	0.59
PFOS	1.3
Combined PFOA/PFOS	1.89

FEWRN03-003-GW-920 (dup)

Analyte	Result (µg/L)
PFBS	0.36
PFOA	0.66
PFOS	1.7
Combined PFOA/PFOS	2.36

FEWRN03-002-GW-020

Analyte	Result (µg/L)
PFBS	0.38
PFOA	0.26
PFOS	0.72
Combined PFOA/PFOS	0.98

FEWRN03-001-GW-020

Analyte	Result (µg/L)
PFBS	0.16 J
PFOA	0.16 J
PFOS	0.82
Combined PFOA/PFOS	0.98 J

Groundwater Screening Levels:

PFBS - 40 µg/L PFOA - 0.07 µg/L PFOS -0.07 µg/L

PFOA + PFOS - 0.07 µg/L

Notes:

Bold value indicates analyte detected at concentration indicated.

🟨 = indicates analyte exceeds screening level

J = The reported concentration is an estimated value.

GW = groundwater

F. E. Warren Air Force Base
Laramie County, Wyoming

Figure 10
Building 1247 - Base Fuels (AFFF Area 3) PFBS, PFOA, and PFOS in Groundwater

Drawn: tmorse
Date: 4/5/2018

Service Layer Credits: Esri ArcGIS Online Aerial Photography

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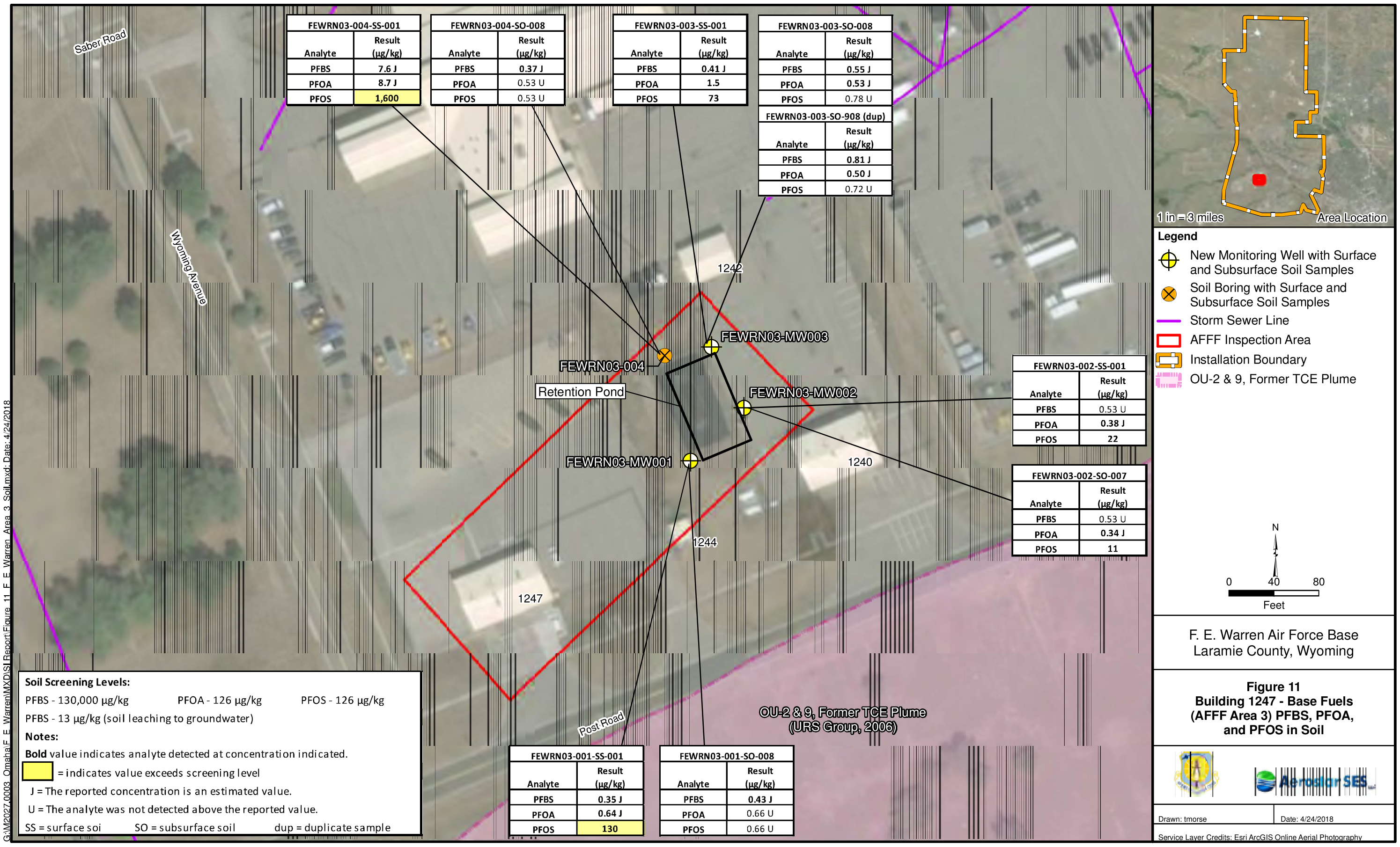


FEWRN03-004-SS-001

Analyte	Result (µg/kg)
PFBS	**7.6 J**
PFOA	**8.7 J**
PFOS	**1,600**

FEWRN03-004-SO-008

Analyte	Result (µg/kg)
PFBS	**0.37 J**
PFOA	0.53 U
PFOS	0.53 U

FEWRN03-003-SS-001

Analyte	Result (µg/kg)
PFBS	**0.41 J**
PFOA	**1.5**
PFOS	**73**

FEWRN03-003-SO-008

Analyte	Result (µg/kg)
PFBS	**0.55 J**
PFOA	**0.53 J**
PFOS	0.78 U

FEWRN03-003-SO-908 (dup)

Analyte	Result (µg/kg)
PFBS	**0.81 J**
PFOA	**0.50 J**
PFOS	0.72 U

FEWRN03-002-SS-001

Analyte	Result (µg/kg)
PFBS	0.53 U
PFOA	**0.38 J**
PFOS	**22**

FEWRN03-002-SO-007

Analyte	Result (µg/kg)
PFBS	0.53 U
PFOA	**0.34 J**
PFOS	**11**

FEWRN03-001-SS-001

Analyte	Result (µg/kg)
PFBS	**0.35 J**
PFOA	**0.64 J**
PFOS	**130**

FEWRN03-001-SO-008

Analyte	Result (µg/kg)
PFBS	**0.43 J**
PFOA	0.66 U
PFOS	0.66 U

Soil Screening Levels:

PFBS - 130,000 µg/kg PFOA - 126 µg/kg PFOS - 126 µg/kg

PFBS - 13 µg/kg (soil leaching to groundwater)

Notes:

Bold value indicates analyte detected at concentration indicated.

🟨 = indicates value exceeds screening level

J = The reported concentration is an estimated value.

U = The analyte was not detected above the reported value.

SS = surface soi SO = subsurface soil dup = duplicate sample

Legend

- ⊕ New Monitoring Well with Surface and Subsurface Soil Samples
- ⊗ Soil Boring with Surface and Subsurface Soil Samples
- ― Storm Sewer Line
- ▭ AFFF Inspection Area
- ▭ Installation Boundary
- ▨ OU-2 & 9, Former TCE Plume

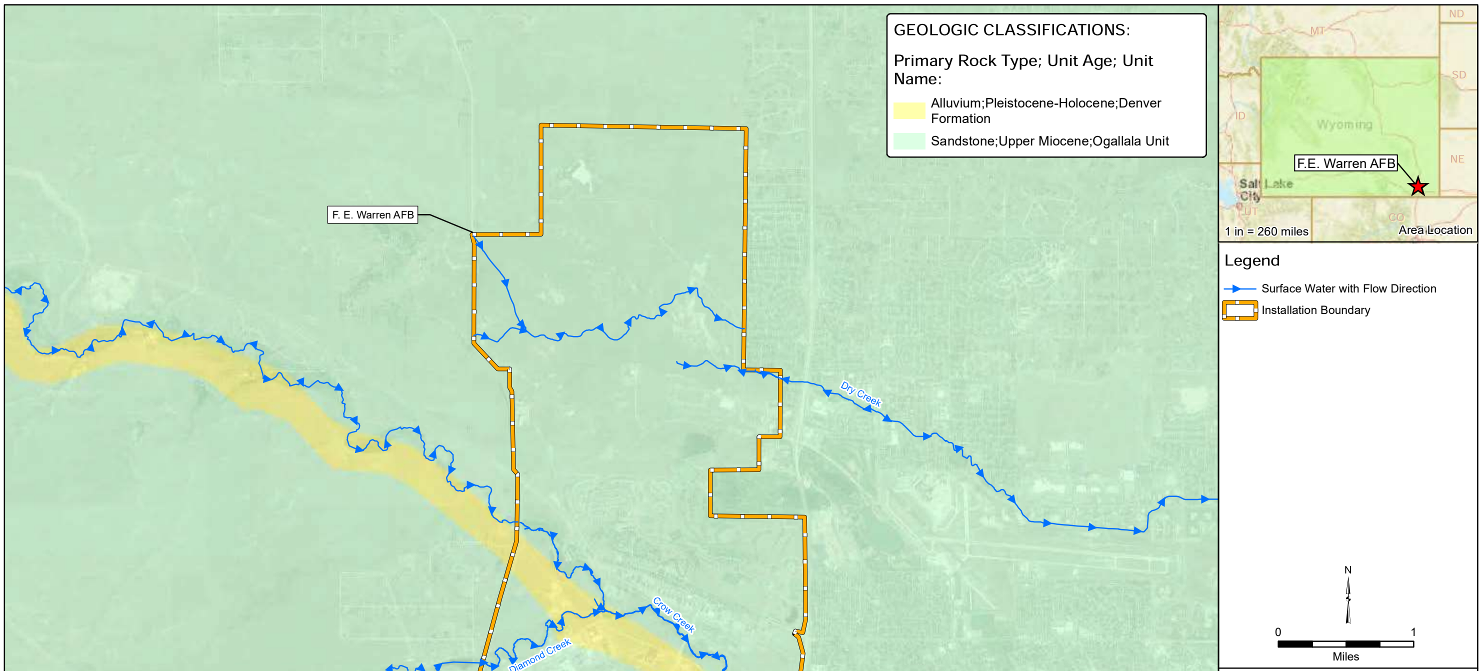
F. E. Warren Air Force Base
Laramie County, Wyoming

Figure 11
Building 1247 - Base Fuels (AFFF Area 3) PFBS, PFOA, and PFOS in Soil

Drawn: tmorse Date: 4/24/2018

Service Layer Credits: Esri ArcGIS Online Aerial Photography

G:\M2027.0003_Omaha\F_E_Warren\MXD\SI Report\Figure_11_F_E_Warren_Area_3_Soil.mxd Date: 4/24/2018



F. E. Warren Air Force Base
Laramie County, Wyoming

Figure 12
Geologic Map of F. E. Warren Air Force Base
Laramie County, Wyoming

Aerostar SES LLC

Figure_12_FE_Warren_Geology.mxd

Drawn: B. Baxter
Date: 12/28/2017

Service Layer Credits: Esri ArcGIS Online Aerial Photography and Base Maps

Appendix B

Regional Screening Level Calculations for Soil and Sediment

Default
Resident Equation Inputs for Soil

Variable	Value
THQ (target hazard quotient) unitless	0.1
TR (target risk) unitless	1E-06
LT (lifetime) years	70
ET_{res} (exposure time) hours/day	24
ET_{res-c} (child exposure time) hours/day	24
ET_{res-a} (adult exposure time) hours/day	24
ET_{0-2} (mutagenic exposure time) hours/day	24
ET_{2-6} (mutagenic exposure time) hours/day	24
ET_{6-16} (mutagenic exposure time) hours/day	24
ET_{16-26} (mutagenic exposure time) hours/day	24
ED_{res} (exposure duration) years	26
ED_{res-c} (exposure duration - child) years	6
ED_{res-a} (exposure duration - adult) years	20
ED_{0-2} (mutagenic exposure duration) years	2
ED_{2-6} (mutagenic exposure duration) years	4
ED_{6-16} (mutagenic exposure duration) years	10
ED_{16-26} (mutagenic exposure duration) years	10
BW_{res-c} (body weight - child) kg	15
BW_{res-a} (body weight - adult) kg	80
BW_{0-2} (mutagenic body weight) kg	15
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-26} (mutagenic body weight) kg	80
SA_{res-c} (skin surface area - child) cm^2/day	2373
SA_{res-a} (skin surface area - adult) cm^2/day	6032
SA_{0-2} (mutagenic skin surface area) cm^2/day	2373
SA_{2-6} (mutagenic skin surface area) cm^2/day	2373
SA_{6-16} (mutagenic skin surface area) cm^2/day	6032
SA_{16-26} (mutagenic skin surface area) cm^2/day	6032
EF_{res} (exposure frequency) days/year	350
EF_{res-c} (exposure frequency - child) days/year	350
EF_{res-a} (exposure frequency - adult) days/year	350

Output generated 15FEB2018:16:21:12

Default
Resident Equation Inputs for Soil

Variable	Value
EF_{0-2} (mutagenic exposure frequency) days/year	350
EF_{2-6} (mutagenic exposure frequency) days/year	350
EF_{6-16} (mutagenic exposure frequency) days/year	350
EF_{16-26} (mutagenic exposure frequency) days/year	350
$IFS_{res-adj}$ (age-adjusted soil ingestion factor) mg/kg	36750
$IFSM_{res-adj}$ (mutagenic age-adjusted soil ingestion factor) mg/kg	166833.3
IRS_{res-c} (soil intake rate - child) mg/day	200
IRS_{res-a} (soil intake rate - adult) mg/day	100
IRS_{0-2} (mutagenic soil intake rate) mg/day	200
IRS_{2-6} (mutagenic soil intake rate) mg/day	200
IRS_{6-16} (mutagenic soil intake rate) mg/day	100
IRS_{16-26} (mutagenic soil intake rate) mg/day	100
AF_{res-a} (skin adherence factor - adult) mg/cm ^{2}	0.07
AF_{res-c} (skin adherence factor - child) mg/cm ^{2}	0.2
AF_{0-2} (mutagenic skin adherence factor) mg/cm ^{2}	0.2
AF_{2-6} (mutagenic skin adherence factor) mg/cm ^{2}	0.2
AF_{6-16} (mutagenic skin adherence factor) mg/cm ^{2}	0.07
AF_{16-26} (mutagenic skin adherence factor) mg/cm ^{2}	0.07
$DFS_{res-adj}$ (age-adjusted soil dermal factor) mg/kg	103390
$DFSM_{res-adj}$ (mutagenic age-adjusted soil dermal factor) mg/kg	428260
AT_{res} (averaging time - resident carcinogenic)	365
$City_{PEF}$ (Climate Zone) Selection	Default
A_s (PEF acres)	0.5
Q/C_{wind} (g/m^2-s per kg/m^3)	93.77
PEF (particulate emission factor) m ^{3}/kg	1359344438
A (PEF Dispersion Constant)	16.2302
B (PEF Dispersion Constant)	18.7762
C (PEF Dispersion Constant)	216.108
V (fraction of vegetative cover) unitless	0.5
U_m (mean annual wind speed) m/s	4.69
U_t (equivalent threshold value)	11.32
F(x) (function dependent on U_m/U_t) unitless	0.194

Output generated 15FEB2018:16:21:12

Default
Resident Equation Inputs for Soil

Variable	Value
City$_{VF}$ (Climate Zone) Selection	Default
A_s (VF acres)	0.5
Q/C$_{vol}$ (g/m^2-s per kg/m^3)	68.18
foc (fraction organic carbon in soil) g/g	0.006
p_b (dry soil bulk density) g/cm^3	1.5
p_s (soil particle density) g/cm^3	2.65
n (total soil porosity) L_{pore}/L_{soil}	0.43396
Theta$_a$ (air-filled soil porosity) L_{air}/L_{soil}	0.28396
Theta$_w$ (water-filled soil porosity) L_{water}/L_{soil}	0.15
T (exposure interval) s	819936000
A (VF Dispersion Constant)	11.911
B (VF Dispersion Constant)	18.4385
C (VF Dispersion Constant)	209.7845
City$_{VF\ mass\text{-}loading}$ (Climate Zone) Selection	Default
VF$_{ml}$ (volitization factor - mass-limit) m^3/kg	.
Q/C$_{vol}$ (g/m^2-s per kg/m^3)	68.18
A_s (VF mass-limit acres)	0.5
T (exposure interval) yr	26
d_s (depth of source) m	.
p_b (dry soil bulk density) g/cm^3	1.5
A (VF Dispersion Constant - Mass Limit)	11.911
B (VF Dispersion Constant - Mass Limit)	18.4385
C (VF Dispersion Constant - Mass Limit)	209.7845
T_w (groundwater temperature) Celsius	25

Default
Resident Risk-Based Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; D = DWSHA; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #29); H = HEAST; F = See FAQ; E = see user guide Section 2.3.5; W = see user guide Section 2.3.6; L = see user guide on lead; M = mutagen; S = see user guide Section 5; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide); U = User-provided

Chemical	CAS Number	Mutagen?	VOC?	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Inhalation Unit Risk (ug/m ^{3}) $^{-1}$	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m ^{3})	RfC Ref	GIABS	ABS	RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	No	No	-		-		2.00E-05	D	-		1	0.1	1	-	6.80E+02
Perfluorooctanoic acid (PFOA)	335-67-1	No	No	7.00E-02	D	-		2.00E-05	D	-		1	0.1	1	-	9.50E+03

K_{oc} (cm3/g)	K_d (cm³/g)	HLC (atm-m ^{3}/mole)	Henry's Law Constant (unitless)	H\` and HLC Ref	Normal Boiling Point T_{boil} (K)	BP Ref	Critical Temperature T_{crit} (K)	T_{crit} Ref	D_{ia} (cm ^{2}/s)	D_{iw} (cm ^{2}/s)	D_A (cm ^{2}/s)	Particulate Emission Factor (m ^{3}/kg)	Volatilization Factor (m ^{3}/kg)
3.72E+02	-	-	-		532.15	PHYSPROP	-		2.07E-02	5.25E-06	-	1.36E+09	-
1.15E+02	-	-	-		465.55	PHYSPROP	-		2.26E-02	5.79E-06	-	1.36E+09	-

Ingestion SL TR=1E-06 (mg/kg)	Dermal SL TR=1E-06 (mg/kg)	Inhalation SL TR=1E-06 (mg/kg)	Carcinogenic SL TR=1E-06 (mg/kg)	Ingestion SL Child THQ=0.1 (mg/kg)	Dermal SL Child THQ=0.1 (mg/kg)	Inhalation SL Child THQ=0.1 (mg/kg)	Noncarcinogenic SL Child THI=0.1 (mg/kg)	Ingestion SL Adult THQ=0.1 (mg/kg)	Dermal SL Adult THQ=0.1 (mg/kg)	Inhalation SL Adult THQ=0.1 (mg/kg)	Noncarcinogenic SL Adult THI=0.1 (mg/kg)	Screening Level (mg/kg)
-	-	-	-	1.56E-01	6.59E-01	-	1.26E-01	1.67E+00	3.95E+00	-	1.17E+00	1.26E-01 nc
9.93E+00	3.53E+01	-	7.75E+00	1.56E-01	6.59E-01	-	1.26E-01	1.67E+00	3.95E+00	-	1.17E+00	1.26E-01 nc

Inhalation Unit Risk Toxicity Metadata

Chemical	CASNUM	Inhalation Unit Risk (µg/m ^{3})$^{-1}$	Toxicity Source	EPA Cancer Classification	Inhalation Unit Risk Tumor Type	Inhalation Unit Risk Target Organ	Inhalation Unit Risk Species	Inhalation Unit Risk Method	Inhalation Unit Risk Route	Inhalation Unit Risk Treatment Duration	Inhalation Unit Risk Study Reference	Inhalation Unit Risk Notes
Perfluorooctane sulfonic acid (PFOS)	1763-23-1											
Perfluorooctanoic acid (PFOA)	335-67-1											

Output generated 15FEB2018:16:21:12

Oral Slope Factor Toxicity Metadata

Chemical	CASNUM	Oral Slope Factor (mg/kg-day) $^{-1}$	Toxicity Source	EPA Cancer Classification	Oral Slope Factor Tumor Type	Oral Slope Factor Target Organ	Oral Slope Factor Species	Oral Slope Factor Method	Oral Slope Factor Route	Oral Slope Factor Treatment Duration	Oral Slope Factor Study Reference	Oral Slope Factor Notes
Perfluorooctane sulfonic acid (PFOS)	1763-23-1											
Perfluorooctanoic acid (PFOA)	335-67-1	7.00E-02	DWSHA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Output generated 15FEB2018:16:21:12

Oral Chronic Toxicity Metadata

Chemical	CASNUM	Chronic Oral Reference Dose (mg/kg-day)	Toxicity Source	Oral Chronic Reference Dose Basis	Oral Chronic Reference Dose Confidence Level	Oral Chronic Reference Dose Critical Effect
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	2.00E-05	DWSHA	NA	NA	NA
Perfluorooctanoic acid (PFOA)	335-67-1	2.00E-05	DWSHA	NA	NA	NA

Oral Chronic Reference Dose Target Organ	Oral Chronic Reference Dose Modifying Factor	Oral Chronic Reference Dose Uncertainty Factor	Oral Chronic Reference Dose Species	Oral Chronic Reference Dose Route	Oral Chronic Reference Dose Study Duration	Oral Chronic Reference Dose Study Reference	Oral Chronic Reference Dose Notes
NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA

Output generated 15FEB2018:16:21:12

Inhalation Chronic Toxicity Metadata

Chemical	CASNUM	Chronic Inhalation Reference Concentration (mg/m^3)	Toxicity Source	Inhalation Chronic Reference Concentration Basis	Inhalation Chronic Reference Concentration Confidence Level	Inhalation Chronic Reference Concentration Critical Effect	Inhalation Chronic Reference Concentration Target Organ
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	-					
Perfluorooctanoic acid (PFOA)	335-67-1	-					

Inhalation Chronic Reference Concentration Modifying Factor	Inhalation Chronic Reference Concentration Uncertainty Factor	Inhalation Chronic Reference Concentration Species	Inhalation Chronic Reference Concentration Route	Inhalation Chronic Reference Concentration Study Duration	Inhalation Chronic Reference Concentration Study Reference	Inhalation Chronic Reference Concentration Notes

Appendix C

Data Validation Reports and Laboratory Data Sheets

DATA VALIDATION REPORT

M2032.0001 (Omaha) FE Warren

SAMPLE DELIVERY GROUPs: B7J1539, B7J3592

Prepared for

Aerostar SES LLC

October 24, 2017

MEC^{X}, Inc.
8864 Interchange Drive
Houston, Texas 77054

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TABLES

ACRONYMS AND ABBREVIATIONS

°C	Celsius
%	Percent
%D	percent difference
B	blank contamination
CB	calibration blank
CCAL	continuing calibration
CCB	continuing calibration blank
CCV	continuing calibration verification
COC	chain of custody
CLP	Contract Laboratory Program
EPA	US Environmental Protection Agency
ER	equipment rinsate
FB	field blank
FD	field duplicate
ICAL	initial calibration
ICB	initial calibration blank
ICL	instrument calibration limit
ICV	initial calibration verification
IS	internal standard
J	estimated value
LCS	laboratory control sample
LOD	limit of detection
LOQ	limit of quantification
MB	method blank
MDL	method detection limit
MS	matrix spike
MSD	matrix spike duplicate
ND	nondetect
PARCC	precision, accuracy, representativeness, comparability, completeness
PFC	perfluorinated compound
QAPP	Quality Assurance Program Plan
QC	quality control
QSM	Quality Systems Manual
R	Rejected
RL	reporting limit
RPD	relative percent difference
RRF	relative response factor
RSD	relative standard deviation
SDG	sample delivery group
TB	trip blank
U	not detected
UJ	not detected; associated value is an estimate

I. INTRODUCTION

Task Order Title: M2032.0001 (Omaha) FE Warren

Contract: W9128F-15-D-0051

MEC^{X} Project No.: 1529.001H.01

Sample Delivery Group: B7J1539, B7J3592
Project Manager: Jenny Vance

Matrix: Soil/Water

QC Level: Stage 2B, Stage 4

No. of Samples: 54

Laboratory: Maxxam

TABLE 1 - SAMPLE IDENTIFICATION

Sample Name	Lab Sample Name	Matrix	Collection	Method	Validation Level
FEWRN01-004-SD-001	FBF475	SE	2017-09-01 08:45	E537 m	Stage 2B
FEWRN01-004-SW-001	FBF476	WS	2017-09-01 08:45	E537 m	Stage 4
FEWRN01-005-SD-001	FBF453	SE	2017-08-29 11:00	E537 m	Stage 2B
FEWRN01-005-SD-901	FBF454	SE	2017-08-29 11:00	E537 m	Stage 2B
FEWRN01-005-SW-001	FBF455	WS	2017-08-29 11:00	E537 m	Stage 2B
FEWRN01-005-SW-901	FBF456	WS	2017-08-29 11:00	E537 m	Stage 2B
FEWRN01-MW-070-GW-020	FBF460	WG	2017-08-30 14:45	E537 m	Stage 2B
FEWRN01-MW071-GW-020	FBF459	WG	2017-08-30 11:45	E537 m	Stage 2B
FEWRN02-001-SO-028	FBF468	SO	2017-08-31 18:10	E537 m	Stage 2B
FEWRN02-002-SO-031	FBF466	SO	2017-08-31 14:23	E537 m	Stage 4
FEWRN02-003-SO-031	FBF464	SO	2017-08-31 10:10	E537 m	Stage 2B
FEWRN02-004-SO-013	FBF451	SO	2017-08-30 15:20	E537 m	Stage 2B
FEWRN02-005-SS-001	FBF473	SO	2017-09-01 08:25	E537 m	Stage 2B
FEWRN02-006-SD-001	FBF457	SE	2017-08-29 12:35	E537 m	Stage 2B
FEWRN02-006-SW-001	FBF458	WS	2017-08-29 12:35	E537 m	Stage 2B
FEWRN03-001-SO-008	FBF461	SO	2017-08-29 17:30	E537 m	Stage 2B
FEWRN03-001-SS-001	FBF448	SO	2017-08-29 10:06	E537 m	Stage 2B
FEWRN03-002-GW-020	FBF472	WG	2017-08-31 15:34	E537 m	Stage 2B

Sample Name	Lab Sample Name	Matrix	Collection	Method	Validation Level
FEWRN03-002-SO-007	FBF450	SO	2017-08-29 12:55	E537 m	Stage 4
FEWRN03-002-SS-001	FBF444	SO	2017-08-28 16:05	E537 m	Stage 2B
FEWRN03-003-GW-020	FBF470	WG	2017-08-31 11:10	E537 m	Stage 2B
FEWRN03-003-GW-920	FBF471	WG	2017-08-31 11:10	E537 m	Stage 2B
FEWRN03-003-SO-008	FBF447	SO	2017-08-29 11:00	E537 m	Stage 2B
FEWRN03-003-SO-908	FBF449	SO	2017-08-29 11:00	E537 m	Stage 2B
FEWRN03-003-SS-001	FBF443	SO	2017-08-28 15:40	E537 m	Stage 2B
FEWRN03-004-SO-008	FBF445	SO	2017-08-29 07:10	E537 m	Stage 2B
FEWRN03-004-SS-001	FBF441	SO	2017-08-28 13:10	E537 m	Stage 2B
FEWRN-RS-001	FBF440	WQ	2017-08-28 12:05	E537 m	Stage 2B
FEWRN-RS-002	FBF446	WQ	2017-08-29 07:45	E537 m	Stage 2B
FEWRN-RS-003	FBF452	WQ	2017-08-30 15:15	E537 m	Stage 2B
FEWRN-RS-004	FBF463	WQ	2017-08-31 06:55	E537 m	Stage 2B
FEWRN-RS-005	FBF474	WQ	2017-09-01 08:20	E537 m	Stage 2B
FEWRN-SB-001	FBF442	WQ	2017-08-28 12:10	E537 m	Stage 2B
FEWRN-SB-002	FBF469	WQ	2017-08-31 09:25	E537 m	Stage 2B
FEWRN01-001-GW-015	FBP244	WG	2017-09-04 16:20	E537 m	Stage 4
FEWRN01-001-SO-018	FBP225	SO	2017-09-01 15:25	E537 m	Stage 4
FEWRN01-001-SS-001	FBP228	SO	2017-09-01 12:32	E537 m	Stage 2B
FEWRN01-002-SO-018	FBP227	SO	2017-09-01 17:15	E537 m	Stage 2B
FEWRN01-002-SS-001	FBP226	SO	2017-09-01 15:50	E537 m	Stage 2B
FEWRN01-003-GW-015	FBP242	WG	2017-09-04 13:45	E537 m	Stage 2B
FEWRN01-003-GW-915	FBP243	WG	2017-09-04 13:45	E537 m	Stage 2B
FEWRN01-003-SO-016	FBP232	SO	2017-09-02 10:10	E537 m	Stage 2B
FEWRN01-003-SO-916	FBP233	SO	2017-09-02 10:10	E537 m	Stage 2B
FEWRN01-003-SS-001	FBP230	SO	2017-09-02 07:59	E537 m	Stage 2B
FEWRN01-003-SS-901	FBP231	SO	2017-09-02 07:59	E537 m	Stage 2B
FEWRN02-001-GW-025	FBP240	WG	2017-09-04 10:35	E537 m	Stage 2B
FEWRN02-002-GW-033	FBP236	WG	2017-09-02 16:00	E537 m	Stage 2B

Sample Name	Lab Sample Name	Matrix	Collection	Method	Validation Level
FEWRN02-003-GW-030	FBP235	WG	2017-09-02 14:15	E537 m	Stage 2B
FEWRN02-004-GW-024	FBP237	WG	2017-09-02 17:40	E537 m	Stage 2B
FEWRN03-001-GW-020	FBP229	WG	2017-09-01 17:35	E537 m	Stage 2B
FEWRN-IDW-WS	FBP238	SO	2017-09-03 08:50	E537 m	Stage 2B
FEWRN-IDW-WW	FBP239	WG	2017-09-03 09:00	E537 m	Stage 2B
FEWRN-RS-006	FBP234	WQ	2017-09-02 13:15	E537 m	Stage 2B
FEWRN-RS-007	FBP241	WQ	2017-09-04 12:05	E537 m	Stage 2B

II. SAMPLE MANAGEMENT

According to the case narratives and the chains-of-custody (COCs) provided by the laboratory for sample delivery groups (SDGs) B7J1539, B7J3592:

- Cooler temperatures recorded on the COCs were within the temperature limits of ≤6ºC and ≥0ºC.
- Field and laboratory personnel signed and dated the COCs.

TABLE 2 - DATA QUALIFIER REFERENCE

Qualifier	Definition
R	The sample results are rejected because of serious deficiencies in the ability to analyze the sample and to meet quality control (QC) criteria. The presence or absence of the analyte cannot be verified.
U	The analyte was analyzed for but was nondetect (ND) above the reported sample quantification limit.
B	The reported concentration is less than 5 times the concentration reported in an associated field or lab blank.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample. J- denotes a low bias for the sample results and J+ for a high bias.
UJ	The material was analyzed for but was ND. The associated value is an estimate and may be inaccurate or imprecise.

TABLE 3 - REASON CODE REFERENCE

Reason Code	Definition
01	Sample received outside of 4+/-2 degrees Celsius (°C)
01A	Improper sample preservation
02	Holding time exceeded
02A	Extraction
02B	Analysis
03	Instrument performance – outside criteria
03A*	Bromofluorobenzene (BFB)
03B*	Decafluorotriphenylphosphine (DFTPP)
03C*	dichlorodiphenyltrichloroethane (DDT) and/or endrin % breakdown exceeds criteria
03D	Retention time windows
03E	Resolution
04	ICAL results outside specified criteria
04A	Compound mean RRF QC criteria not met
04B	Individual % RSD criteria not met
04C	$r < 0.995$ or $r^2 < 0.99$
04D	ICAL % Recovery
05	Continuing calibration results outside specified criteria

Reason Code	Definition
05A	Compound mean RRF QC criteria not met
05B	Compound % Difference QC criteria not met
06	Result qualified as a result of the 5x/10x blank correction
06A	Method or preparation blank
06B	ICB or CCB
06C	ER
06D	TB
06E	FB
07	Surrogate recoveries outside control limits
07A	Sample
07B	Associated MB or LCS
08	MS/MSD/Duplicate results outside criteria
08A	MS and/or MSD recovery not within control limits (accuracy)
08B	% RPD outside acceptance criteria (precision)
09*	Post digestion spike outside criteria graphite furnace atomic absorption (GFAA)
10	Internal standards outside specified control limits
10A	Recovery
10B	Retention time
11	LCS recoveries outside specified limits
11A	Recovery
11B	% RPD (if run in duplicate)
12*	Interference check standard
13*	Serial dilution
14*	Tentatively identified compounds
15	Quantification
16	Multiple results available; alternate analysis preferred
17	Field duplicate RPD criteria is exceeded
18*	Percent difference between original and second column exceeds QC criteria
19	Professional judgment was used to qualify the data
20*	Pesticide clean-up checks
21	Target compound identification

Reason Code	Definition
22*	Radiological calibration
23*	Radiological quantification
24	Reported result and/or lab qualifier revised to reflect validation findings

*Indicates that this code is not expected to apply to the evaluation of PFAS analyses

III. METHOD ANALYSIS – PERFLUORINATED COMPOUNDS BY MODIFIED EPA METHOD 537

K. Zilis of MEC^X reviewed this SDG November 1-3, 2017.

III.1. HOLDING TIMES

SDGs B7J1539, B7J3592
Except as noted below, the holding times specified in the QAPP were met. Samples were extracted within 28 days of collection and analyzed within 45 days of extraction.

In SDG B7J3592, sample FEWRN03-001-GW-020 was analyzed for PFHxS and PFOS by the high level analysis method in batch 5155735 on 9/24. The sample was re-extracted by the low level method past the 28 day holding time. Data for the target compounds analyzed by the low level method were qualified as estimated (J/UJ)

In the original analysis of sample FEWRN01-001-GW-015, PFDS exceeded the control limits in the Instrument Sensitivity Check and the sample was reextracted for this compound on 10/01/2017, past the 28 day extraction holding time. Data for PFDS was qualified as estimated (UJ) as noted in Table 4 below.

Table 4-Extraction Holding Time

SDG B7J3592

Extraction Batch	Analyte	Affected Samples`
5185352	All analytes with the exception of PFHxS and PFOS	FBP229
	PFDS	FBP244

.

III.2. CALIBRATION

Calibration criteria were met, with exceptions noted in the tables below.

III.2.1. *INITIAL CALIBRATION*

SDGs B7J1539, B7J3592
Initial calibration criteria were met. Recoveries were within 70-130% for the lowest level of each initial calibration and 75-125% for the remaining levels, and all correlation coefficient r^2 values were within the control limit of ≥0.990 or r values ≥0.995. Applicable %RSDs were within the control limit of ≤20%. The calculated peak asymmetry factors were within the control range of 0.8-1.5. MEC^X noted the laboratory utilized as the calibration method a weighted (1/X) linear initial calibration standard curve not forced through zero.

III.2.2. *CONTINUING CALIBRATION*

The initial calibration verification (ICV) and continuing calibration verification (CCV) recoveries were within the control limits of 75-125%. Low-level check standard (ISC) recoveries were within the control limits of 70-130%, with the exception noted in the table below. ISC exceptions did not result in qualification to the sample data.

Table 4-Continuing Calibration

SDGs B7J3592

ICV or CCV date / time / instrument	Analyte	Recovery	Affected Samples
ISC 09/24/2017 6:55P LCMS04	PFOS	131%	None. Sensitivity std applies only to a high level detection.
ISC 09/16/2017 4:13A LCMS04	PFDS	137%	None. Sample re-extracted and reanalyzed on 10/01
ISC 10/01/2017 4:33P LCMS04	PFUnA	137%	None. The initial 12:32 ISC is compliant. Sample run at 1:17P

III.3. QUALITY CONTROL SAMPLES

III.3.1. *METHOD BLANKS*

SDGs B7J1539, B7J3592

The method blanks associated with the analyses of the soil and water samples had no target analyte detects above the respective soil and water detection limits (DLs).

III.3.2. *LABORATORY CONTROL SAMPLES*

SDGs B7J1539, B7J3592

Recoveries affecting sample data were within the control limits of 70-130%, and RPDs for LCS/LCSD pairs were within the control limit of ≤30%.

III.3.3. *MATRIX SPIKE/MATRIX SPIKE DUPLICATE*

MS/MSD analyses were performed on the samples listed below. MS/MSD recoveries were not evaluated if the parent sample concentration exceeded 4× the spike amount. Qualifications were not assigned for a single recovery outlier not occurring in both the MS and MSD of a pair. Nondetects in the parent sample were not qualified for RPD outliers. Remaining recoveries and RPDs affecting sample data were within the control limits of 70-130% and ≤30%, respectively.

SDGs B7J1539

MS/MSD analyses were performed on surface water sample FEWRN02-006-SW-001 and soil sample FEWRN02-006-SD-001. Recoveries and RPDs were within the control limits of 70-130% and ≤30%, respectively.

SDGs B7J3592

MS/MSD analyses were performed on soil samples FEWRN01-001-SO-018 and FEWRN-001-SS-001. Results were not calculated for FEWRN-001-SS-001 due to the high levels of target analytes. MS/MSD analyses were requested on water sample FEWRN01-001-GW-015 but due to high concentrations of target analytes in the native sample, a laboratory control sample spike and spike duplicate were performed in batch 5159897 instead.

III.4. FIELD QC SAMPLES

MEC^X evaluated field QC samples, and if necessary, qualified based on method blanks and other laboratory QC results affecting the usability of the field QC data. MEC^X used the remaining detects to evaluate the associated site samples. Findings associated with field QC samples are summarized below.

III.4.1. *FIELD BLANKS AND EQUIPMENT BLANKS*

The field and equipment blanks and detects, if any, are listed in the table below. No target compounds were reported in the equipment rinsate blanks. The reviewer noted the ambient field blank (AB), FEWRN-SB-001, contained detections for 6:2-FTS and PFOS, as listed below. The reviewer did not apply qualifications for the ambient field blank as this sample was designed to show potential contamination in the driller's source water used to decontaminate the drilling equipment. As such, this water would have little to no contact with site samples or sampling equipment.

Table 5-FB/EB Detects

SDG B7J1539

Ambient Blank	Detect	Concentration	LOQ
FEWRN-SB-001 (AB)	6:2 Fluorotelomer sulfonate (6:2-FTS) Perfluorooctane sulfonate (PFOS)	0.010 ug/L 0.032 ug/L	0.020 ug/L

III.4.2. *FIELD DUPLICATES*

Field duplicate pairs are listed below. RPDs for detections ≥ the LOQ were within the control limits of ≤30% for soils and waters, and detected values below the LOQ, in one or both samples of a pair, were within control limit of ± the LOQ, with exceptions noted in the tables below. In the case of samples analyzed at different dilutions, the greater of the two LOQs was used for comparison. Target analyte results for the outlier RPDs were qualified as estimated (J for detects and UJ for nondetects) in both samples of a pair.

Table 6-FD RPDs

SDG B7J1539

Parent Sample	Field Duplicate	Target Analyte	RPD Outliers
FEWRN01-005-SD-001	FEWRN01-005-SD-901	PFOS	93%

SDG B7J3592

Parent Sample	Field Duplicate	Target Analyte	RPD Outliers
FEWRN01-003-SS-001	FEWRN01-003-SS-901	8:2 FTS PFDS	154% ±LOQ
FEWRN01-003-SO-016	FEWRN01-003-SO-916		none
FEWRN01-003-GW-015	FEWRN01-003-GW-915		none

III.5. INTERNAL STANDARDS PERFORMANCE

The applicable labeled internal standard recoveries were within the control limits of ±50% of the average peak areas of the initial calibration, except as noted in the tables below. The results for the associated target compounds were qualified as estimated (UJ for nondetects or J for detects) in the affected samples.

Table 7-IS Recovery Outliers

SDG B7J1539

Internal Standard	% Recovery	Affected Sample	Associated Target Analyte(s)
M2-PFTeA	39%	FEWRN01-004-SW-001	PFTeA PFTriA

III.6. COMPOUND IDENTIFICATION

Compound identification was verified for three soil samples and two water samples: soil samples FEWRN01-001-SO-018, FEWRN03-002-SO-007 and FEWRN02-002-SO-031, and water samples FEWRN01-001-GW-015 and FEWRN01-004-SW-001. The laboratory analyzed for 18 perfluorinated compounds by Modified EPA Method 537. Review of retention times and the ion chromatograms indicated no issues with compound identification.

III.7. COMPOUND QUANTIFICATION AND REPORTED DETECTION LIMITS

Calculations were verified and sample results reported on the sample result summaries were verified against the raw data for the samples listed above (see Compound Identification section). Quantitation verification was limited based upon the significant figures presented in the raw data and were therefore estimations of the actual sample amounts. The reviewer considered the concentration verified within that limitation. The laboratory calculated and reported compound-specific detection limits. Detects below the LOQ were qualified as estimated (J). Nondetects are valid to the LOD.

Most samples were initially analyzed undiluted. However, water samples and soil extracts were prescreened to obtain estimated concentrations so that extracts could be appropriately diluted. Some samples with high concentrations of PFCs were not analyzed undiluted. Reporting limits have been adjusted accordingly. Analytes were reported from the least dilute analysis possible to report all target analytes within the linear calibration range.

The laboratory integrated isomeric forms for the PFCs with linear and branched isomers as required by Revision 1.1 of EPA Method 537.

III.8. SYSTEM PERFORMANCE

No issues were noted with system performance.

IV. SUMMARY AND CONCLUSIONS

MEC^X evaluated a total of 810 data records from field samples during the validation and qualified 38 records (4.7 % of the data) as estimated values (J/UJ). The qualification was required for extraction holding time exceedance, potential field blank contamination, internal standard recovery outliers and field duplicate precision outliers. Nondetect compounds were flagged (U) to indicate that the compound was analyzed for but not detected above the limit of detection (LOD). Specific qualification were discussed in the text above.

Overall, the quality of the data was acceptable. The precision (99.3%) and accuracy results (96.0%) were acceptable. Other data quality indicators (DQI) (representativeness, comparability and completeness) met the project objectives. Each of these DQIs is discussed below.

IV.1. PRECISION

Precision is a measure of the agreement between duplicate sample measurements of the same quantity and is reflected in the relative percent difference (RPD) between spikes and the RPD for the field duplicate pair analysis. Precision was measured at 99.3%. The outliers in the precision measurements were due to samples flagged for field duplicate RPD outliers. Precision was considered acceptable for the project.

IV.2. ACCURACY

Accuracy is measured by the results from the recovery of known amounts of compounds or elements from calibration, method blanks, laboratory control samples (LCS), matrix spikes (MS), internal standard recoveries and surrogate recoveries. Holding time exceedances also impact accuracy. Accuracy outliers were primarily holding time exceedances and potential field blank contamination. The accuracy was 96.0%. Accuracy was considered acceptable for the project.

IV.3. REPRESENTATIVENESS

The measures of representativeness – sample handling, analytical blank analysis, were met. Designated analytical protocols were followed. The laboratory did utilize a weighted 1/X calibration curve which was not forced through zero. Although this is a deviation from Method 537, modified, it is acceptable on DoD projects and was considered acceptable by the reviewer. Analytical holding times were met for all analyses. Extraction holding times were exceeded for portions of two samples. No analytical problems were noted which would impact data representativeness.

IV.4. COMPARABILITY

The samples were analyzed using appropriate approved methods of analysis. All data were reported correctly using standard units.

IV.5. COMPLETENESS

Completeness is the amount of validated data compared to the planned amount of data and is expressed as a percentage of the usable data divided by the total number of data points. Although one data point was rejected by the reviewer, it was not a target compound and was not counted against the overall percent completeness. Of the 810 target data points, no data points were rejected, resulting in a completeness of 100%.

V. REFERENCES

Aerostar, 2016. *Final Quality Assurance Project Plan for Site Inspection of Aqueous Film Forming Foam Areas, Multiple Sites United States Air Force Installations*, March 2016

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EPA, 2009. *Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS),* Version 1.1, September 2009. EPA Document #: EPA/600/R-08/092.

EPA, 2014. *EPA Contract Laboratory Program (CLP) National Functional Guidelines for Superfund Organic Methods Data Review*, EPA/540-R-014-002.

EPA (U.S. Environmental Protection Agency), January 2009. OSWER 9200-1-85. *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use.* EPA-540/R-08-005.

Validated Sample Result Forms: B7J1539

Analysis Method: EPA 537 m

Sample Name FEWRN01-004-SD-001 **Matrix Type:** S **Result Type:** TRG

Lab Sample Name: FBF475 **Sample Date/Time:** 2017-09-01 08:45 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	0.34	0.28	0.72	1.2	ug/kg	J	J	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.72	0.38	0.72	1.2	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.72	0.20	0.72	1.2	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	<0.72	0.28	0.72	1.2	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.72	0.28	0.72	1.2	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	0.51	0.16	0.48	1.2	ug/kg	J	J	
PERFLUORODODECANOIC ACID	307-55-1	0.30	0.26	0.72	1.2	ug/kg	J	J	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.72	0.20	0.72	1.2	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	0.46	0.28	0.72	1.2	ug/kg	J	J	
PERFLUOROHEXANOIC ACID	307-24-4	0.58	0.23	0.72	1.2	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	<0.72	0.20	0.72	1.2	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.72	0.31	0.72	1.2	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	1.1	0.25	0.72	1.2	ug/kg	J	J	
PERFLUOROOCTANOIC ACID	335-67-1	<0.72	0.31	0.72	1.2	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	0.76	0.22	0.72	1.2	ug/kg	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.48	0.13	0.48	1.2	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.48	0.14	0.48	1.2	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.72	0.22	0.72	1.2	ug/kg	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN01-004-SW-001 **Matrix Type:** W **Result Type:** TRG

Lab Sample Name: FBF476 **Sample Date/Time:** 2017-09-01 08:45 **Validation Level:** Stage 4

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	3.5	0.064	0.20	0.40	ug/L			
8:2 FLUOROTELOMER SULFONATE	39108-34-4	0.022	0.0036	0.010	0.020	ug/L			
PERFLUOROBUTANE SULFONATE	29420-43-3	0.013	0.0053	0.011	0.022	ug/L	J	J	
PERFLUOROBUTANOIC ACID	375-22-4	9.0	0.086	0.20	0.40	ug/L			
PERFLUORODECANE SULFONATE	335-77-3	<0.011	0.0051	0.011	0.022	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.011	0.0044	0.011	0.022	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.011	0.0031	0.011	0.022	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.096	0.0036	0.011	0.022	ug/L			
PERFLUOROHEXANE SULFONATE	108427-53-8	0.036	0.0037	0.011	0.022	ug/L			
PERFLUOROHEXANOIC ACID	307-24-4	0.48	0.0032	0.011	0.022	ug/L			
PERFLUORONONANOIC ACID	375-95-1	0.014	0.0042	0.011	0.022	ug/L	J	J	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.011	0.0040	0.011	0.022	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	0.045	0.0029	0.011	0.022	ug/L			
PERFLUOROOCTANOIC ACID	335-67-1	0.043	0.0051	0.011	0.022	ug/L			
PERFLUOROPENTANOIC ACID	2706-90-3	<0.011	0.0030	0.011	0.022	ug/L	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.010	0.0038	0.010	0.020	ug/L	U	UJ	10A
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.010	0.0033	0.010	0.020	ug/L	U	UJ	10A
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.011	0.0047	0.011	0.022	ug/L	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN01-005-SD-001 **Matrix Type:** S **Result Type:** TRG

Lab Sample Name: FBF453 **Sample Date/Time:** 2017-08-29 11:00 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.66	0.25	0.66	1.1	ug/kg	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.66	0.35	0.66	1.1	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.66	0.19	0.66	1.1	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	<0.66	0.25	0.66	1.1	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.66	0.25	0.66	1.1	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.44	0.14	0.44	1.1	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	0.25	0.24	0.66	1.1	ug/kg	J	J	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.66	0.19	0.66	1.1	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	1.2	0.25	0.66	1.1	ug/kg			
PERFLUOROHEXANOIC ACID	307-24-4	<0.66	0.21	0.66	1.1	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	<0.66	0.19	0.66	1.1	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	0.77	0.29	0.66	1.1	ug/kg	J	J	
PERFLUOROOCTANE SULFONATE	1763-23-1	5.2	0.23	0.66	1.1	ug/kg		J	17
PERFLUOROOCTANOIC ACID	335-67-1	0.63	0.29	0.66	1.1	ug/kg	J	J	
PERFLUOROPENTANOIC ACID	2706-90-3	<0.66	0.20	0.66	1.1	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.44	0.12	0.44	1.1	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.44	0.13	0.44	1.1	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.66	0.20	0.66	1.1	ug/kg	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN01-005-SD-901 **Matrix Type:** S **Result Type:** TRG

Lab Sample Name: FBF454 **Sample Date/Time:** 2017-08-29 11:00 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.84	0.32	0.84	1.4	ug/kg	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.84	0.45	0.84	1.4	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.84	0.24	0.84	1.4	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	<0.84	0.32	0.84	1.4	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.84	0.32	0.84	1.4	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.56	0.18	0.56	1.4	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.84	0.31	0.84	1.4	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.84	0.24	0.84	1.4	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	0.94	0.32	0.84	1.4	ug/kg	J	J	
PERFLUOROHEXANOIC ACID	307-24-4	<0.84	0.27	0.84	1.4	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	<0.84	0.24	0.84	1.4	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.84	0.36	0.84	1.4	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	1.9	0.29	0.84	1.4	ug/kg		J	17
PERFLUOROOCTANOIC ACID	335-67-1	0.56	0.36	0.84	1.4	ug/kg	J	J	
PERFLUOROPENTANOIC ACID	2706-90-3	<0.84	0.25	0.84	1.4	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.56	0.15	0.56	1.4	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.56	0.17	0.56	1.4	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.84	0.25	0.84	1.4	ug/kg	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN01-005-SW-001 **Matrix Type:** W **Result Type:** TRG

Lab Sample Name: FBF455 **Sample Date/Time:** 2017-08-29 11:00 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	0.17	0.0038	0.012	0.024	ug/L			
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.012	0.0043	0.012	0.024	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	0.13	0.0058	0.012	0.024	ug/L			
PERFLUOROBUTANOIC ACID	375-22-4	0.055	0.0052	0.012	0.024	ug/L			
PERFLUORODECANE SULFONATE	335-77-3	<0.012	0.0055	0.012	0.024	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.012	0.0048	0.012	0.024	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.012	0.0034	0.012	0.024	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.078	0.0040	0.012	0.024	ug/L			
PERFLUOROHEXANE SULFONATE	108427-53-8	1.2	0.034	0.10	0.20	ug/L			
PERFLUOROHEXANOIC ACID	307-24-4	0.35	0.0035	0.012	0.024	ug/L			
PERFLUORONONANOIC ACID	375-95-1	<0.012	0.0046	0.012	0.024	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	0.014	0.0043	0.012	0.024	ug/L	J	J	
PERFLUOROOCTANE SULFONATE	1763-23-1	1.2	0.0031	0.012	0.024	ug/L			
PERFLUOROOCTANOIC ACID	335-67-1	0.33	0.0055	0.012	0.024	ug/L			
PERFLUOROPENTANOIC ACID	2706-90-3	0.17	0.0032	0.012	0.024	ug/L			
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.012	0.0046	0.012	0.024	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.012	0.0040	0.012	0.024	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.012	0.0052	0.012	0.024	ug/L	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN01-005-SW-901 **Matrix Type:** W **Result Type:** TRG

Lab Sample Name: FBF456 **Sample Date/Time:** 2017-08-29 11:00 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	0.18	0.0040	0.013	0.025	ug/L			
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.013	0.0045	0.013	0.025	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	0.13	0.0060	0.013	0.025	ug/L			
PERFLUOROBUTANOIC ACID	375-22-4	0.060	0.0054	0.013	0.025	ug/L			
PERFLUORODECANE SULFONATE	335-77-3	<0.013	0.0058	0.013	0.025	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.013	0.0050	0.013	0.025	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.013	0.0035	0.013	0.025	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.076	0.0041	0.013	0.025	ug/L			
PERFLUOROHEXANE SULFONATE	108427-53-8	1.2	0.034	0.10	0.20	ug/L			
PERFLUOROHEXANOIC ACID	307-24-4	0.40	0.0036	0.013	0.025	ug/L			
PERFLUORONONANOIC ACID	375-95-1	<0.013	0.0048	0.013	0.025	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.013	0.0045	0.013	0.025	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	1.2	0.0033	0.013	0.025	ug/L			
PERFLUOROOCTANOIC ACID	335-67-1	0.33	0.0058	0.013	0.025	ug/L			
PERFLUOROPENTANOIC ACID	2706-90-3	0.18	0.0034	0.013	0.025	ug/L			
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.013	0.0048	0.013	0.025	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.013	0.0041	0.013	0.025	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.013	0.0054	0.013	0.025	ug/L	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN01-MW-070-GW-020 **Matrix Type:** W **Result Type:** TRG

Lab Sample Name: FBF460 **Sample Date/Time:** 2017-08-30 14:45 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	15	0.16	0.50	1.0	ug/L			
8:2 FLUOROTELOMER SULFONATE	39108-34-4	0.069	0.036	0.10	0.20	ug/L	J	J	
PERFLUOROBUTANE SULFONATE	29420-43-3	1.7	0.048	0.10	0.20	ug/L			
PERFLUOROBUTANOIC ACID	375-22-4	1.3	0.043	0.10	0.20	ug/L			
PERFLUORODECANE SULFONATE	335-77-3	<0.10	0.046	0.10	0.20	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.10	0.040	0.10	0.20	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.10	0.028	0.10	0.20	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	3.2	0.033	0.10	0.20	ug/L			
PERFLUOROHEXANE SULFONATE	108427-53-8	26	0.17	0.50	1.0	ug/L			
PERFLUOROHEXANOIC ACID	307-24-4	6.3	0.029	0.10	0.20	ug/L			
PERFLUORONONANOIC ACID	375-95-1	0.10	0.038	0.10	0.20	ug/L	J	J	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	0.12	0.036	0.10	0.20	ug/L	J	J	
PERFLUOROOCTANE SULFONATE	1763-23-1	6.0	0.026	0.10	0.20	ug/L			
PERFLUOROOCTANOIC ACID	335-67-1	5.4	0.046	0.10	0.20	ug/L			
PERFLUOROPENTANOIC ACID	2706-90-3	4.7	0.027	0.10	0.20	ug/L			
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.10	0.038	0.10	0.20	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.10	0.033	0.10	0.20	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.10	0.043	0.10	0.20	ug/L	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN01-MW071-GW-020 **Matrix Type:** W **Result Type:** TRG

Lab Sample Name: FBF459 **Sample Date/Time:** 2017-08-30 11:45 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	0.58	0.0035	0.011	0.022	ug/L			
8:2 FLUOROTELOMER SULFONATE	39108-34-4	0.0069	0.0040	0.011	0.022	ug/L	J	J	
PERFLUOROBUTANE SULFONATE	29420-43-3	0.39	0.0053	0.011	0.022	ug/L			
PERFLUOROBUTANOIC ACID	375-22-4	0.18	0.0047	0.011	0.022	ug/L			
PERFLUORODECANE SULFONATE	335-77-3	<0.011	0.0051	0.011	0.022	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.011	0.0044	0.011	0.022	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.011	0.0031	0.011	0.022	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.20	0.0036	0.011	0.022	ug/L			
PERFLUOROHEXANE SULFONATE	108427-53-8	1.8	0.034	0.10	0.20	ug/L			
PERFLUOROHEXANOIC ACID	307-24-4	0.93	0.0032	0.011	0.022	ug/L			
PERFLUORONONANOIC ACID	375-95-1	0.0090	0.0042	0.011	0.022	ug/L	J	J	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.011	0.0040	0.011	0.022	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	0.35	0.0029	0.011	0.022	ug/L			
PERFLUOROOCTANOIC ACID	335-67-1	0.24	0.0051	0.011	0.022	ug/L			
PERFLUOROPENTANOIC ACID	2706-90-3	0.66	0.0030	0.011	0.022	ug/L			
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.011	0.0042	0.011	0.022	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.011	0.0036	0.011	0.022	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.011	0.0047	0.011	0.022	ug/L	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN02-001-SO-028 **Matrix Type:** S **Result Type:** TRG

Lab Sample Name: FBF468 **Sample Date/Time:** 2017-08-31 18:10 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.66	0.25	0.66	1.1	ug/kg	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.66	0.35	0.66	1.1	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.66	0.19	0.66	1.1	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	<0.66	0.25	0.66	1.1	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.66	0.25	0.66	1.1	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.44	0.14	0.44	1.1	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.66	0.24	0.66	1.1	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.66	0.19	0.66	1.1	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	<0.66	0.25	0.66	1.1	ug/kg	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	<0.66	0.21	0.66	1.1	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	<0.66	0.19	0.66	1.1	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.66	0.29	0.66	1.1	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	<0.66	0.23	0.66	1.1	ug/kg	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	<0.66	0.29	0.66	1.1	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	<0.66	0.20	0.66	1.1	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.44	0.12	0.44	1.1	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.44	0.13	0.44	1.1	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.66	0.20	0.66	1.1	ug/kg	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN02-002-SO-031 **Matrix Type:** S **Result Type:** TRG

Lab Sample Name: FBF466 **Sample Date/Time:** 2017-08-31 14:23 **Validation Level:** Stage 4

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.66	0.25	0.66	1.1	ug/kg	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.66	0.35	0.66	1.1	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.66	0.19	0.66	1.1	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	<0.66	0.25	0.66	1.1	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.66	0.25	0.66	1.1	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.44	0.14	0.44	1.1	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	0.26	0.24	0.66	1.1	ug/kg	J	J	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.66	0.19	0.66	1.1	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	<0.66	0.25	0.66	1.1	ug/kg	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	<0.66	0.21	0.66	1.1	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	<0.66	0.19	0.66	1.1	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.66	0.29	0.66	1.1	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	0.80	0.23	0.66	1.1	ug/kg	J	J	
PERFLUOROOCTANOIC ACID	335-67-1	<0.66	0.29	0.66	1.1	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	<0.66	0.20	0.66	1.1	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.44	0.12	0.44	1.1	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.44	0.13	0.44	1.1	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.66	0.20	0.66	1.1	ug/kg	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN02-003-SO-031 **Matrix Type:** S **Result Type:** TRG

Lab Sample Name: FBF464 **Sample Date/Time:** 2017-08-31 10:10 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	0.60	0.21	0.54	0.90	ug/kg	J	J	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.54	0.29	0.54	0.90	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	0.76	0.15	0.54	0.90	ug/kg	J	J	
PERFLUOROBUTANOIC ACID	375-22-4	0.38	0.21	0.54	0.90	ug/kg	J	J	
PERFLUORODECANE SULFONATE	335-77-3	<0.54	0.21	0.54	0.90	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.36	0.12	0.36	0.90	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.54	0.20	0.54	0.90	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.45	0.15	0.54	0.90	ug/kg	J	J	
PERFLUOROHEXANE SULFONATE	108427-53-8	3.5	0.21	0.54	0.90	ug/kg			
PERFLUOROHEXANOIC ACID	307-24-4	1.1	0.17	0.54	0.90	ug/kg			
PERFLUORONONANOIC ACID	375-95-1	<0.54	0.15	0.54	0.90	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.54	0.23	0.54	0.90	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	3.2	0.19	0.54	0.90	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	0.45	0.23	0.54	0.90	ug/kg	J	J	
PERFLUOROPENTANOIC ACID	2706-90-3	0.60	0.16	0.54	0.90	ug/kg	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.36	0.099	0.36	0.90	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.36	0.11	0.36	0.90	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.54	0.16	0.54	0.90	ug/kg	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN02-004-SO-013 **Matrix Type:** S **Result Type:** TRG

Lab Sample Name: FBF451 **Sample Date/Time:** 2017-08-30 15:20 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	4.2	0.25	0.66	1.1	ug/kg			
8:2 FLUOROTELOMER SULFONATE	39108-34-4	4.9	0.35	0.66	1.1	ug/kg			
PERFLUOROBUTANE SULFONATE	29420-43-3	1.1	0.19	0.66	1.1	ug/kg	J	J	
PERFLUOROBUTANOIC ACID	375-22-4	0.84	0.25	0.66	1.1	ug/kg	J	J	
PERFLUORODECANE SULFONATE	335-77-3	<0.66	0.25	0.66	1.1	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.44	0.14	0.44	1.1	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	0.24	0.24	0.66	1.1	ug/kg	J	J	
PERFLUOROHEPTANOIC ACID	375-85-9	0.65	0.19	0.66	1.1	ug/kg	J	J	
PERFLUOROHEXANE SULFONATE	108427-53-8	7.3	0.25	0.66	1.1	ug/kg			
PERFLUOROHEXANOIC ACID	307-24-4	3.1	0.21	0.66	1.1	ug/kg			
PERFLUORONONANOIC ACID	375-95-1	<0.66	0.19	0.66	1.1	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	0.60	0.29	0.66	1.1	ug/kg	J	J	
PERFLUOROOCTANE SULFONATE	1763-23-1	82	2.3	6.6	11	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	0.98	0.29	0.66	1.1	ug/kg	J	J	
PERFLUOROPENTANOIC ACID	2706-90-3	1.6	0.20	0.66	1.1	ug/kg			
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.44	0.12	0.44	1.1	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.44	0.13	0.44	1.1	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.66	0.20	0.66	1.1	ug/kg	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN02-005-SS-001 **Matrix Type:** S **Result Type:** TRG

Lab Sample Name: FBF473 **Sample Date/Time:** 2017-09-01 08:25 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	2.7	0.28	0.72	1.2	ug/kg			
8:2 FLUOROTELOMER SULFONATE	39108-34-4	4.1	0.38	0.72	1.2	ug/kg			
PERFLUOROBUTANE SULFONATE	29420-43-3	2.9	0.20	0.72	1.2	ug/kg			
PERFLUOROBUTANOIC ACID	375-22-4	0.98	0.28	0.72	1.2	ug/kg	J	J	
PERFLUORODECANE SULFONATE	335-77-3	<0.72	0.28	0.72	1.2	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	0.68	0.16	0.48	1.2	ug/kg	J	J	
PERFLUORODODECANOIC ACID	307-55-1	0.48	0.26	0.72	1.2	ug/kg	J	J	
PERFLUOROHEPTANOIC ACID	375-85-9	1.4	0.20	0.72	1.2	ug/kg			
PERFLUOROHEXANE SULFONATE	108427-53-8	23	0.28	0.72	1.2	ug/kg			
PERFLUOROHEXANOIC ACID	307-24-4	4.3	0.23	0.72	1.2	ug/kg			
PERFLUORONONANOIC ACID	375-95-1	1.1	0.20	0.72	1.2	ug/kg	J	J	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.72	0.31	0.72	1.2	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	38	0.25	0.72	1.2	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	2.0	0.31	0.72	1.2	ug/kg			
PERFLUOROPENTANOIC ACID	2706-90-3	3.2	0.22	0.72	1.2	ug/kg			
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.48	0.13	0.48	1.2	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.48	0.14	0.48	1.2	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	0.62	0.22	0.72	1.2	ug/kg	J	J	

Analysis Method: EPA 537 m

Sample Name FEWRN02-006-SD-001 **Matrix Type:** S **Result Type:** TRG

Lab Sample Name: FBF457 **Sample Date/Time:** 2017-08-29 12:35 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.66	0.25	0.66	1.1	ug/kg	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.66	0.35	0.66	1.1	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.66	0.19	0.66	1.1	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	<0.66	0.25	0.66	1.1	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.66	0.25	0.66	1.1	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.44	0.14	0.44	1.1	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.66	0.24	0.66	1.1	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.66	0.19	0.66	1.1	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	<0.66	0.25	0.66	1.1	ug/kg	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	<0.66	0.21	0.66	1.1	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	<0.66	0.19	0.66	1.1	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.66	0.29	0.66	1.1	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	<0.66	0.23	0.66	1.1	ug/kg	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	<0.66	0.29	0.66	1.1	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	<0.66	0.20	0.66	1.1	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.44	0.12	0.44	1.1	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.44	0.13	0.44	1.1	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.66	0.20	0.66	1.1	ug/kg	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN02-006-SW-001 **Matrix Type:** W **Result Type:** TRG

Lab Sample Name: FBF458 **Sample Date/Time:** 2017-08-29 12:35 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.010	0.0032	0.010	0.020	ug/L	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.010	0.0036	0.010	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.010	0.0048	0.010	0.020	ug/L	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	<0.010	0.0043	0.010	0.020	ug/L	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.010	0.0046	0.010	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.010	0.0040	0.010	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.010	0.0028	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	<0.010	0.0034	0.010	0.020	ug/L	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	<0.010	0.0029	0.010	0.020	ug/L	U	U	
PERFLUORONONANOIC ACID	375-95-1	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.010	0.0036	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	<0.010	0.0026	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	<0.010	0.0046	0.010	0.020	ug/L	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	<0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.010	0.0043	0.010	0.020	ug/L	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN03-001-SO-008 **Matrix Type:** S **Result Type:** TRG

Lab Sample Name: FBF461 **Sample Date/Time:** 2017-08-29 17:30 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.66	0.25	0.66	1.1	ug/kg	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.66	0.35	0.66	1.1	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	0.43	0.19	0.66	1.1	ug/kg	J	J	
PERFLUOROBUTANOIC ACID	375-22-4	<0.66	0.25	0.66	1.1	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.66	0.25	0.66	1.1	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.44	0.14	0.44	1.1	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.66	0.24	0.66	1.1	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.66	0.19	0.66	1.1	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	0.72	0.25	0.66	1.1	ug/kg	J	J	
PERFLUOROHEXANOIC ACID	307-24-4	<0.66	0.21	0.66	1.1	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	<0.66	0.19	0.66	1.1	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.66	0.29	0.66	1.1	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	<0.66	0.23	0.66	1.1	ug/kg	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	<0.66	0.29	0.66	1.1	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	<0.66	0.20	0.66	1.1	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.44	0.12	0.44	1.1	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.44	0.13	0.44	1.1	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.66	0.20	0.66	1.1	ug/kg	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN03-001-SS-001 **Matrix Type:** S **Result Type:** TRG

Lab Sample Name: FBF448 **Sample Date/Time:** 2017-08-29 10:06 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.57	0.22	0.57	0.95	ug/kg	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.57	0.30	0.57	0.95	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	0.35	0.16	0.57	0.95	ug/kg	J	J	
PERFLUOROBUTANOIC ACID	375-22-4	0.61	0.22	0.57	0.95	ug/kg	J	J	
PERFLUORODECANE SULFONATE	335-77-3	<0.57	0.22	0.57	0.95	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	0.58	0.12	0.38	0.95	ug/kg	J	J	
PERFLUORODODECANOIC ACID	307-55-1	0.38	0.21	0.57	0.95	ug/kg	J	J	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.57	0.16	0.57	0.95	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	5.8	0.22	0.57	0.95	ug/kg			
PERFLUOROHEXANOIC ACID	307-24-4	0.61	0.18	0.57	0.95	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	0.55	0.16	0.57	0.95	ug/kg	J	J	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	0.46	0.25	0.57	0.95	ug/kg	J	J	
PERFLUOROOCTANE SULFONATE	1763-23-1	130	2.0	5.7	9.5	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	0.64	0.25	0.57	0.95	ug/kg	J	J	
PERFLUOROPENTANOIC ACID	2706-90-3	0.67	0.17	0.57	0.95	ug/kg	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	0.37	0.10	0.38	0.95	ug/kg	J	J	
PERFLUOROTRIDECANOIC ACID	72629-94-8	0.34	0.11	0.38	0.95	ug/kg	J	J	
PERFLUOROUNDECANOIC ACID	2058-94-8	0.41	0.17	0.57	0.95	ug/kg	J	J	

Analysis Method: EPA 537 m

Sample Name FEWRN03-002-GW-020 **Matrix Type:** W **Result Type:** TRG

Lab Sample Name: FBF472 **Sample Date/Time:** 2017-08-31 15:34 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	0.27	0.0032	0.010	0.020	ug/L			
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.010	0.0036	0.010	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	0.38	0.0048	0.010	0.020	ug/L			
PERFLUOROBUTANOIC ACID	375-22-4	0.18	0.0043	0.010	0.020	ug/L			
PERFLUORODECANE SULFONATE	335-77-3	<0.010	0.0046	0.010	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.010	0.0040	0.010	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.010	0.0028	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.12	0.0033	0.010	0.020	ug/L			
PERFLUOROHEXANE SULFONATE	108427-53-8	2.0	0.034	0.10	0.20	ug/L			
PERFLUOROHEXANOIC ACID	307-24-4	0.64	0.0029	0.010	0.020	ug/L			
PERFLUORONONANOIC ACID	375-95-1	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.010	0.0036	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	0.72	0.0026	0.010	0.020	ug/L			
PERFLUOROOCTANOIC ACID	335-67-1	0.26	0.0046	0.010	0.020	ug/L			
PERFLUOROPENTANOIC ACID	2706-90-3	0.40	0.0027	0.010	0.020	ug/L			
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.010	0.0043	0.010	0.020	ug/L	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN03-002-SO-007 **Matrix Type:** S **Result Type:** TRG

Lab Sample Name: FBF450 **Sample Date/Time:** 2017-08-29 12:55 **Validation Level:** Stage 4

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.53	0.20	0.53	0.88	ug/kg	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.53	0.28	0.53	0.88	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.53	0.15	0.53	0.88	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	<0.53	0.20	0.53	0.88	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.53	0.20	0.53	0.88	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.35	0.11	0.35	0.88	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	0.25	0.19	0.53	0.88	ug/kg	J	J	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.53	0.15	0.53	0.88	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	1.2	0.20	0.53	0.88	ug/kg			
PERFLUOROHEXANOIC ACID	307-24-4	<0.53	0.17	0.53	0.88	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	<0.53	0.15	0.53	0.88	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.53	0.23	0.53	0.88	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	11	0.18	0.53	0.88	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	0.34	0.23	0.53	0.88	ug/kg	J	J	
PERFLUOROPENTANOIC ACID	2706-90-3	<0.53	0.16	0.53	0.88	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.35	0.097	0.35	0.88	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.35	0.11	0.35	0.88	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	0.26	0.16	0.53	0.88	ug/kg	J	J	

Analysis Method: EPA 537 m

Sample Name FEWRN03-002-SS-001 **Matrix Type:** S **Result Type:** TRG

Lab Sample Name: FBF444 **Sample Date/Time:** 2017-08-28 16:05 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.53	0.20	0.53	0.89	ug/kg	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.53	0.28	0.53	0.89	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.53	0.15	0.53	0.89	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	0.35	0.20	0.53	0.89	ug/kg	J	J	
PERFLUORODECANE SULFONATE	335-77-3	<0.53	0.20	0.53	0.89	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	0.39	0.12	0.36	0.89	ug/kg	J	J	
PERFLUORODODECANOIC ACID	307-55-1	<0.53	0.20	0.53	0.89	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.53	0.15	0.53	0.89	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	1.0	0.20	0.53	0.89	ug/kg			
PERFLUOROHEXANOIC ACID	307-24-4	0.39	0.17	0.53	0.89	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	<0.53	0.15	0.53	0.89	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.53	0.23	0.53	0.89	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	22	0.19	0.53	0.89	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	0.38	0.23	0.53	0.89	ug/kg	J	J	
PERFLUOROPENTANOIC ACID	2706-90-3	<0.53	0.16	0.53	0.89	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.36	0.098	0.36	0.89	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.36	0.11	0.36	0.89	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	0.25	0.16	0.53	0.89	ug/kg	J	J	

Analysis Method: EPA 537 m

Sample Name FEWRN03-003-GW-020 **Matrix Type:** W **Result Type:** TRG

Lab Sample Name: FBF470 **Sample Date/Time:** 2017-08-31 11:10 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	0.62	0.0032	0.010	0.020	ug/L			
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.010	0.0036	0.010	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	0.31	0.0048	0.010	0.020	ug/L			
PERFLUOROBUTANOIC ACID	375-22-4	0.16	0.0043	0.010	0.020	ug/L			
PERFLUORODECANE SULFONATE	335-77-3	<0.010	0.0046	0.010	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.010	0.0040	0.010	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.010	0.0028	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.18	0.0033	0.010	0.020	ug/L			
PERFLUOROHEXANE SULFONATE	108427-53-8	2.4	0.034	0.10	0.20	ug/L			
PERFLUOROHEXANOIC ACID	307-24-4	0.85	0.0029	0.010	0.020	ug/L			
PERFLUORONONANOIC ACID	375-95-1	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.010	0.0036	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	1.3	0.026	0.10	0.20	ug/L			
PERFLUOROOCTANOIC ACID	335-67-1	0.59	0.0046	0.010	0.020	ug/L			
PERFLUOROPENTANOIC ACID	2706-90-3	0.46	0.0027	0.010	0.020	ug/L			
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.010	0.0043	0.010	0.020	ug/L	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN03-003-GW-920 **Matrix Type:** W **Result Type:** TRG

Lab Sample Name: FBF471 **Sample Date/Time:** 2017-08-31 11:10 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	0.64	0.0037	0.012	0.023	ug/L			
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.012	0.0041	0.012	0.023	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	0.36	0.0055	0.012	0.023	ug/L			
PERFLUOROBUTANOIC ACID	375-22-4	0.20	0.0049	0.012	0.023	ug/L			
PERFLUORODECANE SULFONATE	335-77-3	<0.012	0.0053	0.012	0.023	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.012	0.0046	0.012	0.023	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.012	0.0032	0.012	0.023	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.19	0.0038	0.012	0.023	ug/L			
PERFLUOROHEXANE SULFONATE	108427-53-8	2.3	0.034	0.10	0.20	ug/L			
PERFLUOROHEXANOIC ACID	307-24-4	0.99	0.0033	0.012	0.023	ug/L			
PERFLUORONONANOIC ACID	375-95-1	0.010	0.0044	0.012	0.023	ug/L	J	J	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	0.012	0.0041	0.012	0.023	ug/L	J	J	
PERFLUOROOCTANE SULFONATE	1763-23-1	1.7	0.026	0.10	0.20	ug/L			
PERFLUOROOCTANOIC ACID	335-67-1	0.66	0.0053	0.012	0.023	ug/L			
PERFLUOROPENTANOIC ACID	2706-90-3	0.53	0.0031	0.012	0.023	ug/L			
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.012	0.0044	0.012	0.023	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.012	0.0038	0.012	0.023	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.012	0.0049	0.012	0.023	ug/L	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN03-003-SO-008 **Matrix Type:** S **Result Type:** TRG

Lab Sample Name: FBF447 **Sample Date/Time:** 2017-08-29 11:00 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.78	0.30	0.78	1.3	ug/kg	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.78	0.42	0.78	1.3	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	0.55	0.22	0.78	1.3	ug/kg	J	J	
PERFLUOROBUTANOIC ACID	375-22-4	0.53	0.30	0.78	1.3	ug/kg	J	J	
PERFLUORODECANE SULFONATE	335-77-3	<0.78	0.30	0.78	1.3	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.52	0.17	0.52	1.3	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.78	0.29	0.78	1.3	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.78	0.22	0.78	1.3	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	5.0	0.30	0.78	1.3	ug/kg			
PERFLUOROHEXANOIC ACID	307-24-4	0.85	0.25	0.78	1.3	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	<0.78	0.22	0.78	1.3	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.78	0.34	0.78	1.3	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	<0.78	0.27	0.78	1.3	ug/kg	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	0.53	0.34	0.78	1.3	ug/kg	J	J	
PERFLUOROPENTANOIC ACID	2706-90-3	0.80	0.23	0.78	1.3	ug/kg	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.52	0.14	0.52	1.3	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.52	0.16	0.52	1.3	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.78	0.23	0.78	1.3	ug/kg	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN03-003-SO-908 **Matrix Type:** S **Result Type:** TRG

Lab Sample Name: FBF449 **Sample Date/Time:** 2017-08-29 11:00 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.72	0.28	0.72	1.2	ug/kg	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.72	0.38	0.72	1.2	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	0.81	0.20	0.72	1.2	ug/kg	J	J	
PERFLUOROBUTANOIC ACID	375-22-4	0.47	0.28	0.72	1.2	ug/kg	J	J	
PERFLUORODECANE SULFONATE	335-77-3	<0.72	0.28	0.72	1.2	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.48	0.16	0.48	1.2	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	0.27	0.26	0.72	1.2	ug/kg	J	J	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.72	0.20	0.72	1.2	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	7.9	0.28	0.72	1.2	ug/kg			
PERFLUOROHEXANOIC ACID	307-24-4	0.92	0.23	0.72	1.2	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	<0.72	0.20	0.72	1.2	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.72	0.31	0.72	1.2	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	<0.72	0.25	0.72	1.2	ug/kg	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	0.50	0.31	0.72	1.2	ug/kg	J	J	
PERFLUOROPENTANOIC ACID	2706-90-3	0.80	0.22	0.72	1.2	ug/kg	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.48	0.13	0.48	1.2	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.48	0.14	0.48	1.2	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.72	0.22	0.72	1.2	ug/kg	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN03-003-SS-001 **Matrix Type:** S **Result Type:** TRG

Lab Sample Name: FBF443 **Sample Date/Time:** 2017-08-28 15:40 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.54	0.21	0.54	0.90	ug/kg	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.54	0.29	0.54	0.90	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	0.41	0.15	0.54	0.90	ug/kg	J	J	
PERFLUOROBUTANOIC ACID	375-22-4	0.52	0.21	0.54	0.90	ug/kg	J	J	
PERFLUORODECANE SULFONATE	335-77-3	<0.54	0.21	0.54	0.90	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.36	0.12	0.36	0.90	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.54	0.20	0.54	0.90	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.54	0.15	0.54	0.90	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	12	0.21	0.54	0.90	ug/kg			
PERFLUOROHEXANOIC ACID	307-24-4	0.58	0.17	0.54	0.90	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	0.50	0.15	0.54	0.90	ug/kg	J	J	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.54	0.23	0.54	0.90	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	73	1.9	5.4	9.0	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	1.5	0.23	0.54	0.90	ug/kg			
PERFLUOROPENTANOIC ACID	2706-90-3	0.67	0.16	0.54	0.90	ug/kg	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.36	0.099	0.36	0.90	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.36	0.11	0.36	0.90	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.54	0.16	0.54	0.90	ug/kg	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN03-004-SO-008 **Matrix Type:** S **Result Type:** TRG

Lab Sample Name: FBF445 **Sample Date/Time:** 2017-08-29 07:10 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.53	0.20	0.53	0.89	ug/kg	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.53	0.28	0.53	0.89	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	0.37	0.15	0.53	0.89	ug/kg	J	J	
PERFLUOROBUTANOIC ACID	375-22-4	0.35	0.20	0.53	0.89	ug/kg	J	J	
PERFLUORODECANE SULFONATE	335-77-3	<0.53	0.20	0.53	0.89	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.36	0.12	0.36	0.89	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.53	0.20	0.53	0.89	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.53	0.15	0.53	0.89	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	1.1	0.20	0.53	0.89	ug/kg			
PERFLUOROHEXANOIC ACID	307-24-4	0.53	0.17	0.53	0.89	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	<0.53	0.15	0.53	0.89	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.53	0.23	0.53	0.89	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	<0.53	0.19	0.53	0.89	ug/kg	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	<0.53	0.23	0.53	0.89	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	0.57	0.16	0.53	0.89	ug/kg	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.36	0.098	0.36	0.89	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.36	0.11	0.36	0.89	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.53	0.16	0.53	0.89	ug/kg	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN03-004-SS-001 **Matrix Type:** S **Result Type:** TRG

Lab Sample Name: FBF441 **Sample Date/Time:** 2017-08-28 13:10 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	3.9	2.3	6.0	10	ug/kg	J	J	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<6.0	3.2	6.0	10	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	7.6	1.7	6.0	10	ug/kg	J	J	
PERFLUOROBUTANOIC ACID	375-22-4	3.8	2.3	6.0	10	ug/kg	J	J	
PERFLUORODECANE SULFONATE	335-77-3	7.2	2.3	6.0	10	ug/kg	J	J	
PERFLUORODECANOIC ACID	335-76-2	4.4	1.3	4.0	10	ug/kg	J	J	
PERFLUORODODECANOIC ACID	307-55-1	<6.0	2.2	6.0	10	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	4.6	1.7	6.0	10	ug/kg	J	J	
PERFLUOROHEXANE SULFONATE	108427-53-8	220	2.3	6.0	10	ug/kg			
PERFLUOROHEXANOIC ACID	307-24-4	13	1.9	6.0	10	ug/kg			
PERFLUORONONANOIC ACID	375-95-1	<6.0	1.7	6.0	10	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	6.8	2.6	6.0	10	ug/kg	J	J	
PERFLUOROOCTANE SULFONATE	1763-23-1	1600	21	60	100	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	8.7	2.6	6.0	10	ug/kg	J	J	
PERFLUOROPENTANOIC ACID	2706-90-3	7.6	1.8	6.0	10	ug/kg	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	<4.0	1.1	4.0	10	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<4.0	1.2	4.0	10	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<6.0	1.8	6.0	10	ug/kg	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN-RS-001 **Matrix Type:** W **Result Type:** TRG

Lab Sample Name: FBF440 **Sample Date/Time:** 2017-08-28 12:05 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.010	0.0032	0.010	0.020	ug/L	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.010	0.0036	0.010	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.010	0.0048	0.010	0.020	ug/L	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	<0.010	0.0043	0.010	0.020	ug/L	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.010	0.0046	0.010	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.010	0.0040	0.010	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.010	0.0028	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	<0.010	0.0034	0.010	0.020	ug/L	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	<0.010	0.0029	0.010	0.020	ug/L	U	U	
PERFLUORONONANOIC ACID	375-95-1	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.010	0.0036	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	<0.010	0.0026	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	<0.010	0.0046	0.010	0.020	ug/L	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	<0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.010	0.0043	0.010	0.020	ug/L	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN-RS-002 **Matrix Type:** W **Result Type:** TRG

Lab Sample Name: FBF446 **Sample Date/Time:** 2017-08-29 07:45 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.010	0.0032	0.010	0.020	ug/L	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.010	0.0036	0.010	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.010	0.0048	0.010	0.020	ug/L	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	<0.010	0.0043	0.010	0.020	ug/L	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.010	0.0046	0.010	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.010	0.0040	0.010	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.010	0.0028	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	<0.010	0.0034	0.010	0.020	ug/L	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	<0.010	0.0029	0.010	0.020	ug/L	U	U	
PERFLUORONONANOIC ACID	375-95-1	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.010	0.0036	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	<0.010	0.0026	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	<0.010	0.0046	0.010	0.020	ug/L	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	<0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.010	0.0043	0.010	0.020	ug/L	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN-RS-003 **Matrix Type:** W **Result Type:** TRG

Lab Sample Name: FBF452 **Sample Date/Time:** 2017-08-30 15:15 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.010	0.0032	0.010	0.020	ug/L	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.010	0.0036	0.010	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.010	0.0048	0.010	0.020	ug/L	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	<0.010	0.0043	0.010	0.020	ug/L	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.010	0.0046	0.010	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.010	0.0040	0.010	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.010	0.0028	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	<0.010	0.0034	0.010	0.020	ug/L	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	<0.010	0.0029	0.010	0.020	ug/L	U	U	
PERFLUORONONANOIC ACID	375-95-1	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.010	0.0036	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	<0.010	0.0026	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	<0.010	0.0046	0.010	0.020	ug/L	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	<0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.010	0.0043	0.010	0.020	ug/L	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN-RS-004 **Matrix Type:** W **Result Type:** TRG

Lab Sample Name: FBF463 **Sample Date/Time:** 2017-08-31 06:55 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.010	0.0032	0.010	0.020	ug/L	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.010	0.0036	0.010	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.010	0.0048	0.010	0.020	ug/L	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	<0.010	0.0043	0.010	0.020	ug/L	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.010	0.0046	0.010	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.010	0.0040	0.010	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.010	0.0028	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	<0.010	0.0034	0.010	0.020	ug/L	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	<0.010	0.0029	0.010	0.020	ug/L	U	U	
PERFLUORONONANOIC ACID	375-95-1	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.010	0.0036	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	<0.010	0.0026	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	<0.010	0.0046	0.010	0.020	ug/L	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	<0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.010	0.0043	0.010	0.020	ug/L	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN-RS-005 **Matrix Type:** W **Result Type:** TRG

Lab Sample Name: FBF474 **Sample Date/Time:** 2017-09-01 08:20 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.010	0.0032	0.010	0.020	ug/L	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.010	0.0036	0.010	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.010	0.0048	0.010	0.020	ug/L	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	<0.010	0.0043	0.010	0.020	ug/L	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.010	0.0046	0.010	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.010	0.0040	0.010	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.010	0.0028	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	<0.010	0.0034	0.010	0.020	ug/L	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	<0.010	0.0029	0.010	0.020	ug/L	U	U	
PERFLUORONONANOIC ACID	375-95-1	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.010	0.0036	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	<0.010	0.0026	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	<0.010	0.0046	0.010	0.020	ug/L	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	<0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.010	0.0043	0.010	0.020	ug/L	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN-SB-001 **Matrix Type:** W **Result Type:** TRG

Lab Sample Name: FBF442 **Sample Date/Time:** 2017-08-28 12:10 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	0.010	0.0032	0.010	0.020	ug/L	J	J	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.010	0.0036	0.010	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.010	0.0048	0.010	0.020	ug/L	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	<0.010	0.0043	0.010	0.020	ug/L	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.010	0.0046	0.010	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.010	0.0040	0.010	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.010	0.0028	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	<0.010	0.0034	0.010	0.020	ug/L	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	<0.010	0.0029	0.010	0.020	ug/L	U	U	
PERFLUORONONANOIC ACID	375-95-1	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.010	0.0036	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	0.032	0.0026	0.010	0.020	ug/L			
PERFLUOROOCTANOIC ACID	335-67-1	<0.010	0.0046	0.010	0.020	ug/L	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	<0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.010	0.0043	0.010	0.020	ug/L	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN-SB-002 **Matrix Type:** W **Result Type:** TRG

Lab Sample Name: FBF469 **Sample Date/Time:** 2017-08-31 09:25 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.010	0.0032	0.010	0.020	ug/L	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.010	0.0036	0.010	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.010	0.0048	0.010	0.020	ug/L	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	<0.010	0.0043	0.010	0.020	ug/L	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.010	0.0046	0.010	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.010	0.0040	0.010	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.010	0.0028	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	<0.010	0.0034	0.010	0.020	ug/L	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	<0.010	0.0029	0.010	0.020	ug/L	U	U	
PERFLUORONONANOIC ACID	375-95-1	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.010	0.0036	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	<0.010	0.0026	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	<0.010	0.0046	0.010	0.020	ug/L	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	<0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.010	0.0043	0.010	0.020	ug/L	U	U	

Validated Sample Result Forms: B7J3592

Analysis Method: EPA 537 m

Sample Name FEWRN01-001-GW-015 **Matrix Type:** W **Result Type:** TRG

Lab Sample Name: FBP244 **Sample Date/Time:** 2017-09-04 16:20 **Validation Level:** Stage 4

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	49	0.32	1.0	2.0	ug/L			
8:2 FLUOROTELOMER SULFONATE	39108-34-4	0.76	0.072	0.20	0.40	ug/L			
PERFLUOROBUTANE SULFONATE	29420-43-3	11	0.096	0.20	0.40	ug/L			
PERFLUOROBUTANOIC ACID	375-22-4	7.9	0.086	0.20	0.40	ug/L			
PERFLUORODECANE SULFONATE	335-77-3	<0.20	0.092	0.20	0.40	ug/L	U	UJ	02A
PERFLUORODECANOIC ACID	335-76-2	<0.20	0.080	0.20	0.40	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.20	0.056	0.20	0.40	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	6.1	0.066	0.20	0.40	ug/L			
PERFLUOROHEXANE SULFONATE	108427-53-8	140	2.4	5.0	8.0	ug/L			
PERFLUOROHEXANOIC ACID	307-24-4	53	0.29	1.0	2.0	ug/L			
PERFLUORONONANOIC ACID	375-95-1	0.33	0.076	0.20	0.40	ug/L	J	J	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	3.0	0.072	0.20	0.40	ug/L			
PERFLUOROOCTANE SULFONATE	1763-23-1	64	0.26	1.0	2.0	ug/L			
PERFLUOROOCTANOIC ACID	335-67-1	72	0.46	1.0	2.0	ug/L			
PERFLUOROPENTANOIC ACID	2706-90-3	13	0.054	0.20	0.40	ug/L			
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.20	0.076	0.20	0.40	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.20	0.066	0.20	0.40	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.20	0.086	0.20	0.40	ug/L	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN01-001-SO-018 **Matrix Type:** S **Result Type:** TRG

Lab Sample Name: FBP225 **Sample Date/Time:** 2017-09-01 15:25 **Validation Level:** Stage 4

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	2.6	0.20	0.53	0.89	ug/kg			
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.53	0.28	0.53	0.89	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	0.64	0.15	0.53	0.89	ug/kg	J	J	
PERFLUOROBUTANOIC ACID	375-22-4	1.4	0.20	0.53	0.89	ug/kg			
PERFLUORODECANE SULFONATE	335-77-3	<0.53	0.20	0.53	0.89	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.36	0.12	0.36	0.89	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.53	0.20	0.53	0.89	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.50	0.15	0.53	0.89	ug/kg	J	J	
PERFLUOROHEXANE SULFONATE	108427-53-8	4.9	0.20	0.53	0.89	ug/kg			
PERFLUOROHEXANOIC ACID	307-24-4	4.0	0.17	0.53	0.89	ug/kg			
PERFLUORONONANOIC ACID	375-95-1	<0.53	0.15	0.53	0.89	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	0.71	0.23	0.53	0.89	ug/kg	J	J	
PERFLUOROOCTANE SULFONATE	1763-23-1	4.0	0.19	0.53	0.89	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	2.8	0.23	0.53	0.89	ug/kg			
PERFLUOROPENTANOIC ACID	2706-90-3	0.75	0.16	0.53	0.89	ug/kg	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.36	0.098	0.36	0.89	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.36	0.11	0.36	0.89	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.53	0.16	0.53	0.89	ug/kg	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN01-001-SS-001 **Matrix Type:** S **Result Type:** TRG

Lab Sample Name: FBP228 **Sample Date/Time:** 2017-09-01 12:32 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	<59	23	59	99	ug/kg	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<59	32	59	99	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	3600	17	59	99	ug/kg			
PERFLUOROBUTANOIC ACID	375-22-4	820	23	59	99	ug/kg			
PERFLUORODECANE SULFONATE	335-77-3	<59	23	59	99	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	14	13	40	99	ug/kg	J	J	
PERFLUORODODECANOIC ACID	307-55-1	<59	22	59	99	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	860	17	59	99	ug/kg			
PERFLUOROHEXANE SULFONATE	108427-53-8	20000	23	59	990	ug/kg			
PERFLUOROHEXANOIC ACID	307-24-4	6900	190	590	990	ug/kg			
PERFLUORONONANOIC ACID	375-95-1	48	17	59	99	ug/kg	J	J	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	5100	260	590	990	ug/kg			
PERFLUOROOCTANE SULFONATE	1763-23-1	3400	21	59	99	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	50000	470	1100	1800	ug/kg			
PERFLUOROPENTANOIC ACID	2706-90-3	1200	18	59	99	ug/kg			
PERFLUOROTETRADECANOIC ACID	376-06-7	<40	11	40	99	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<40	12	40	99	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<59	18	59	99	ug/kg	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN01-002-SO-018 **Matrix Type:** S **Result Type:** TRG

Lab Sample Name: FBP227 **Sample Date/Time:** 2017-09-01 17:15 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	4.6	0.23	0.60	1.0	ug/kg			
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.60	0.32	0.60	1.0	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	1.3	0.17	0.60	1.0	ug/kg			
PERFLUOROBUTANOIC ACID	375-22-4	3.1	0.23	0.60	1.0	ug/kg			
PERFLUORODECANE SULFONATE	335-77-3	<0.60	0.23	0.60	1.0	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.40	0.13	0.40	1.0	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.60	0.22	0.60	1.0	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.73	0.17	0.60	1.0	ug/kg	J	J	
PERFLUOROHEXANE SULFONATE	108427-53-8	17	0.23	0.60	1.0	ug/kg			
PERFLUOROHEXANOIC ACID	307-24-4	7.4	0.19	0.60	1.0	ug/kg			
PERFLUORONONANOIC ACID	375-95-1	<0.60	0.17	0.60	1.0	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	0.77	0.26	0.60	1.0	ug/kg	J	J	
PERFLUOROOCTANE SULFONATE	1763-23-1	20	0.21	0.60	1.0	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	6.0	0.26	0.60	1.0	ug/kg			
PERFLUOROPENTANOIC ACID	2706-90-3	2.2	0.18	0.60	1.0	ug/kg			
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.40	0.11	0.40	1.0	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.40	0.12	0.40	1.0	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.60	0.18	0.60	1.0	ug/kg	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN01-002-SS-001 **Matrix Type:** S **Result Type:** TRG

Lab Sample Name: FBP226 **Sample Date/Time:** 2017-09-01 15:50 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.60	0.23	0.60	1.0	ug/kg	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.60	0.32	0.60	1.0	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	0.59	0.17	0.60	1.0	ug/kg	J	J	
PERFLUOROBUTANOIC ACID	375-22-4	0.48	0.23	0.60	1.0	ug/kg	J	J	
PERFLUORODECANE SULFONATE	335-77-3	1.6	0.23	0.60	1.0	ug/kg			
PERFLUORODECANOIC ACID	335-76-2	0.56	0.13	0.40	1.0	ug/kg	J	J	
PERFLUORODODECANOIC ACID	307-55-1	<0.60	0.22	0.60	1.0	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.45	0.17	0.60	1.0	ug/kg	J	J	
PERFLUOROHEXANE SULFONATE	108427-53-8	11	0.23	0.60	1.0	ug/kg			
PERFLUOROHEXANOIC ACID	307-24-4	1.1	0.19	0.60	1.0	ug/kg			
PERFLUORONONANOIC ACID	375-95-1	0.50	0.17	0.60	1.0	ug/kg	J	J	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	6.5	0.26	0.60	1.0	ug/kg			
PERFLUOROOCTANE SULFONATE	1763-23-1	140	2.1	6.0	10	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	2.2	0.26	0.60	1.0	ug/kg			
PERFLUOROPENTANOIC ACID	2706-90-3	0.39	0.18	0.60	1.0	ug/kg	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.40	0.11	0.40	1.0	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.40	0.12	0.40	1.0	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	0.41	0.18	0.60	1.0	ug/kg	J	J	

Analysis Method: EPA 537 m

Sample Name FEWRN01-003-GW-015 **Matrix Type:** W **Result Type:** TRG

Lab Sample Name: FBP242 **Sample Date/Time:** 2017-09-04 13:45 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	2.4	0.064	0.20	0.40	ug/L			
8:2 FLUOROTELOMER SULFONATE	39108-34-4	0.11	0.0036	0.010	0.020	ug/L			
PERFLUOROBUTANE SULFONATE	29420-43-3	0.97	0.0048	0.010	0.020	ug/L			
PERFLUOROBUTANOIC ACID	375-22-4	0.32	0.0043	0.010	0.020	ug/L			
PERFLUORODECANE SULFONATE	335-77-3	<0.010	0.0046	0.010	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.010	0.0040	0.010	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.010	0.0028	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.37	0.0033	0.010	0.020	ug/L			
PERFLUOROHEXANE SULFONATE	108427-53-8	4.2	0.068	0.20	0.40	ug/L			
PERFLUOROHEXANOIC ACID	307-24-4	2.5	0.058	0.20	0.40	ug/L			
PERFLUORONONANOIC ACID	375-95-1	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	0.017	0.0036	0.010	0.020	ug/L	J	J	
PERFLUOROOCTANE SULFONATE	1763-23-1	2.5	0.052	0.20	0.40	ug/L			
PERFLUOROOCTANOIC ACID	335-67-1	0.43	0.0046	0.010	0.020	ug/L			
PERFLUOROPENTANOIC ACID	2706-90-3	1.2	0.054	0.20	0.40	ug/L			
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.010	0.0043	0.010	0.020	ug/L	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN01-003-GW-915 **Matrix Type:** W **Result Type:** TRG

Lab Sample Name: FBP243 **Sample Date/Time:** 2017-09-04 13:45 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	2.8	0.064	0.20	0.40	ug/L			
8:2 FLUOROTELOMER SULFONATE	39108-34-4	0.13	0.0036	0.010	0.020	ug/L			
PERFLUOROBUTANE SULFONATE	29420-43-3	1.1	0.096	0.20	0.40	ug/L			
PERFLUOROBUTANOIC ACID	375-22-4	0.36	0.0043	0.010	0.020	ug/L			
PERFLUORODECANE SULFONATE	335-77-3	<0.010	0.0046	0.010	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.010	0.0040	0.010	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.010	0.0028	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.39	0.0033	0.010	0.020	ug/L			
PERFLUOROHEXANE SULFONATE	108427-53-8	4.7	0.068	0.20	0.40	ug/L			
PERFLUOROHEXANOIC ACID	307-24-4	2.7	0.058	0.20	0.40	ug/L			
PERFLUORONONANOIC ACID	375-95-1	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	0.017	0.0036	0.010	0.020	ug/L	J	J	
PERFLUOROOCTANE SULFONATE	1763-23-1	3.2	0.052	0.20	0.40	ug/L			
PERFLUOROOCTANOIC ACID	335-67-1	0.48	0.0046	0.010	0.020	ug/L			
PERFLUOROPENTANOIC ACID	2706-90-3	1.3	0.054	0.20	0.40	ug/L			
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.010	0.0043	0.010	0.020	ug/L	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN01-003-SO-016 **Matrix Type:** S **Result Type:** TRG

Lab Sample Name: FBP232 **Sample Date/Time:** 2017-09-02 10:10 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	1.1	0.25	0.66	1.1	ug/kg			
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.66	0.35	0.66	1.1	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	0.65	0.19	0.66	1.1	ug/kg	J	J	
PERFLUOROBUTANOIC ACID	375-22-4	0.39	0.25	0.66	1.1	ug/kg	J	J	
PERFLUORODECANE SULFONATE	335-77-3	<0.66	0.25	0.66	1.1	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.44	0.14	0.44	1.1	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.66	0.24	0.66	1.1	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.47	0.19	0.66	1.1	ug/kg	J	J	
PERFLUOROHEXANE SULFONATE	108427-53-8	1.4	0.25	0.66	1.1	ug/kg			
PERFLUOROHEXANOIC ACID	307-24-4	0.90	0.21	0.66	1.1	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	<0.66	0.19	0.66	1.1	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.66	0.29	0.66	1.1	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	0.80	0.23	0.66	1.1	ug/kg	J	J	
PERFLUOROOCTANOIC ACID	335-67-1	0.94	0.29	0.66	1.1	ug/kg	J	J	
PERFLUOROPENTANOIC ACID	2706-90-3	0.46	0.20	0.66	1.1	ug/kg	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.44	0.12	0.44	1.1	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.44	0.13	0.44	1.1	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.66	0.20	0.66	1.1	ug/kg	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN01-003-SO-916 **Matrix Type:** S **Result Type:** TRG

Lab Sample Name: FBP233 **Sample Date/Time:** 2017-09-02 10:10 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	0.69	0.25	0.66	1.1	ug/kg	J	J	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.66	0.35	0.66	1.1	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.66	0.19	0.66	1.1	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	0.38	0.25	0.66	1.1	ug/kg	J	J	
PERFLUORODECANE SULFONATE	335-77-3	<0.66	0.25	0.66	1.1	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.44	0.14	0.44	1.1	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.66	0.24	0.66	1.1	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.66	0.19	0.66	1.1	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	0.88	0.25	0.66	1.1	ug/kg	J	J	
PERFLUOROHEXANOIC ACID	307-24-4	0.68	0.21	0.66	1.1	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	<0.66	0.19	0.66	1.1	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.66	0.29	0.66	1.1	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	0.51	0.23	0.66	1.1	ug/kg	J	J	
PERFLUOROOCTANOIC ACID	335-67-1	<0.66	0.29	0.66	1.1	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	0.45	0.20	0.66	1.1	ug/kg	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.44	0.12	0.44	1.1	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.44	0.13	0.44	1.1	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.66	0.20	0.66	1.1	ug/kg	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN01-003-SS-001 **Matrix Type:** S **Result Type:** TRG

Lab Sample Name: FBP230 **Sample Date/Time:** 2017-09-02 07:59 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	1.9	0.25	0.66	1.1	ug/kg			
8:2 FLUOROTELOMER SULFONATE	39108-34-4	4.4	0.35	0.66	1.1	ug/kg		J	17
PERFLUOROBUTANE SULFONATE	29420-43-3	0.59	0.19	0.66	1.1	ug/kg	J	J	
PERFLUOROBUTANOIC ACID	375-22-4	0.78	0.25	0.66	1.1	ug/kg	J	J	
PERFLUORODECANE SULFONATE	335-77-3	2.7	0.25	0.66	1.1	ug/kg		J	17
PERFLUORODECANOIC ACID	335-76-2	1.4	0.14	0.44	1.1	ug/kg			
PERFLUORODODECANOIC ACID	307-55-1	0.46	0.24	0.66	1.1	ug/kg	J	J	
PERFLUOROHEPTANOIC ACID	375-85-9	0.85	0.19	0.66	1.1	ug/kg	J	J	
PERFLUOROHEXANE SULFONATE	108427-53-8	3.8	0.25	0.66	1.1	ug/kg			
PERFLUOROHEXANOIC ACID	307-24-4	0.97	0.21	0.66	1.1	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	1.3	0.19	0.66	1.1	ug/kg			
PERFLUOROOCTANE SULFONAMIDE	754-91-6	11	0.29	0.66	1.1	ug/kg			
PERFLUOROOCTANE SULFONATE	1763-23-1	62	2.3	6.6	11	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	2.2	0.29	0.66	1.1	ug/kg			
PERFLUOROPENTANOIC ACID	2706-90-3	0.84	0.20	0.66	1.1	ug/kg	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.44	0.12	0.44	1.1	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.44	0.13	0.44	1.1	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	0.91	0.20	0.66	1.1	ug/kg	J	J	

Analysis Method: EPA 537 m

Sample Name FEWRN01-003-SS-901 **Matrix Type:** S **Result Type:** TRG

Lab Sample Name: FBP231 **Sample Date/Time:** 2017-09-02 07:59 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	1.9	0.20	0.52	0.87	ug/kg			
8:2 FLUOROTELOMER SULFONATE	39108-34-4	34	0.28	0.52	0.87	ug/kg		J	17
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.52	0.15	0.52	0.87	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	0.44	0.20	0.52	0.87	ug/kg	J	J	
PERFLUORODECANE SULFONATE	335-77-3	<0.52	0.20	0.52	0.87	ug/kg	U	UJ	17
PERFLUORODECANOIC ACID	335-76-2	0.81	0.11	0.35	0.87	ug/kg	J	J	
PERFLUORODODECANOIC ACID	307-55-1	<0.52	0.19	0.52	0.87	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.94	0.15	0.52	0.87	ug/kg			
PERFLUOROHEXANE SULFONATE	108427-53-8	3.3	0.20	0.52	0.87	ug/kg			
PERFLUOROHEXANOIC ACID	307-24-4	0.80	0.17	0.52	0.87	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	0.86	0.15	0.52	0.87	ug/kg	J	J	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	13	0.23	0.52	0.87	ug/kg			
PERFLUOROOCTANE SULFONATE	1763-23-1	71	1.8	5.2	8.7	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	2.0	0.23	0.52	0.87	ug/kg			
PERFLUOROPENTANOIC ACID	2706-90-3	0.79	0.16	0.52	0.87	ug/kg	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.35	0.096	0.35	0.87	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.35	0.10	0.35	0.87	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	0.32	0.16	0.52	0.87	ug/kg	J	J	

Analysis Method: EPA 537 m

Sample Name FEWRN02-001-GW-025 **Matrix Type:** W **Result Type:** TRG

Lab Sample Name: FBP240 **Sample Date/Time:** 2017-09-04 10:35 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.010	0.0032	0.010	0.020	ug/L	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	0.0038	0.0036	0.010	0.020	ug/L	J	J	
PERFLUOROBUTANE SULFONATE	29420-43-3	0.074	0.0048	0.010	0.020	ug/L			
PERFLUOROBUTANOIC ACID	375-22-4	0.040	0.0043	0.010	0.020	ug/L			
PERFLUORODECANE SULFONATE	335-77-3	<0.010	0.0046	0.010	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.010	0.0040	0.010	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.010	0.0028	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.022	0.0033	0.010	0.020	ug/L			
PERFLUOROHEXANE SULFONATE	108427-53-8	0.29	0.0034	0.010	0.020	ug/L			
PERFLUOROHEXANOIC ACID	307-24-4	0.16	0.0029	0.010	0.020	ug/L			
PERFLUORONONANOIC ACID	375-95-1	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.010	0.0036	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	0.72	0.0026	0.010	0.020	ug/L			
PERFLUOROOCTANOIC ACID	335-67-1	0.031	0.0046	0.010	0.020	ug/L			
PERFLUOROPENTANOIC ACID	2706-90-3	0.14	0.0027	0.010	0.020	ug/L			
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.010	0.0043	0.010	0.020	ug/L	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN02-002-GW-033 **Matrix Type:** W **Result Type:** TRG

Lab Sample Name: FBP236 **Sample Date/Time:** 2017-09-02 16:00 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	0.044	0.0032	0.010	0.020	ug/L			
8:2 FLUOROTELOMER SULFONATE	39108-34-4	0.065	0.0036	0.010	0.020	ug/L			
PERFLUOROBUTANE SULFONATE	29420-43-3	0.022	0.0048	0.010	0.020	ug/L			
PERFLUOROBUTANOIC ACID	375-22-4	0.020	0.0043	0.010	0.020	ug/L	J	J	
PERFLUORODECANE SULFONATE	335-77-3	<0.010	0.0046	0.010	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.010	0.0040	0.010	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.010	0.0028	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.0099	0.0033	0.010	0.020	ug/L	J	J	
PERFLUOROHEXANE SULFONATE	108427-53-8	0.13	0.0034	0.010	0.020	ug/L			
PERFLUOROHEXANOIC ACID	307-24-4	0.079	0.0029	0.010	0.020	ug/L			
PERFLUORONONANOIC ACID	375-95-1	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	0.0079	0.0036	0.010	0.020	ug/L	J	J	
PERFLUOROOCTANE SULFONATE	1763-23-1	0.91	0.026	0.10	0.20	ug/L			
PERFLUOROOCTANOIC ACID	335-67-1	0.029	0.0046	0.010	0.020	ug/L			
PERFLUOROPENTANOIC ACID	2706-90-3	0.064	0.0027	0.010	0.020	ug/L			
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.010	0.0043	0.010	0.020	ug/L	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN02-003-GW-030 **Matrix Type:** W **Result Type:** TRG

Lab Sample Name: FBP235 **Sample Date/Time:** 2017-09-02 14:15 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	2.6	0.032	0.10	0.20	ug/L			
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.10	0.036	0.10	0.20	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	3.2	0.048	0.10	0.20	ug/L			
PERFLUOROBUTANOIC ACID	375-22-4	1.2	0.043	0.10	0.20	ug/L			
PERFLUORODECANE SULFONATE	335-77-3	<0.10	0.046	0.10	0.20	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.10	0.040	0.10	0.20	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.10	0.028	0.10	0.20	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.79	0.033	0.10	0.20	ug/L			
PERFLUOROHEXANE SULFONATE	108427-53-8	17	0.17	0.50	1.0	ug/L			
PERFLUOROHEXANOIC ACID	307-24-4	8.0	0.029	0.10	0.20	ug/L			
PERFLUORONONANOIC ACID	375-95-1	<0.10	0.038	0.10	0.20	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.10	0.036	0.10	0.20	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	17	0.13	0.50	1.0	ug/L			
PERFLUOROOCTANOIC ACID	335-67-1	0.95	0.046	0.10	0.20	ug/L			
PERFLUOROPENTANOIC ACID	2706-90-3	2.4	0.027	0.10	0.20	ug/L			
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.10	0.038	0.10	0.20	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.10	0.033	0.10	0.20	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.10	0.043	0.10	0.20	ug/L	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN02-004-GW-024 **Matrix Type:** W **Result Type:** TRG

Lab Sample Name: FBP237 **Sample Date/Time:** 2017-09-02 17:40 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	4.3	0.032	0.10	0.20	ug/L			
8:2 FLUOROTELOMER SULFONATE	39108-34-4	0.14	0.036	0.10	0.20	ug/L	J	J	
PERFLUOROBUTANE SULFONATE	29420-43-3	3.7	0.048	0.10	0.20	ug/L			
PERFLUOROBUTANOIC ACID	375-22-4	1.4	0.043	0.10	0.20	ug/L			
PERFLUORODECANE SULFONATE	335-77-3	<0.10	0.046	0.10	0.20	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.10	0.040	0.10	0.20	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.10	0.028	0.10	0.20	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.94	0.033	0.10	0.20	ug/L			
PERFLUOROHEXANE SULFONATE	108427-53-8	22	0.17	0.50	1.0	ug/L			
PERFLUOROHEXANOIC ACID	307-24-4	7.5	0.029	0.10	0.20	ug/L			
PERFLUORONONANOIC ACID	375-95-1	<0.10	0.038	0.10	0.20	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.10	0.036	0.10	0.20	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	19	0.13	0.50	1.0	ug/L			
PERFLUOROOCTANOIC ACID	335-67-1	1.1	0.046	0.10	0.20	ug/L			
PERFLUOROPENTANOIC ACID	2706-90-3	3.6	0.027	0.10	0.20	ug/L			
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.10	0.038	0.10	0.20	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.10	0.033	0.10	0.20	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.10	0.043	0.10	0.20	ug/L	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN03-001-GW-020 **Matrix Type:** W **Result Type:** TRG

Lab Sample Name: FBP229 **Sample Date/Time:** 2017-09-01 17:35 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	0.063	0.0032	0.010	0.020	ug/L		J	02A
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.010	0.0036	0.010	0.020	ug/L	U	UJ	02A
PERFLUOROBUTANE SULFONATE	29420-43-3	0.16	0.0048	0.010	0.020	ug/L		J	02A
PERFLUOROBUTANOIC ACID	375-22-4	0.088	0.0043	0.010	0.020	ug/L		J	02A
PERFLUORODECANE SULFONATE	335-77-3	<0.010	0.0046	0.010	0.020	ug/L	U	UJ	02A
PERFLUORODECANOIC ACID	335-76-2	<0.010	0.0040	0.010	0.020	ug/L	U	UJ	02A
PERFLUORODODECANOIC ACID	307-55-1	<0.010	0.0028	0.010	0.020	ug/L	U	UJ	02A
PERFLUOROHEPTANOIC ACID	375-85-9	0.069	0.0033	0.010	0.020	ug/L		J	02A
PERFLUOROHEXANE SULFONATE	108427-53-8	1.3	0.24	0.50	0.80	ug/L			
PERFLUOROHEXANOIC ACID	307-24-4	0.34	0.0029	0.010	0.020	ug/L		J	02A
PERFLUORONONANOIC ACID	375-95-1	<0.010	0.0038	0.010	0.020	ug/L	U	UJ	02A
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.010	0.0036	0.010	0.020	ug/L	U	UJ	02A
PERFLUOROOCTANE SULFONATE	1763-23-1	0.82	0.23	0.50	0.80	ug/L			
PERFLUOROOCTANOIC ACID	335-67-1	0.16	0.0046	0.010	0.020	ug/L		J	02A
PERFLUOROPENTANOIC ACID	2706-90-3	0.16	0.0027	0.010	0.020	ug/L		J	02A
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.010	0.0038	0.010	0.020	ug/L	U	UJ	02A
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.010	0.0033	0.010	0.020	ug/L	U	UJ	02A
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.010	0.0043	0.010	0.020	ug/L	U	UJ	02A

Analysis Method: EPA 537 m

Sample Name FEWRN-IDW-WS **Matrix Type:** S **Result Type:** TRG

Lab Sample Name: FBP238 **Sample Date/Time:** 2017-09-03 08:50 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	<64	25	64	110	ug/kg	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<64	34	64	110	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	350	18	64	110	ug/kg			
PERFLUOROBUTANOIC ACID	375-22-4	170	25	64	110	ug/kg			
PERFLUORODECANE SULFONATE	335-77-3	<64	25	64	110	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<43	14	43	110	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<64	24	64	110	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	160	18	64	110	ug/kg			
PERFLUOROHEXANE SULFONATE	108427-53-8	5600	250	640	1100	ug/kg			
PERFLUOROHEXANOIC ACID	307-24-4	1300	20	64	110	ug/kg			
PERFLUORONONANOIC ACID	375-95-1	53	18	64	110	ug/kg	J	J	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	2000	28	64	110	ug/kg			
PERFLUOROOCTANE SULFONATE	1763-23-1	1300	23	64	110	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	12000	280	640	1100	ug/kg			
PERFLUOROPENTANOIC ACID	2706-90-3	190	19	64	110	ug/kg			
PERFLUOROTETRADECANOIC ACID	376-06-7	<43	12	43	110	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<43	13	43	110	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<64	19	64	110	ug/kg	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN-IDW-WW **Matrix Type:** W **Result Type:** TRG

Lab Sample Name: FBP239 **Sample Date/Time:** 2017-09-03 09:00 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	4.6	0.064	0.20	0.40	ug/L			
8:2 FLUOROTELOMER SULFONATE	39108-34-4	3.7	0.072	0.20	0.40	ug/L			
PERFLUOROBUTANE SULFONATE	29420-43-3	2.3	0.096	0.20	0.40	ug/L			
PERFLUOROBUTANOIC ACID	375-22-4	0.81	0.086	0.20	0.40	ug/L			
PERFLUORODECANE SULFONATE	335-77-3	<0.20	0.092	0.20	0.40	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.20	0.080	0.20	0.40	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.20	0.056	0.20	0.40	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.69	0.066	0.20	0.40	ug/L			
PERFLUOROHEXANE SULFONATE	108427-53-8	18	0.068	0.20	0.40	ug/L			
PERFLUOROHEXANOIC ACID	307-24-4	7.3	0.058	0.20	0.40	ug/L			
PERFLUORONONANOIC ACID	375-95-1	0.14	0.076	0.20	0.40	ug/L	J	J	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	4.2	0.072	0.20	0.40	ug/L			
PERFLUOROOCTANE SULFONATE	1763-23-1	100	0.26	1.0	2.0	ug/L			
PERFLUOROOCTANOIC ACID	335-67-1	26	0.46	1.0	2.0	ug/L			
PERFLUOROPENTANOIC ACID	2706-90-3	1.6	0.054	0.20	0.40	ug/L			
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.20	0.076	0.20	0.40	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.20	0.066	0.20	0.40	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.20	0.086	0.20	0.40	ug/L	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN-RS-006 **Matrix Type:** W **Result Type:** TRG

Lab Sample Name: FBP234 **Sample Date/Time:** 2017-09-02 13:15 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.010	0.0032	0.010	0.020	ug/L	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.010	0.0036	0.010	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.010	0.0048	0.010	0.020	ug/L	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	<0.010	0.0043	0.010	0.020	ug/L	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.010	0.0046	0.010	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.010	0.0040	0.010	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.010	0.0028	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	<0.010	0.0034	0.010	0.020	ug/L	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	<0.010	0.0029	0.010	0.020	ug/L	U	U	
PERFLUORONONANOIC ACID	375-95-1	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.010	0.0036	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	<0.010	0.0026	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	<0.010	0.0046	0.010	0.020	ug/L	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	<0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.010	0.0043	0.010	0.020	ug/L	U	U	

Analysis Method: EPA 537 m

Sample Name FEWRN-RS-007 **Matrix Type:** W **Result Type:** TRG

Lab Sample Name: FBP241 **Sample Date/Time:** 2017-09-04 12:05 **Validation Level:** Stage 2B

Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
6:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.010	0.0032	0.010	0.020	ug/L	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.010	0.0036	0.010	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.010	0.0048	0.010	0.020	ug/L	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	<0.010	0.0043	0.010	0.020	ug/L	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.010	0.0046	0.010	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.010	0.0040	0.010	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.010	0.0028	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	<0.010	0.0034	0.010	0.020	ug/L	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	<0.010	0.0029	0.010	0.020	ug/L	U	U	
PERFLUORONONANOIC ACID	375-95-1	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.010	0.0036	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	<0.010	0.0026	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	<0.010	0.0046	0.010	0.020	ug/L	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	<0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.010	0.0043	0.010	0.020	ug/L	U	U	

Prepared for: Aerostar SES LLC

Project: M2027.0003 (OMAHA)
FE Warren

Analytical Data Package
(Level IV)

Analysis: PFOS and PFOA in water and soil (Method 537 mod.)

Maxxam Job #: B7J3592

Maxxam Analytics International
6740 Campobello Rd.
Mississauga, Ontario, Canada
L5N 2L8
1-800-668-0639
www.maxxamanalytics.com

I hereby certify that to the best of my knowledge all analytical data presented in this report:

- Has been checked for completeness.
- Is accurate, legible and error free.
- Has been conducted in accordance with approved SOP's and that all deviations are clearly listed in the Case Narrative.
- This report has been generated in .pdf format.

Review Performed By:

Steph Pollen
Project Manager
Maxxam
A Bureau Veritas Group Company

Stephanie
Pollen
2017.10.18
17:16:31 -04'00'

Maxxam Analytics International
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www.maxxamanalytics.com

Glossary of Terms

- ***Detection Limit (DL)*** this can also be called ***Method Detection Limit (MDL***): The lowest concentration or amount of the target analyte that can be identified, measured, and reported with confidence that the analyte concentration is not a false positive value. (Clarification): The smallest analyte concentration that can be demonstrated to be different from zero or a blank concentration at the 99% level of confidence. At the DL, the false positive rate (Type I error) is 1%.

- ***Limit of Detection (LOD*)**: An estimate of the minimum amount of a substance that an analytical process can reliably detect. An LOD is analyte- and matrix-specific and may be laboratory-dependent. (Clarification): The smallest amount or concentration of a substance that must be present in a sample in order to be detected at a high level of confidence (99%). At the LOD, the false negative rate (Type II error) is 1%.

- ***Limits of Quantitation (LOQ)*** this can also be called ***Reporting Detection Limit (RDL)***: The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. (Clarification): The lowest concentration that produces a quantitative result within specified limits of precision and bias. For DoD projects, the LOQ shall be set at or above the concentration of the lowest initial calibration standard.

- ***Acceptance Criteria*** are values used by the laboratory to determine that a process is in control.

- ***Accuracy*** is the degree of agreement of a measured value with the true or expected value.

- ***Calibration Standards*** are a set of solutions containing the analytes of interest at a specified concentration.

- ***Calibration Verification Standard*** consists of a calibration standard solution of intermediate concentration (mid-point initial calibration level) used to access whether the initial calibration is still valid

- ***Certified Reference Material*** is a stable homogenous material that is certified by repetitive analysis from a supplier who is certified to generate said materials.

- ***Internal Standard*** a deuterated or ^{13}C-labelled analyte that is added to a sample extract prior to instrumental analysis to compensate for injection variability.

- ***Isomer*** is a member of a group of compounds that differ from each other only in the locations of a specific number of common substituent atoms or groups of atoms on the parent compound.

- ***Method Blank*** is a laboratory control sample using reagents that are known to be free of contamination.

- ***Precision*** is the degree of agreement between the data generated from repetitive measurements under specific conditions.

- ***Quality Assurance*** is a system of activities whose purpose is to provide the producer or user of a product with the assurance that the product meets a defined standard of quality.

- ***Quality Control*** is the overall system of activities whose purpose is to control the quality of a product so that it meets the needs of the end user.

- ***RSD*** is the relative standard deviation.

- ***Blank Spike*** is a laboratory control sample that has been fortified with native analytes of interest.

- ***Window Defining Mixture*** is a solution containing only the earliest and latest eluting congeners within each homologous group of target analytes on a specified GC column.

- ***RPD*** or Relative Percent Difference. A measure used to compare duplicate sample analysis.

- ***EMPC/NDR –*** Peak detected does not meet ratio criteria and has resulted in a higher detection limit.

1.0 Project Narrative

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Maxxam Job: B7J3592 – Soil Analysis

Sample Analysis

Samples were initially analyzed on QC batches 5158547 (2017/09/22) and 5158618 (2017/09/22). Due to failure of QC acceptance criteria on QC batch 5158547 (2017/09/22), samples were re-extracted and re-analyzed on QC batch 5186997 (2017/10/03-04). QC acceptance criterion was also not met for Perfluorooctanoic acid (PFOA) in the Blank sample on QC batch 5158618. The sample was re-extracted and re-analyzed on QC batch 5187001 (2017/10/02) for this analyte.

Soil extracts were initially pre-screened and estimated concentrations were obtained so that samples could be appropriately diluted for analysis. Dilutions were required for selected analytes in the following samples:

FBP226	*FEWRN01-002-SS-001*	*Perfluorooctanesulfonate (PFOS)*
FBP228	*FEWRN01-001-SS-001*	*All analytes*
FBP230	*FEWRN01-003-SS-001*	*Perfluorooctanesulfonate (PFOS)*
FBP231	*FEWRN01-003-SS-901*	*Perfluorooctanesulfonate (PFOS)*
FBP238	*FEWRN-IDW-WS*	*All analytes*

Detection limits were adjusted accordingly.

A high concentration of Perfluorooctanesulfonate (PFOS) was detected in the following sample during pre-screening:

FBP230 *FEWRN01-003-SS-001*

The sample was diluted 10x and 100x for analysis. Due to discrepancies between the dilution and screening results, the sample was re-diluted and re-analyzed. Consistent results were obtained between the re-diluted and undiluted samples. These results indicate a possible error during the initial dilution procedure. There is no impact on data quality as results were reported from the re-diluted sample.

Data was evaluated in accordance with acceptance criteria specified in DoD QSM 5.1.

QC Samples

Matrix Spike and Matrix Spike Duplicate (MS/MSD) was performed on sample FBP228 *(FEWRN01-001-SS-001)* on QC batches 5158618 (2017/09/22) and 5187001 (2017/10/02) but not analyzed due to high concentrations of target analytes in the native sample.

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Maxxam Job: B7J3592 – Water Analysis

Sample Analysis

Samples were initially pre-screened and estimated concentrations were obtained so that appropriate sample volumes could be extracted on QC batches 5159252 (2017/09/25) and 5159897 (2017/09/16) and 5185352 (2017/10/01). Due to high concentrations, the following samples were analyzed for selected analytes using reduced sample extraction volumes:

FBP229	*FEWRN03-001-GW-020*	*All analytes*
FBP235	*FEWRN02-003-GW-030*	*All analytes*
FBP236	*FEWRN02-002-GW-033*	*Perfluorooctanesulfonate (PFOS)*
FBP237	*FEWRN02-004-GW-024*	*All analytes*
FBP239	*FEWRN-IDW-WW*	*All analytes*
FBP242	*FEWRN01-003-GW-015*	*Perfluoropentanoic acid (PFPeA), Perfluorohexanoic acid (PFHxA), Perfluorohexanesulfonate (PFHxS), Perfluorooctanesulfonate (PFOS), 6:2 Fluorotelomersulfonate (6:2FTS)*
FBP243	*FEWRN01-003-GW-915*	*Perfluorobutanesulfonate (PFBS), Perfluoropentanoic acid (PFPeA), Perfluorohexanoic acid (PFHxA), Perfluorohexanesulfonate (PFHxS), Perfluorooctanesulfonate (PFOS), 6:2 Fluorotelomersulfonate (6:2FTS)*
FBP244	*FEWRN01-001-GW-015*	*All analytes*

Detection limits were adjusted accordingly for these samples.

The following samples were also analyzed for selected parameters by serial dilution (high level analysis) on QC batch 5155735 (2017/09/24):

FBP229	*FEWRN03-001-GW-020*	*Perfluorohexanesulfonate (PFHxS), Perfluorooctanesulfonate (PFOS)*
FBP244	*FEWRN01-001-GW-015*	*Perfluorohexanesulfonate (PFHxS)*

Detection limits were adjusted accordingly for these analytes.

The following sample was initially analyzed on QC batch 5159897 (2017/09/16):

FBP244 *FEWRN01-001-GW-015*

Due to failure of the Instrument Sensitivity Check (ISC) for Perfluorodecanesulfonate (PFDS), the sample was re-extracted and re-analyzed for this analyte on QC batch 5185352 (2017/10/01) past the method defined hold time.

The following sample was initially analyzed for Perfluorohexanesulfonate (PFHxS) and Perfluorooctanesulfonate (PFOS) by serial dilution (high level analysis) on QC batch 5155735 (2017/09/24):

FBP229 *FEWRN03-001-GW-020*

The sample was subsequently extracted and analyzed on QC batch 5185352 (2017/10/01) past the method defined hold time for all other analytes. Because of their chemical structures, per- and polyfluorinated alkyl substances (PFAS) are chemically and biologically stable in the environment and resist typical environmental degradation processes. This would suggest the hold time exceedance would not have a significant impact on the data quality.

QC Samples

Matrix Spike and Matrix Spike Duplicate (MS/MSD) was required for sample FBP244 *(FEWRN01-001-GW-015)* on QC batch 5159897 (2017/09/16) but not performed due to high concentrations of target analytes in the native sample. A Spike and Spike Duplicate (LCS/LCS Dup) was analyzed instead. There is no impact on data quality as % RPD between the LCS/LCS Dup met acceptance criteria.

Data was evaluated in accordance with acceptance criteria specified in DoD QSM 5.1.

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PROJECT NARRATIVE

Maxxam Analytics
Client Project #: M2027.0003 (OMAHA)

Client: Aerostar SES LLC
Client Project: M2027.0003 (OMAHA)

I. SAMPLE RECEIPT/ANALYSIS

a) Sample Listing

Maxxam ID	Client Sample ID	Date Sampled	Date Received	Date Prepped	Date Run	Initial Calibration
PFOS and PFOA in soil by SPE/LCMS						
FBP225	FEWRN01-001-SO-018	2017/09/01	2017/09/06	2017/09/28	2017/10/03	2017/10/03-04
FBP226	FEWRN01-002-SS-001	2017/09/01	2017/09/06	2017/09/28	2017/10/03	2017/10/03-04
FBP227	FEWRN01-002-SO-018	2017/09/01	2017/09/06	2017/09/28	2017/10/03	2017/10/03-04
FBP228	FEWRN01-001-SS-001	2017/09/01	2017/09/06	2017/09/11	2017/09/22	2017/09/22 & 2017/10/02
FBP230	FEWRN01-003-SS-001	2017/09/02	2017/09/06	2017/09/28	2017/10/05	2017/10/03-04
FBP231	FEWRN01-003-SS-901	2017/09/02	2017/09/06	2017/09/28	2017/10/03	2017/10/03-04
FBP232	FEWRN01-003-SO-016	2017/09/02	2017/09/06	2017/09/28	2017/10/03	2017/10/03-04
FBP233	FEWRN01-003-SO-916	2017/09/02	2017/09/06	2017/09/28	2017/10/03	2017/10/03-04
FBP238	FEWRN-IDW-WS	2017/09/03	2017/09/06	2017/09/28	2017/10/03	2017/10/03-04
PFOS and PFOA in water by SPE/LCMS						
FBP229	FEWRN03-001-GW-020	2017/09/01	2017/09/06	2017/09/27	2017/10/01	2017/09/24 & 2017/10/01
FBP229 Dup	FEWRN03-001-GW-020	2017/09/01	2017/09/06	2017/09/08	2017/09/24	2017/09/24 & 2017/10/01
FBP234	FEWRN-RS-006	2017/09/02	2017/09/06	2017/09/12	2017/09/25	2017/09/25
FBP235	FEWRN02-003-GW-030	2017/09/02	2017/09/06	2017/09/12	2017/09/25	2017/09/25
FBP236	FEWRN02-002-GW-033	2017/09/02	2017/09/06	2017/09/12	2017/09/25	2017/09/25
FBP237	FEWRN02-004-GW-024	2017/09/02	2017/09/06	2017/09/12	2017/09/25	2017/09/25
FBP239	FEWRN-IDW-WW	2017/09/03	2017/09/06	2017/09/12	2017/09/25	2017/09/25
FBP240	FEWRN02-001-GW-025	2017/09/04	2017/09/06	2017/09/12	2017/09/25	2017/09/25
FBP241	FEWRN-RS-007	2017/09/04	2017/09/06	2017/09/12	2017/09/25	2017/09/25
FBP242	FEWRN01-003-GW-015	2017/09/04	2017/09/06	2017/09/12	2017/09/25	2017/09/25
FBP243	FEWRN01-003-GW-915	2017/09/04	2017/09/06	2017/09/12	2017/09/25	2017/09/25
FBP244	FEWRN01-001-GW-015	2017/09/04	2017/09/06	2017/09/12	2017/09/16	2017/09/16 & 2017/09/24 & 2017/10/01
FBP244 Dup	FEWRN01-001-GW-015	2017/09/04	2017/09/06	2017/09/08	2017/09/24	2017/09/24

Run Date is defined as the date of injection of the last calibration standard (12 hours or less) prior to the samples analyzed within that run sequence. Therefore the time of calibration injection that defines the run date is always within 12 hours of the time of sample injection.

b) Shipping Problems: Samples were received with cooler temperature less than 10 degrees Celsius. Cooler custody seal was present and intact.

c) Documentation Problems: none encountered

II. SAMPLE PREP:

No problems encountered

III. SAMPLE ANALYSIS:

See also comments within the appropriate Certificate of Analysis

a) Hold Times: all within recommended hold times

b) Instrument Calibration: all within control limits

c) Quality Control: All applicable QC meets control criteria, except where otherwise noted.

d) All analytes requiring manual intergration(s) are noted on the sample chromatograms

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for other than the conditions detailed above.

In addition, I certify, that to the best of my knowledge and belief, the data as reported are true and accurate. Release of the data contained in this data package has been authorized by the cognizant laboratory official or his/her designee, as verified by this signature.

Steph Paller

Project Manager- Site Assessment and Remediation/ Ultra Trace

2017/10/18

Date

AerostarSES AIR

1006 Floyd Culler Court
Oak Ridge, TN 37830
865-481-7837

Chain of C
Analysis Re

8120 06-Sep-17 13:43
Stephanie Pollen
B7J3592
MAF ENV-668

088
e 1 of 2

Project Name: Site Inspection of Aqueous Film Forming Foam Areas, Multiple Sites, United States Air Force Installations

Job No.: M2027.0003 (Omaha)

Installation: FE Warren

Aerostar Project Manager: Brian Odom, BOdom@aecproene.com (478) 397-4906
Send Data to: Jenny Vance, jvance@aerostar.net (865) 483-7904

Sampler(s): Kaleb Brumbaugh, Travis Cassella, Ash Willis

Laboratory Name/Address:
Maxxam Analytics, Inc.
6740 Campobello Rd.
Mississauga, Ontario
L5N2L8

Laboratory Shipping Address:
Maxxam Analytics
c/o FedEx Depot
299 Cayuga Rd.
Cheektowaga, NY 14225
Please indicate "HOLD FOR PICKUP"

Contact: Melissa DiGrazia
Phone: (905) 817-5700, ext. 5784
email: MDiGrazia@maxxam.ca

Sample Types:
N = Normal
FD = Field Duplicate
AB = Ambient Blank or Field Reagent Blank
EB = Equipment Rinsate

Matrix:
WG = Groundwater
SO = Soil
WP = Potable Water
SE = Sediment
WS = Surface Water
WQ = Field QC (AB, EB)

MAXXAM use only	Sample ID	Date Collected	Time Collected	Sample Type	Matrix	PFAS (see list of 15 analytes below)	NOTES
	FEWRN01-001-SO-018	9/1/17	1525	N	SO	2	parent + MS/MSD
	FEWRN01-002-SS-001	9/1/17	1550	N	SO	1	[illegible]
	FEWRN01-002-SO-018	9/1/17	1715	N	SO	1	
	FEWRN01-001-SS-001	9/1/17	1252	N	SO	2	Parent & MSD
	FEWRN03-001-GW-020	9/1/17	1735	N	WG	2	
	FEWRN01-003-SS-001	9/2/17	0759	N	SO	1	
	FEWRN01-003-SS-901	9/2/17	0759	FD	SO	1	
	FEWRN01-003-SO-016	9/2/17	1010	N	SO	1	
	FEWRN01-003-SO-916	9/2/17	1010	FD	SO	1	
	FEWRN-RS-006	9/2/17	1315	EB	WQ	2	associated with FEWRN02-003-GW-030 taken through PE tubing
	FEWRN02-003-GW-030	9/2/17	1415	N	WG	2	
	FEWRN02-002-GW-033	9/2/17	1600	N	WG	2	
	FEWRN02-004-GW-024	9/2/17	1740	N	WG	2	
	FEWRN-IDW-WS	9/5/17	0850	N	SO	1	
	FEWRN-IDW-WW	9/5/17	0900	N	WG	2	
					Total # of Containers	23	

International Solid Sample
Heat Treat Required

RELINQUISHED BY
Signature: | Date/Time: 9-5-17 1900
Printed Name: Ash Willis | Firm: ASL
Signature: | Date/Time:
Printed Name: | Firm:

RECEIVED BY
Signature: Paramjeet | Date/Time: 2017/09/06 13:43
Printed Name: PARAMJEET SINGH | Firm: 3.4/3.3/3.4
Signature: | Date/Time: Custody seal present
Printed Name: | Firm:

Analyte List:

ANALYTE	ERPIMS PAR CODE	CAS	Contaminant	ERPIMS PAR CODE	CAS

AerostarSES AIR

1006 Floyd Culler Court
Oak Ridge, TN 37830
865-481-7837

Chain of Custody Record/ Analysis Request Number:

855352

136

Page 2 of 2

Project Name: Site Inspection of Aqueous Film Forming Foam Areas, Multiple Sites, United States Air Force Installations

Job No.: M2027.0003 (Omaha)

Installation: FE WARREN

Aerostar Project Manager: Brian Odom, BOdom@specproenv.com (478) 397-4906
Send Data to: Jenny Vance, jvance@aerostar.net (865) 483-7904

Sampler(s): Ash Willis, Travis Cassella, Jeremy Klein

Laboratory Name/Address:
Maxxam Analytics, Inc
6740 Campobello Rd.
Mississauga, Ontario
L5N2L8

Laboratory Shipping Address:
Maxxam Analytics
c/o FedEx Depot
299 Cayuga Rd.
Cheektowaga, NY 14225

Please indicate "HOLD FOR PICKUP"

Contact: Melissa DiGrazia

Phone: (905) 817-5700, ext. 5784
email: MDiGrazia@maxxam.ca

ANALYSIS

Sample Types:
N = Normal
FD = Field Duplicate
AB = Ambient Blank or Field Reagent Blank
EB = Equipment Rinsate

Matrix:
WG = Groundwater
SO = Soil
WP = Potable Water
SE = Sediment
WS = Surface Water
WQ = Field QC (AB, EB)

MAXXAM use only	Sample ID	Date Collected	Time Collected	Sample Type	Matrix	PFAS (see list of 18 analytes below)						NOTES
	FEWRN02-001-GW-025	9-4-17	1035	N	WG	2						
	FEWRN-RS-007	9-4-17	1205	EB	WQ	2						
	FEWRN01-003-GW-015	9-4-17	1345	N	WG	2						
	FEWRN01-003-GW-915	9-4-17	1345	N	WG	2						
	FEWRN01-001-GW-015	9-4-17	1620	N	WG	6						MS/MSD

Total # of Containers 14

RELINQUISHED BY:
Signature: Ash Willis Date/Time: 9-5-17 1900
Printed Name: Ash Willis Firm: ASL
Signature: Date/Time:
Printed Name: Firm:

RECEIVED BY:
Signature: Paramjeet Date/Time: 2017/09/06 13:43
Printed Name: PARAMJEET SINGH Firm: 3.4/3.3/3.4
Signature: Date/Time:
Printed Name: Firm:

Analyte List:

ANALYTE	ERPIMS PAR CODE	CAS	Compound	ERPIMS PAR CODE	CAS
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Maxxam

Prepared for: Aerostar SES LLC

Project: M2027.0003 (OMAHA)
FE WARREN

Analytical Data Package

(Level IV)

Analysis: PFOS and PFOA in water and soil (Method 537 mod.)

Maxxam Job #: B7J1539

Maxxam Analytics International
6740 Campobello Rd.
Mississauga, Ontario, Canada
L5N 2L8
1-800-668-0639
www.maxxamanalytics.com

I hereby certify that to the best of my knowledge all analytical data presented in this report:

- Has been checked for completeness.
- Is accurate, legible and error free.
- Has been conducted in accordance with approved SOP's and that all deviations are clearly listed in the Case Narrative.
- This report has been generated in .pdf format.

Review Performed By:

Karolina Pawlowska

Project Manager Assistant

Maxxam

A Bureau Veritas Group Company

Digitally signed by Karolina Pankowska
Date: 2017.11.02 09:16:52 -04'00'

Maxxam Analytics International
6740 Campobello Rd.
Mississauga, Ontario, Canada
L5N 2L8
1-800-668-0639
www.maxxamanalytics.com

Glossary of Terms

- ***Detection Limit (DL)*** this can also be called ***Method Detection Limit (MDL***): The lowest concentration or amount of the target analyte that can be identified, measured, and reported with confidence that the analyte concentration is not a false positive value. (Clarification): The smallest analyte concentration that can be demonstrated to be different from zero or a blank concentration at the 99% level of confidence. At the DL, the false positive rate (Type I error) is 1%.

- ***Limit of Detection (LOD)***: An estimate of the minimum amount of a substance that an analytical process can reliably detect. An LOD is analyte- and matrix-specific and may be laboratory-dependent. (Clarification): The smallest amount or concentration of a substance that must be present in a sample in order to be detected at a high level of confidence (99%). At the LOD, the false negative rate (Type II error) is 1%.

- ***Limits of Quantitation (LOQ)*** this can also be called ***Reporting Detection Limit (RDL)***: The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. (Clarification): The lowest concentration that produces a quantitative result within specified limits of precision and bias. For DoD projects, the LOQ shall be set at or above the concentration of the lowest initial calibration standard.

- ***Acceptance Criteria*** are values used by the laboratory to determine that a process is in control.

- ***Accuracy*** is the degree of agreement of a measured value with the true or expected value.

- ***Calibration Standards*** are a set of solutions containing the analytes of interest at a specified concentration.

- ***Calibration Verification Standard*** consists of a calibration standard solution of intermediate concentration (mid-point initial calibration level) used to access whether the initial calibration is still valid

- ***Certified Reference Material*** is a stable homogenous material that is certified by repetitive analysis from a supplier who is certified to generate said materials.

- ***Internal Standard*** a deuterated or ^{13}C-labelled analyte that is added to a sample extract prior to instrumental analysis to compensate for injection variability.

- ***Isomer*** is a member of a group of compounds that differ from each other only in the locations of a specific number of common substituent atoms or groups of atoms on the parent compound.

- ***Method Blank*** is a laboratory control sample using reagents that are known to be free of contamination.

- ***Precision*** is the degree of agreement between the data generated from repetitive measurements under specific conditions.

- ***Quality Assurance*** is a system of activities whose purpose is to provide the producer or user of a product with the assurance that the product meets a defined standard of quality.

- ***Quality Control*** is the overall system of activities whose purpose is to control the quality of a product so that it meets the needs of the end user.

- ***RSD*** is the relative standard deviation.

- ***Blank Spike*** is a laboratory control sample that has been fortified with native analytes of interest.

- ***Window Defining Mixture*** is a solution containing only the earliest and latest eluting congeners within each homologous group of target analytes on a specified GC column.

- ***RPD*** or Relative Percent Difference. A measure used to compare duplicate sample analysis.

- ***EMPC/NDR –*** Peak detected does not meet ratio criteria and has resulted in a higher detection limit.

1.0 Project Narrative

Maxxam Analytics International
6740 Campobello Rd.
Mississauga, Ontario, Canada
L5N 2L8
1-800-668-0639
www.maxxamanalytics.com

Maxxam Job: B7J1539 – Soil Analysis

Sample Analysis

Soil extracts were initially pre-screened and estimated concentrations were obtained so that extracts could be appropriately diluted for analysis on QC batch 5157643 (2017/09/19). Due to high concentrations, dilutions were required for selected analytes in the following samples:

FBF441	*FEWRN03-004-SS-001*	*All analytes*
FBF443	*FEWRN03-003-SS-001*	*Perfluorooctanesulfonate (PFOS)*
FBF448	*FEWRN03-001-SS-001*	*Perfluorooctanesulfonate (PFOS)*
FBF451	*FEWRN02-004-SO-013*	*Perfluorooctanesulfonate (PFOS)*

Detection limits were adjusted accordingly.

Data was evaluated in accordance with acceptance criteria specified in DoD QSM 5.1.

Sin Chii Chia, B.Sc.
schia@maxxam.ca
Office 905 817 5700

Maxxam Job: B7J1539 – Water Analysis

Sample Analysis

Samples were initially pre-screened and estimated concentrations were obtained so that appropriate sample volumes could be extracted on QC batch 5152828 (2017/09/09). Due to high concentrations, the following samples were analyzed for selected analytes using reduced sample extraction volumes:

FBF455	*FEWRN01-005-SW-001*	*Perfluorohexanesulfonate (PFHxS)*
FBF456	*FEWRN01-005-SW-901*	*Perfluorohexanesulfonate (PFHxS)*
FBF459	*FEWRN01-MW071-GW-020*	*Perfluorohexanesulfonate (PFHxS)*
FBF460	*FEWRN01-MW-070-GW-020*	*All analytes*
FBF470	*FEWRN03-003-GW-020*	*Perfluorohexanesulfonate (PFHxS), Perfluorooctanesulfonate (PFOS)*
FBF471	*FEWRN03-003-GW-920*	*Perfluorohexanesulfonate (PFHxS), Perfluorooctanesulfonate (PFOS)*
FBF472	*FEWRN03-002-GW-020*	*Perfluorohexanesulfonate (PFHxS)*
FBF476	*FEWRN01-004-SW-001*	*Perfluorobutanoic acid (PFBA), 6:2 Fluorotelomersulfonate (6:2FTS)*

Detection limits were adjusted accordingly.

The extracted internal standard analytes $^{13}C_2$-Perfluorotetradecanoic acid ($^{13}C_2$-PFTeDA) and $^{13}C_2$-8:2 Fluorotelomersulfonate ($^{13}C_2$-8:2FTS) are used to quantify native Perfluorotridecanoic acid (PFTrDA) & Perfluorotetradecanoic acid (PFTeDA) and 8:2 Fluorotelomersulfonate (8:2FTS) respectively. The recovery observed for $^{13}C_2$-Perfluorotetradecanoic acid ($^{13}C_2$-PFTeDA) was below the defined lower control limit (LCL) for the following sample:

FBF476 *FEWRN01-004-SW-001*

In addition, the recoveries observed for $^{13}C_2$-8:2 Fluorotelomersulfonate ($^{13}C_2$-8:2FTS) were above the defined upper control limit (UCL) for the following samples:

FBF469 *FEWRN-SB-002*
FBF476 *FEWRN01-004-SW-001*

Samples were re-extracted and re-analyzed to confirm these extracted internal standard analyte recoveries on QC batch 5159252 (2017/09/25). Acceptable recovery was obtained for $^{13}C_2$-8:2 Fluorotelomersulfonate ($^{13}C_2$-8:2FTS) in sample FBF476 (*FEWRN01-004-SW-001*) on re-analysis.

Data was evaluated in accordance with acceptance criteria specified in DoD QSM 5.1.

Sin Chii Chia, B.Sc.
schia@maxxam.ca
Office 905 817 5700

PROJECT NARRATIVE

Maxxam Analytics
Client Project #: M2027.0003 (OMAHA)

Client: Aerostar SES LLC
Client Project: M2027.0003 (OMAHA)

I. SAMPLE RECEIPT/ANALYSIS

a) Sample Listing

Maxxam ID	Client Sample ID	Date Sampled	Date Received	Date Prepped	Date Run	Initial Calibration
PFOS and PFOA in soil by SPE/LCMS						
FBF441	FEWRN03-004-SS-001	2017/08/28	2017/09/02	2017/09/11	2017/09/19	2017/09/19
FBF443	FEWRN03-003-SS-001	2017/08/28	2017/09/02	2017/09/11	2017/09/19	2017/09/19
FBF444	FEWRN03-002-SS-001	2017/08/28	2017/09/02	2017/09/11	2017/09/19	2017/09/19
FBF445	FEWRN03-004-SO-008	2017/08/29	2017/09/02	2017/09/11	2017/09/19	2017/09/19
FBF447	FEWRN03-003-SO-008	2017/08/29	2017/09/02	2017/09/11	2017/09/19	2017/09/19
FBF448	FEWRN03-001-SS-001	2017/08/29	2017/09/02	2017/09/11	2017/09/19	2017/09/19
FBF449	FEWRN03-003-SO-908	2017/08/29	2017/09/02	2017/09/11	2017/09/19	2017/09/19
FBF450	FEWRN03-002-SO-007	2017/08/29	2017/09/02	2017/09/11	2017/09/19	2017/09/19
FBF451	FEWRN02-004-SO-013	2017/08/30	2017/09/02	2017/09/11	2017/09/19	2017/09/19
FBF453	FEWRN01-005-SD-001	2017/08/29	2017/09/02	2017/09/11	2017/09/19	2017/09/19
FBF454	FEWRN01-005-SD-901	2017/08/29	2017/09/02	2017/09/11	2017/09/19	2017/09/19
FBF457	FEWRN02-006-SD-001	2017/08/29	2017/09/02	2017/09/11	2017/09/19	2017/09/19
FBF461	FEWRN03-001-SO-008	2017/08/29	2017/09/02	2017/09/11	2017/09/19	2017/09/19
FBF464	FEWRN02-003-SO-031	2017/08/31	2017/09/02	2017/09/11	2017/09/19	2017/09/19
FBF466	FEWRN02-002-SO-031	2017/08/31	2017/09/02	2017/09/11	2017/09/19	2017/09/19
FBF468	FEWRN02-001-SO-028	2017/08/31	2017/09/02	2017/09/11	2017/09/19	2017/09/19
FBF473	FEWRN02-005-SS-001	2017/09/01	2017/09/02	2017/09/11	2017/09/19	2017/09/19
FBF475	FEWRN01-004-SD-001	2017/09/01	2017/09/02	2017/09/11	2017/09/19	2017/09/19
PFOS and PFOA in water by SPE/LCMS						
FBF440	FEWRN-RS-001	2017/08/28	2017/09/02	2017/09/07	2017/09/09	2017/09/09
FBF442	FEWRN-SB-001	2017/08/28	2017/09/02	2017/09/07	2017/09/09	2017/09/09
FBF446	FEWRN-RS-002	2017/08/29	2017/09/02	2017/09/07	2017/09/09	2017/09/09
FBF452	FEWRN-RS-003	2017/08/30	2017/09/02	2017/09/07	2017/09/09	2017/09/09
FBF455	FEWRN01-005-SW-001	2017/08/29	2017/09/02	2017/09/07	2017/09/09	2017/09/09
FBF456	FEWRN01-005-SW-901	2017/08/29	2017/09/02	2017/09/07	2017/09/09	2017/09/09
FBF458	FEWRN02-006-SW-001	2017/08/29	2017/09/02	2017/09/07	2017/09/09	2017/09/09
FBF459	FEWRN01-MW071-GW-020	2017/08/30	2017/09/02	2017/09/07	2017/09/09	2017/09/09
FBF460	FEWRN01-MW-070-GW-020	2017/08/30	2017/09/02	2017/09/07	2017/09/09	2017/09/09
FBF463	FEWRN-RS-004	2017/08/31	2017/09/02	2017/09/07	2017/09/09	2017/09/09
FBF469	FEWRN-SB-002	2017/08/31	2017/09/02	2017/09/07	2017/09/09	2017/09/09
FBF470	FEWRN03-003-GW-020	2017/08/31	2017/09/02	2017/09/07	2017/09/09	2017/09/09
FBF471	FEWRN03-003-GW-920	2017/08/31	2017/09/02	2017/09/07	2017/09/09	2017/09/09
FBF472	FEWRN03-002-GW-020	2017/08/31	2017/09/02	2017/09/07	2017/09/09	2017/09/09
FBF474	FEWRN-RS-005	2017/09/01	2017/09/02	2017/09/07	2017/09/09	2017/09/09
FBF476	FEWRN01-004-SW-001	2017/09/01	2017/09/02	2017/09/07	2017/09/09	2017/09/09

Run Date is defined as the date of injection of the last calibration standard (12 hours or less) prior to the samples analyzed within that run sequence. Therefore the time of calibration injection that defines the run date is always within 12 hours of the time of sample injection.

b) Shipping Problems: none encountered

c) Documentation Problems: Level IV revised to reflect sample ID correction as per client request.

II. SAMPLE PREP:

No problems encountered

III. SAMPLE ANALYSIS:

See also comments within the appropriate Certificate of Analysis

a) Hold Times: all within recommended hold times

b) Instrument Calibration: all within control limits

c) Quality Control: All applicable QC meets control criteria, except where otherwise noted.

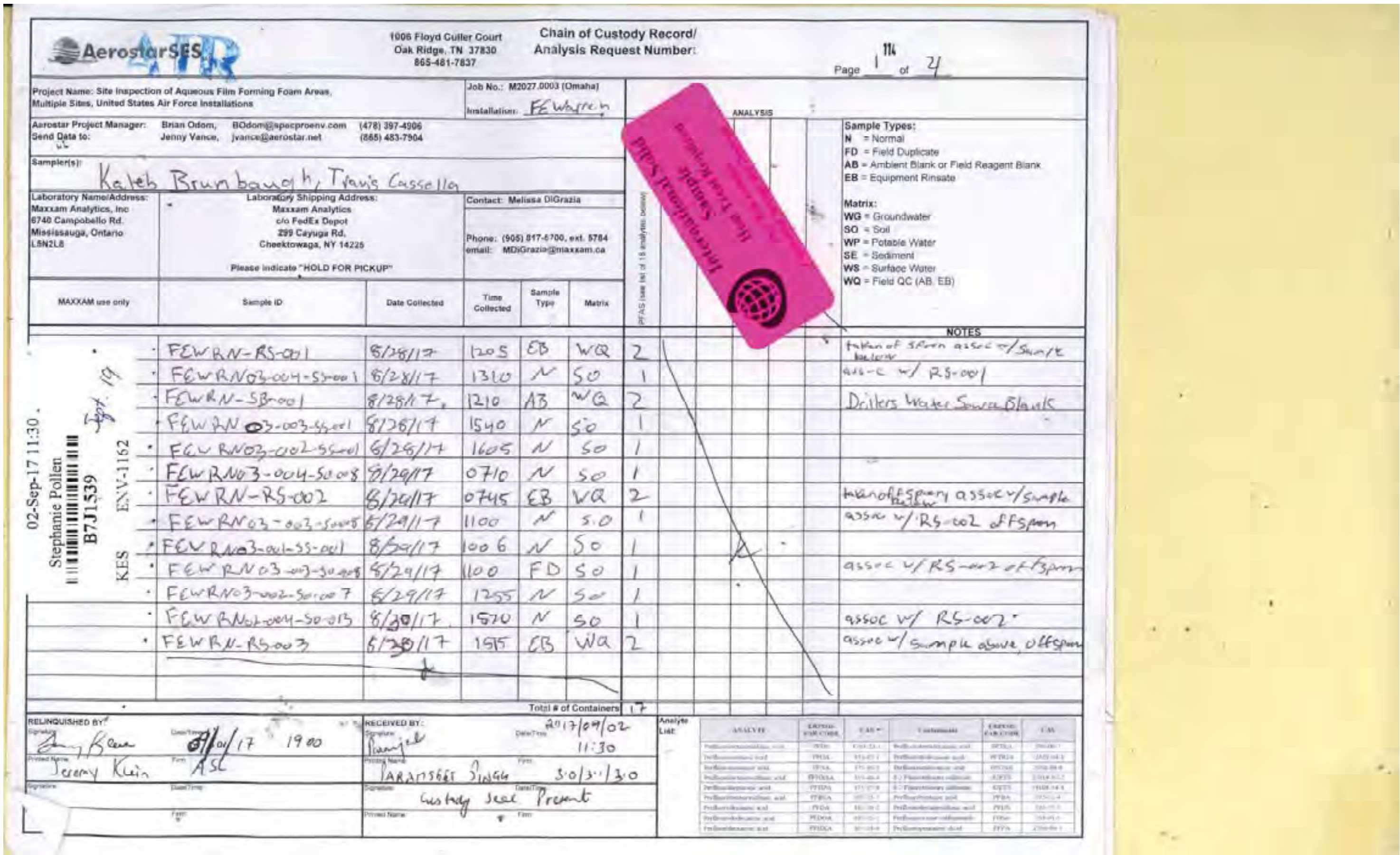
d) All analytes requiring manual intergration(s) are noted on the sample chromatograms

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for other than the conditions detailed above.

In addition, I certify, that to the best of my knowledge and belief, the data as reported are true and accurate. Release of the data contained in this data package has been authorized by the cognizant laboratory official or his/her designee, as verified by this signature.

Karolina Pawlowska
Project Manager Assistant- Site Assessment
and Remediation/Ultra Trace

2017/11/01
Date



AerostarSES

1006 Floyd Culler Court
Oak Ridge, TN 37830
865-481-7837

Chain of Custody Record/
Analysis Request Number:

Page 1 of 4
114

Project Name: Site Inspection of Aqueous Film Forming Foam Areas, Multiple Sites, United States Air Force Installations

Job No.: M2027.0003 (Omaha)

Installation: FE Warren

Aerostar Project Manager: Brian Odom, BOdom@specproenv.com (478) 397-4906
Send Data to: Jenny Vance, jvance@aerostar.net (865) 483-7904

Sampler(s): Kaleb Brumbaugh, Travis Cassella

Laboratory Name/Address:
Maxxam Analytics, Inc
6740 Campobello Rd.
Mississauga, Ontario
L5N2L8

Laboratory Shipping Address:
Maxxam Analytics
c/o FedEx Depot
299 Cayuga Rd.
Cheektowaga, NY 14225
Please indicate "HOLD FOR PICKUP"

Contact: Melissa DiGrazia
Phone: (905) 817-5700, ext. 5784
email: MDiGrazia@maxxam.ca

ANALYSIS

International Sample

Sample Types:
N = Normal
FD = Field Duplicate
AB = Ambient Blank or Field Reagent Blank
EB = Equipment Rinsate

Matrix:
WG = Groundwater
SO = Soil
WP = Potable Water
SE = Sediment
WS = Surface Water
WQ = Field QC (AB, EB)

02-Sep-17 11:30
Stephanie Pollen
B7J1539
ENV-1162
KES
Sept. 19

MAXXAM use only	Sample ID	Date Collected	Time Collected	Sample Type	Matrix	PFAS (see list of 18 analytes below)						NOTES
	FEWRN-RS-001	8/28/17	1205	EB	WQ	2						taken of spoon assoc w/ sample below
	FEWRN03-004-SS-001	8/28/17	1310	N	SO	1						assoc w/ RS-001
	FEWRN-SB-001	8/28/17	1210	AB	WQ	2						Drillers Water Source Blank
	FEWRN03-003-SS-001	8/28/17	1540	N	SO	1						
	FEWRN03-002-SS-001	8/28/17	1605	N	SO	1						
	FEWRN03-004-SO-008	8/29/17	0710	N	SO	1						
	FEWRN-RS-002	8/29/17	0745	EB	WQ	2						taken off spoon assoc w/ sample below
	FEWRN03-003-SO-008	8/29/17	1100	N	S.O	1						assoc w/ RS-002 off spoon
	FEWRN03-001-SS-001	8/29/17	1006	N	SO	1						
	FEWRN03-003-SO-108	8/29/17	1100	FD	SO	1						assoc w/ RS-002 off spoon
	FEWRN03-002-SO-007	8/29/17	1255	N	SO	1						
	FEWRN02-004-SO-013	8/30/17	1570	N	SO	1						assoc w/ RS-002
	FEWRN-RS-003	8/30/17	1515	EB	WQ	2						assoc w/ sample above, off spoon
					Total # of Containers	17						

RELINQUISHED BY:
Signature:
Date/Time: 9/01/17 1900
Printed Name: Jeremy Klein
Firm: ASL
Signature:
Date/Time:
Printed Name:
Firm:

RECEIVED BY:
Signature: Paramjeet
Date/Time: 2017/09/02 11:30
Printed Name: PARAMJEET SINGH
Firm: 3.0/3.1/3.0
Signature: Custody Seal Present
Date/Time:
Printed Name:
Firm:

Analyte List:

AerostarSES LLC

1006 Floyd Culler Court
Oak Ridge, TN 37830
865-481-7837

Chain of Custody Record/ Analysis Request Number:

Page 2 of 21 133

Project Name: Site Inspection of Aqueous Film Forming Foam Areas, Multiple Sites, United States Air Force Installations

Job No.: M2027.0003 (Omaha)

Installation: FE Warren

Aerostar Project Manager: Send Data to: Brian Odom, BOdom@specproenv.com (478) 397-4906
Jenny Vance, jvance@aerostar.net (865) 483-7904

Sampler(s): Ash Willis, Travis Cassella

Laboratory Name/Address:
Maxxam Analytics, Inc
6740 Campobello Rd.
Mississauga, Ontario
L5N2L8

Laboratory Shipping Address:
Maxxam Analytics
c/o FedEx Depot
299 Cayuga Rd.
Cheektowaga, NY 14225

Please indicate "HOLD FOR PICKUP"

Contact: Melissa DiGrazia

Phone: (905) 817-5700, ext. 5784
email: MDiGrazia@maxxam.ca

ANALYSIS

Sample Types:
N = Normal
FD = Field Duplicate
AB = Ambient Blank or Field Reagent Blank
EB = Equipment Rinsate

Matrix:
WG = Groundwater
SO = Soil
WP = Potable Water
SE = Sediment
WS = Surface Water
WQ = Field QC (AB, EB)

MAXXAM use only	Sample ID	Date Collected	Time Collected	Sample Type	Matrix	PFAS (see list of 18 analytes below)						NOTES
	FEWRN01-005-SD-001	8/29/2017	1100	N	SE	1x						
	FEWRN01-005-SD-901		1100	FD	SE	1x						
	FEWRN01-005-SW-001		1100	N	WS	2x						
	FEWRN01-005-SW-901		1100	FD	WS	2x						
	FEWRN02-006-SD-001	8/29/17	1235	N	SE	3						MS/MSD
	FEWRN02-006-SW-001	8/29/17	1235	N	WS	6						MS/MSD
	~~FEWRN01-MW071-020~~	~~8/30/17~~	~~1145~~	~~N~~		~~2~~						
	FEWRN01-MW071-GW-020	8/30/17	1145	N	WG	2						
	FEWRN01-MW-070-GW-020	8/30/17	1445	N	WG	2						
	FEWRN03-001-SO-008	8/29/17	1730	N	SO	1						

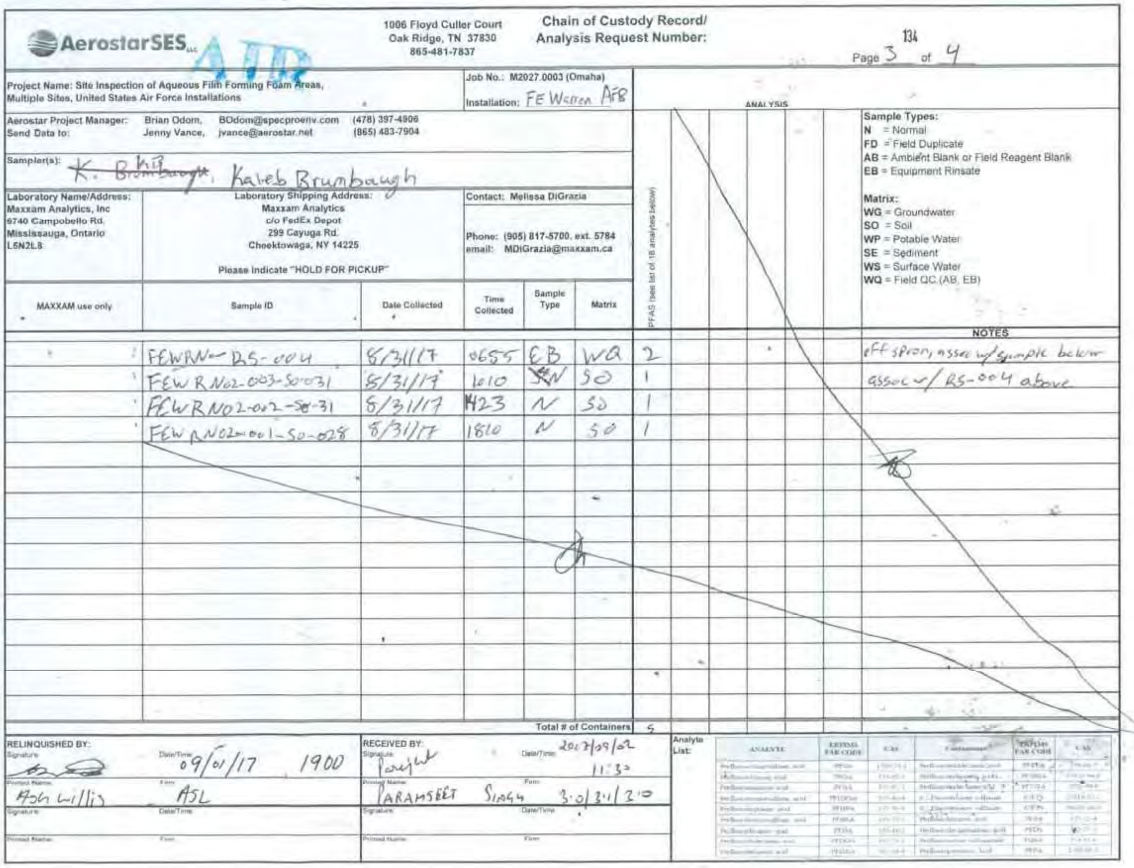
Total # of Containers 20

RELINQUISHED BY:
Signature: Jeremy Klein Date/Time: 09/01/17 1700
Printed Name: Jeremy Klein Firm: ASL
Signature: Date/Time:
Printed Name: Firm:

RECEIVED BY:
Signature: Paramjeet Date/Time: 2017/09/02 11:30
Printed Name: PARAMJEET SINGH Firm: 3.0/3.1/3.0
Signature: Date/Time:
Printed Name: Firm:

Analyte List:

ANALYTE	ERPIMS FAR CODE	CAS	Compound	ERPIMS FAR CODE	CAS
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]



AerostarSES ATR

1006 Floyd Culler Court
Oak Ridge, TN 37830
865-481-7837

Chain of Custody Record/ Analysis Request Number: 134

Page 3 of 4

Project Name: Site Inspection of Aqueous Film Forming Foam Areas, Multiple Sites, United States Air Force Installations

Job No.: M2027.0003 (Omaha)

Installation: FE Warren AFB

Aerostar Project Manager: Brian Odom, BOdom@specproenv.com (478) 397-4906
Send Data to: Jenny Vance, jvance@aerostar.net (865) 483-7904

Sampler(s): ~~K. Brumbaugh~~ KB, Kaleb Brumbaugh

Laboratory Name/Address:
Maxxam Analytics, Inc
6740 Campobello Rd.
Mississauga, Ontario
L5N2L8

Laboratory Shipping Address:
Maxxam Analytics
c/o FedEx Depot
299 Cayuga Rd.
Cheektowaga, NY 14225

Please Indicate "HOLD FOR PICKUP"

Contact: Melissa DiGrazia

Phone: (905) 817-5700, ext. 5784
email: MDiGrazia@maxxam.ca

ANALYSIS

Sample Types:
N = Normal
FD = Field Duplicate
AB = Ambient Blank or Field Reagent Blank
EB = Equipment Rinsate

Matrix:
WG = Groundwater
SO = Soil
WP = Potable Water
SE = Sediment
WS = Surface Water
WQ = Field QC (AB, EB)

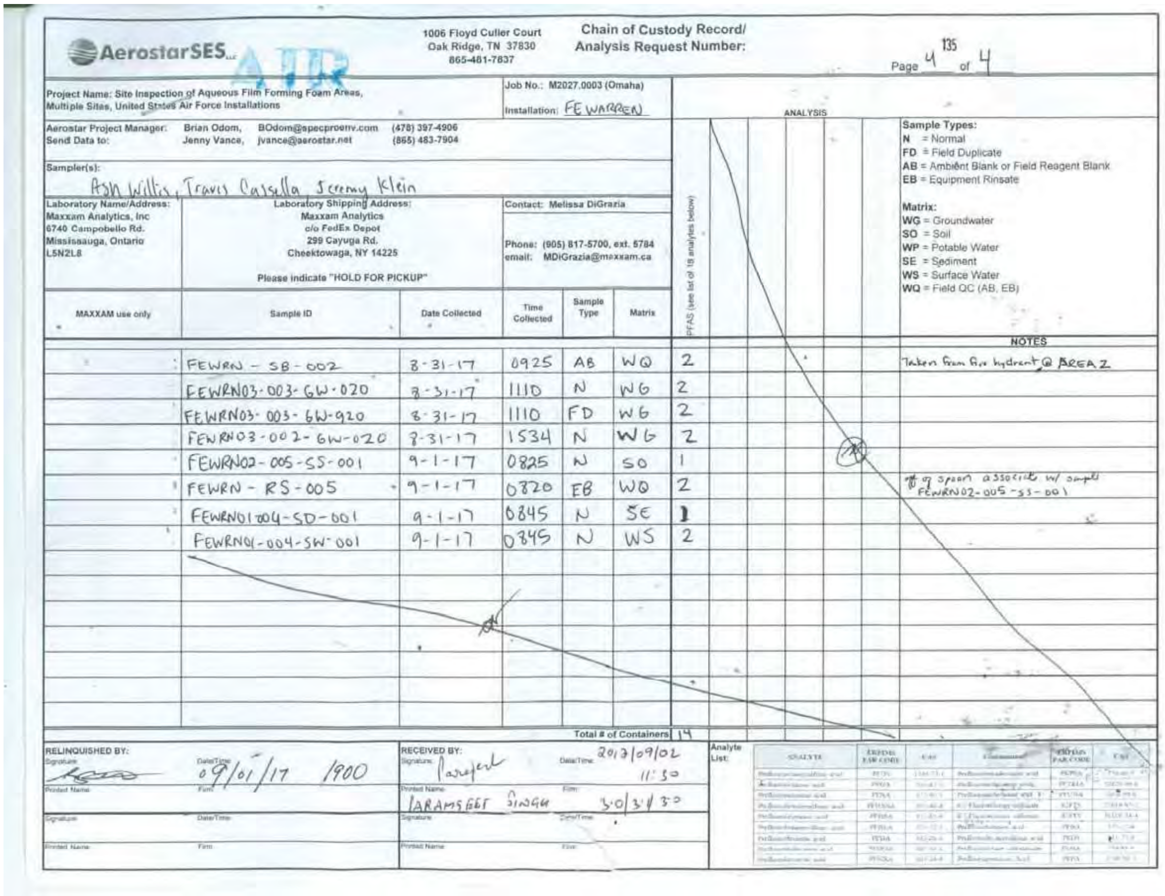
MAXXAM use only	Sample ID	Date Collected	Time Collected	Sample Type	Matrix	PFAS (see list of 18 analytes below)						NOTES
	FEWRN-RS-004	8/31/17	0655	EB	WQ	2						eff spray, assoc w/ sample below
	FEWRN02-003-SO-031	8/31/17	1010	N	SO	1						assoc w/ RS-004 above
	FEWRN02-002-SO-31	8/31/17	1423	N	SO	1						
	FEWRN02-001-SO-028	8/31/17	1810	N	SO	1						

Total # of Containers: 5

RELINQUISHED BY:
Signature: Date/Time: 09/01/17 1900
Printed Name: Ash Willis Firm: ASL
Signature: Date/Time:
Printed Name: Firm:

RECEIVED BY:
Signature: Paramjeet Date/Time: 2017/09/02 11:30
Printed Name: PARAMJEET SINGH Firm: 3.0/3.1/2.0
Signature: Date/Time:
Printed Name: Firm:

Analyte List:



AerostarSES

1006 Floyd Culler Court
Oak Ridge, TN 37830
865-481-7837

Chain of Custody Record/ Analysis Request Number: 135

Page 4 of 4

Project Name: Site Inspection of Aqueous Film Forming Foam Areas, Multiple Sites, United States Air Force Installations

Job No.: M2027.0003 (Omaha)

Installation: FE WARREN

Aerostar Project Manager: Brian Odom, BOdom@specproenv.com (478) 397-4906
Send Data to: Jenny Vance, jvance@aerostar.net (865) 483-7904

Sampler(s): Ash Willis, Travis Cassella, Jeremy Klein

Laboratory Name/Address:
Maxxam Analytics, Inc
6740 Campobello Rd.
Mississauga, Ontario
L5N2L8

Laboratory Shipping Address:
Maxxam Analytics
c/o FedEx Depot
299 Cayuga Rd.
Cheektowaga, NY 14225

Please indicate "HOLD FOR PICKUP"

Contact: Melissa DiGrazia

Phone: (905) 817-5700, ext. 5784
email: MDiGrazia@maxxam.ca

ANALYSIS

Sample Types:
N = Normal
FD = Field Duplicate
AB = Ambient Blank or Field Reagent Blank
EB = Equipment Rinsate

Matrix:
WG = Groundwater
SO = Soil
WP = Potable Water
SE = Sediment
WS = Surface Water
WQ = Field QC (AB, EB)

MAXXAM use only	Sample ID	Date Collected	Time Collected	Sample Type	Matrix	PFAS (see list of 18 analytes below)						NOTES
	FEWRN - SB - 002	8-31-17	0925	AB	WQ	2						Taken from fire hydrant @ AREA Z
	FEWRN03-003-GW-020	8-31-17	1110	N	WG	2						
	FEWRN03-003-GW-920	8-31-17	1110	FD	WG	2						
	FEWRN03-002-GW-020	8-31-17	1534	N	WG	2						
	FEWRN02-005-SS-001	9-1-17	0825	N	SO	1						
	FEWRN - RS-005	9-1-17	0820	EB	WQ	2						EB of spoon associate w/ sample FEWRN02-005-SS-001
	FEWRN01-004-SD-001	9-1-17	0845	N	SE	1						
	FEWRN01-004-SW-001	9-1-17	0845	N	WS	2						

Total # of Containers: 14

RELINQUISHED BY:
Signature:
Date/Time: 09/01/17 1900
Printed Name:
Firm:

RECEIVED BY:
Signature: Paramjeet
Date/Time: 2017/09/02 11:30
Printed Name: PARAMJEET SINGH
Firm: 3.0/3.1/3.0

Signature:
Date/Time:
Printed Name:
Firm:

Signature:
Date/Time:
Printed Name:
Firm:

Analyte List:

Appendix D

Physiochemical Analytical Results

Table D-1 F.E. Warren Air Force Base Physiochemical Sample Analysis Results

AFFF Area	Sample ID	Medium	% Passing #4 Screen	% Passing #200 Screen	USCS Classification	TOC (mg/kg)	pH	% Solids
1	FEWRN01-006-SS-001	SS	90.5	30.2	SM	12,900	8.29	92.7
1	FEWRN01-006-SO-017	SO	93.8	53.1	ML	426	8.62	83.0
2	FEWRN02-007-SO-031	SO	98.9	49.2	SM	215	8.45	84.8
3	FEWRN03-005-SS-001	SS	73.2	18.7	SM	4,220	7.98	81.7
3	FEWRN03-005-SO-008	SO	98.9	51.0	ML	132 J	8.43	78.1

% = percent
# = number
mg/kg = milligrams per kilogram
AFFF = aqueous film forming foam
ID = identification
J = estimated value
ML = silt
pH = potential of hydrogen
SM = silty sand
SO = subsurface soil
SS = surface soil
TOC = total organic carbon
USCS = United Soil Classification System

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JENNY VANCE
AEROSTAR SES LLC
1006 FLOYD CULLER CIRCLE
OAK RIDGE, TN 37830

and

MELISSA DI GRAZIA
MAXXAM
6740 CAMPOBELLA RD
MISSISSAUGA, ON, CANADA L5N 2L8

PROJECT SITE: SI AFFF Sites, FE Warren AFB, WY

WORK ORDER/CONTRACT #: W9128F-15-D-0051

PROJECT #:	M2027.0003
SDG:	130380
PREPARED:	October 1, 2017 (REVISED 11-27-17)
DOCUMENT PAGES:	108

The data contained in the following report have been reviewed by the appropriate CT Laboratories LLC's staff members. In addition, CT Laboratories LLC certifies that to the best of our knowledge that the analyses reported herein are true, complete and correct within the limits of the methods employed and that they follow the applicable requirements as specified by the project plan, state-specific, NELAC or DOD QSM requirements. The estimated uncertainty of measurement is only available upon request. The reported results relate only to the tested samples. This report shall not be reproduced, except in full, without written approval of CT Laboratories LLC.

APPROVED BY: ______________________
LABORATORY DIRECTOR

APPROVED BY: ______________________
PROJECT MANAGER

Certifications: IL (NELAP 002413), KS (NELAP E-10368), KY (0023), WI (157066030), DOD ELAP (A2LA 3806.01), VA (7608), MD (344), LA (NELAP 115843), ISO17025 (A2LA 3806.01, GA EDP Stipulation (Accreditor: LA NELAP, ACC#: E971111, Scope: Non-potable water solid and chemical materials, biological tissue, Effective: 12/10/2014, Expires: annually), PA (68-04201) #008

CT Laboratories LLC • 1230 Lange Court • Baraboo, WI 53913 • 608-356-2760
www.ctlaboratories.com

Case Narrative

Client: MAXXAM/Aerostar SES LLC
Project: FE Warren AFB, WY
Sample Receipt Date(s): 9-01 through 09-06-2017
SDG #: 130380 (folder 130380 and 130445 partial) - revised 11-27-17 for sample description change

Five samples were analyzed for (GSA)/hydrometer, pH, and TOC. GSA/hydrometer analyses were sub-contracted to Mi-Tech, Weston, WI. The assigned sample ID numbers, date sampled, and date received are indicated in the attached Project Summary. The samples were received intact and at a temperature within method specified acceptance limits. Any exceptions are noted below. The analyses were performed, where applicable, following QSM 5.0 requirements.

Sample Analysis and Quality Control

Inorganics:

The samples were analyzed using US EPA Method 9045D (pH) and the Llyod-Kahn method (total organic carbon, TOC). All samples were analyzed within the holding time. The following summaries of quality control procedures are included:

Initial and Continuing Calibration Verification
Blanks Summary
ICP Interference Check Data
Spike Sample Recovery
Duplicates Data
Laboratory Control Sample Data
Analysis Run Log

All analysis results met the method specified quality control criteria with the following exceptions:

pH (9045D) Solid Analyses

Analytical Run # 141851

All analysis results for this analytical run met the method/project specified quality control criteria.

TOC (Lloyd-Kahn) Solid Analyses

Analytical Run # 142064

All analysis results for this analytical run met the method/project specified quality control criteria.

Data Qualifiers

Code	Description
A	Analyte averaged calibration criteria within acceptable limits.
B	Analyte detected in associated Method Blank.
C	Toxicity present in BOD sample.
D	Diluted Out.
E	Safe, No Total Coliform detected.
F	Unsafe, Total Coliform detected, no E. Coli detected.
G	Unsafe, Total Coliform detected and E. Coli detected.
H	Holding time exceeded.
J	Estimated value.
L	Significant peaks were detected outside the chromatographic window.
M	Matrix spike and/or Matrix Spike Duplicate recovery outside acceptance limits.
N	Insufficient BOD oxygen depletion.
O	Complete BOD oxygen depletion.
P	Concentration of analyte differs more than 40% between primary and confirmation analysis.
Q	Laboratory Control Sample outside acceptance limits.
R	See Narrative at end of report.
S	Surrogate standard recovery outside acceptance limits due to apparent matrix effects.
T	Sample received with improper preservation or temperature.
U	Analyte concentration was not above the detection level.
V	Raised Quantitation or Reporting Limit due to limited sample amount or dilution for matrix background interference.
W	Sample amount received was below program minimum.
X	Analyte exceeded calibration range.
Y	Replicate/Duplicate precision outside acceptance limits.
Z	Calibration criteria exceeded.

MANUAL INTEGRATION REASON CODES

CTLaboratories has identified four general cases with valid reasons supporting the use of manual integration techniques. These codes are used on chromatograms in this data package to document the reasons for manual integrations per CTLaboratories' SOP SS-10 current revision.

#1: **Data system failed to select the correct peak or missed the peak entirely.**
In some cases the chromatography system selects and integrates the "wrong peak". In this case the analyst must correct the selection and force the system to integrate the proper peak. In other instances the system may miss the peak completely. In this case the analyst manually integrated the peak

#2: **Data System Splits the Peak Incorrectly or Integrates a False Peak as a Rider Peak.**
This phenomenon is common at low concentrations where the signal to noise ratio is low. A single compound (peak) is incorrectly split into multiple peaks or integrated as a main peak with one or more rider peaks resulting in low or high area counts for the target compound.

#3: Improperly Integrated Isomers and/or coeluting compounds.
For when the system fails to distinguish coeluting compounds and or isomers. The integration areas and concentrations may be inaccurate, and they must be corrected by manual integration. Prime examples are compounds that are unresolved and integrated improperly when present at low concentrations in standards or samples.

#4: System Established Incorrect Baseline.
There are numerous situations in chromatography where the system establishes the baseline incorrectly. Some baseline errors will be obvious to the analyst and may be corrected via manual procedures.

#5: Miscellaneous.
Some situations involving integration errors may require in-depth review and technical judgment. These cases should be brought to the attention of the group supervisor. If the form of manual integration is not clearly covered by these four cases, then review and approval by the group supervisor or the *QA/QC* Supervisor will be required.

Sample Description

FEWRN01-006-SO-017

1

INORGANIC ANALYSIS DATA SHEET

Lab Name:	CT Laboratories	Contract:	MAXXAM ANALYTICS-AFFF SITE INVESTIGATION
Matrix (soil/water):	SOIL	SDG No.:	130380
% Solids:	83.0	Lab Sample ID:	915902
Analytical Method:	EPA 8000C	Date Received:	09/06/2017
Dilution Factor:	1.00	TCLP/SPLP Extraction Date/time:	
Analytical Run #:	141820	Analysis Date/Time	09/08/2017 08:20
Analytical Prep Batch #:		Prep. Date/Time:	
ICAL Calibration #:		Concentration Units:	%

CAS #	Analyte	Concentration	Qualifiers	DL	LOD	LOQ	RL
SOLID	Solids, Percent	83.0		0.1	0.1	0.1	0.1

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Sample Description

FEWRN01-006-SO-017

1

INORGANIC ANALYSIS DATA SHEET

Lab Name:	CT Laboratories	Contract:	MAXXAM ANALYTICS-AFFF SITE INVESTIGATION
Matrix (soil/water):	SOIL	SDG No.:	130380
% Solids:	83.0	Lab Sample ID:	915902
Analytical Method:	L-Kahn/9060A	Date Received:	09/06/2017
Dilution Factor:	1.00	TCLP/SPLP Extraction Date/time:	
Analytical Run #:	142064	Analysis Date/Time	09/15/2017 10:45
Analytical Prep Batch #:		Prep. Date/Time:	
ICAL Calibration #:	ICAL - TOC010	Concentration Units:	mg/kg

CAS #	Analyte	Concentration	Qualifiers	DL	LOD	LOQ	RL
TOC	Total Organic Carbon	426		43	90	180	180

Sample Description

FEWRN01-006-SO-017

1

INORGANIC ANALYSIS DATA SHEET

Lab Name:	CT Laboratories	Contract:	MAXXAM ANALYTICS-AFFF SITE INVESTIGATION
Matrix (soil/water):	SOIL	SDG No.:	130380
% Solids:	83.0	Lab Sample ID:	915902
Analytical Method:	EPA 9045D	Date Received:	09/06/2017
Dilution Factor:	1	TCLP/SPLP Extraction Date/time:	
Analytical Run #:	141851	Analysis Date/Time	09/08/2017 11:15
Analytical Prep Batch #:		Prep. Date/Time:	
ICAL Calibration #:		Concentration Units:	S.U.

CAS #	Analyte	Concentration	Qualifiers	DL	LOD	LOQ	RL
PH	pH	8.62		0.1	0.1	0.1	0.1

Sample Description

FEWRN01-006-SS-001

1

INORGANIC ANALYSIS DATA SHEET

Lab Name: CT Laboratories

Contract: MAXXAM ANALYTICS-AFFF SITE INVESTIGATION

Matrix (soil/water): SOIL

SDG No.: 130380

% Solids: 92.7

Lab Sample ID: 915894

Analytical Method: EPA 8000C

Date Received: 09/06/2017

Dilution Factor: 1.00

TCLP/SPLP Extraction Date/time:

Analytical Run #: 141820

Analysis Date/Time 09/08/2017 08:20

Analytical Prep Batch #:

Prep. Date/Time:

ICAL Calibration #:

Concentration Units: %

CAS #	Analyte	Concentration	Qualifiers	DL	LOD	LOQ	RL
SOLID	Solids, Percent	92.7		0.1	0.1	0.1	0.1

Sample Description

FEWRN01-006-SS-001

1

INORGANIC ANALYSIS DATA SHEET

Lab Name:	CT Laboratories	Contract:	MAXXAM ANALYTICS-AFFF SITE INVESTIGATION
Matrix (soil/water):	SOIL	SDG No.:	130380
% Solids:	92.7	Lab Sample ID:	915894
Analytical Method:	L-Kahn/9060A	Date Received:	09/06/2017
Dilution Factor:	1.00	TCLP/SPLP Extraction Date/time:	
Analytical Run #:	142064	Analysis Date/Time	09/15/2017 10:33
Analytical Prep Batch #:		Prep. Date/Time:	
ICAL Calibration #:	ICAL - TOC010	Concentration Units:	mg/kg

CAS #	Analyte	Concentration	Qualifiers	DL	LOD	LOQ	RL
TOC	Total Organic Carbon	12900		39	81	160	160

Sample Description

FEWRN01-006-SS-001

1

INORGANIC ANALYSIS DATA SHEET

Lab Name: CT Laboratories

Contract: MAXXAM ANALYTICS-AFFF SITE INVESTIGATION

Matrix (soil/water): SOIL

SDG No.: 130380

% Solids: 92.7

Lab Sample ID: 915894

Analytical Method: EPA 9045D

Date Received: 09/06/2017

Dilution Factor: 1

TCLP/SPLP Extraction Date/time:

Analytical Run #: 141851

Analysis Date/Time 09/08/2017 11:15

Analytical Prep Batch #:

Prep. Date/Time:

ICAL Calibration #:

Concentration Units: S.U.

CAS #	Analyte	Concentration	Qualifiers	DL	LOD	LOQ	RL
PH	pH	8.29		0.1	0.1	0.1	0.1

Sample Description

FEWRN03-005-SO-008

1

INORGANIC ANALYSIS DATA SHEET

Lab Name: CT Laboratories

Contract: MAXXAM ANALYTICS-SI AFFF SITES

Matrix (soil/water): SOIL

SDG No.: 130380

% Solids: 78.1

Lab Sample ID: 915130

Analytical Method: EPA 8000C

Date Received: 09/05/2017

Dilution Factor: 1.00

TCLP/SPLP Extraction Date/time:

Analytical Run #: 141774

Analysis Date/Time 09/08/2017 08:20

Analytical Prep Batch #:

Prep. Date/Time:

ICAL Calibration #:

Concentration Units: %

CAS #	Analyte	Concentration	Qualifiers	DL	LOD	LOQ	RL
SOLID	Solids, Percent	78.1		0.1	0.1	0.1	0.1

Sample Description

FEWRN03-005-SO-008

1

INORGANIC ANALYSIS DATA SHEET

Lab Name: CT Laboratories

Contract: MAXXAM ANALYTICS-SI AFFF SITES

Matrix (soil/water): SOIL

SDG No.: 130380

% Solids: 78.1

Lab Sample ID: 915130

Analytical Method: L-Kahn/9060A

Date Received: 09/05/2017

Dilution Factor: 1.00

TCLP/SPLP Extraction Date/time:

Analytical Run #: 142064

Analysis Date/Time 09/15/2017 09:56

Analytical Prep Batch #:

Prep. Date/Time:

ICAL Calibration #: ICAL - TOC010

Concentration Units: mg/kg

CAS #	Analyte	Concentration	Qualifiers	DL	LOD	LOQ	RL
TOC	Total Organic Carbon	132	J	46	96	190	190

Sample Description

FEWRN03-005-SO-008

1

INORGANIC ANALYSIS DATA SHEET

Lab Name: CT Laboratories

Contract: MAXXAM ANALYTICS-SI AFFF SITES

Matrix (soil/water): SOIL

SDG No.: 130380

% Solids: 78.1

Lab Sample ID: 915130

Analytical Method: EPA 9045D

Date Received: 09/05/2017

Dilution Factor: 1

TCLP/SPLP Extraction Date/time:

Analytical Run #: 141851

Analysis Date/Time 09/08/2017 11:15

Analytical Prep Batch #:

Prep. Date/Time:

ICAL Calibration #:

Concentration Units: S.U.

CAS #	**Analyte**	**Concentration**	**Qualifiers**	**DL**	**LOD**	**LOQ**	**RL**
PH	pH	8.43		0.1	0.1	0.1	0.1

Sample Description

FEWRN03-005-SS-001

1

INORGANIC ANALYSIS DATA SHEET

Lab Name: CT Laboratories

Contract: MAXXAM ANALYTICS-SI AFFF SITES

Matrix (soil/water): SOIL

SDG No.: 130380

% Solids: 81.7

Lab Sample ID: 915129

Analytical Method: EPA 8000C

Date Received: 09/05/2017

Dilution Factor: 1.00

TCLP/SPLP Extraction Date/time:

Analytical Run #: 141774

Analysis Date/Time 09/08/2017 08:20

Analytical Prep Batch #:

Prep. Date/Time:

ICAL Calibration #:

Concentration Units: %

CAS #	Analyte	Concentration	Qualifiers	DL	LOD	LOQ	RL
SOLID	Solids, Percent	81.7		0.1	0.1	0.1	0.1

Sample Description

FEWRN03-005-SS-001

1

INORGANIC ANALYSIS DATA SHEET

Lab Name: CT Laboratories

Contract: MAXXAM ANALYTICS-SI AFFF SITES

Matrix (soil/water): SOIL

SDG No.: 130380

% Solids: 81.7

Lab Sample ID: 915129

Analytical Method: L-Kahn/9060A

Date Received: 09/05/2017

Dilution Factor: 1.00

TCLP/SPLP Extraction Date/time:

Analytical Run #: 142064

Analysis Date/Time 09/15/2017 09:49

Analytical Prep Batch #:

Prep. Date/Time:

ICAL Calibration #: ICAL - TOC010

Concentration Units: mg/kg

CAS #	Analyte	Concentration	Qualifiers	DL	LOD	LOQ	RL
TOC	Total Organic Carbon	4220		44	92	180	180

Sample Description

FEWRN03-005-SS-001

1

INORGANIC ANALYSIS DATA SHEET

Lab Name: CT Laboratories

Contract: MAXXAM ANALYTICS-SI AFFF SITES

Matrix (soil/water): SOIL

SDG No.: 130380

% Solids: 81.7

Lab Sample ID: 915129

Analytical Method: EPA 9045D

Date Received: 09/05/2017

Dilution Factor: 1

TCLP/SPLP Extraction Date/time:

Analytical Run #: 141851

Analysis Date/Time 09/08/2017 11:15

Analytical Prep Batch #:

Prep. Date/Time:

ICAL Calibration #:

Concentration Units: S.U.

CAS #	**Analyte**	**Concentration**	**Qualifiers**	**DL**	**LOD**	**LOQ**	**RL**
PH	pH	7.98		0.1	0.1	0.1	0.1

Sample Description

FEWRN02-007-SO-031

1

INORGANIC ANALYSIS DATA SHEET

Lab Name: CT Laboratories

Contract: MAXXAM ANALYTICS-SI AFFF SITES

Matrix (soil/water): SOIL

SDG No.: 130380

% Solids: 84.8

Lab Sample ID: 915131

Analytical Method: EPA 8000C

Date Received: 09/05/2017

Dilution Factor: 1.00

TCLP/SPLP Extraction Date/time:

Analytical Run #: 141774

Analysis Date/Time 09/08/2017 08:20

Analytical Prep Batch #:

Prep. Date/Time:

ICAL Calibration #:

Concentration Units: %

CAS #	Analyte	Concentration	Qualifiers	DL	LOD	LOQ	RL
SOLID	Solids, Percent	84.8		0.1	0.1	0.1	0.1

Sample Description

FEWRN02-007-SO-031

1

INORGANIC ANALYSIS DATA SHEET

Lab Name: CT Laboratories

Contract: MAXXAM ANALYTICS-SI AFFF SITES

Matrix (soil/water): SOIL

SDG No.: 130380

% Solids: 84.8

Lab Sample ID: 915131

Analytical Method: L-Kahn/9060A

Date Received: 09/05/2017

Dilution Factor: 1.00

TCLP/SPLP Extraction Date/time:

Analytical Run #: 142064

Analysis Date/Time 09/15/2017 10:26

Analytical Prep Batch #:

Prep. Date/Time:

ICAL Calibration #: ICAL - TOC010

Concentration Units: mg/kg

CAS #	Analyte	Concentration	Qualifiers	DL	LOD	LOQ	RL
TOC	Total Organic Carbon	215		42	88	180	180

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Sample Description

FEWRN02-007-SO-031

1

INORGANIC ANALYSIS DATA SHEET

Lab Name: CT Laboratories

Contract: MAXXAM ANALYTICS-SI AFFF SITES

Matrix (soil/water): SOIL

SDG No.: 130380

% Solids: 84.8

Lab Sample ID: 915131

Analytical Method: EPA 9045D

Date Received: 09/05/2017

Dilution Factor: 1

TCLP/SPLP Extraction Date/time:

Analytical Run #: 141851

Analysis Date/Time 09/08/2017 11:15

Analytical Prep Batch #:

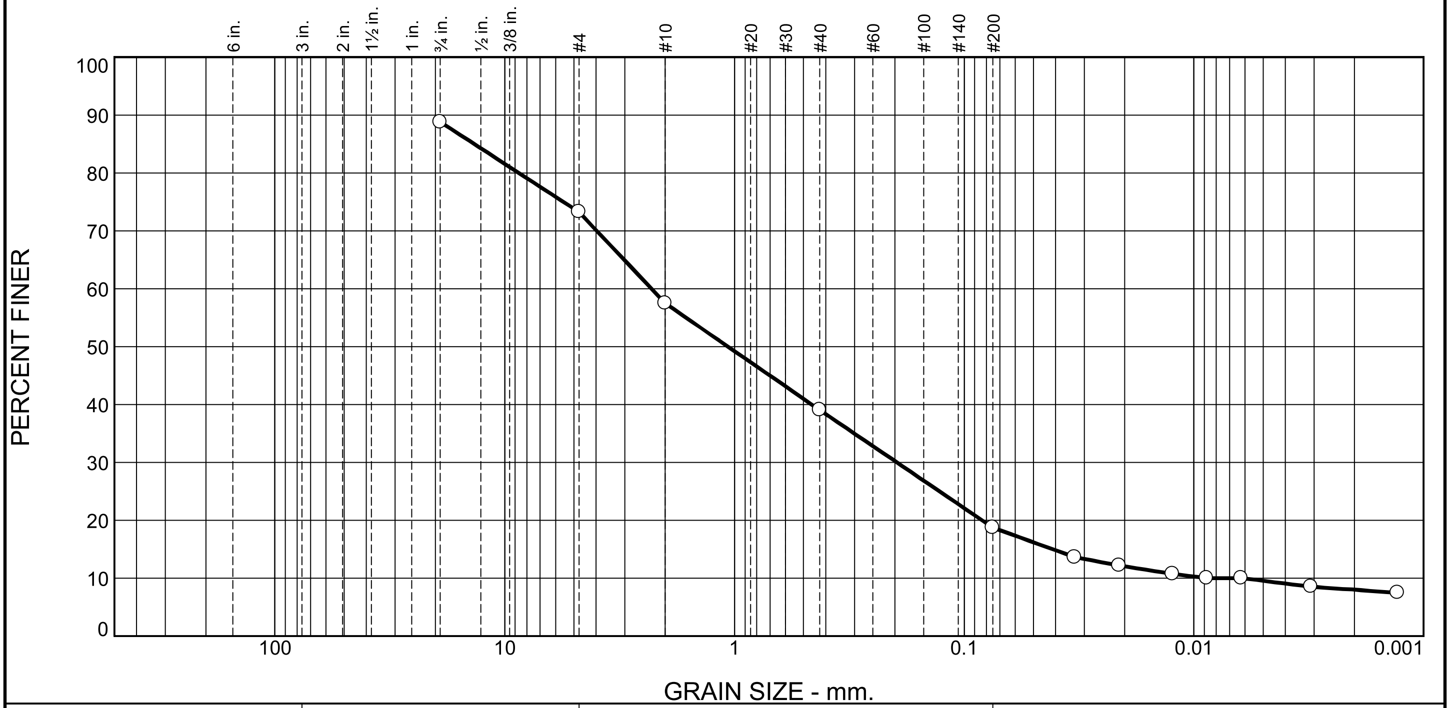
Prep. Date/Time:

ICAL Calibration #:

Concentration Units: S.U.

CAS #	Analyte	Concentration	Qualifiers	DL	LOD	LOQ	RL
PH	pH	8.45		0.1	0.1	0.1	0.1

Particle Size Distribution Report - Hydrometer Method



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
		15.6	15.7	18.5	20.3	9.1	9.6

Test Results (ASTM D 422-63 & ASTM D 2217)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
.75	88.8		
#4	73.2		
#10	57.5		
#40	39.0		
#200	18.7		
0.0330 mm.	13.6		
0.0211 mm.	12.2		
0.0124 mm.	10.7		
0.0088 mm.	10.0		
0.0062 mm.	10.0		
0.0031 mm.	8.5		
0.0013 mm.	7.5		

* (no specification provided)

Client Sample Description

FEWRNO3-005-SS-001

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}=	D_{85}= 13.5751	D_{60}= 2.2961
D_{50}= 1.0666	D_{30}= 0.1963	D_{15}= 0.0411
D_{10}= 0.0062	C_u= 371.48	C_c= 2.72

Remarks

Date Received: 9/6/17 **Date Tested:** 6/7/17

Tested By: NJW

Checked By: DB

Title: ENVIRO. ENGINEER

Sample Number: 915129

Date Sampled: 8/29/17

Mi-Tech Services, Inc.

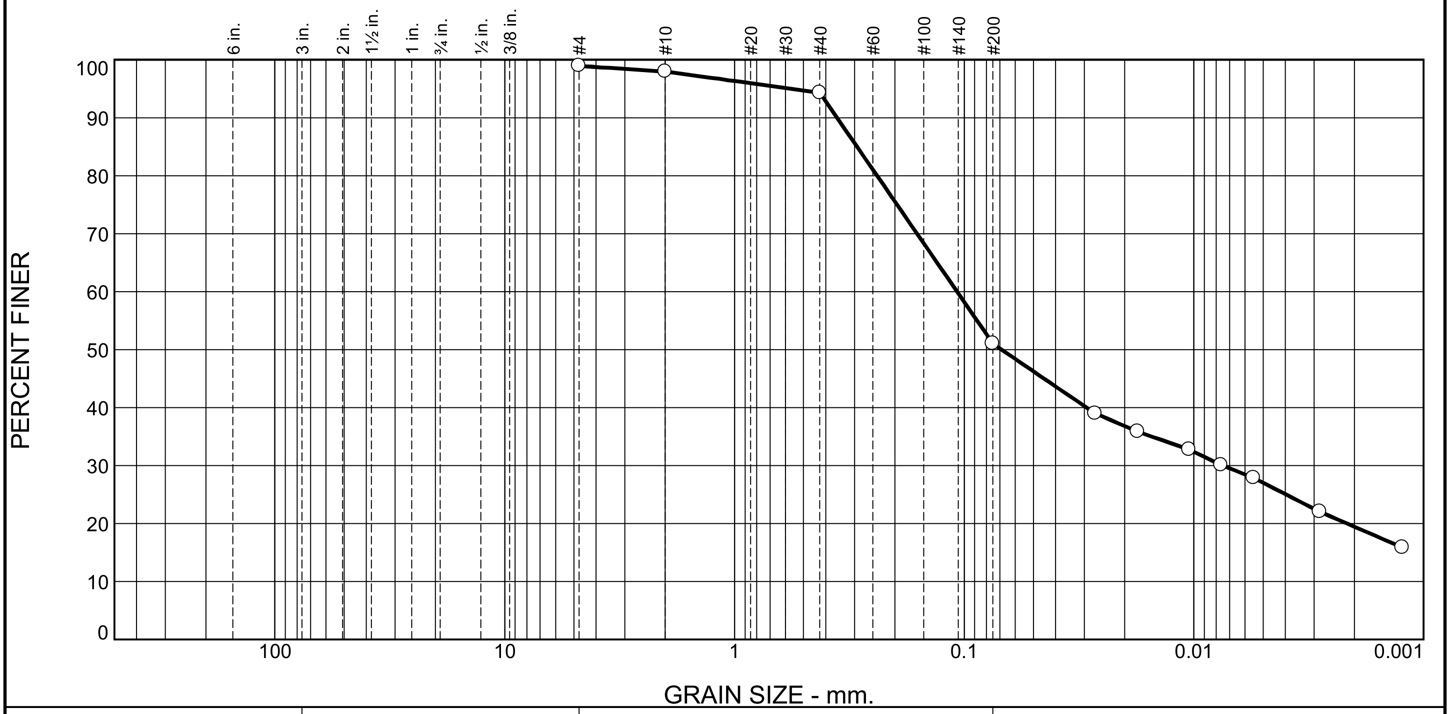
Weston, WI

Client: CT LABS

Project: FE WARREN AFB WY #130380 MITECH

Project No: 10743 **Figure** 1

Particle Size Distribution Report - Hydrometer Method



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
			0.9	3.7	43.3	24.0	27.0

Test Results (ASTM D 422-63 & ASTM D 2217)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	98.9		
#10	98.0		
#40	94.3		
#200	51.0		
0.0269 mm.	39.0		
0.0176 mm.	35.9		
0.0105 mm.	32.8		
0.0076 mm.	30.1		
0.0055 mm.	27.9		
0.0028 mm.	22.0		
0.0012 mm.	15.9		

* (no specification provided)

Client Sample Description

FEWRNO3-005-SO-008

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= ML **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 0.3576	D_{85}= 0.2927	D_{60}= 0.1075
D_{50}= 0.0687	D_{30}= 0.0075	D_{15}=
D_{10}=	C_u=	C_c=

Remarks

Date Received: 9/6/17 **Date Tested:** 9/7/17

Tested By: NJW

Checked By: DB

Title: ENVIRO. ENGINEER

Sample Number: 915130

Date Sampled: 8/29/17

Mi-Tech Services, Inc.

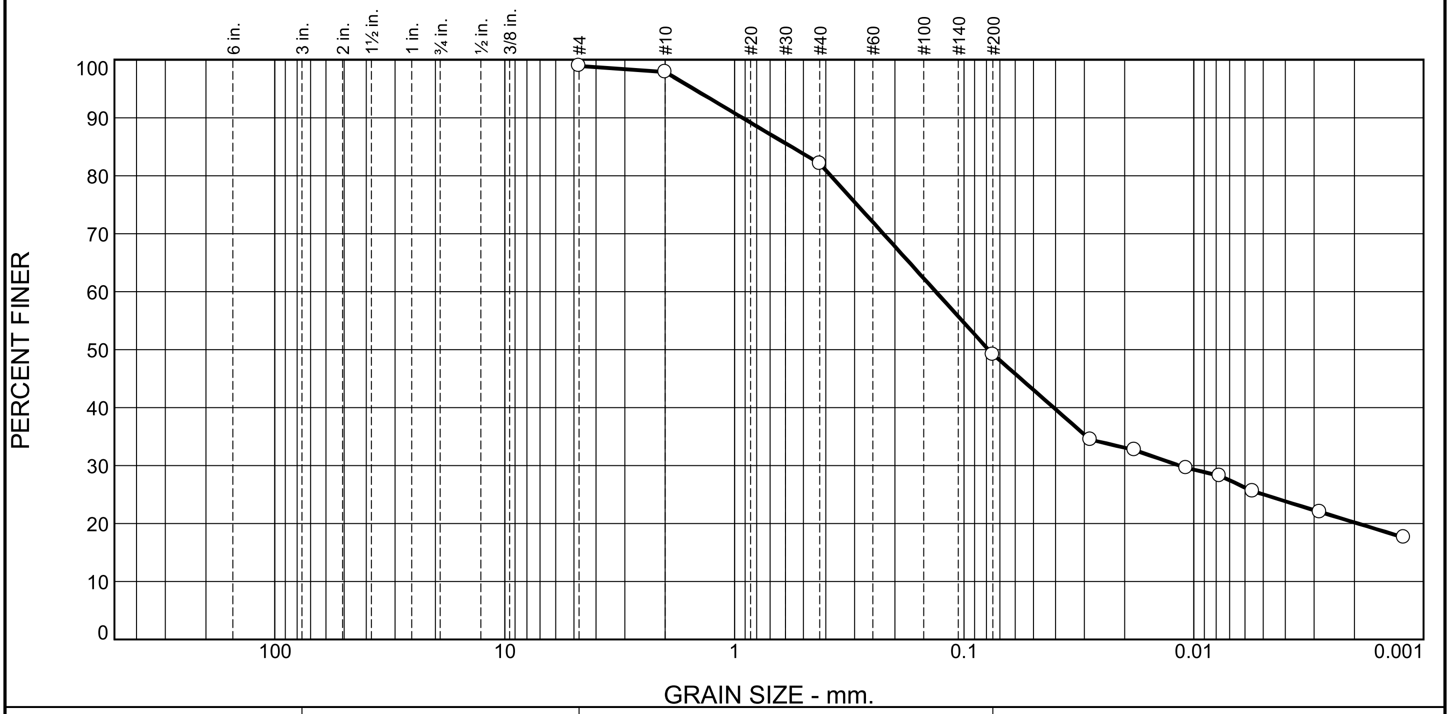
Weston, WI

Client: CT LABS

Project: FE WARREN AFB WY #130380 MITECH

Project No: 10743 **Figure** 2

Particle Size Distribution Report - Hydrometer Method



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
			1.0	15.8	32.9	24.2	25.0

Test Results (ASTM D 422-63 & ASTM D 2217)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	98.9		
#10	97.9		
#40	82.1		
#200	49.2		
0.0282 mm.	34.5		
0.0182 mm.	32.7		
0.0108 mm.	29.6		
0.0077 mm.	28.3		
0.0056 mm.	25.6		
0.0028 mm.	22.0		
0.0012 mm.	17.6		

* (no specification provided)

Client Sample Description

FEWRNO2-007-SO-031

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 0.9244 **D_{85}=** 0.5661 **D_{60}=** 0.1328
D_{50}= 0.0784 **D_{30}=** 0.0116 **D_{15}=**
D_{10}= **C_u=** **C_c=**

Remarks

Date Received: 9/6/17 **Date Tested:** 9/7/17
Tested By: NJW
Checked By: DB
Title: ENVIRO. ENGINEER

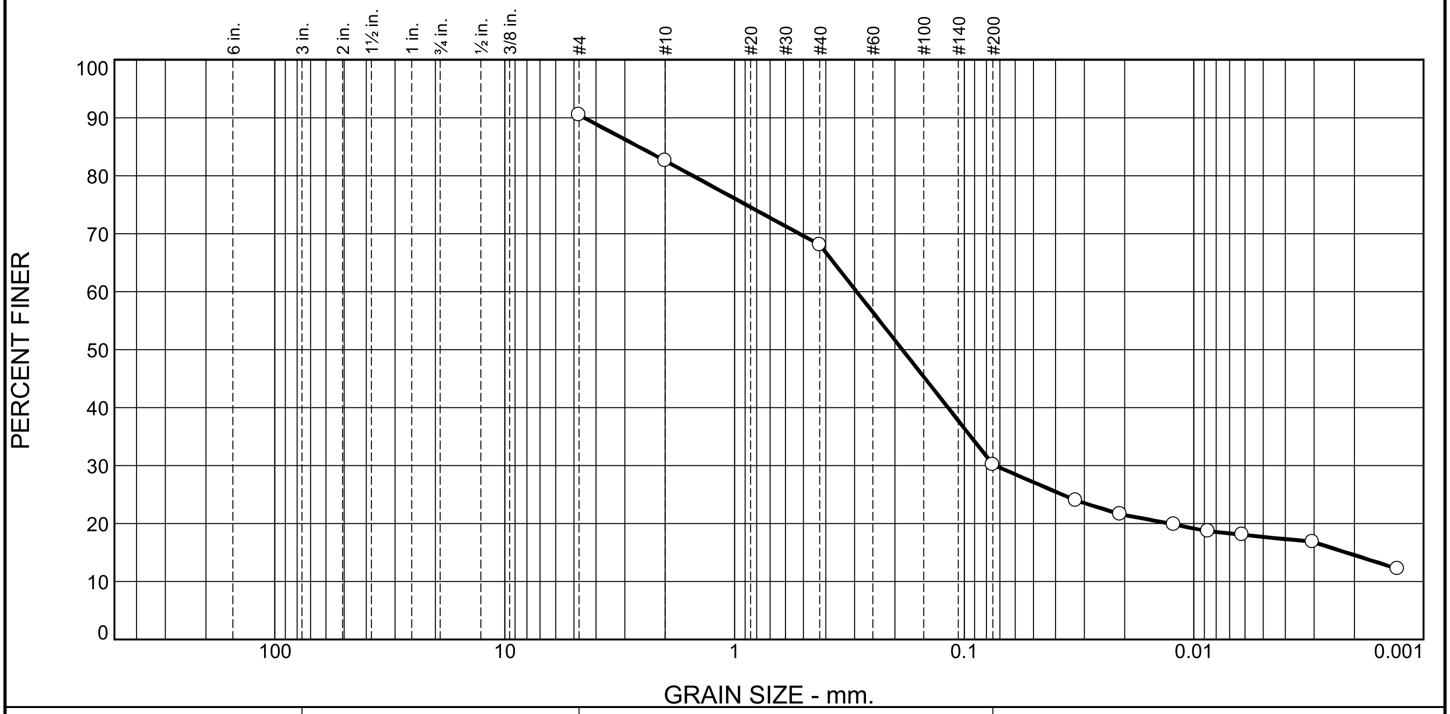
Sample Number: 915131 **Date Sampled:** 8/31/17

Mi-Tech Services, Inc.

Weston, WI

Client: CT LABS
Project: FE WARREN AFB WY #130380 MITECH
Project No: 10743 **Figure** 3

Particle Size Distribution Report - Hydrometer Method



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
			7.9	14.5	37.9	12.5	17.7

Test Results (ASTM D 422-63 & ASTM D 2217)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	90.5		
#10	82.6		
#40	68.1		
#200	30.2		
0.0327 mm.	24.0		
0.0209 mm.	21.6		
0.0122 mm.	19.8		
0.0087 mm.	18.7		
0.0062 mm.	18.1		
0.0030 mm.	16.8		
0.0013 mm.	12.2		

* (no specification provided)

Client Sample Description

FEWRN01-006-SS-001

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-2-4(0)

Coefficients

D_{90}= 4.5168 **D_{85}=** 2.6110 **D_{60}=** 0.2937
D_{50}= 0.1859 **D_{30}=** 0.0735 **D_{15}=** 0.0022
D_{10}= **C_u=** **C_c=**

Remarks

Date Received: 9/7/17 **Date Tested:** 9/8/17
Tested By: NJW
Checked By: DB
Title: ENVIRO. ENGINEER

Sample Number: 915894

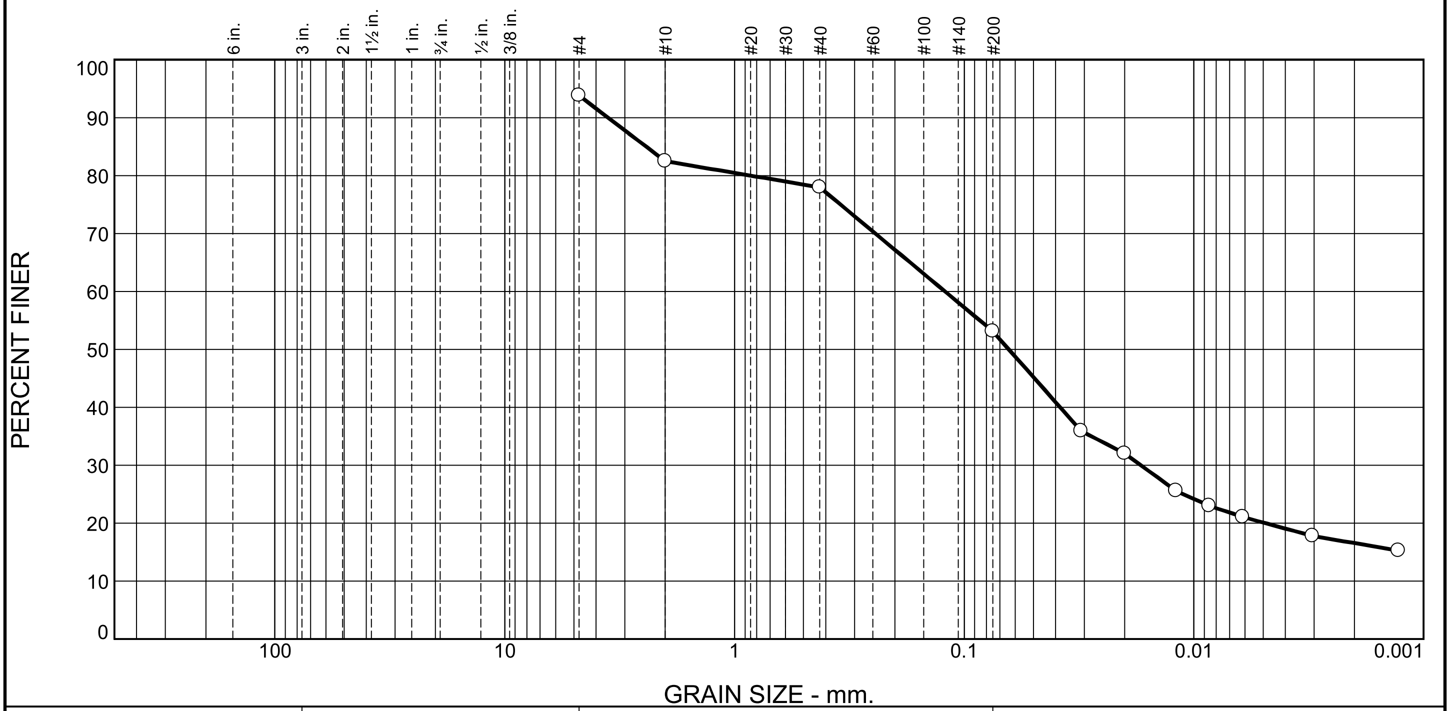
Date Sampled: 9/5/17

Mi-Tech Services, Inc.

Weston, WI

Client: CT Labs
Project: AFF SITE INVESTIGATION WY #130445 MITECH
Project No: 10743 **Figure** 1

Particle Size Distribution Report - Hydrometer Method



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
			11.3	4.5	24.9	33.0	20.1

Test Results (ASTM D 422-63 & ASTM D 2217)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	93.8		
#10	82.5		
#40	78.0		
#200	53.1		
0.0309 mm.	35.9		
0.0200 mm.	32.0		
0.0120 mm.	25.6		
0.0086 mm.	23.0		
0.0061 mm.	21.1		
0.0030 mm.	17.8		
0.0013 mm.	15.3		

* (no specification provided)

Client Sample Description

FEWRN01-006-SO-017

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= ML **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 3.5509 **D_{85}=** 2.4249 **D_{60}=** 0.1214
D_{50}= 0.0640 **D_{30}=** 0.0170 **D_{15}=**
D_{10}= **C_u=** **C_c=**

Remarks

Date Received: 9/7/17 **Date Tested:** 9/8/17
Tested By: NJW
Checked By: DB
Title: ENVIRO. ENGINEER

Sample Number: 915902

Date Sampled: 9/5/17

Mi-Tech Services, Inc.

Weston, WI

Client: CT Labs
Project: AFF SITE INVESTIGATION WY #130445 MITECH
Project No: 10743 **Figure** 2

Rev. 3/2015

CHAIN OF CUSTODY

Page 1 of 1

Company: Acrostar SES LLC
Project Contact: Brian Odom
Telephone: 478-397-4906
Project Name: SI of AFFF Areas, Multiple Sites
Project #: M2027.0003
Location: FE WARREN
Sampled By: Kaleb Brumbaugh

CT LABORATORIES

Folder #: 130380
Company: MAXXAM ANALYTICS
Project: FE WARREN
Logged By: BNA PM: BM

1230 Lange Court, Baraboo, WI 53913
608-356-2760 Fax 608-356-2766
www.ctlaboratories.com

ogram:
M RCRA SDWA NPDES
id Waste Other ________

M2027.0003

Report To: Jenny Vance
EMAIL: jvance@acrostar.net
Company: Acrostar SES LLC
Address: 1006 Floyd Culler Ct
Oak Ridge, TN 37830

Invoice To:* Brian Odom
EMAIL: bodom@specproenv.com
Company: Acrostar SES LLC
Address: 1006 Floyd Culler Ct
Oak Ridge, TN 37830

*Party listed is responsible for payment of invoice as per CT Laboratories' terms and conditions

Client Special Instructions

ANALYSES REQUESTED

Turnaround Time
Normal RUSH*
Date Needed: ________
Rush analysis requires prior CT Laboratories' approval
Surcharges:
24 hr 200%
2-3 days 100%
4-9 days 50%

Matrix:
GW – groundwater SW - surface water WW - wastewater DW - drinking water
S - soil/sediment SL - sludge A - air M - misc/waste

Collection Date	Collection Time	Matrix	Grab/ Comp	Sample #	Sample ID Description	Filtered? Y/N	~~T~~PH, TOC	Hydrometer	Grain Size	Total # Containers	Designated MS/MSD	CT Lab ID # *Lab use only*
08/29/17	1006	S	Comp	1	FEWRN03-005-SS-001	N	X	X	X			915129
08/29/17	1605	S	Comp	1	FEWRN03-005-SO-008	N	X	X	X			915130
~~07/31/17~~												
07/31/17	1423	S	Comp	1	FEWRN02-007-SO-031	N	X	X	X			915131

Fill in Spaces with Bottles per Test

Relinquished By:	Date/Time	Received By:	Date/Time
	9/01/17 1900		9/2/17 1105
Received by:	**Date/Time**	**Received for Laboratory by:**	**Date/Time**
			9-5-17 0844

Lab Use Only
Ice Present [✓ Yes] No
Temp 23 IR Gun 20
Cooler # Maxxam

Rev. 02/2017

CHAIN OF CUSTODY

Page 1 of 2

Company: Aerostar SES LLC
Project Contact: Brian Odom
Telephone: 478 397 4906
Project Name: ~~M2027.0003~~ K AFFF Site Investigation
Project #: M2027.0003
Location: FE Warren AFB
Sampled By: J. Barker

(T
1230 Lange Court, Baraboo, WI 53913
08-356-2760 Fax 608-356-2766
www.ctlaboratories.com

Folder #: 130445
Company: MAXXAM ANALYTI
Project: AFFF SITE INVESTIGATI
Logged By: BNA PM: ET

n:
RCRA SDWA NPDES
aste Other ________

Report To: Jenny Vance
EMAIL: Jvance @
Company: Aerostar SES LLC
Address: 1006 Floyd Culler Ct.
Oak Ridge, TN 37830
Invoice To:* Brian Odom
EMAIL: BOdom @specproenv.com
Company: Aerostar SES LLC
Address: 1006 Floyd Culler Ct.
Oak Ridge, TN 37830

*Party listed is responsible for payment of invoice as per CT Laboratories' terms and conditions

Client Special Instructions

Matrix:
GW – groundwater SW - surface water WW - wastewater DW - drinking water
S - soil/sediment SL - sludge A - air M - misc/waste

ANALYSES REQUESTED

Fill in Spaces with Bottles per Test

Collection Date	Collection Time	Matrix	Grab/ Comp	Sample #	Sample ID Description	Filtered? Y/N	pH, TOC, Hydrometer	Grain Size	Total # Containers	Designated MS/MSD	CT Lab ID # Lab use only
9/5/17	0830	S	comp	1	FEWRN01-006-SS-001	N	1	1	2		915894
9/5/17	0835	S	Comp	2	FEWRN01-006-SO-017	N	1	1	2		915902

Turnaround Time
Normal RUSH*
Date Needed: ________
Rush analysis requires prior CT Laboratories' approval
Surcharges:
24 hr 200%
2-3 days 100%
4-9 days 50%

Relinquished By: Ash Willis
Date/Time: 9-5-17 1900
Received By:
Date/Time: 9/6/17 1130
Received by:
Date/Time:
Received for Laboratory by:
Date/Time: 9-6-17 1318

Lab Use Only
Ice Present Yes No
Temp 13 IR Gun 18
Cooler # Maxxam x2

Rev. 02/2017

CHAIN OF CUSTODY

Page 2 of 2

Company: Aerostar SES LLC
Project Contact: Brian Odom
Telephone: 478 397 4906
Project Name: AFFF SI
Project #: M2027.0003
Location: FE Warren AFB
Sampled By: K. Brumbaugh

CT LABORATORIES
1230 Lange Court, Baraboo, WI 53913
608-356-2760 Fax 608-356-2766
www.ctlaboratories.com

Lab Use Only
Place Header Sticker Here:
136445

Program:
QSM RCRA SDWA NPDES
Solid Waste Other ________

PO #

Report To: ~~Brian~~ Jenny Vance
EMAIL: jvance@aerostar.net
Company: Aero Star SES LLC
Address: 1006 Floyd Culler Ct.
Oak Ridge, TN 37830
Invoice To:* Brian odom
EMAIL: BOdom@specproenv.com
Company: Aerostar SES LLC
Address: 1006 Floyd Culler Cr.
Oak Ridge, TN 37830

**Party listed is responsible for payment of invoice as per CT Laboratories' terms and conditions*

Client Special Instructions

Matrix:
GW – groundwater SW - surface water WW - wastewater DW - drinking water
S - soil/sediment SL - sludge A - air M - misc/waste

Turnaround Time
Normal RUSH*
Date Needed: ________
Rush analysis requires prior CT Laboratories' approval
Surcharges:
24 hr 200%
2-3 days 100%
4-9 days 50%

ANALYSES REQUESTED — Fill in Spaces with Bottles per Test

Collection Date	Collection Time	Matrix	Grab/ Comp	Sample #	Sample ID Description	Filtered? Y/N	SVOC, Pesticides, Herbicides	TPH-DRO, PCB	Metals	Cyanide	pH, Flashpoint	pH, Flashpoint, Cyanide	Sulfide	VOC 8260	VOC	TPH-GRO	Sulfide	Metals, SVOC, Pesticide, Herbicides	PCB, TPH-DRO/GRO			Total # Containers	Designated MS/MSD	CT Lab ID # *Lab use only*
9/5/17	0845	WW	Comp	1	FEWRN-IDW-WW	N	3	3	1	1	1				3	2	1					15		915903/915909
9/5/17	0845	S	Comp	2	FEWRN-IDW-WS	N						1	1	1				1	1			5		915910/915911

Relinquished By: willis
Date/Time: 9-5-17 1900
Received By:
Date/Time: 9/6/17 1130
Received by:
Date/Time:
Received for Laboratory by:
Date/Time: 9-6-17 1335

Lab Use Only
Ice Present [✓ Yes] No
Temp 1.3 IR Gun 15
Cooler #

Appendix E

Boring Logs and Field Forms

SES FIELD READINESS REVIEW FORM

EMPLOYEE NAME: ASH WILLIS

EMPLOYEE NUMBER: 130276

JOB NUMBER: M2027.0003

Job Location: FE Warren

READINESS REVIEW DATE: 08/14/17

JOB TASKS:

SURFACE SAMPLING

GROUNDWATER SAMPLING

SOIL SAMPLING – SURFACE SOIL AND SUBSURFACE SOIL

SOIL BORING LOGGING

SURFACE WATER AND SEDIMENT SAMPLING

MOBE/DEMOBE TASKS

EQUIPMENT NEEDED:

SOIL BORING: MUNSELL CHARTS, TAPE MEASURE, PENS, SOIL BORING FORMS, USCS TABLE,

GW SAMPLING: YSI, PERISTALTIC PUMP, MULTIRAE, SAMPLE CONTAINERS ETC.

SEDIMENT SAMPLING: SAMPLE CONTAINERS, SPOONS

SW SAMPLING: SAMPLE CONTAINERS, SW COLLECTION DEVICE

PROPER PPE FOR ALL ABOVE TASKS IS A MINIMUM LEVEL D, PLUS NITRILES.

DOCUMENTS NEEDED:

FIELD FORMS: BORING LOG, GW SAMPLING LOG, SAMPLE LOG, LOG BOOK, CALIBRATION SHEETS

SIGNIFICANT TRAINING CONDUCTED PRIOR TO DEPARTURE:

MINI-SONIC DRILLING. PERMANENT WELL INSTALLATION. UXO RECOGNITION AND ANOMALY AVOIDANCE.

FIELD QC REVIEW SHEET

EQUIPMENT PACKED FOR TRAVEL ON: 08-15-17

TRAVEL DATES: 08/27/17 THRU 09-08-17

SITE SUPERVISOR SIGNATURE

Site Supervisor Signature

SES FIELD READINESS REVIEW FORM

EMPLOYEE NAME: JEREMY KLEIN

EMPLOYEE NUMBER: 130286

JOB NUMBER: M2027.0003

Job Location: WPAFB

READINESS REVIEW DATE: 08/14/17

JOB TASKS:

SURFACE SAMPLING

GROUNDWATER SAMPLING

SOIL SAMPLING – SURFACE SOIL AND SUBSURFACE SOIL

SOIL BORING LOGGING

SURFACE WATER AND SEDIMENT SAMPLING

MOBE/DEMOBE TASKS

EQUIPMENT NEEDED:

SOIL BORING: MUNSELL CHARTS, TAPE MEASURE, PENS, SOIL BORING FORMS, USCS TABLE,

GW SAMPLING: YSI, PERISTALTIC PUMP, MULTIRAE, SAMPLE CONTAINERS ETC.

SEDIMENT SAMPLING: SAMPLE CONTAINERS, SPOONS

SW SAMPLING: SAMPLE CONTAINERS, SW COLLECTION DEVICE

PROPER PPE FOR ALL ABOVE TASKS IS A MINIMUM LEVEL D, PLUS NITRILES.

DOCUMENTS NEEDED:

FIELD FORMS: BORING LOG, GW SAMPLING LOG, SAMPLE LOG, LOG BOOK, CALIBRATION SHEETS

SIGNIFICANT TRAINING CONDUCTED PRIOR TO DEPARTURE:

MINI-SONIC DRILLING. PERMANENT WELL INSTALLATION. UXO RECOGNITION AND ANOMALY AVOIDANCE.

FIELD QC REVIEW SHEET

EQUIPMENT PACKED FOR TRAVEL ON: 08-15-17

TRAVEL DATES: 08/27/17 THRU 09-08-17

SITE SUPERVISOR SIGNATURE

Site Supervisor Signature

SES FIELD READINESS REVIEW FORM

EMPLOYEE NAME: KALEB BRUMBAUGH

EMPLOYEE NUMBER: 130333

JOB NUMBER: M2027.0003

Job Location: FE Warren

READINESS REVIEW DATE: 08/14/17

JOB TASKS:

SURFACE SAMPLING

GROUNDWATER SAMPLING

SOIL SAMPLING – SURFACE SOIL AND SUBSURFACE SOIL

SOIL BORING LOGGING

SURFACE WATER AND SEDIMENT SAMPLING

MOBE/DEMOBE TASKS

EQUIPMENT NEEDED:

SOIL BORING: MUNSELL CHARTS, TAPE MEASURE, PENS, SOIL BORING FORMS, USCS TABLE,

GW SAMPLING: YSI, PERISTALTIC PUMP, MULTIRAE, SAMPLE CONTAINERS ETC.

SEDIMENT SAMPLING: SAMPLE CONTAINERS, SPOONS

SW SAMPLING: SAMPLE CONTAINERS, SW COLLECTION DEVICE

PROPER PPE FOR ALL ABOVE TASKS IS A MINIMUM LEVEL D, PLUS NITRILES.

DOCUMENTS NEEDED:

FIELD FORMS: BORING LOG, GW SAMPLING LOG, SAMPLE LOG, LOG BOOK, CALIBRATION SHEETS

SIGNIFICANT TRAINING CONDUCTED PRIOR TO DEPARTURE:

MINI-SONIC DRILLING. PERMANENT WELL INSTALLATION. UXO RECOGNITION AND ANOMALY AVOIDANCE.

FIELD QC REVIEW SHEET

EQUIPMENT PACKED FOR TRAVEL ON: 08-15-17

TRAVEL DATES: 08/27/17 THRU 09-08-17

SITE SUPERVISOR SIGNATURE

Site Supervisor Signature

SES FIELD READINESS REVIEW FORM

EMPLOYEE NAME: TRAVIS CASSELLA

EMPLOYEE NUMBER:

JOB NUMBER: M2027.0003

Job Location: FE Warren

READINESS REVIEW DATE: 08/14/17

JOB TASKS:

SURFACE SAMPLING

GROUNDWATER SAMPLING

SOIL SAMPLING – SURFACE SOIL AND SUBSURFACE SOIL

SOIL BORING LOGGING

SURFACE WATER AND SEDIMENT SAMPLING

MOBE/DEMOBE TASKS

EQUIPMENT NEEDED:

SOIL BORING: MUNSELL CHARTS, TAPE MEASURE, PENS, SOIL BORING FORMS, USCS TABLE,

GW SAMPLING: YSI, PERISTALTIC PUMP, MULTIRAE, SAMPLE CONTAINERS ETC.

SEDIMENT SAMPLING: SAMPLE CONTAINERS, SPOONS

SW SAMPLING: SAMPLE CONTAINERS, SW COLLECTION DEVICE

PROPER PPE FOR ALL ABOVE TASKS IS A MINIMUM LEVEL D, PLUS NITRILES.

DOCUMENTS NEEDED:

FIELD FORMS: BORING LOG, GW SAMPLING LOG, SAMPLE LOG, LOG BOOK, CALIBRATION SHEETS

SIGNIFICANT TRAINING CONDUCTED PRIOR TO DEPARTURE:

MINI-SONIC DRILLING. PERMANENT WELL INSTALLATION. UXO RECOGNITION AND ANOMALY AVOIDANCE.

FIELD QC REVIEW SHEET

EQUIPMENT PACKED FOR TRAVEL ON: 08-15-17

TRAVEL DATES: 08/27/17 THRU 09-08-17

SITE SUPERVISOR SIGNATURE

Site Supervisor Signature

Aerostar SES LLC

AFFF Areas (Omaha District)
AFFF Site Inspection
Project# M2027.0003

FE Warren Air Force Base

BORING LOG - FEWRN01-001

Well ID: FEWRN01-MW001

Start Date : 9/01/17
End Date : 9/01/17
Northing : 234401.78
Easting : 740945.32
Surface Elev* : 6129.06
Total Depth (ft)** : 20.0

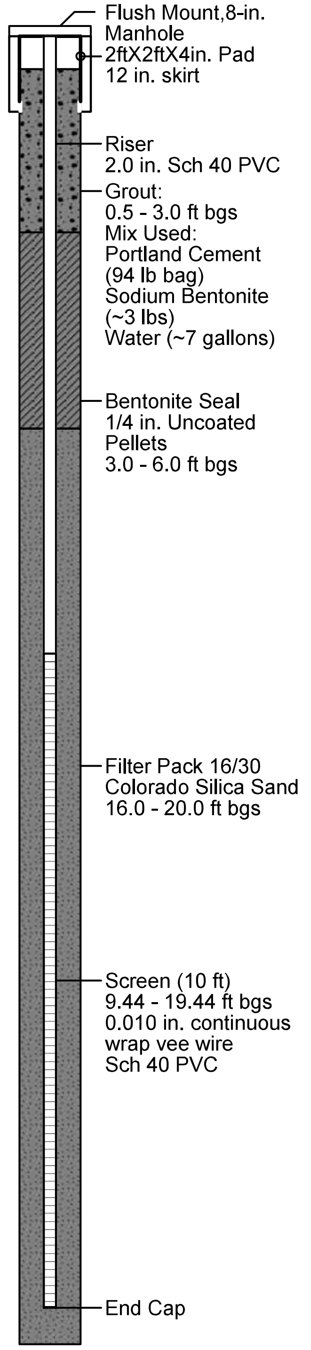
Site Name : AFFF Area 01
Drilling Company : Cascade Drilling
Drilling Method : Mini Sonic/Boart Longyear
Driller : Ryan Miller
Borehole Diameter : 6.0 in.
Boring Completion : Monitoring Well
: 2.0 in. PVC
Depth to Water (ft) : 19.2
Logged by : Kaleb Brumbaugh
Signature Kaleb Brumbaugh

Water Levels
▼ During Drilling

Measurements
*North American Vertical Datum (NAVD88) feet (ft)
**Below Ground Surface (BGS) feet (ft)

DEPTH IN FEET (BGS)	INTERVAL	% RECOVERY	DESCRIPTION	PID (ppm)	USCS \ LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SAMPLE ID
0	1	100	(0.0 - 2.5) Well graded Gravel with Silt, 10YR 4/1 - 8/1, dark gray to white, sub-round to sub-angular fine to coarse grained, scattered cobble, 20.0 - 27.5 cm, mottled, dry (fill)		GW			SS	FEWRN01-001-SS-001 Interval 0.0 - 1.0 ft
	2	90	(2.5 - 5.0) SILT with Gravel, fine grained, low plasticity, 10YR 6/3 pale brown, loose, noncemented, gravel sub-angular to sub-round, trace cobble, dry, (fill)	0	MH				
5	3	100	(5.0 - 13.0) CLAYEY SAND, non to low plasticity, 10YR 7/3, very pale brown, 95% fines, 5% medium sand, trace gravel, sub-angular to sub-round, poorly graded, dry	0	SC				
10	4	100		2					
	5	100	(13.0 - 20.0) SANDSTONE, N7, light gray, poorly cemented, medium to coarse grain with some larger quartz inclusions, hard, dry, no visible staining, most of core was rock flour with few competent pieces	7	SS				
15	6	80					▼	SO	FEWRN01-001-S0-018 Interval 18.0 - 19.0 ft
20			Total Depth of Boring 20.0 feet						

Well: FEWRN01-MW001
Elev (TOC): 6128.62



12-20-2017 R:\Projects\M2027.0003 Site Insp of AFFF Areas (Omaha District)\Boring_Log_Well Geographics Data\FE Warren\FEWRN01-001.bor

BORING LOG - FEWRN01-002

AFFF Areas (Omaha District)
AFFF Site Inspection
Project# M2027.0003

FE Warren Air Force Base

Start Date : 9/01/17
End Date : 9/01/17
Northing : 234346.89
Easting : 740861.91
Surface Elev* : 6129.34
Total Depth (ft)** : 20.0

Site Name : AFFF Area 01
Drilling Company : Cascade Drilling
Drilling Method : Mini Sonic/Boart Longyear
Driller : Ryan Miller
Borehole Diameter : 6.0 in.
Boring Completion : Soil Boring

Depth to Water (ft) : 19.3
Logged by : Kaleb Brumbaugh
Signature : Kaleb Brumbaugh

Water Levels
▼ During Drilling

Measurements
*North American Vertical Datum (NAVD88) feet (ft)
**Below Ground Surface (BGS) feet (ft)

DEPTH IN FEET (BGS)	INTERVAL	% RECOVERY	DESCRIPTION	PID (ppm)	USCS \ LITHOLOGY	Depth to Water (DTW)	SAMPLE TYPE	SAMPLE ID	REMARKS
0	1	100	(0.0 - 2.0) SILT (very fine) with Cobble and Gravel, 10YR 5/2, grayish brown, 40% fine to coarse gravel, cobble 25.0 - 30.0 cm, loose, well graded, noncemented, low plasticity, dry,		MH		SS	FEWRN01-002-SS-001 Interval 0.0 - 1.0 ft	Soil Boring Borehole backfill - Grout: Mix Used: Portland Cement (94 lb bag), Sodium Bentonite (~3 lbs), Water (~7 gallons)
	2	100	(2.0 - 5.0) SILTY SAND, 90% fine grained 10% medium grained, 10YR 8/2, very pale brown, trace to scattered gravel and cobble, dry	0	SM				
5	3	100	(5.0 - 10.0) CLAYEY SAND, non to low plasticity, 10YR 7/3, very pale brown, 98% fines, 2% medium sand, trace mica, argillaceous matrix, low to medium toughness, soft to firm, damp at 7.5 ft bgs	0	SC				
10	4	100	(10.0 - 12.0) CLAYEY SAND, 10YR 8/2, very pale brown, non to low plasticity, fine grained sand, sub-angular to sub-round, trace argillaceous matrix, dry	2	SC				
15	5 6	100 100	(12.0 - 20.0) SANDY LEAN CLAY with interbedded SANDSTONE, 10YR 8/2, very pale brown, fine gravel, well graded (SS), medium to hard, low plasticity, sub-angular to sub-round, medium to high toughness. wet	7	CL	▼	SO	FEWRN01-002-S0-018 Interval 18.0 - 19.0 ft	
20			Total Depth of Boring 20.0 feet						

AFFF Areas (Omaha District)
AFFF Site Inspection
Project# M2027.0003

FE Warren Air Force Base

BORING LOG - FEWRN01-003

Well ID: FEWRN01-MW002

Start Date : 9/02/17
End Date : 9/02/17
Northing : 234194.01
Easting : 740625.92
Surface Elev* : 6131.49
Total Depth (ft)** : 21.0

Site Name : AFFF Area 01
Drilling Company : Cascade Drilling
Drilling Method : Mini Sonic/Boart Longyear
Driller : Ryan Miller
Borehole Diameter : 6.0 in.
Boring Completion : Monitoring Well
: 2.0 in. PVC
Depth to Water (ft) : 17.0
Logged by : Kaleb Brumbaugh
Signature : Kaleb Brumbaugh

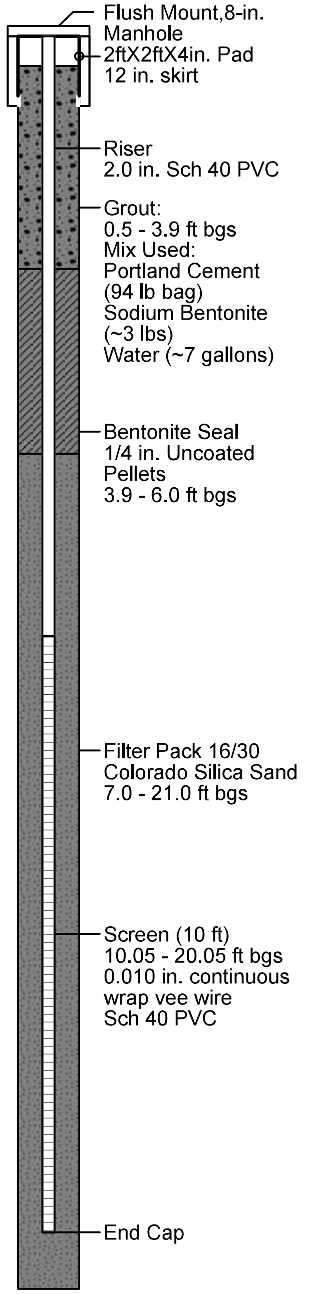
Water Levels
▼ During Drilling

Measurements
*North American Vertical Datum (NAVD88) feet (ft)
**Below Ground Surface (BGS) feet (ft)

DEPTH IN FEET (BGS)	INTERVAL	% RECOVERY	DESCRIPTION	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SAMPLE ID
0	1	100	(0.0 - 2.0) SILTY GRAVEL, 10YR 6/2, light grayish brown, well graded, fine to coarse grained with cobble, sub-angular to sub-round, noncemented, dry		GM			SS	FEWRN01-003-SS-001 FEWRN01-003-SS-901 Interval 0.0 - 1.0 ft
5	2	100	(2.0 - 7.0) GRAVELY SAND, well graded, fine to coarse grained for both gravel and sand, non-plastic, loose, sub-angular to sub-round, dry	0 0	SW				
	3	100	(7.0 - 10.0) CLAYEY SAND, non to low plasticity, 10YR 7/3, very pale brown, 98% fines, 2% medium sand, trace mica, argillaceous matrix, low to medium toughness, soft to firm, damp at 7.5 ft bgs		SC				
10	4	100	(10.0 - 12.0) CLAYEY SAND, 10YR 8/2, very pale brown, non to low plasticity, fine grained sand, sub-angular to sub-round, trace argillaceous matrix, dry	2	SC				
15	5	100	(12.0 - 17.0) Well graded GRAVELLY SAND, 10YR 8/2 to 8/1, very pale brown to white sand, gravel is mottled, 10YR 4/1 to 7/3, dark gray to very pale brown, dry,	7	SW		▼	SO	FEWRN01-003-S0-016 FEWRN01-003-S0-916 Interval 16.0 - 17.0 ft
	6	100	(17.0 - 20.0) CLAYEY GRAVEL, 10YR 5/2, grayish brown, fine to coarse grained, trace cobbles, subround predominantely to subangular, argillaceous matrix, wet at 17.0 ft bgs		GC				
20	7	100	(20.0 - 21.0) SANDSTONE, N7, light gray, poorly cemented, hard, dry, no visible staining, most of core was rock flour with few competent pieces		SS				

Total Depth of Boring 21.0 feet

Well: FEWRN01-MW002
Elev (TOC): 6131.07



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Aerostar SES LLC

AFFF Areas (Omaha District)
AFFF Site Inspection
Project# M2027.0003

FE Warren Air Force Base

BORING LOG - FEWRN02-001

Well ID: FEWRN02-MW001

Start Date : 8/31/17
End Date : 9/1/17
Northing : 237253.64
Easting : 736697.91
Surface Elev* : 6152.33
Total Depth (ft)** : 30.0

Site Name : AFFF Area 02
Drilling Company : Cascade Drilling
Drilling Method : Mini Sonic/Boart Longyear
Driller : Ryan Miller
Borehole Diameter : 6.0 in.
Boring Completion : Monitoring Well
: 2.0 in. PVC
Depth to Water (ft) : 29.0
Logged by : Kaleb Brumbaugh
Signature : Kaleb Brumbaugh

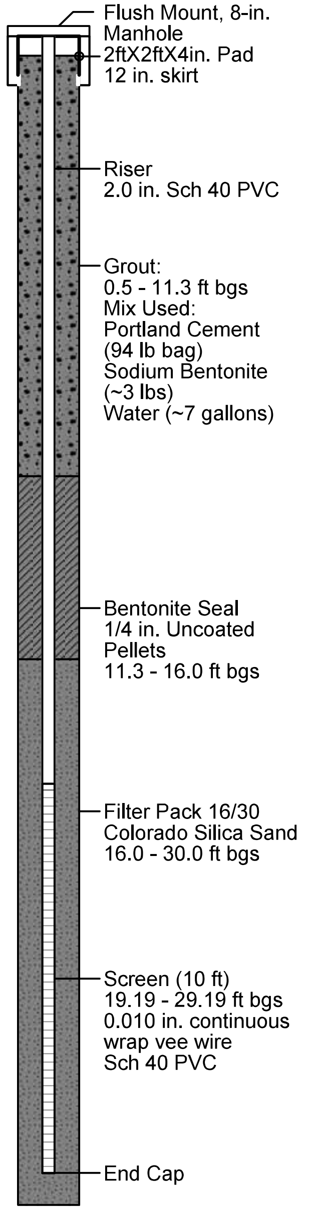
Water Levels
▼ During Drilling

Measurements
*North American Vertical Datum (NAVD88) feet (ft)
**Below Ground Surface (BGS) feet (ft)

DEPTH IN FEET (BGS)	INTERVAL	% RECOVERY	DESCRIPTION	PID (ppm)	USCS \ LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SAMPLE ID
0	1	100	(0.0 - 1.0) GRAVEL, well graded, 10YR 6/1 to 6/4, gray to light yellowish brown, 15 to 20 cm, noncemented, loose, dry, fill	0	GW				
	2 3	100 100	(1.0 - 9.0) GRAVEL, well graded, trace cobble and sand, 80% fine sand, 20% medium grained sand, 10YR 7/3 to 5/2, very pale brown to grayish brown, gravel is coarse to medium noncemented, sub-round to sub-angular		GW				
5									
10	4	100	(9.0 - 17.5) SANDY LEAN CLAY, 10YR 7/3, very pale brown, low to medium plasticity, sand firm to soft, some fracturing when core broke open, trace of glaconite, dry to damp	0	CL				
15	5	100							
20	6	100	(17.5 - 25.0) SANDY FAT CLAY, medium to high plasticity, 10YR 8/2, very pale brown, scattered gravel, firm to hard, medium to high toughness, dry, with some trace areas of mottling around gravel when core is broken apart	0	CH				
25	7	100	(25.0 - 27.0) CLAYEY SAND, 10YR 4/1, dark gray, 90% fine, 10% medium gravel, with trace medium gravel, argillaceous matrix, well graded, damp to moist		SC				
			(27.0 - 28.0) SANDY LEAN CLAY, low plasticity, 10YR 4/1, dark gray, low toughness, soft to slightly firm, damp		CL				
30			(28.0 - 30.0) CLAYEY SAND, low plasticity, 10YR 4/1, dark gray, 90% fine 10% medium grained sand, argillaceous matrix to scattered looseness, sub-round to sub-angular, wet at 29 ft bgs		SC		▼	SO	FEWRN02-001-S0-028 Interval 28.0 - 29.0 ft

Total Depth of Boring 30.0 feet

Well: FEWRN02-MW001
Elev (TOC): 6151.97



Aerostar SES LLC

AFFF Areas (Omaha District)
AFFF Site Inspection
Project# M2027.0003

FE Warren Air Force Base

BORING LOG - FEWRN02-002

Well ID: FEWRN02-MW002

Start Date : 8/31/17
End Date : 8/31/17
Northing : 237150.56
Easting : 736736.63
Surface Elev* : 6152.76
Total Depth (ft)** : 40.0

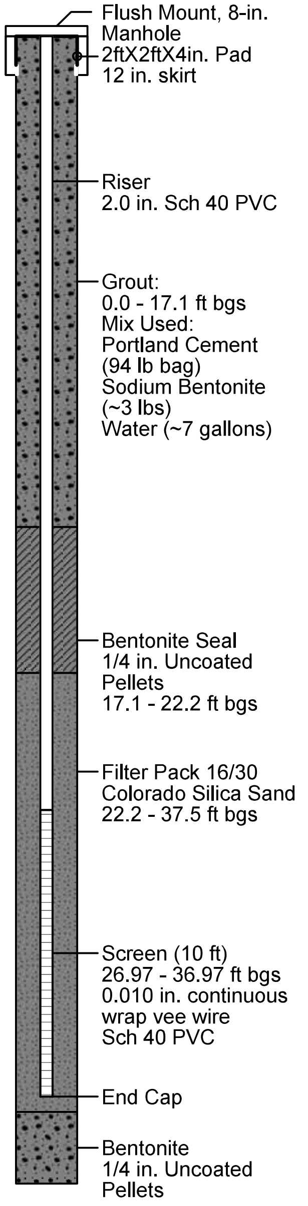
Site Name : AFFF Area 02
Drilling Company : Cascade Drilling
Drilling Method : Mini Sonic/Boart Longyear
Driller : Ryan Miller
Borehole Diameter : 6.0 in.
Boring Completion : Monitoring Well
: 2.0 in. PVC
Depth to Water (ft) : 32.0
Logged by : Kaleb Brumbaugh
Signature : Kaleb Brumbaugh

Water Levels
▼ During Drilling

Measurements
*North American Vertical Datum (NAVD88) feet (ft)
**Below Ground Surface (BGS) feet (ft)

DEPTH IN FEET (BGS)	INTERVAL	% RECOVERY	DESCRIPTION	PID (ppm)	USCS \ LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SAMPLE ID
0	1	100	(0.0 - 0.5) GRAVEL and COBBLE, well graded with trace silt, mottled, 10YR 8/1 to 4/1, white to dark gray, cobbles 7.5 cm to 30 cm, gravel fine to coarse, rounded to sub-round, dry	0	GW				
5	2 3	100	(0.5 - 10.0) Well Graded SAND with Gravel, mottled, 10YR 7/3, very pale brown, fine to coarse sand and gravel, with scattered cobble, 20.0 - 25.0 cm, dry fill	0	SW				
10 15	4	100	(10.0 - 17.5) GRAVELY LEAN CLAY with Sand, low plasticity, 10YR 8/2 to 5/2, very pale brown to grayish brown, coarse to fined gravel, predominantly fine sand, soft to firm, medium to low toughness, dry	0	CL				
	5	100	(17.5 - 20.0) GRAVELY FAT CLAY, medium to low plasticity, 10YR 5/3, brown, firm to very stiff, medium to high toughness, fractured when core broken open, dry	1	CH				
20	6	90	(20.0 - 25.0) GRAVELY FAT CLAY, medium to low plasticity, 10YR 8/2, very pale brown, firm to very stiff, medium to high toughness, fractured when core broken open, moist 20.0 - 22.0 ft bgs		CH				
25	7	100	(25.0 - 30.0) SANDY LEAN CLAY with gravel, low to medium plasticity, 10YR 7/3 to 5/2, very pale brown to grayish brown, high to low plasticity, damp when core broken, fracturing present	1	CL				
30 35		90 80	(30.0 - 37.5) CLAYEY SAND with trace gravel, 10YR 6/3, to 5/2, pale brown to grayish brown, 80% fine to 20% medium to coarse grained sand, sub-round to sub-angular, argillaceous matrix, low to no plasticity, soft to very soft, some slight low toughness	0 0	SC		▼	SO	FEWRN02-002-S0-031 Interval 31.0 - 32.0 ft
			(37.5 - 38.0) Granite boulder, 10YR 7/4, grayish orange, very hard, embedded mica, laminated	0	N/A				
40			(38.0 - 39.5) FAT CLAY with Gravel, high plasticity, 10YR 6/3, pale brown, very firm, some fracturing		CH				
			(37.5 - 38.0) Granite boulder, 10YR 7/4, grayish orange, very hard, embedded mica, laminated		NA				
45			Total Depth of Boring 40.0 feet						

Well: FEWRN02-MW002
Elev (TOC): 6152.27



Aerostar SES LLC

AFFF Areas (Omaha District)
AFFF Site Inspection
Project# M2027.0003

FE Warren Air Force Base

BORING LOG - FEWRN02-003

Well ID: FEWRN02-MW003

Start Date : 8/30/17
End Date : 8/31/17
Northing : 237304.25
Easting : 736943.37
Surface Elev* : 6147.47
Total Depth (ft)** : 35.0

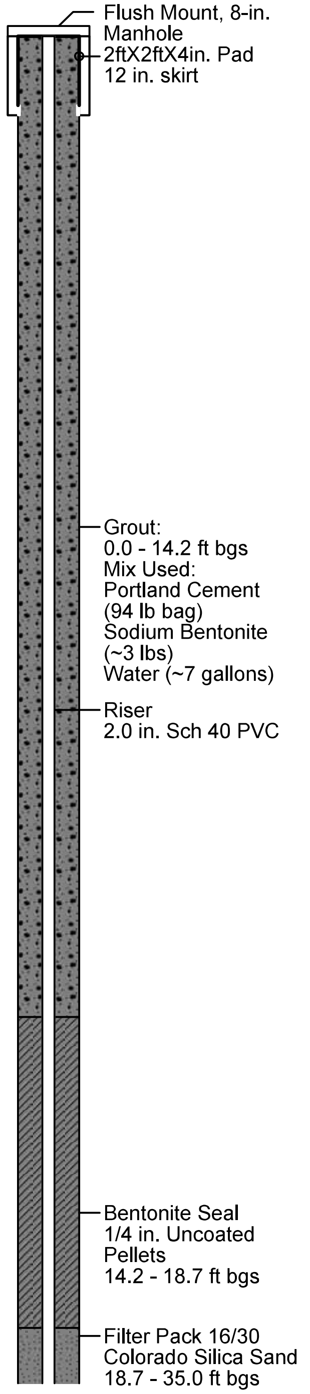
Site Name : AFFF Area 02
Drilling Company : Cascade Drilling
Drilling Method : Mini Sonic/Boart Longyear
Driller : Ryan Miller
Borehole Diameter : 6.0 in.
Boring Completion : Monitoring Well
: 2.0 in. PVC
Depth to Water (ft) : 32.0
Logged by : Kaleb Brumbaugh
Signature : Kaleb Brumbaugh

Water Levels
▼ During Drilling

Measurements
*North American Vertical Datum (NAVD88) feet (ft)
**Below Ground Surface (BGS) feet (ft)

DEPTH IN FEET (BGS)	INTERVAL	% RECOVERY	DESCRIPTION	PID (ppm)	USCS \ LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SAMPLE ID
0	1	100	(0.0 - 1.0) SILT with Gravel, non-plastic, 10YR 5/2, grayish brown, 80% fines and 20% medium to coarse well graded gravel, sub-round to sub-angular, loose, dry	0	MH				
	2	100	(1.0 - 5.0) GRAVEL, well graded, with sand and trace cobble, 10YR 7/3, very pale brown, predominately round to sub-round with scattered subangular, 40% fine gravel, 60% medium to coarse gravel, non-cemented, 60% medium-grained sand, 40% fine-grained sand, loose, dry		GW				
5	3	70	(5.0 - 10.0) CLAYEY SAND, low plasticity, 10YR 7/3, very pale brown, 95% fine grained sand, 5% medium grained sand, sub-round to sub-angular, trace mica, damp	0	SC				
10	4	90	(10.0 - 11.0) GRAVEL, well graded, with Sand, 10YR 5/2 to 4/1, grayish brown to dark gray, argillaceous matrix, 40% fine gravel, 60% coarse gravel, 99% fine sand	0	GW				
	5	90	(11.0 - 15.0) CLAYEY SAND, low plasticity, 10YR 7/3, very pale brown, poorly graded, 95% fine grained sand, 5% medium grained sand, sub-round to sub-angular, low to trace medium toughness, soft to slightly firm, fractured when core broken apart, damp	0	SC				
15	6		(15.0 - 20) CLAYEY SAND with Gravel, 10YR 7/3, very pale brown, low to no plasticity, well graded, sub-angular to sub-round (both sand and gravel) 95% fine grained and 5% medium grained sand, 70% coarse gravel, 30% medium gravel, trace fine gravel, gravel is mottled grays and whites, damp to trace moist	0	SC				

Well: FEWRN02-MW003
Elev (TOC): 6147.12



Aerostar SES LLC

AFFF Areas (Omaha District)
AFFF Site Inspection
Project# M2027.0003

FE Warren Air Force Base

BORING LOG - FEWRN02-003

Well ID: FEWRN02-MW003

Start Date : 8/30/17
End Date : 8/31/17
Northing : 237304.25
Easting : 736943.37
Surface Elev* : 6147.47
Total Depth (ft)** : 35.0

Site Name : AFFF Area 02
Drilling Company : Cascade Drilling
Drilling Method : Mini Sonic/Boart Longyear
Driller : Ryan Miller
Borehole Diameter : 6.0 in.
Boring Completion : Monitoring Well
: 2.0 in. PVC
Depth to Water (ft) : 32.0
Logged by : Kaleb Brumbaugh
Signature : Kaleb Brumbaugh

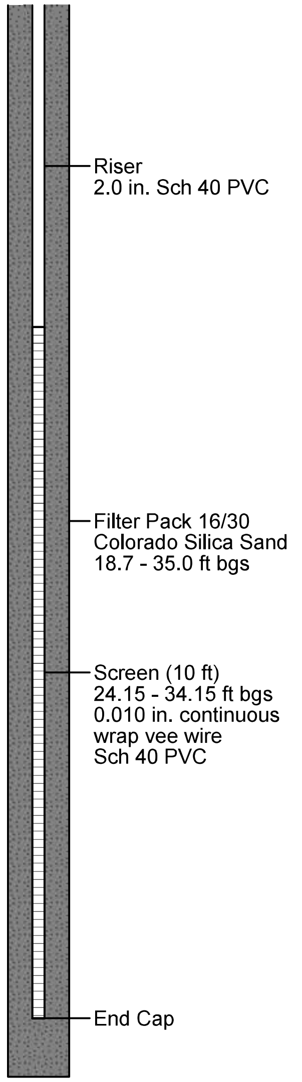
Water Levels
▼ During Drilling

Measurements
*North American Vertical Datum (NAVD88) feet (ft)
**Below Ground Surface (BGS) feet (ft)

DEPTH IN FEET (BGS)	INTERVAL	% RECOVERY	DESCRIPTION	PID (ppm)	USCS \ LITHOLOGY	Depth to Water (DTW)	SAMPLE TYPE	SAMPLE ID
19.5	6	84			SC			
	7	100	(20.0 - 25.0) SANDY LEAN CLAY, low to non-plastic, 10YR 8/2, very pale brown, 80% fine grained sand and 20% medium grained sand, loose to firm in areas, dry	0	CL			
24.5	8	100	(25.0 - 27.0) FAT CLAY with Gravel, low to medium plasticity, 10YR 5/2, grayish brown, fractured when core broken apart, damp to dry	6	CH			
	9	100	(27.0 - 30.0) LEAN CLAY with trace Sand, low to medium plasticity, 10YR 8/2, very pale brown, soft to firm, moist, fractured when core broken open with areas of wetness	0	CL			
29.5	10	100	(30.0 - 32.0) CLAYEY SAND, 10YR 7/3, to 5/2, pale brown to grayish brown, 98% fine grained and 2% medium grained sand, sub-angular to sub-round, poorly graded, argillaceous matrix, damp		SC	▼	SO	FEWRN02-003-S0-031 Interval 31.0 - 32.0 ft
	11		(32.0 - 33.0) SAND with Gravel, well graded, 10YR 8/2 to 4/1, very pale brown to dark gray, 70% fine and 30% medium sand with trace coarse sand, scattered coarse gravel, sub-round to sub-angular, some round, loose trace argillaceous matrix, moist to wet	7.6	SW			
34.5	12	100	(33.0 - 35.0) Well graded SAND with gravel, 10YR 8/2 to 4/1, very pale brown to dark gray, 70% fine and 30% medium sand with trace coarse sand, scattered coarse gravel, sub-round to sub-angular, some round, loose trace argillaceous matrix, wet	0 0	SW			

Total Depth of Boring 35.0 feet

Well: FEWRN02-MW003
Elev (TOC): 6147.12



BORING LOG - FEWRN02-004

Well ID: FEWRN02-MW004

AFFF Areas (Omaha District)
AFFF Site Inspection
Project# M2027.0003

FE Warren Air Force Base

Start Date : 8/30/17
End Date : 8/30/17
Northing : 237463.58
Easting : 737010.80
Surface Elev* : 6147.00
Total Depth (ft)** : 30.0

Site Name : AFFF Area 02
Drilling Company : Cascade Drilling
Drilling Method : Mini Sonic/Boart Longyear
Driller : Ryan Miller
Borehole Diameter : 6.0 in.
Boring Completion : Monitoring Well
: 2.0 in. PVC
Depth to Water (ft) : 14.0
Logged by : Kaleb Brumbaugh
Signature : Kaleb Brumbaugh

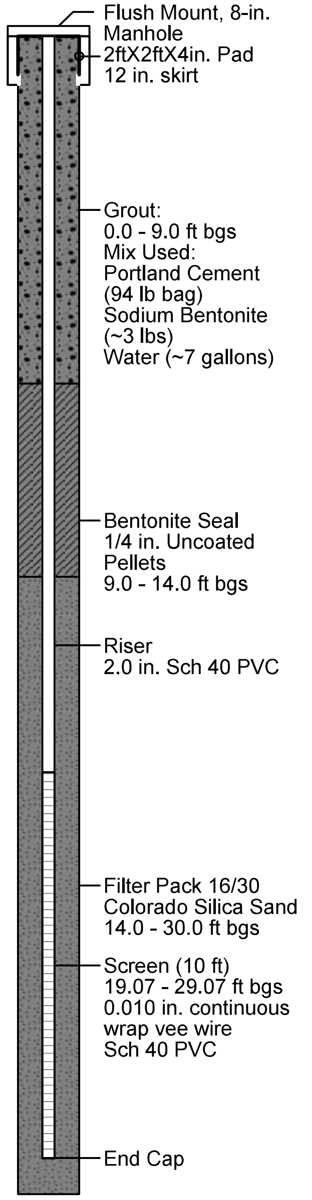
Water Levels
▼ During Drilling

Measurements
*North American Vertical Datum (NAVD88) feet (ft)
**Below Ground Surface (BGS) feet (ft)

DEPTH IN FEET (BGS)	INTERVAL	% RECOVERY	DESCRIPTION	PID (ppm)	USCS \ LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SAMPLE ID
0	1	100	(0.0 - 2.0) SILT with Gravel, non-plastic, 10YR 5/2, grayish brown, 80% fines and 20% medium to coarse (trace cobble) well graded gravel, sub-round to sub-angular, loose, dry	0	MH				
	2	100	(2.0 - 5.0) SILT with Gravel, non-plastic, 10YR 5/2, grayish brown, 80% fines and 20% medium to coarse (trace cobble) well graded gravel, sub-round to sub-angular, loose, scattered mica, dry		MH				
5 10	3	100	(5.0 - 12.5) CLAYEY SAND, low plasticity, to non-plasticity, 10YR 7/3, very pale brown, 95% fine grained sand, 5% medium grained sand, sub-round to sub-angular, low toughness, trace mica, damp	0 0	SC				
	4	100	(12.5 - 15.0) LEAN CLAY with Sand, 10YR 5/2, grayish brown, low plasticity, soft to firm, low toughness, damp	0	SC		▼	SO	FEWRN02-004-S0-013 Interval 13.0 - 14.0 ft
15	5	100	(15.0 - 18.0) CLAYEY SAND with Gravel, 10YR 7/3, very pale brown, low plasticity, medium toughness, sub-angular to sub-round 95% fine grained and 5% medium grained sand, damp	0	SC				
	6	100	(18.0 - 20.0) SANDY LEAN CLAY, 10YR 5/2, grayish brown, low plasticity, medium toughness, soft to firm, fractured when core broken off, damp to some moisture		CL				
20	7	100	(20.0 - 24.0) SANDY LEAN CLAY, low plasticity, 10YR 7/3 to 8/2, very pale brown, 95% fine grained sand and 5% medium grained sand, fractured when core broken off, damp to dry	0	CL				
25	8	83	(24.0 - 27.0) CLAYEY SAND, low plasticity, 10YR 5/2 to 8/2, grayish brown to very pale brown, 95% fine grained sand and 5% medium grained sand, sub-round to sub-angular, argillaceous matrix, poorly graded, firm to soft, trace mica, damp	0	SC				
	9	100	(27.0 - 28.0) SAND, well graded, 10YR 4/1 7/3, dark gray to very pale brown, 70% fine grained sand and 30% medium grained sand, sub-round to round, scattered sub-angular, wet	0	SW				
30	10		(28.0 - 30.0) CLAYEY SAND, low toughness, 10YR 7/3, very pale yellow, predominantly fine grained sands, poorly graded, sub-round to sub-angular, soft, wet		SC				

Total Depth of Boring 30.0 feet

Well: FEWRN02-MW004
Elev (TOC): 6146.52



AFFF Areas (Omaha District)
AFFF Site Inspection
Project# M2027.0003

FE Warren Air Force Base

BORING LOG - FEWRN03-001

Well ID: FEWR03-MW001

Start Date	: 8/29/17
End Date	: 8/30/17
Northing	: 234716.19
Easting	: 738044.37
Surface Elev*	: 6155.01
Total Depth (ft)**	: 26.11

Site Name	: AFFF Area 03
Drilling Company	: Cascade Drilling
Drilling Method	: Mini Sonic/Boart Longyear
Driller	: Ryan Miller
Borehole Diameter	: 6.0 in.
Boring Completion	: Monitoring Well : 2.0 in. PVC
Depth to Water (ft)	: 9.0
Logged by	: Kaleb Brumbaugh
Signature	: Kaleb Brumbaugh

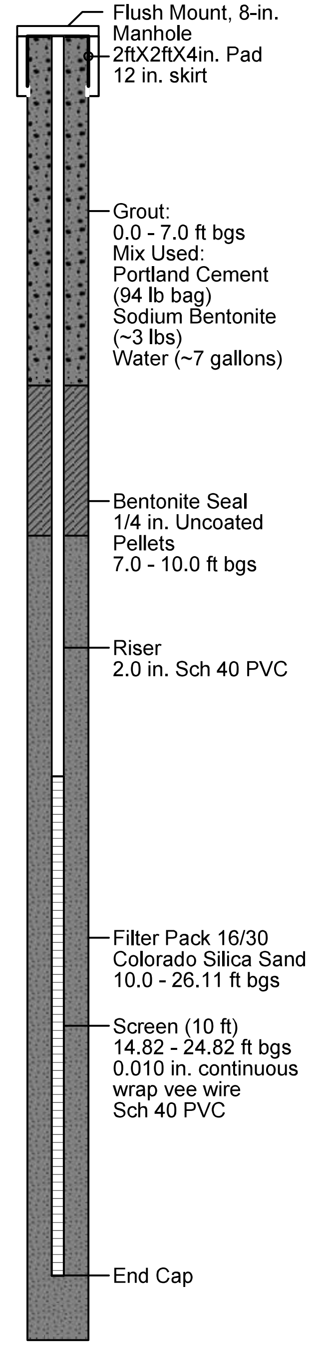
Water Levels
▼ During Drilling

Measurements
*North American Vertical Datum (NAVD88) feet (ft)
**Below Ground Surface (BGS) feet (ft)

DEPTH IN FEET (BGS)	INTERVAL	% RECOVERY	DESCRIPTION	PID (ppm)	USCS \ LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SAMPLE ID
0	1	100	(0.0 - 4.0) SILT with Gravel, non-plastic, 10YR 5/2, grayish brown,40% fine to medium grained gravel, sub-round to round, dry	0	MH			SS	FEWRN03-001-SS-001 Interval 0.0 - 1.0 ft
	2	100	(4.0 - 5.0) CLAYEY SAND with trace Gravel, 10YR 7/3, very pale brown, 90% fine grained and 10% medium grained, sub-angular to subround, non-plastic to very low plasticity, poorly graded, argillaceous matrix, mica scattered, dry to slightly damp		SC				
5	3	90	(5.0 - 10.0) CLAYEY SAND with trace Gravel, 10YR 7/3, very pale brown, 90% fine grained and 10% medium grained sand, 5% medium grained gravel, sub-angular to subround, non-plastic to very low plasticity, poorly graded, damp	0	SC		▼	SO	FEWRN03-001-SO-008 Interval 8.0 - 9.0 ft
10	4	90	(10.0 - 15.0) LEAN CLAY with Gravel and Sand, 10YR 7/3, very pale brown, low plasticity, low toughness, soft to slight firm, low toughness, fine to medium gravel scattered throughout lean clay, 10% fine sand interbedded, fractured bedding when core broken open, damp to dry	0 0	SC				
15	5	90	(15.0 - 25.0) CLAYEY SAND, 10YR 7/3, very pale brown, non-plastic to low plasticity, sub-angular to sub-round 95% fine grained and 5% medium grained, poorly graded, damp to moist, trace mica	0	SC				
20	6	100		0					
25	7	100	(25.0 - 26.11) FAT CLAY with Sand, medium to high plasticity, 10YR 5/2, grayish brown, high toughness, very hard, dry	0	CH				

Total Depth of Boring 26.11 feet

Well: FEWRN03-MW001
Elev (TOC): 6154.46



AFFF Areas (Omaha District)
AFFF Site Inspection
Project# M2027.0003

FE Warren Air Force Base

BORING LOG - FEWRN03-002

Well ID: FEWR03-MW002

Start Date : 8/28/17
End Date : 8/29/17
Northing : 234763.09
Easting : 738091.93
Surface Elev* : 6155.04
Total Depth (ft)** : 26.0

Site Name : AFFF Area 03
Drilling Company : Cascade Drilling
Drilling Method : Mini Sonic/Boart Longyear
Driller : Ryan Miller
Borehole Diameter : 6.0 in.
Boring Completion : Monitoring Well
: 2.0 in. PVC
Depth to Water (ft) : 8.0
Logged by : Kaleb Brumbaugh
Signature : Kaleb Brumbaugh

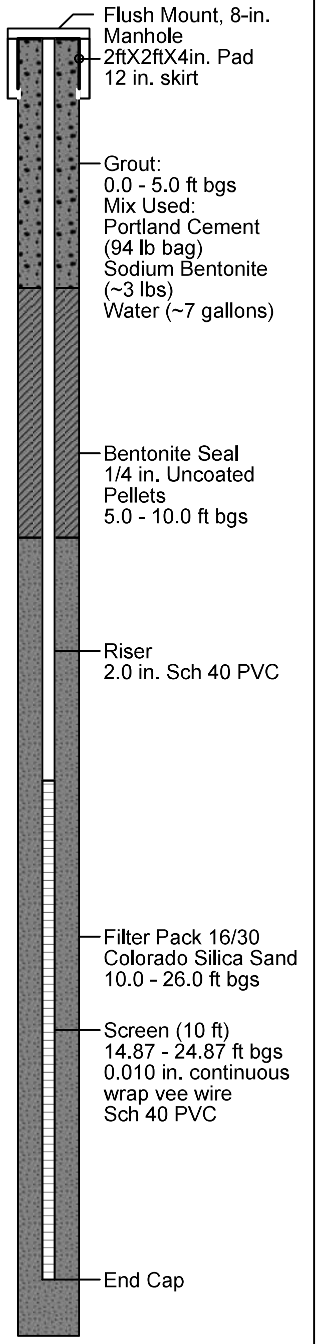
Water Levels
▼ During Drilling

Measurements
*North American Vertical Datum (NAVD88) feet (ft)
**Below Ground Surface (BGS) feet (ft)

DEPTH IN FEET (BGS)	INTERVAL	% RECOVERY	DESCRIPTION	PID (ppm)	USCS \ LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SAMPLE ID
0	1	100	(0.0 - 1.0) SILT, non-plastic, 10YR 5/2, grayish brown, 65% fines, 35% fine to medium grained gravel, sub-angular to angular, noncemented, trace mica, dry to slightly damp	0	MH			SS	FEWRN03-002-SS-001 Interval 0.0 - 1.0 ft
	1 2	100	(1.0 - 5.0) CLAYEY SAND, 10YR 5/2 to 7/3, grayish brown to very pale brown, 90% fine grained and 10% medium grained, sub-angular to subround, low to non-plastic, poorly graded, argillaceous matrix, trace mica, damp		SC				
5	3	90	(5.0 - 10.0) CLAYEY SAND, 10YR 7/3, very pale brown, low plasticity to non-plastic, 95% fine grained and 5% medium grained sand, poorly graded, argillaceous matrix, abundant mica, damp to trace moist at 8.0 ft bgs	0	SC		▼	SO	FEWRN03-002-SO-007 Interval 7.0 - 8.0 ft
10	4	90	(10.0 - 15.0) CLAYEY SAND, 10YR 7/3 to 5/2, very pale brown to grayish brown, 90% fine 10% medium grained clayey sand, sub-round to round to sub-angular, none to low plasticity, argillaceous matrix, trace mica, damp	0 0	SC				
15	5	90	(15.0 - 20.0) LEAN CLAY with Gravel (subround to round), 10YR 5/2, grayish brown, low plasticity, medium toughness, firm to very firm, fractured when core broken apart, damp to dry	0	CL				
20	6	100	(20.0 - 22.0) GRAVELY LEAN CLAY with Sand, 10YR 5/2, grayish brown, low plasticity, medium toughness, round pebbles, fine to cobble size gravel, well graded, fine to medium grained sand, sub-round to sub-angular, damp to wet around gravel and sand, clay is dry	0	CL				
25	6 7	100 100	(22.0 - 26.0) FAT CLAY, high plasticity, 10YR 5/2, grayish brown, high toughness, high density, dry	0	CH				

Total Depth of Boring 26.0 feet

Well: FEWRN03-MW002
Elev (TOC): 6154.59



AFFF Areas (Omaha District)
AFFF Site Inspection
Project# M2027.0003

FE Warren Air Force Base

BORING LOG - FEWRN03-003

Well ID: FEWR03-MW003

Start Date : 8/28/17
End Date : 8/29/17
Northing : 234817.24
Easting : 738063.07
Surface Elev* : 6154.58
Total Depth (ft)** : 35.0

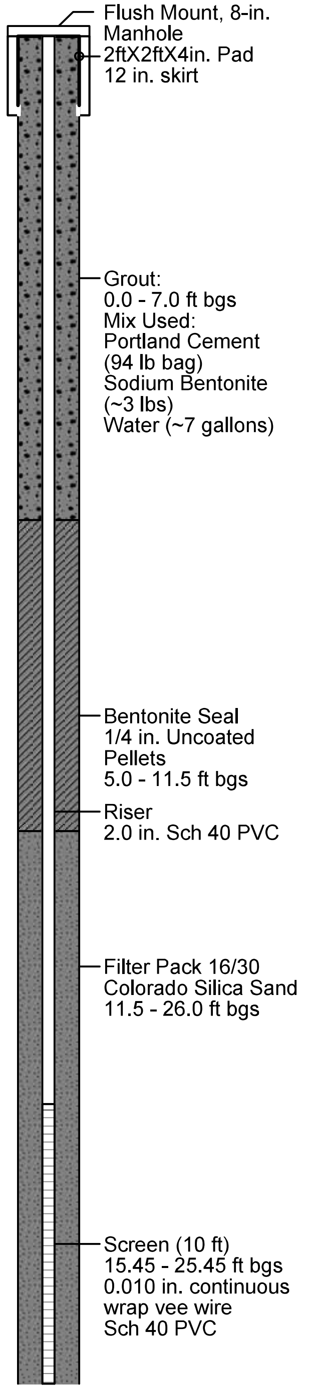
Site Name : AFFF Area 03
Drilling Company : Cascade Drilling
Drilling Method : Mini Sonic/Boart Longyear
Driller : Ryan Miller
Borehole Diameter : 6.0 in.
Boring Completion : Monitoring Well
: 2.0 in. PVC
Depth to Water (ft) : 9.0
Logged by : Kaleb Brumbaugh
Signature : Kaleb Brumbaugh

Water Levels
▼ During Drilling

Measurements
*North American Vertical Datum (NAVD88) feet (ft)
**Below Ground Surface (BGS) feet (ft)

DEPTH IN FEET (BGS)	INTERVAL	% RECOVERY	DESCRIPTION	PID (ppm)	USCS \ LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SAMPLE ID
0	1	100	(0.0 - 2.0) SILT, non-plastic, 10YR 5/2, grayish brown, 70% fines, 30% fine grained to cobble size gravel, scattered round, sub-angular to angular, noncemented, soft to firm, trace mica, dry	0	MH			SS	FEWRN03-003-SS-001 FEWRN03-003-SS-901 Interval 0.0 - 1.0 ft
	2		(2.0 - 5.0) SILTY SAND, non-plastic, 10YR 5/2, grayish brown, 70% fines and 30% fine to medium grained, sub-angular to subround to scattered round, well graded, damp		SM				
5	3	100	(5.0 - 10.0) CLAYEY SAND, 10YR 7/3, very pale brown, low plasticity to non-plastic, 95% fine grained and 5% medium grained sand, poorly graded, argillaceous matrix, abundant mica, damp	0	SC		▼	SO	FEWRN03-003-SO-008 FEWRN03-003-SO-908 Interval 8.0 - 9.0 ft
10	4	90	(10.0 - 15.0) CLAYEY SAND, 10YR 7/3 to 5/2, very pale brown to grayish brown, 90% fine 10% medium grained clayey sand, sub-round to round to sub-angular, none to low plasticity, argillaceous matrix, trace mica, fractured bedding planes when core broken open, damp	0 0	SC				
15	5		(15.0 - 17.5) LEAN CLAY with Gravel, 10YR 7/3 to 5/2, very pale brown to grayish brown, low plasticity, medium to high toughness, very firm, fine to medium sized, round to sub-round gravel, wet around gravel	0	CL				
	6		(17.5 - 20.0) CLAYEY SAND, 10YR 7/3, very pale brown, low to non-plastic, low toughness, soft to slightly firm, 95% fine 5% medium grained sand, sub-round to sub-angular, argillaceous matrix, poorly graded, trace mica, damp to wet at 20 ft bgs		SC				

Well: FEWRN03-MW003
Elev (TOC): 6154.06



Aerostar SES LLC

AFFF Areas (Omaha District)
AFFF Site Inspection
Project# M2027.0003

FE Warren Air Force Base

BORING LOG - FEWRN03-003

Well ID: FEWR03-MW003

Start Date : 8/28/17
End Date : 8/29/17
Northing : 234817.24
Easting : 738063.07
Surface Elev* : 6154.58
Total Depth (ft)** : 35.0

Site Name : AFFF Area 03
Drilling Company : Cascade Drilling
Drilling Method : Mini Sonic/Boart Longyear
Driller : Ryan Miller
Borehole Diameter : 6.0 in.
Boring Completion : Monitoring Well
: 2.0 in. PVC
Depth to Water (ft) : 9.0
Logged by : Kaleb Brumbaugh
Signature : Kaleb Brumbaugh

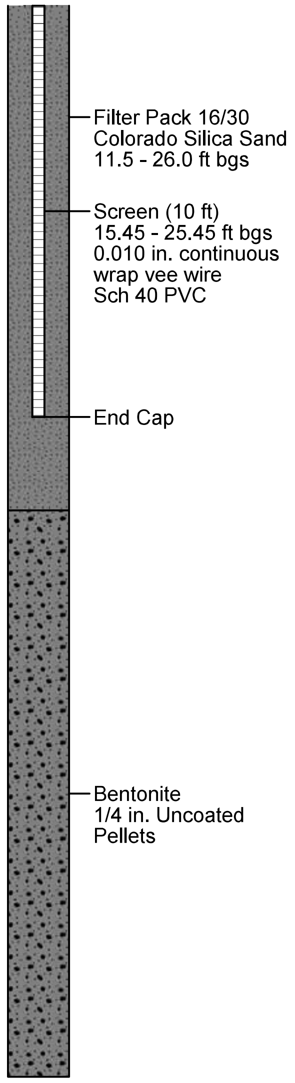
Water Levels
▼ During Drilling

Measurements
*North American Vertical Datum (NAVD88) feet (ft)
**Below Ground Surface (BGS) feet (ft)

DEPTH IN FEET (BGS)	INTERVAL	% RECOVERY	DESCRIPTION	PID (ppm)	USCS \ LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SAMPLE ID
19.5	6	90			SC				
	7	90	(20.0 - 22.0) LEAN CLAY with Sand & Gravel, 10YR 5/2, grayish brown, low plasticity, medium toughness, round pebbles, fine to cobble size gravel, well graded, fine to medium grained sand, sub-round to sub-angular, damp to wet around gravel and sand, clay is dry	0	CL				
	8	83	(22.0 - 27.0) CLAYEY SAND, 10YR 7/3, very pale brown, low to medium plasticity, low toughness, soft to slightly firm, 95% fine 5% medium grained sand, sub-round to sub-angular, argillaceous matrix, poorly graded, trace mica, damp with depth		SC				
24.5	9	80		0					
	10		(27.0 - 35.0) LEAN CLAY with Sand, 10YR 5/2 to 7/3, grayish brown to very pale brown, very low to low plasticity, soft to firm, medium toughness, predominantly fine grained, round to sub-round sand, mica present to scattered, dry		CL				
29.5	11	100							
34.5	12	100							

Total Depth of Boring 35.0 feet

Well: FEWRN03-MW003
Elev (TOC): 6154.06



Aerostar SES LLC

BORING LOG - FEWRN03-004

AFFF Areas (Omaha District)
AFFF Site Inspection
Project# M2027.0003

FE Warren Air Force Base

Start Date : 8/28/17
End Date : 8/29/17
Northing : 234809.64
Easting : 738021.35
Surface Elev* : 6154.40
Total Depth (ft)** : 30.0

Site Name : AFFF Area 03
Drilling Company : Cascade Drilling
Drilling Method : Mini Sonic/Boart Longyear
Driller : Ryan Miller
Borehole Diameter : 6.0 in.
Boring Completion : Soil Boring

Depth to Water (ft) : 8.9
Logged by : Kaleb Brumbaugh
Signature : Kaleb Brumbaugh

Water Levels
▼ During Drilling

Measurements
*North American Vertical Datum (NAVD88) feet (ft)
**Below Ground Surface (BGS) feet (ft)

DEPTH IN FEET (BGS)	INTERVAL	% RECOVERY	DESCRIPTION	PID (ppm)	USCS \ LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SAMPLE ID	REMARKS
0	1	100	(0.0 - 2.5) SILT with Gravel, non-plastic, 10YR 5/2, grayish brown, 70% fines, 30% fine grained to cobble size gravel, sub-angular to angular, noncemented, soft to very firm, trace mica	0	MH			SS	FEWRN03-004-SS-001 Interval 0.0 - 1.0 ft	Soil Boring Borehole backfill - Grout: Mix Used: Portland Cement (94 lb bag), Sodium Bentonite (~3 lbs), Water (~7 gallons)
	2	100	(2.5 - 5.0) SILTY SAND with Gravel, non-plastic, 10YR 5/2, grayish brown, 70% fines and 30% gravel (fine to medium sized), subangular to subround to scattered round, well graded, damp		SM					
5	3	90	(5.0 - 10.0) CLAYEY SAND, 10YR 7/3, very pale brown, low plasticity, 95% fine grained and 5% medium grained sand, sub-round to sub-angular, poorly graded, argillaceous cementing matrix, abundant mica, damp	0	SC		▼	SO	FEWRN03-004-SO-008 Interval 8.0 - 9.0 ft	
10	4	90	(10.0 - 15.0) CLAYEY SAND, 10YR 7/3, very pale brown, 100% fine with trace medium grained clayey sand, trace fine gravel, sub-round to round to sub-anguaIar, low plasticity, low toughness, argillaceous matrix with cementing	0 0	SC					
15	5	83	(15.0 - 18.0) LEAN CLAY with cobbles and gravel, 10YR 7/3, very pale brown, low to non-plastic, low toughness, soft to slightly firm, 95% fine 5% medium grained sand, sub-round to round, predominantly dry, some slight dampness around cobbles	0	CL					
	6	100	(18.0 - 19.0) LEAN CLAY, low plasticity, 10YR 7/3 to 7/2, very pale brown to light gray, medium toughness, dry		CL					
20	7	100	(19.0 - 24.0) CLAYEY SAND, 10YR 5/2, grayish brown, very low plasticity, soft to firm, 95% fine 5% medium grained sand, sub-round to sub-angular, argillaceous matrix with cementing, trace mica,	0	SC					
25	8	100	(24.0 - 27.0) CLAYEY SAND, 10YR 7/4, very pale brown, low to very low plasticity to none, 95% fine, 5% medium grained sand, sub-round to sub-angular, trace argillaceous matrix, trace mica, dry	0	SC					
	9	100	(27.0 - 30.0) CLAYEY SAND, 10YR 7/4 to 8/2, very pale brown, low to very low plasticity to none, 95% fine, 5% medium grained sand, sub-round to sub-angular, trace argillaceous matrix, trace mica, wet to damp at 27.0 ft bgs		SC					
30			Total Depth of Boring 30.0 feet							

12-20-2017 R:\Projects\M2027.0003 Site Insp of AFFF Areas (Omaha District)\Boring_Log_Well Geographics Data\FE Warren\FEWRN03-004.bor

AerostarSES LLC

GROUNDWATER SAMPLING LOG

Installation: ~~MINOT AFB~~ M2027.0003 FEWARREN

Site: ~~FEWARREN~~ FORMER EPTA 2 (AREA 1)

WELL NO: FEWRN01- MW001

SAMPLE ID: FEWRN01- 001 -GW- 015

DATE: 9-4-17

PURGING DATA

WELL DIAMETER (inches): 2.0

TUBING DIAMETER (inches): 1/4 OD

WELL SCREEN INTERVAL DEPTH: 19.26 Ft - 9.26 Ft

STATIC DEPTH TO WATER (feet BTOC): * 11.12

PURGE PUMP TYPE OR BAILER: PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH BTOC – STATIC DEPTH TO WATER) X WELL CAPACITY

(only fill out if applicable) = (19.26 Ft - 11.12 Ft) x 0.163 gal/ft = 1.33 gal

~~EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME~~

~~(only fill out if applicable) = gal = (Ft) + gal = gal~~

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 15

FINAL PUMP OR TUBING DEPTH IN WELL (feet): 15

PURGING INITIATED AT: 1435

PURGING ENDED AT: 1620

TOTAL VOLUME PURGED (gallons): 2.74

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet BTOC)	pH (standard units)	TEMP. (°C)	COND. ~~µS/cm~~ mS/cm	DISSOLVED OXYGEN mg/L	ORP (mV)	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
1435	N/A	N/A	0.026	11.12	N/A	N/A	N/A	N/A	N/A	N/A	Cloudy	none
1455	0.52	0.52	0.026	11.39	7.35	14.94	0.540	2.53	-222.0	769		
1526	0.78	1.31	0.026	12.20	7.42	14.29	0.564	1.40	-312.3	833		
1535	0.26	1.57	0.026	12.24	7.40	14.23	0.574	1.06	-372.3	**OR		
1555	0.52	2.09	0.026	12.25	7.35	13.96	0.603	0.71	-398.2	OR		
1610	0.39	2.48	0.026	12.24	7.31	13.54	0.607	0.47	-402.3	OR		
1615	0.13	2.61	0.026	12.24	7.31	13.55	0.607	0.47	-407.6	OR		
1620	0.13	2.74	0.026	12.24	7.31	13.51	0.605	0.50	-399.9	OR		

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88

TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Ash Willis
Travis Cassella / AL

SAMPLER(S) SIGNATURE(S):

SAMPLING INITIATED AT: 1620

SAMPLING ENDED AT: 1621

PUMP OR TUBING DEPTH IN WELL (feet): 15

TUBING MATERIAL CODE: PE

FIELD-FILTERED: Y [✓ N] Filter Size: mm

Filtration Equipment Type:

FIELD DECONTAMINATION: PUMP Y [✓ N] TUBING Y [✓ N (replaced)]

DUPLICATE: Y [✓ N]

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (mL)	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH (Standard Units)			
FEWRN01-001-GW-015	2	PE	150 each				EPA 537M	APP	
FEWRN01-001-GW-015 MS/MSD	4	PE	150ml each				EPA 537M	APP	

REMARKS: * casing at 0.45 below ground surface. PAD COMPLETED. TD 19.71 bgs
** OR = over range
WL 11.57 bgs

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

Stabilization Criteria for range of variation of last three consecutive readings

pH: ± 0.2 units **Temperature:** ± 0.2 °C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation; optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: March 14, 2016

9/5/17

AerostarSES LLC

GROUNDWATER SAMPLING LOG

Installation: ~~MINOT AFB~~ M2027.0003 FE WARREN		Site: ~~FE WARREN~~ FORMER EPTA 2 (AFFF AREA 1)	
WELL NO: FEWRN01- MW002	SAMPLE ID: FEWRN01-003-GW-015		DATE: 9-4-17

PURGING DATA

WELL DIAMETER (inches): 2.0	TUBING DIAMETER (inches): 1/4 OD	WELL SCREEN INTERVAL DEPTH: 20.05 Ft - 10.05 Ft	STATIC DEPTH TO WATER (feet BTOC): * 10.64	PURGE PUMP TYPE OR BAILER: PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH BTOC – STATIC DEPTH TO WATER) X WELL CAPACITY

(only fill out if applicable) = (20.05 Ft - 10.64 Ft) x 0.163 gal/ft = 1.53 gal

~~EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME +~~ (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME

(only fill out if applicable) = gal = (x) + gal = gal

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 15	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 15	PURGING INITIATED AT: 1220	PURGING ENDED AT: 1345	TOTAL VOLUME PURGED (gallons): 5.02

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet BTOC)	pH (standard units)	TEMP. (°C)	COND. ~~µS/cm~~ mS/cm	DISSOLVED OXYGEN mg/L	ORP (mV)	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
1220	N/A	N/A	0.066	10.02	N/A	N/A	N/A	N/A	N/A	N/A	Clear	none
1230	0.66	0.66	0.066	10.90	7.26	16.64	0.910	6.72	-249.9	432		
1240	0.66	1.32	0.066	10.92	7.29	16.12	0.894	3.41	-232.5	299		
1300	1.32	2.64	0.066	10.92	7.27	15.77	0.886	4.12	-199.3	165		
1310	0.66	3.3	0.066	10.93	7.26	15.54	0.877	3.93	-185.6	90.4		
1320	0.66	3.96	0.066	10.93	7.24	15.50	0.872	3.96	-176.4	65.6		
1330	0.66	4.026	0.066	10.94	7.23	15.20	0.867	4.30	-159.6	38.4		
1340	0.66	4.686	0.066	10.94	7.22	15.36	0.869	4.63	-151.2	~~41.8~~ 24.9		
1345	0.33	5.02	0.066	10.94	7.23	15.36	0.862	4.63	-143.1	20.4		

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; [✓ 2" = 0.16]; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88

TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Ash Willis Travis Cassella	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: 1345	SAMPLING ENDED AT: 1346
PUMP OR TUBING DEPTH IN WELL (feet): 15	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y [✓ N] Filtration Equipment Type:	Filter Size mm
FIELD DECONTAMINATION: PUMP Y [✓ N]	TUBING Y [✓ N (replaced)]	DUPLICATE: [✓ Y] N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (mL)	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH (Standard Units)			
FEWRN01-003-GW-015	2	PE	150ml each				EPA 537M	APP	100
FEWRN01-003-GW-915	2	PE	150ml each						

REMARKS: * casing 0.43 below ground surface. PAD COMPLETED. TD = ~~19.82 bgs~~ 20.48 bgs
~~Well~~ WL = ~~10.21~~ WL 11.07 bgs

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

Stabilization Criteria for range of variation of last three consecutive readings

pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation; optionally, ± 0.2 mg/L or ± 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: March 14, 2016

9/5/17

AerostarSES LLC

GROUNDWATER SAMPLING LOG

Installation: ~~MINOT AFB~~ M2027.0003 FE WARREN

Site: ~~FE WARREN~~ FORMER EPTA 2 AFFF (AREA 1)

WELL NO: FEWRN01-MW-070

SAMPLE ID: FEWRN01-MW-070-GW-020

DATE: 8-30-29

PURGING DATA

WELL DIAMETER (inches): 4"

TUBING DIAMETER (inches): 1/4 OD

WELL SCREEN INTERVAL DEPTH: 25.13 Ft - 9.13 Ft

STATIC DEPTH TO WATER (feet BTOC): 12.19

PURGE PUMP TYPE OR BAILER: PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH BTOC – STATIC DEPTH TO WATER) X WELL CAPACITY

(only fill out if applicable) = (25.13 Ft - 12.19 Ft) x 0.65 gal/ft = 8.41 gal

~~EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME~~

(only fill out if applicable) = gal = (x Ft) + gal

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 20

FINAL PUMP OR TUBING DEPTH IN WELL (feet): 20

PURGING INITIATED AT: 1240

PURGING ENDED AT: 1446

TOTAL VOLUME PURGED (gallons): 9.96

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet BTOC)	pH (standard units)	TEMP. (°C)	COND. ~~µS/cm~~ mS/cm	DISSOLVED OXYGEN mg/L	ORP (mV)	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
1240	X	X	0.079	12.19	X	X	X	X	X	X	purple*	~~clear~~ none
1250	0.79	0.79	0.079	12.45	7.35	16.26	0.899	7.26	602.3	17.8		
1330	3.16	3.95	0.079	12.62	7.09	16.14	0.916	6.55	614	6.12		
1350	1.58	5.53	0.079	12.65	6.91	16.11	0.917	20.01	599.9	4.41		
1410	1.58	7.11	0.079	12.65	6.72	15.73	0.915	6.59	628.7	3.71		
1420	0.79	7.90	0.079	12.68	7.01	14.89	0.902	6.27	635.0	3.76		
1430	0.79	8.69	0.079	12.67	7.08	15.08	0.905	6.22	635.6	3.17		
1440	0.79	9.48	0.079	12.68	7.06	15.08	0.906	6.20	636.4	3.07		
1443	0.24	9.72	0.079	12.68	7.06	15.07	0.906	6.21	636.7	3.05		

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; [✓ 4" = 0.65;] 5" = 1.02; 6" = 1.47; 12" = 5.88

TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Ash Willis
Travis Cassella / ASL

SAMPLER(S) SIGNATURE(S):

SAMPLING INITIATED AT: 1445

SAMPLING ENDED AT: 1446

PUMP OR TUBING DEPTH IN WELL (feet): 20'

TUBING MATERIAL CODE: PE

FIELD-FILTERED: Y [✓ N] Filter Size: μm

Filtration Equipment Type:

FIELD DECONTAMINATION: PUMP Y [✓ N] TUBING Y [✓ N (replaced)]

DUPLICATE: Y [✓ N]

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (mL)	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH (Stanard Units)	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
FEWRN01-MW-070-GW-020	2	PE	150mL each				EPA 537M	APP	300

REMARKS: * purple dye from potassium permanganate

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

Stabilization Criteria for range of variation of last three consecutive readings

pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation; optionally, ± 0.2 mg/L or ± 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: March 14, 2016

9/5/17

2549

AerostarSES LLC

GROUNDWATER SAMPLING LOG

Installation: ~~MINOT AFB~~ M2027.0003 FE WARREN	Site: ~~FE WARREN~~ FORMER EPTA 2 (AFFF AREA1)
WELL NO: FEWRN01-MW071	SAMPLE ID: FEWRN01-MW071-GW-020 DATE: 8-30-17

PURGING DATA

WELL DIAMETER (inches): 4"	TUBING DIAMETER (inches): 1/4 OD	WELL SCREEN INTERVAL DEPTH: ~~24.43~~ - 15.49 Ft	STATIC DEPTH TO WATER (feet BTOC): 13.91	PURGE PUMP TYPE OR BAILER: PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH BTOC – STATIC DEPTH TO WATER) X WELL CAPACITY

(only fill out if applicable) = (~~24.43~~ 25.49 Ft - 13.91 Ft) x 0.65 gal/ft = ~~6.83~~ 7.58 gal

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME

~~(only fill out if applicable) = gal = (x Ft) + gal = gal~~ 1143

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 20	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 20	PURGING INITIATED AT: 1050	PURGING ENDED AT: 1146	TOTAL VOLUME PURGED (gallons): 2.92	

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet BTOC)	pH (standard units)	TEMP. (°C)	COND. ~~µS/cm~~ mS/cm	DISSOLVED OXYGEN mg/L	ORP (mV)	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
1050	N/A	N/A	N/A	13.92	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1055	0.26	0.26	0.052	14.01	7.12	15.54	1.289	6.58	154.9	2.32	Clear	none
1105	0.52	0.78	0.052	14.03	7.11	14.67	1.256	5.94	164.5	1.65		
1115	0.52	1.30	0.052	14.03	7.11	14.23	1.241	5.38	213.0	2.35		
1125	0.52	1.82	0.052	14.04	7.12	14.08	1.235	5.48	224.1	2.18		
1135	0.52	2.34	0.052	14.03	7.11	13.91	1.223	5.95	238.8	1.72		
1140	0.26	2.60	0.052	14.02	7.12	14.05	1.234	5.64	241.2	1.83		
1143	0.156	2.76	0.052	14.02	7.12	14.06	1.235	5.64	242.0	1.80		

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; [✓ 4" = 0.65;] 5" = 1.02; 6" = 1.47; 12" = 5.88

TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Ash Willis Travis / ASL	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: 1145	SAMPLING ENDED AT: 1146
PUMP OR TUBING DEPTH IN WELL (feet): 20	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y [✓ N] Filter Size mm Filtration Equipment Type:	
FIELD DECONTAMINATION: PUMP Y [✓ N]	TUBING Y [✓ N (replaced)]	DUPLICATE: Y [✓ N]	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (mL)	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH (Stanard Units)	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
FEWRN01-MW071-GW-020	2	PE	150				EPA 537M	APP	200

REMARKS:

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

Stabilization Criteria for range of variation of last three consecutive readings

pH: ± 0.2 units Temperature: ± 0.2°C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation; optionally, ± 0.2 mg/L or ± 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: March 14, 2016

9/5/17

AerostarSES LLC

GROUNDWATER SAMPLING LOG

Installation: ~~MINOT AFB~~ AW M2027.0003 FE WARREN		Site: ~~FE WARREN~~ AW ~~AF~~ FORMER FPTA 3 (AFFF AREA 2)	
WELL NO: FEWRN02 - MW001	SAMPLE ID: FEWRN02-001 - GW-025		DATE: 9-4-17

* PURGING DATA

WELL DIAMETER (inches): 2.0	TUBING DIAMETER (inches): 1/400	WELL SCREEN INTERVAL DEPTH: 30.33 Ft - 20.33 Ft	STATIC DEPTH TO WATER (feet BTOC): * 16.95	PURGE PUMP TYPE OR BAILER: PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH BTOC – STATIC DEPTH TO WATER) X WELL CAPACITY

(only fill out if applicable) = (30.33 Ft - ~~20.33~~ AW 16.95 Ft) x 0.163 gal/ft = 2.18 gal

~~EQUIPMENT VOLUME~~ PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME

(only fill out if applicable) = AW x Ft) + gal = gal

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 25	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 25	PURGING INITIATED AT: 0804	PURGING ENDED AT: 1035	TOTAL VOLUME PURGED (gallons): 4.012

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet BTOC)	pH (standard units)	TEMP. (°C)	COND. ~~uS/cm~~ AW mS/cm	DISSOLVED OXYGEN mg/L	ORP (mV)	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
0804	N/A	N/A	0.026	16.96	N/A	N/A	N/A	N/A	N/A	N/A	Cloudy	none
0810	0.156	0.156	|	17.55	7.50	12.61	0.449	5.86	101.4	323	|	|
0815	0.156	0.312	|	17.59	7.51	12.51	0.448	5.17	40.7	306	|	|
0840	0.65	0.962	|	17.72	7.58	12.48	0.443	3.69	-115.1	392	|	|
0905	0.65	1.582	|	17.76	7.60	12.83	0.441	2.77	-145.9	282	|	|
0930	0.65	2.232	|	17.74	7.59	13.18	0.435	3.25	-166.1	221	|	|
0940	0.25	2.492	|	17.63	7.57	13.73	0.437	3.37	-153.5	164	|	|
0950	0.25	2.742	|	17.62	7.57	13.92	0.440	3.79	-150.3	133	|	|
1010	0.52	3.262	|	17.62	7.56	13.90	0.438	3.89	-139.3	106	Clear	|
1020	0.25	3.512	|	17.68	7.56	14.00	0.441	3.90	-129.0	82.5	|	|
1030	0.25	3.762	|	17.63	7.54	14.16	0.440	3.99	-124.4	81.9	|	|
1035	0.25	4.012	|	17.63	7.54	14.14	0.439	4.00	-121.8	81.6	|	|

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88

TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Ash Willis Travis Cassella / ASL	SAMPLER(S) SIGNATURE(S): AW	SAMPLING INITIATED AT: 1035	SAMPLING ENDED AT: 1036
PUMP OR TUBING DEPTH IN WELL (feet): 25	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y [✓ N] Filtration Equipment Type:	Filter Size mm
FIELD DECONTAMINATION: PUMP Y [✓ N]	TUBING Y [✓ N (replaced)]	DUPLICATE: Y [✓ N]	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (mL)	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH (Standard Units)			
FEWRN02-001-GW-025	2	PE	150ml each				EPA 537M	APP	100
				AW				AW	
	AW								

REMARKS: * Casing is 0.89 above ground surface, PAD not completed. TD of well 29.44 bgs
WL 16.06 bgs

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

Stabilization Criteria for range of variation of last three consecutive readings

pH: ± 0.2 units **Temperature:** ± 0.2 °C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation; optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: March 14, 2016

9/5/17

AerostarSES LLC

GROUNDWATER SAMPLING LOG

Installation: ~~MINOT AFB~~ M2027.0003 FE WARREN | Site: ~~FE WARREN~~ FORMER FPTA 3 (AFFF AREA 2)

WELL NO: FEWRN02-~~002-0~~ MW002 | SAMPLE ID: FEWRN02-002-GW-033 | DATE: 9-2-17

PURGING DATA

WELL DIAMETER (inches): 2.0 | TUBING DIAMETER (inches): 1/4 OD | WELL SCREEN INTERVAL DEPTH: 38.56 Ft - 28.56 Ft | STATIC DEPTH TO WATER (feet BTOC): * 16.91 | PURGE PUMP TYPE OR BAILER: PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH BTOC – STATIC DEPTH TO WATER) X WELL CAPACITY

(only fill out if applicable) = (38.56 Ft - 16.91 Ft) x 0.163 gal/ft = 3.53 gal

~~EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME~~ + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME

(only fill out if applicable) = gal = (x gal = gal

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 33 | FINAL PUMP OR TUBING DEPTH IN WELL (feet): 33 | PURGING INITIATED AT: 1458 | PURGING ENDED AT: 1600 | TOTAL VOLUME PURGED (gallons): 2.68

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet BTOC)	pH (standard units)	TEMP. (°C)	COND. ~~μS/cm~~ mS/cm	DISSOLVED OXYGEN mg/L	ORP (mV)	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
1458	N/A	N/A	0.04	16.9	N/A	N/A	N/A	N/A	N/A	N/A	Clear	none
1505	0.28	0.28	0.04	17.0	7.73	15.14	0.807	6.64	145.8	210		
1515	0.40	0.68	0.04	17.13	7.61	14.96	0.766	4.38	-170.3	180		
1525	0.40	1.08	0.04	17.7	7.62	14.46	0.766	3.97	-163.3	72.9		
1535	0.40	1.48	0.04	17.17	7.61	14.24	0.769	3.88	-148.5	45.6		
1545	0.40	1.88	0.04	17.17	7.60	14.00	0.769	4.24	-132.4	31.8		
1555	0.40	2.28	0.04	17.17	7.59	13.97	0.767	3.96	-124.5	27.7		
1600	0.40	2.68	0.04	17.17	7.57	13.90	0.766	3.99	-118.2	19.7		

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; [✓ 2" = 0.16;] 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88

TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Ash Willis / Jeremy Klein / ASL | SAMPLER(S) SIGNATURE(S): | SAMPLING INITIATED AT: 1600 | SAMPLING ENDED AT: 1601

PUMP OR TUBING DEPTH IN WELL (feet): 33 | TUBING MATERIAL CODE: PE | FIELD-FILTERED: Y [✓ N] | Filter Size: mm | Filtration Equipment Type:

FIELD DECONTAMINATION: PUMP Y [✓ N] | TUBING Y [✓ N (replaced)] | DUPLICATE: Y [✓ N]

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (mL)	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH (Stanard Units)	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
FEWRN02-002-GW-033	2	PE	150 ml each				EPA 537M	APP	150

REMARKS: * Casing @ 0.95 above ground surface

1600 Developed

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

Stabilization Criteria for range of variation of last three consecutive readings

pH: ± 0.2 units **Temperature:** ± 0.2 °C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation; optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: March 14, 2016

9/5/17

AerostarSES LLC

GROUNDWATER SAMPLING LOG

Installation: ~~MINOT AFB~~ M2027.0003 FE WARREN		Site: ~~FE WARREN~~ FORMER FDTA 3(AFFF AREA 2)	
WELL NO: FEWRN02-~~003R~~ - MW003	SAMPLE ID: FEWRN02-003-GW-030		DATE: 9-2-17

PURGING DATA

WELL DIAMETER (inches): 2.0	TUBING DIAMETER (inches): 1/4 OD	* WELL SCREEN INTERVAL DEPTH: 35.35 Ft - 25.35 Ft	STATIC DEPTH TO WATER (feet BTOC): * 15.06	PURGE PUMP TYPE OR BAILER: PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH BTOC – STATIC DEPTH TO WATER) X WELL CAPACITY

(only fill out if applicable) = (35.35 Ft - 15.06 Ft) x 0.16 gal/ft = 3.24 gal

~~EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME~~

~~(only fill out if applicable) = gal = (Ft.) + gal = gal~~

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 30	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 30	PURGING INITIATED AT: 1318	PURGING ENDED AT: 1415	TOTAL VOLUME PURGED (gallons): 3.94

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet BTOC)	pH (standard units)	TEMP. (°C)	COND. ~~µS/cm~~ mS/cm	DISSOLVED OXYGEN mg/L	ORP (mV)	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
1318	N/A	N/A	~~0.250~~	15.04	N/A	N/A	N/A	N/A	N/A	N/A	Clear	none
1325	0.49	0.49	0.07	15.23	7.66	15.05	0.996	5.24	-25.9	75.43		
1330	0.49	0.98	0.07	15.23	7.61	14.81	0.990	3.55	-76.8	214.0		
1335	0.49	1.47	0.07	15.23	7.58	13.98	0.946	2.67	-133.6	182		
1340	0.49	1.96	0.07	15.25	7.60	13.50	0.896	2.73	-143.3	150		
1345	0.49	2.45	0.07	15.24	7.61	13.45	0.847	2.63	-133.1	101		
1350	0.49	2.94	0.07	15.24	7.64	13.35	0.838	2.40	-127.5	91.7		
1355	0.20	3.14	0.04	15.24	7.63	13.49	0.830	2.48	-118.7	82.3		
1400	0.20	3.34	0.04	15.22	7.64	13.58	0.817	2.46	-110.8	66.4		
1405	0.20	3.54	0.04	15.20	7.63	13.63	0.799	4.20	-93.7	52.7		
1410	0.20	3.74	0.04	15.20	7.62	13.28	0.792	4.15	-87.0	51.9		
1415	0.20	3.94	0.04	15.20	7.61	13.56	0.793	4.17	-85.3	50.0		

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88

TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Ash Willis Jeremy Klein (ASL)	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: 1415	SAMPLING ENDED AT: 1416
PUMP OR TUBING DEPTH IN WELL (feet): 30	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y [✓ N] Filtration Equipment Type:	Filter Size mm
FIELD DECONTAMINATION: PUMP Y [✓ N]	TUBING Y [✓ N (replaced)]	DUPLICATE: Y [✓ N]	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (mL)	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH (Standard Units)	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
FEWRN02-003-GW-030	2	PE	150mL each				EPA 537M	APP	150

REMARKS:
* Casing is 0.61 above ground surface
1415 END PURGE

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

Stabilization Criteria for range of variation of last three consecutive readings

pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation; optionally, ± 0.2 mg/L or ± 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: March 14, 2016

9/5/17

AerostarSES LLC

GROUNDWATER SAMPLING LOG

JAB

Installation: ~~MINOT AFB - M2027.0003~~ FE Warren AFB

Site: ~~FE WARREN~~ FPTA3 (AFFF Area 2) JAB

WELL NO: FEWRN02-~~002~~ MW004

SAMPLE ID: FEWRN02-004-GW-024

DATE: 9-2-17

PURGING DATA

WELL DIAMETER (inches): 2"

TUBING DIAMETER (inches): 1/4 OD

WELL SCREEN INTERVAL DEPTH: 28.76 Ft - 18.76 Ft

STATIC DEPTH TO WATER (feet BTOC): ~~14.78~~ 13.78 JAB

PURGE PUMP TYPE OR BAILER: PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH BTOC – STATIC DEPTH TO WATER) X WELL CAPACITY

(only fill out if applicable) = (28.76 Ft - ~~14.78~~ 13.78 Ft) x .16 gal/ft = ~~2.24~~ 2.44 JAB gal

~~EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME~~ JAB

~~(only fill out if applicable) = gal = (x Ft) + gal = gal~~

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 24

FINAL PUMP OR TUBING DEPTH IN WELL (feet): 24

PURGING INITIATED AT: 1638

PURGING ENDED AT: 1740

TOTAL VOLUME PURGED (gallons): 2.84

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet BTOC)	pH (standard units)	TEMP. (°C)	COND. ~~µS/cm~~ mS/cm	DISSOLVED OXYGEN mg/L	ORP (mV)	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
1638	N/A	N/A	0.05	13.75	N/A	N/A	N/A	N/A	N/A	N/A	Clear	none
1645	0.42	0.42	0.05	13.96	7.73	13.66	1.019	10.05	-58.7	222	|	|
1650	0.42	0.84	0.05	13.96	7.65	12.38	0.989	5.25	-90.7	133	|	|
1710	0.50	1.34	0.05	13.96	7.55	12.11	0.986	5.08	-95.0	56.6	|	|
1720	0.50	1.84	0.05	13.96	7.50	12.00	0.981	5.66	-101.7	35.6	|	|
1730	0.50	2.34	0.05	13.96	7.48	12.27	0.991	5.48	-95.6	25.7	|	|
1740	0.50	2.84	0.05	13.96	7.49	12.23	0.987	5.26	-92.2	19.3	|	|

JAB

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88

TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Ash Willis
J. Klein, To Cassella (ASL)

SAMPLER(S) SIGNATURE(S):

SAMPLING INITIATED AT: 1740

SAMPLING ENDED AT: 1741

PUMP OR TUBING DEPTH IN WELL (feet): 24

TUBING MATERIAL CODE: PE

FIELD-FILTERED: Y [✓ N] Filter Size: mm

Filtration Equipment Type:

FIELD DECONTAMINATION: PUMP Y [✓ N] TUBING Y [✓ N (replaced)]

DUPLICATE: Y [✓ N]

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (mL)	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH (Standard Units)			
FEWRN02-004-~~FEWRN02-002~~ GW-024	2	PE	150ml each				EPA 537M	APP	190

JAB

REMARKS: * Casing 0.51 below ground surface, pad finished

1740 purge end

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

Stabilization Criteria (for range of variation of last three consecutive readings)

pH: ± 0.2 units **Temperature:** ± 0.2 °C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation; optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: March 14, 2016

9/5/17

AerostarSES LLC

GROUNDWATER SAMPLING LOG

Installation: ~~MINOT AFB~~ M2027.0003 FE WARREN | Site: ~~FE WARREN~~ Building 1247 (Base fuels) (AFFF AREA3)

WELL NO: FEWRN03-MW001 | SAMPLE ID: FEWRN03-001-GW-020 | DATE: 9/1/17

PURGING DATA

WELL DIAMETER (inches): 2 | TUBING DIAMETER (inches): 1/4 | WELL SCREEN INTERVAL ~~DEPTH~~: 25.35 Ft ~~25.35~~ 15.35 Ft | STATIC DEPTH TO WATER (feet BTOC): 10.18 | PURGE PUMP TYPE OR BAILER: PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH BTOC – STATIC DEPTH TO WATER) X WELL CAPACITY

(only fill out if applicable) = (25.35 Ft – 10.18 Ft) x 0.16 gal/ft = 2.43 gal

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME

(only fill out if applicable) = 0 gal + (0.0026 x 20 Ft) + 0.25 gal = gal

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 20 | FINAL PUMP OR TUBING DEPTH IN WELL (feet): 20 | PURGING INITIATED AT: 1618 | PURGING ENDED AT: 1735 | TOTAL VOLUME PURGED (gallons): 2.088

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet BTOC)	pH (standard units)	TEMP. (°C)	COND. ~~µS/cm~~ mS/cm	DISSOLVED OXYGEN mg/L	ORP (mV)	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
1618	N/A	N/A	~~HO~~	9.96	N/A	N/A	N/A	N/A	N/A	N/A	Clear	none
1626	0.232	0.232	0.029	11.12	7.41	17.53	0.750	11.41	-79.1	7.06		
1636	0.232	0.464	0.029	12.32	7.46	16.50	0.737	5.70	-120.7	20.6		
1650	0.232	0.696	0.029	13.61	7.49	16.91	0.732	8.51	-120.3	6.08		
1700	0.232	0.928	0.029	14.70	7.48	16.76	0.730	5.38	-119.1	7.62		
1710	0.232	1.160	0.029	15.00	7.47	16.42	0.722	5.43	-116.1	8.23		
1720	0.232	1.392	0.029	15.03	7.47	15.95	0.709	5.52	-110.5	4.74		
1725	0.232	1.624	0.029	15.52	7.43	16.31	0.713	5.54	-116.1	4.60		
1730	0.232	1.856	0.029	15.62	7.43	16.40	0.715	5.54	-115.3	4.52		
1735	0.232	2.088	0.029	15.50	7.42	16.45	0.715	5.51	-115.5	4.20		

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88

TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: J. Klein, A. Willis/ASE | SAMPLER(S) SIGNATURE(S): | SAMPLING INITIATED AT: 1735 | SAMPLING ENDED AT: 1735

PUMP OR TUBING DEPTH IN WELL (feet): 20 | TUBING MATERIAL CODE: PE | FIELD-FILTERED: Y [✓ N] Filter Size mm | Filtration Equipment Type:

FIELD DECONTAMINATION: PUMP Y [✓ N] TUBING Y [✓ N (replaced)] | DUPLICATE: Y [✓ N]

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (mL)	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH (Stanard Units)			
FEWRN03-001-GW-020	2	PE	125	N/A	N/A	N/A	EPA 537M	APP	

REMARKS: casing at ground surface

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

Stabilization Criteria for range of variation of last three consecutive readings

pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation; optionally, ± 0.2 mg/L or ± 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: March 14, 2016

9/5/17

AerostarSES LLC

GROUNDWATER SAMPLING LOG

Installation: ~~MINOT AFB~~ KD M2027.0003 FE WARREN

Site: ~~FE WARREN~~ KD Building 1247 (Base Fuels) (AFFF AREA 3)

WELL NO: FEWRN03~~-002~~ - MW002

SAMPLE ID: FEWRN03-002-GW-020

DATE: 8-31-17

PURGING DATA

WELL DIAMETER (inches): 2

TUBING DIAMETER (inches): 1/4 OD

WELL SCREEN INTERVAL DEPTH: 25.15 Ft - 15.15 Ft

STATIC DEPTH TO WATER (feet BTOC): 11.6

PURGE PUMP TYPE OR BAILER: PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH BTOC – STATIC DEPTH TO WATER) X WELL CAPACITY

(only fill out if applicable) = (25.15 Ft - 11.6 Ft) x 0.16 gal/ft = 2.168 gal

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME

(only fill out if applicable) = 0 gal = (0.0026 x 20.15 Ft) + 0.25 gal = 0.302 gal

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 20.15

FINAL PUMP OR TUBING DEPTH IN WELL (feet): 20.15

PURGING INITIATED AT: 1506

PURGING ENDED AT: 1534

TOTAL VOLUME PURGED ~~(gallons)~~ L:

TIME	VOLUME PURGED ~~(gallons)~~ L mL	CUMUL. VOLUME PURGED ~~(gallons)~~ mL	PURGE RATE ~~(gpm)~~ mL/min	DEPTH TO WATER (feet BTOC)	pH (standard units)	TEMP. (°C)	COND. ~~µS/cm~~ mS/cm	DISSOLVED OXYGEN mg/L	ORP (mV)	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
1512	0	0	150	11.29	7.43	18.18	0.571	4.95	37.2	21.0	Clear	None
1519	1050	1050	150	12.99	7.63	16.84	0.545	4.10	27.4	2.88	Clear	none
1524	750	1800	150	13.25	7.34	16.50	0.534	3.44	33.0	8.00	Clear	none
1529	750	2550	150	14.11	7.39	16.47	0.534	3.22	30.7	3.06	clear	none
1534	750	3300	150	14.95	7.41	16.53	0.531	3.26	29.3	2.33	clear	none

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88

TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: J. Klein / ASL

SAMPLER(S) SIGNATURE(S):

SAMPLING INITIATED AT: 1534

SAMPLING ENDED AT: 1539

PUMP OR TUBING DEPTH IN WELL (feet): 20.15

TUBING MATERIAL CODE: PE

FIELD-FILTERED: Y [✓ N] Filter Size mm

Filtration Equipment Type:

FIELD DECONTAMINATION: PUMP Y [✓ N] TUBING Y [✓ N] (replaced)

DUPLICATE: Y [✓ N]

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (mL)	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH (Standard Units)			
FEWRN03-002-GW-020	2	PE	125	N/A	N/A	N/A	EPA 537M	APP	150

REMARKS: ~~1506 began F~~

Permanent Well

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

Stabilization Criteria for range of variation of last three consecutive readings

pH: ± 0.2 units **Temperature:** ± 0.2 °C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation; optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: March 14, 2016

John
9/5/17

AerostarSES LLC

GROUNDWATER SAMPLING LOG

Installation: ~~MINOT AFB~~ M2027.0003 @ FE WARREN

Site: ~~FE WARREN~~ Building 1247 (Base Fuels) (AFFF Area 3)

WELL NO: FEWRN03-~~B003~~ MW003

SAMPLE ID: FEWRN03-003-GW-020

DATE: 8-31-17

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 1/4 OD	* WELL SCREEN INTERVAL DEPTH: 25.43 Ft - 15.43 Ft	* STATIC DEPTH TO WATER (feet BTOC): 8.47	PURGE PUMP TYPE OR BAILER: PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH BTOC – STATIC DEPTH TO WATER) X WELL CAPACITY

(only fill out if applicable) = (25.43 Ft - 8.49 Ft) x 0.163 gal/ft = 2.76 gal

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME

(only fill out if applicable) = gal = (x Ft) + gal = gal

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 20	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 20	PURGING INITIATED AT: 1010	PURGING ENDED AT: 1110	TOTAL VOLUME PURGED (gallons): 4.95

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet BTOC)	pH (standard units)	TEMP. (°C)	COND. ~~µS/cm~~ mS/cm	DISSOLVED OXYGEN mg/L	ORP (mV)	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
1010	N/A	N/A	0.026	8.43	N/A	N/A	N/A	N/A	N/A	N/A	Clear	none
1040	0.78	0.78	|	10.97	7.77	16.69	1.052	7.73	-16.9	24.4	|	|
1045	0.13	0.91	|	13.77	7.76	16.35	1.034	7.77	-32.3	9.37	|	|
1050	0.13	1.04	|	13.91	7.77	16.55	1.041	7.12	-34.3	8.56	|	|
1100	0.13	1.30	|	14.88	7.77	16.59	1.046	7.28	-34.8	7.73	|	|
1110	0.26	1.56	⊥	15.82	7.75	16.54	1.056	7.29	-44.2	4.95	⊥	⊥

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88

TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Ash Willis (tdl) Travis Cassell Jeremy Klein

SAMPLER(S) SIGNATURE(S):

SAMPLING INITIATED AT: 1110

SAMPLING ENDED AT: 1112

PUMP OR TUBING DEPTH IN WELL (feet): 20

TUBING MATERIAL CODE: PE

FIELD-FILTERED: Y [✓ N] Filter Size: mm

Filtration Equipment Type:

FIELD DECONTAMINATION: PUMP Y [✓ N] TUBING Y [✓ N (replaced)]

DUPLICATE: [✓ Y] N

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (mL)	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH (Stenard Units)	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
FEWRN03-003-GW-020	2	PE	150 mL each				EPA 537M	APP	100
FEWRN03-003-GW-920	2	PE	150 mL each						

REMARKS:
* Casing 4.8 from ground, pad dug out but not completed
** SAMPLED AFTER 3 consecutive stable parameters.

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

Stabilization Criteria for range of variation of last three consecutive readings

pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation; optionally, ± 0.2 mg/L or ± 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: March 14, 2016

9/5/17

AerostarSES LLC

SAMPLE COLLECTION LOG
SEDIMENT / SURFACE WATER / GROUNDWATER (GRAB)

Project Name: Site Inspections of AFFF Areas (USACE Omaha District)
ASL Project No: M2027.0003
Installation: FE WARREN
Date: 9-1-17
Sample Technician(s): Ash Willis / Jeremy Klein / Travis Cassella
Station ID: FEWRN01 - 004
Location Description:
80', 190° SW of Missle Dr and Old Glory Rd Intersection

Type(s) of Sample (circle all that apply): [✓ Sediment] [✓ Surface Water] Groundwater

Sample Collected from (circle one): [✓ Channel/Ditch] Holding Pond/Lagoon Lake/Pond River/Stream Trench Other ____

SEDIMENT SAMPLE

Sample ID: FEWRN01-004-SD-001
Sample Collection Time: 0845
Sample Depth: 0-0.5
Sediment Description: Well sorted silty Sand
Collection Method: Spoon
Analysis/Method: EPA 537M
Sample Container: 250mL
Preservative: NONE

SURFACE WATER SAMPLE

Sample ID: FEWRN01-004-SW-001
Sample Collection Time: 0845
Sample Depth: 0-0.5
Collection Method: Collector
Analysis/Method: EPA 537M
Sample Container: 2 x 150 mL
Preservative: NONE
Water Quality (circle one): Clear Cloudy Turbid Other

GROUNDWATER SAMPLE (GRAB)

Sample ID: ____
Sample Collection Time: ____
Sample Depth: ____
Collection Method: ____
Analysis/Method: EPA 537M
Sample Container: ____
Preservative: NONE
Water Quality (circle one): Clear Cloudy Turbid Other

COMMENTS: no comments

9/4/17

100 260

AerostarSES LLC

SAMPLE COLLECTION LOG
SEDIMENT / SURFACE WATER / GROUNDWATER (GRAB)

Project Name: Site Inspections of AFFF Areas (USACE Omaha District)

ASL Project No: M2027.0003

Installation: FE WARREN

Date: 8-29-17

Sample Technician(s): Ash Willis / Travis Cassella / Jeremy Klein

Station ID: FEWRN01-005

Location Description:
650', 75° NE of Missle Drive and Old Glory Road intersection

Type(s) of Sample (circle all that apply): [✓ Sediment] [✓ Surface Water] Groundwater

Sample Collected from (circle one): Channel/Ditch Holding Pond/Lagoon Lake/Pond [✓ River/Stream] Trench Other ______

SEDIMENT SAMPLE

Sample ID: FEWRN01-005-SD-901
FEWRN01-005-SD-001

Sample Collection Time: 1100

Sample Depth: 0-0.5

Sediment Description: organic gravelly silt

Collection Method: Spoon

Analysis/Method: EPA 537M

Sample Container: 2 X 250mL

Preservative: NONE

SURFACE WATER SAMPLE

Sample ID: FEWRN01-005-SW-901
FEWRN01-005-SW-001

Sample Collection Time: 1100

Sample Depth: 0-0.5

Collection Method: collector

Analysis/Method: EPA 537M

Sample Container: 4 X 150mL

Preservative: NONE

Water Quality (circle one): [✓ Clear] Cloudy Turbid Other

GROUNDWATER SAMPLE (GRAB)

Sample ID: ______

Sample Collection Time: ______

Sample Depth: ______

Collection Method: ______

Analysis/Method: EPA 537M

Sample Container: ______

Preservative: NONE

Water Quality (circle one): Clear Cloudy Turbid Other

COMMENTS: Parent and Duplicate for both SD and SW
GPS ✓

9/4/17

AerostarSES LLC

SAMPLE COLLECTION LOG
SEDIMENT / SURFACE WATER / GROUNDWATER (GRAB)

Project Name: Site Inspections of AFFF Areas (USACE Omaha District)

ASL Project No: M2027.0003

Installation: FE WARREN

Date: 9-1-17

Sample Technician(s): Ash Willis / Jeremy Klein / Travis Cassella

Station ID: FEWRN02-005

Location Description:
650', 30° NE of NE corner of building 1337

Type(s) of Sample (circle all that apply): [✓ Surface Soil] ~~Sediment~~ AW Surface Water Groundwater

Sample Collected from (circle one): [✓ Channel/Ditch] Holding Pond/Lagoon Lake/Pond River/Stream Trench Other ____

* Surface Soil ~~SEDIMENT~~ SAMPLE AW

Sample ID: FEWRN02-005-SS-001

Sample Collection Time: 0825

Sample Depth: 0-0.15

Sediment Description: organic clayey silt

Collection Method: Spoon

Analysis/Method: EPA 537M

Sample Container: 250mL

Preservative: NONE

SURFACE WATER SAMPLE

Sample ID: ____

Sample Collection Time: ____

Sample Depth: ____

Collection Method: ____

Analysis/Method: EPA 537M

Sample Container: ____

Preservative: NONE

AW

Water Quality (circle one): Clear Cloudy Turbid Other

GROUNDWATER SAMPLE (GRAB)

Sample ID: ____

Sample Collection Time: ____

Sample Depth: ____

Collection Method: ____

Analysis/Method: EPA 537M

Sample Container: ____

Preservative: NONE

Water Quality (circle one): Clear Cloudy Turbid Other

COMMENTS: * Ditch DRY - changed SD/SW to SS

9/4/17

AerostarSES LLC

SAMPLE COLLECTION LOG
SEDIMENT / SURFACE WATER / GROUNDWATER (GRAB)

Project Name: Site Inspections of AFFF Areas (USACE Omaha District)

ASL Project No: M2027.0003

Installation: FE WARREN

Date: 8-29-17

Sample Technician(s): Ash Willis / Jeremy Klein

Station ID: FEWRN02-006

Location Description:
750', NE 130° of the NE corner of Building 1337

Type(s) of Sample (circle all that apply): [✓ Sediment] [✓ Surface Water] Groundwater

Sample Collected from (circle one): Channel/Ditch Holding Pond/Lagoon Lake/Pond [✓ River/Stream] Trench Other ______

SEDIMENT SAMPLE

MS/MSD [✓ MS/MSD]

Sample ID: FEWRN02-006-SD-001

Sample Collection Time: 1235

Sample Depth: 0-0.5

Sediment Description: organic silt

Collection Method: Spoon

Analysis/Method: EPA 537M

Sample Container: 3 x 250ml

Preservative: NONE

SURFACE WATER SAMPLE

MS/MSD [✓ MS/MSD]

Sample ID: FEWRN02-006-SW-001

Sample Collection Time: 1235

Sample Depth: 0-0.5

Collection Method: collector

Analysis/Method: EPA 537M

Sample Container: 6 X 150mL

Preservative: NONE

Water Quality (circle one): Clear [✓ Cloudy] Turbid Other

GROUNDWATER SAMPLE (GRAB)

Sample ID:

Sample Collection Time:

Sample Depth:

Collection Method:

Analysis/Method: EPA 537M

Sample Container:

Preservative: NONE

Water Quality (circle one): Clear Cloudy Turbid Other

COMMENTS:

9/4/17

AerostarSES LLC

WELL DEVELOPMENT LOG

Project Name: SI AFFF MULTIPLE SITES

ASL Project No: M2027.0003

Installation: FE WARREN

Site: AREA 1

Date: 9-2-17

Sample Technician: Ash Willis / Travis Cassella / Jeremy Klein

Well ID No.: FEWRN01-~~001~~ MW001

Initial Measurements

Well Total Depth: * 20.85 ft BTOC		Water Level: * 11.88 ft BTOC	
WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH BTOC – STATIC DEPTH TO WATER) X WELL CAPACITY			
(only fill out if applicable) = (20.85 Ft - 11.88 Ft) x 0.163 gal/ft = 1.43 Gal			
Calculated Well Volume: 1.43 Gallons		Well Diameter: 2.0 inches	
Calculations:	1" diameter = 0.041 gal/ft	[✓ 2" diameter = 0.163 gal/ft]	4" diameter = 0.653 gal/ft

Well Purging Activites

Purging Method (pump type): Monsoon

Flow rate (incl. units): 500 – 1400 ml/min

Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. (mS/Cm)	pH	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gal Pumped	Comments
0745	500	N/A	N/A	N/A	N/A	11.71	N/A	N/A	N/A	DEVELOPMENT STARTED
0750	500	** OR	14.22	1.029	7.56	13.64	0.88	-458.6	0.66	
0812	500	N/A	N/A	N/A	N/A	~~14.5~~ 15.2	N/A	N/A	3.56	stopped to surge
0816	1400	N/A	N/A	N/A	N/A	14.5	N/A	N/A	3.56	Resummed development
0818	1400	OR	13.98	1.003	7.69	15.6	0.21	-610.3	5.04	
0820	1400	OR	13.98	1.003	7.69	15.6	0.21	-614.9	5.78	Turned off to recharge - due to slow recharge.
0840	500	N/A	N/A	N/A	N/A	13.0	N/A	N/A	5.78	Resummed development
0850	500	OR	14.00	1.059	7.72	14.9	0.83	-627.3	7.1	
0905	500	OR	14.73	1.084	7.69	14.17	0.82	-626.1	9.08	stopped to surge
0908	600	N/A	N/A	N/A	N/A	13.56	N/A	N/A	9.08	Resummed development
0918	600	OR	14.94	1.090	7.63	14.33	0.22	-623.3	10.66	END OF DEVELOPMENT
Results At End Of Purging:		OR	14.94	1:090	7.63	14.33	0.22	-623.3	10.66	

COMMENTS: * Casing 0.55 above ground surface

7.31 = 5 well volumes

** OR = over range

0918 Developed after purging 10.66 gal (> 5 well volumes)

9/5

AerostarSES LLC

WELL DEVELOPMENT LOG

Project Name: SI AFFF MULTIPLE SITES
ASL Project No: M2027.0003
Installation: FE WARREN
Site: Area 1
Date: 9/2/2017
Sample Technician: Travis Cassella Kaleb Brumbaugh
Well ID No.: FEWRN01- MW002

Initial Measurements

Well Total Depth: 20.38 ft BTOC		Water Level: 10.88 ft BTOC	
WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH BTOC – STATIC DEPTH TO WATER) X WELL CAPACITY			
(only fill out if applicable) = (20.38 Ft - 10.88) x 0.163 gal/ft = 1.55 Gal			
Calculated Well Volume: 1.55 Gallons		Well Diameter: 2 inches	
Calculations:	1" diameter = 0.041 gal/ft	2" diameter = 0.163 gal/ft	4" diameter = 0.653 gal/ft

Well Purging Activites

Purging Method (pump type): Monsoon Pump
Flow rate (incl. units): 500 – 1,000 mL/min

Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. (mS/Cm)	pH	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gal Pumped	Comments
1405	Initiate purge									
1410	600 mL	OR*	17.9	1.18	7.68	12.28	0.04	112.8	0.79	
1420	600 mL	OR	16.3	1.17	7.71	12.81	1.04	65.1	2.40	
1420	Stop pump to surge									
1424	Initiate pump					12.04				
1434	1000 mL	OR	14.8	1.14	7.67	13.25	3.37	52.2	5.04	
1435	Stop Pump · Surge								5.04	
1437	Initiate Pump								5.04	
1447	1000 mL	OR	14.9	1.15	7.94	12.59	3.02	31.7	7.68	
1452	500 mL	OR	16.1	1.18	7.97	11.80	3.01	10.6	8.34	
1457	500 mL	OR	15.8	1.17	8.04	11.75	2.99	-17.9	~~8~~ 9.00	
1502	500 mL	OR	15.8	1.17	7.98	11.72	2.95	-24.7	9.66	

TRC

Results At End Of Purging: 9.66 gal

COMMENTS:
7.74 = 5 well volumes
OR* = Over Range
* 9.66 gal Purged
1402 - Surge well prior to pumping

3,785 mL/Gal

0.16 .66 = 5vols

9/5/17

AerostarSES LLC

WELL DEVELOPMENT LOG

Project Name: SI AFFF MULTIPLE SITES
ASL Project No: M2027.0003
Installation: FE WARREN
Site: AREA 1
Date: 8-29-17
Sample Technician: Ash Willis / Travis Cassella
Well ID No.: FEWRNO1-MW-070-~~GW~~- AW

Initial Measurements

Well Total Depth: 25.13 ft BTOC		Water Level: 12.10 ft BTOC	
WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH BTOC – STATIC DEPTH TO WATER) X WELL CAPACITY (only fill out if applicable) = (25.13 Ft - 12.10 Ft) x 0.653 gal/ft = 8.51 Gal			
Calculated Well Volume: 8.51 Gallons		Well Diameter: 4.0 inches	
Calculations:	1" diameter = 0.041 gal/ft	2" diameter = 0.163 gal/ft	4" diameter = 0.653 gal/ft

Well Purging Activites

Purging Method (pump type): Monsoon
Flow rate (incl. units): 800 – 2000 ml/min

0843 Stopped to Surge
0956 stopped to surge

Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. (mS/Cm)	pH	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gal Pumped	Comments
0743	800 mL	Out of range	12.06	1.288	7.19	12.7	6.86	544.3	0.63	surged before starting purge
0810	800 mL	out of range	12.24	1.251	7.24	13.86	5.12	601.4	6.33	
0855		out of range	12.54	1.311	7.31	13.41	5.41	619.8	13.33	
0935		~~out of range~~ 52.6 AW	12.33	1.355	7.20	14.22	4.80	648.3	21.78	
0959	1200	67.0	12.20	1.354	7.25	14.13	5.80	618.7	26.64	
1020	1200	16.6	12.20	1.365	7.18	14.49	5.18	652.8	33.3	
1025	1200	11.0	12.11	1.365	7.19	14.52	5.20	653.1	34.88	
1030	1500	8.98	12.09	1.364	7.19	14.47	5.20	653.5	36.46	
1035	1500	6.66	12.11	1.366	7.20	14.44	5.20	654.4	38.44	
1040	2000	6.25	12.12	1.366	7.20	14.45	5.20	654.5	40.42	
1045	2000	6.18	12.12	1.366	7.20	14.45	5.20	654.5	43.06	
				AW						
Results At End Of Purging:		4.18	12.12	1.366	7.20	14.45	5.20	654.5	44.64	

COMMENTS: Purging 0740
0843 Stopped to surge
0855 Start purge again
0956 Stopped to surge
0958 Start purge again

1048 purge ended, developed after 44.64 gal

* WELL Maybe has some type of purple dye.
Talked to Ernesto Perez – its potassium permanganate from TCE plume clean up from the NE.

9/5/17

AerostarSES LLC

WELL DEVELOPMENT LOG

Project Name: SI AFFF MULTIPLE SITES
ASL Project No: M2027.0003
Installation: FE WARREN
Site: AREA 1
Date: 8-28-17
Sample Technician: Ash Willis / Travis Cassella
Well ID No.: FEWRN01-MW071

Initial Measurements

Well Total Depth: 25.49 ft BTOC		Water Level: 13.88 ft BTOC	
WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH BTOC – STATIC DEPTH TO WATER) X WELL CAPACIT			
(only fill out if applicable) = (25.49 Ft - 13.88 Ft) x 0.653 gal/ft = 7.58 Gal			
Calculated Well Volume: 7.58 Gallons		Well Diameter: 4.0 inches	
Calculations:	1" diameter = 0.041 gal/ft	2" diameter = 0.163 gal/ft	4" diameter = 0.653 gal/ft

Well Purging Activites

Purging Method (pump type): Monsoon
Flow rate (incl. units): ~ 700ml/min

Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. (mS/Cm)	pH	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gal Pumped	Comments
1450	700ml/min	N/A	N/A	N/A	N/A	13.88	N/A	N/A	N/A	Surged before started
1455	700ml/min	* OR	13.06	2.860	7.09	14.25	1.04	229.3	0.92	
1515		31.6	12.55	2.159	7.18	14.36	1.02	96.3	4.62	Surged after this reading
1520		216	12.41	2.156	7.16	14.40	1.06	76.6	5.54	
1532		120	12.33	2.149	7.28	14.40	1.00	41.4	7.76	Surged after this reading
1536		OR	12.38	2.154	7.29	14.30	1.02	31.8	8.5	
1546		6.99	12.14	2.141	7.16	14.55	1.01	29.6	10.35	
1550		7.00	12.12	2.138	7.17	14.54	1.00	27.0	11.08	
1552		5.54	12.12	2.141	7.18	14.55	0.97	24.3	11.45	
Results At End Of Purging:		5.54	12.12	2.141	7.18	14.55	0.97	24.3	11.45	

COMMENTS: Surged three times. Developement ended after pursing 11.45gal
*OR - out of range

9/5/17

AerostarSES LLC

WELL DEVELOPMENT LOG

Project Name: SI AFFF MULTIPLE SITES
ASL Project No: M2027.0003
Installation: FE WARREN
Site: AREA 2
Date: 9-2-17
Sample Technician: Ash Willis / Jeremy Klein
Well ID No.: FEWRN02-~~002~~ MW001 AW

Initial Measurements

Well Total Depth: *29.87 ft BTOC		Water Level: *17.04 ft BTOC	
WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH BTOC – STATIC DEPTH TO WATER) X WELL CAPACITY			
(only fill out if applicable) = (29.87 Ft -17.04 Ft) x 0.163 gal/ft = 2.09 Gal			
Calculated Well Volume: 2.09 Gallons		Well Diameter: 2.0 inches	
Calculations:	1" diameter = 0.041 gal/ft	[✓ 2" diameter = 0.163 gal/ft]	4" diameter = 0.653 gal/ft

Well Purging Activites

Purging Method (pump type): Monsoon
Flow rate (incl. units): 700 - 1800 ml/min

Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. [✓ (mS/Cm)]	pH	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gal Pumped	Comments
1030	700	N/A	N/A	N/A	N/A	16.68	N/A	N/A	N/A	Started Developing
1036	700	**OR	13.69	1.076	8.09	20.10	1.66	-296.9	0.74	
1052	700	OR	14.65	1.062	7.88	20.67	0.30	-544.6	3.7	Stopped to surge
1053	750	N/A	N/A	N/A	N/A	19.04	N/A	N/A	3.7	Resummed developing
1115	750	OR	11.27	1.075	7.65	21.32	5.50	-98.5	8.06	Stopped to surge
1118	700	N/A	N/A	N/A	N/A	19.95	N/A	N/A	8.06	Resummed developing
1135	700	OR	11.47	AW 0.757	7.66	20.93	5.78	-80.4	11.2	
1140	700	OR	11.49	0.750	7.65	20.96	5.95	-73.1	12.12	Stopped to surge
1145	1800	N/A	N/A	N/A	N/A	18.65	N/A	N/A	12.12	Resume Developing
1150	1800	OR	11.02	0.754	7.65	23.20	5.81	-70.8	14.5	Developed
Results At End Of Purging:		OR	11.02	0.754	7.65	23.20	5.81	-70.8	14.5	

COMMENTS: * Casing is 0.88 above ground surface
** OR = overrange
10.46 = 5 well volume
1150 Developed after purging 14.5 gal (>5 well volumes)

9/5/17

AerostarSES LLC

WELL DEVELOPMENT LOG

Project Name: SI AFFF MULTIPLE SITES
ASL Project No: M2027.0003
Installation: FE WARREN
Site: AREA 2
Date: 8-31-17
Sample Technician: Ash Willis / Travis Cassella / Jeremy Klein
Well ID No.: FEWRN02-~~002~~ MW002

Initial Measurements

Well Total Depth: * 38.60 ft BTOC		Water Level: *17.04 ft BTOC	
WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH BTOC – STATIC DEPTH TO WATER) X WELL CAPACITY			
(only fill out if applicable) = (38.60 Ft - 17.04Ft) x 0.163 gal/ft = 3.51 Gal			
Calculated Well Volume: 3.51 Gallons		Well Diameter: 2.0 inches	
Calculations:	1" diameter = 0.041 gal/ft	[✓ 2" diameter = 0.163 gal/ft]	4" diameter = 0.653 gal/ft

Well Purging Activites

Purging Method (pump type): Monsoon
Flow rate (incl. units): 900 – 15,000 ml/min

Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. (mS/Cm)	pH	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gal Pumped	Comments
1820	15000	N/A	N/A	N/A	N/A	16.99	N/A	N/A	N/A	Development started
1830	1000	** OR	13.41	0.406	7.89	18.78	0.95	12.9	3.98	
1836	1000	OR	13.05	0.403	7.88	18.81	0.97	13.3	5.57	stopped to surge
1838	900	N/A	N/A	N/A	N/A	17.70	N/A	N/A	5.57	Resumed purging
1848	900	OR	12.67	0.400	7.80	18.88	1.50	15.5	7.95	
1858	900	OR	12.21	0.392	7.81	18.90	1.12	16.4	10.33	Stopped to surge
1859	1000	N/A	N/A	N/A	N/A	17.85	N/A	N/A	10.33	Resumed purging
1909	~~1000~~ 1200	OR	12.05	0.392	8.00	19.30	1.09	3.0	10.65	
1920	1600	OR	11.67	0.392	8.05	19.10	1.17	3.2	14.87	
1928	1600	~~850~~ 850	11.58	0.382	9.10	19.15	1.11	-70.5	18.25	
Results At End Of Purging:		850	11.58	0.382	9.10	19.15	1.11	-70.5	18.25	

COMMENTS: * Casing 0.98 above ground surface

17.57 = 5 well volumes

** OR = over range

1928 DEVELOPED after purging 18.25 gal (>5 well volumes)

9/5/17

AerostarSESLLC

WELL DEVELOPMENT LOG

Project Name: SI AFFF MULTIPLE SITES
ASL Project No: M2027.0003
Installation: FE WARREN
Site: ~~3~~ 2
Date: 8/31/17
Sample Technician: J. Klein / Ash Willis / Travis Cassella
Well ID No.: FEWRN02-MW003

Initial Measurements

Well Total Depth: * 35.13 ft BTOC		Water Level: * 15.31 ft BTOC	
WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH BTOC – STATIC DEPTH TO WATER) X WELL CAPACITY			
(only fill out if applicable) = (35.13 Ft - 15.31 Ft) x 0.163 gal/ft = 3.23 Gal			
Calculated Well Volume: 3.23 Gallons		Well Diameter: 2.0 inches	
Calculations:	1" diameter = 0.041 gal/ft	[✓ 2" diameter = 0.163 gal/ft]	4" diameter = 0.653 gal/ft

Well Purging Activites

Purging Method (pump type): Monsoon
Flow rate (incl. units): 400 – 2250 ml/min

Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. (mS/Cm)	pH	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gal Pumped	Comments
1653	1500	N/A	N/A	N/A	N/A	15.33	N/A	N/A	N/A	Development Started
1700	1500	** OR	13.28	0.400	8.20	16.9	1.17	8.6	2.77	
1705	1500	OR	12.63	0.389	6.83	16.95	1.29	48.2	4.75	Stopped to surge
1706	2250	N/A	N/A	N/A	N/A	15.79	N/A	N/A	4.75	Resummed purge
1716	2250	OR	11.77	0.375	6.67	16.92	1.34	50.1	10.69	Stopped to surge
1724 ~~1719~~	1300	N/A	N/A	N/A	N/A	15.~~67~~25	N/A	N/A	10.69	Resummed to purge
1734	1300	OR	12.25	0.378	6.81	16.32	2.09	44.2	14.12	
1737	400	OR	12.22	0.378	6.85	15.79	1.57	38.0	15.15	
1747	400	OR	13.30	0.386	7.17	15.69	1.32	35.9	16.21	
1752	400	OR	13.17	0.385	7.22	15.75	1.32	34.5	16.74	
Results At End Of Purging:			13.15	0.385	7.21	15.76	1.32	34.2	16.74	

TR

COMMENTS: * Casing is 0.78 above ground surface
- 16.15 = 5 well volumes
- ** OR = over range
- Surged before initial purging

1752 DEVELOPED AFTER pursing 16.74 (> 5 well volumes)

9/5/17

AerostarSES LLC

WELL DEVELOPMENT LOG

Project Name: SI AFFF MULTIPLE SITES

ASL Project No: M2027.0003

Installation: FE WARREN

Site: AREA 2

Date: 8-31-17

Sample Technician: Ash Willis / Travis Cassella / Jeremy Klein

Well ID No.: FEWRN02-~~004~~ MW004 Ⓐ

Initial Measurements

*

Well Total Depth: 30.32 ft BTOC Water Level: 14.79 ft BTOC

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH BTOC – STATIC DEPTH TO WATER) X WELL CAPACIT

(only fill out if applicable) = (30.32 Ft - 14.79 Ft) x 0.163 gal/ft = 2.53 Gal

Calculated Well Volume: 2.53 Gallons Well Diameter: 2.0 inches

Calculations:	1" diameter = 0.041 gal/ft	2" diameter = 0.163 gal/ft	4" diameter = 0.653 gal/ft

Well Purging Activites

Purging Method (pump type): Monsoon Flow rate (incl. units): 500-1200 ml/min

Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. (mS/Cm)	pH	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gal Pumped	Comments
0807 Ⓐ ~~0758~~	950	N/A	N/A	N/A	N/A	14.85	N/A	N/A	N/A	Start development
0815	⊥	**OR	11.71	0.943	7.72	16.08	4.69	-298.8	2.01	
0825	⊥	OR	10.61	0.938	7.54	16.09	5.54	-237.4	4.51	Stopped to surge
0826	1200	N/A	N/A	N/A	N/A	15.75	N/A	N/A	4.51	Ⓐ ~~Started~~ Resumed developing
0836	⊥	OR	10.45	0.937	7.52	16.20	5.89	-185.7	7.34	
0846	⊥	OR	10.40	0.936	7.52	16.26	6.09	-137.0	10.17	Stopped to surge
0850	1000	N/A	N/A	N/A	N/A	15.90	N/A	N/A	10.17	Resummed developing
0900	⊥	OR	10.41	0.936	7.52	15.82	6.0	-89.2	12.81	Stopped to Surge
0902	500	N/A	N/A	N/A	N/A	15.69	N/A	N/A	12.81	Resummed developing
0907	500	OR	10.91	0.947	7.56	15.50	6.41	-142.1	13.47	
0912 ~~0909~~ Ⓐ	⊥	820	10.89	0.949	7.53	15.35	6.20	-124.8	14.13	Development finished
Results At End Of Purging:		820	10.89	0.948	7.52	15.35	6.25	-121.2	14.13	

~~Ⓐ~~

COMMENTS: * Casing sticking out of ground ~ 0.7 ft
** OR = Out of Range
12.66 = 5 well volumes

Developed after purging 14.13 gal (> 5 well volumes)

9/5/17

AerostarSES LLC

WELL DEVELOPMENT LOG

Project Name: SI AFFF MULTIPLE SITES
ASL Project No: M2027.0003
Installation: FE WARREN
Site: AREA 3
Date: 8-31-17
Sample Technician: Ash Willis / Travis Cassella / Jeremy Klein
Well ID No.: FENRN03-~~001~~ MW001

Initial Measurements

Well Total Depth: * 25.37 ft BTOC		Water Level: * 11.58 ft BTOC	
WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH BTOC – STATIC DEPTH TO WATER) X WELL CAPACIT			
(only fill out if applicable) = (25.37 Ft - 11.58 Ft) x 0.163 gal/ft = 2.25 Gal			
Calculated Well Volume: 2.25 Gallons		Well Diameter: 2 inches	
Calculations:	1" diameter = 0.041 gal/ft	[✓ 2"] diameter = 0.163 gal/ft	4" diameter = 0.653 gal/ft

Well Purging Activites

Purging Method (pump type): Monsoon
Flow rate (incl. units): 100 - 500 ml/min

Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. [✓ (mS/Cm)]	pH	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gal Pumped	Comments
1226	100	N/A	N/A	N/A	N/A	10.97	N/A	N/A	N/A	Start Development
1230	100	864	18.01	0.027	7.89	12.07	10.36	-88.6	0.16	
1300	100	127	18.07	1.428	7.68	13.57	7.80	-174.4	0.95	~~Stopped to surge~~
1330	100	477	18.25	1.428	7.59	14.64	8.40	-189.9	1.74	Stopped to surge well
1332	100	~~NA~~	NA	NA	NA	14.90	NA	NA	1.74	Resumed purge
1400	100	86.2	16.92	1.380	7.59	15.43	7.42	-193.3	2.53	
1450	100	69.2	17.19	1.378	7.60	17.06	11.77	-161.3	3.85	Stopped to surge well
1452	300	N/A	N/A	N/A	N/A	17.31	N/A	N/A	3.85	Resumed purge
1525	300	260	16.89	1.377	7.58	18.65	6.70	-173.5	6.47	
1535	500	89.5	16.15	1.348	7.53	19.98	7.69	-190.3	7.79	
1545	500	125	15.00	1.360	7.47	20.84	6.83	-170.0	9.11	
1555	500	103	15.95	1.402	7.57	21.53	7.07	-159.9	10.43	
1605	500	70.8	16.51	1.401	7.60	22.12	6.93	-176.5	11.75	
Results At End Of Purging:		68.1	16.52	1.409	7.60		6.94	-176.6	11.75	

COMMENTS:
* Casing 0.14 ~~from~~ below ground surface
PAD DUG OUT, but not completed
- 11.24 (5 well volumes)
- Surged well before starting

DEVELOPED after purging 5 well volumes
1605

9/5/17

AerostarSESLLC

WELL DEVELOPMENT LOG

Project Name: SI AFFF MULTIPLE SITES

ASL Project No: M2027.0003

Installation: FE WARREN

Site: AREA 3

Date: 8-30-17

Sample Technician: Ash Willis / Travis Cassella / Jeremy Klein

Well ID No.: FEWRN03-~~002~~ MW002

Initial Measurements

Well Total Depth: 25.48 * ft BTOC		Water Level: 12.48 * ft BTOC	
WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH BTOC – STATIC DEPTH TO WATER) X WELL CAPACITY (only fill out if applicable) = (25.48 Ft - 12.48 Ft) x 0.163 gal/ft = 2.12 Gal			
Calculated Well Volume: 2.12 Gallons		Well Diameter: 2.0 inches	
Calculations:	1" diameter = 0.041 gal/ft	[✓ 2" diameter = 0.163 gal/ft]	4" diameter = 0.653 gal/ft

Well Purging Activites

Purging Method (pump type): Monsoon

Flow rate (incl. units): 250 - 100 ml/min

Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. (mS/Cm)	pH	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gal Pumped	Comments
0706	250	N/A	N/A	N/A	N/A	12.50	N/A	N/A	N/A	DEVELOPMENT STARTED
0710	250	** OR	14.26	0.560	7.77	13.80	8.69	179.3	0.26	
0722	250	OR	14.80	0.560	7.92	15.56	8.35	133.8	1.08	Stopped purge to surge
0723	250	N/A	N/A	N/A	N/A	15.0	N/A	N/A	1.08	Resummed purging
0735	250	OR	15.22	0.547	7.97	16.21	8.07	92.1	1.94	
0750	250	277.3	15.84	0.557	8.05	17.84	8.32	18.8	2.92	
0805	250	77.3	15.84	0.557	8.04	17.82	8.33	19.8	3.92	Stopped to surge
0806	150	N/A	N/A	N/A	N/A	17.05	N/A	N/A	3.92	Resummed purging
0833	150	172.0	16.76	0.596	8.07	18.73	7.09	-112.3	4.99	
0850	100	304	16.48	0.578	7.91	20.56	7.64	-85.5	5.66	
1020	100	265	16.49	0.579	7.90	22.62	7.65	-84.6	8.03	
Results At End Of Purging:		265	16.49	0.579	7.90	22.62	7.65	-84.6	8.03	

COMMENTS: * Casing at ground surface

** OR = out of Range

1020 DEVELOPED after purging 8.03 gal

9/5/17

AerostarSES LLC

WELL DEVELOPMENT LOG

Project Name: SI AFFF MULTIPLE SITES
ASL Project No: M2027.0003
Installation: FE WARREN
Site: AREA 3
Date: 8-29-17
Sample Technician: Ash Willis / Jeremy Klein
Well ID No.: FEWRN03-~~003~~ MW003

Initial Measurements

Well Total Depth: * 25.32 ft BTOC		Water Level: ¥ 6.86 ft BTOC	
WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH BTOC – STATIC DEPTH TO WATER) X WELL CAPACITY			
(only fill out if applicable) = (25.32 Ft - 6.86 Ft) x 0.163 gal/ft = 3.00 Gal			
Calculated Well Volume: 3.06 Gallons		Well Diameter: 2.0 inches	
Calculations:	1" diameter = 0.041 gal/ft	[✓ 2" diameter = 0.163 gal/ft]	4" diameter = 0.653 gal/ft

Well Purging Activites

Purging Method (pump type): Monsoon
Flow rate (incl. units): 200 - 500 ml/min

Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. [✓ (mS/Cm)]	pH	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gal Pumped	Comments
1436	200mL/min	N/A	N/A	N/A	N/A	6.88	N/A	N/A	N/A	DEVELOPE STARTED
1510	200	540	17.18	1,026	7.91	16.13	3.60	315.0	1.79	Stopped to Surge
1511	200	N/A	N/A	N/A	~~7.01~~	7.01	N/A	N/A	N/A	Resummed development
1540	500ml/min	xx OR	16.43	1.011	7.91	18.82	5.74	294.8	5.48	
1610	500	OR	17.07	1.035	7.87	22.78	4.00	225.2	9.44	
1637	500	OR	17.28	1.019	7.87	23.8	3.22	-293.2	13.0	Stopped to Surge
1638	500	N/A	N/A	N/A	N/A	22.02	N/A	N/A	13.0	Resummed development
1806	500	OR	17.20	1.018	7.86	22.56	4.98	-43.0	16.7	
1810	500	OR	17.15	0.976	7.82	23.2	5.37	-122.8	17.22	
1815	500	OR	17.00	0.996	7.86	23.15	5.63	-116.4	17.88	
1820	500	OR	16.78	1.005	7.90	23.62	6.11	-117.5	18.54	
1825	500	OR	16.97	1.007	7.89	23.82	6.19	-118.7	19.20	
Results At End Of Purging:		OR	16.97	1.007	7.89	23.82	6.19	-118.7		

COMMENTS: * Casing 0.42 below ground surface
x * OR - out of range
15 gall = 5 well volumes
1825 DEVELOPED DONE AFTER PURGING 19.20 (> 5 well volumes)

9/5/17

Appendix F

New Monitoring Wells Construction Details

Table F-1 F.E. Warren Air Force Base New and Existing Monitoring Well Construction Details

AFFF Area	Well Identification	Northing (feet)	Easting (feet)	Top of Casing Elevation (feet)	Ground Surface Elevation (feet)	Total Boring Depth (feet bgs)	Approximate Depth Groundwater Encountered during Drilling (feet bgs)	Wellhead Completion Type	Total Well Depth (feet bgs)	Screen Interval (feet bgs)	Screen Length (feet)
Former FPTA 2 (AFFF Area 1)	MW-070	234305.36	740558.92	6133.20	6132.20	N/A	N/A	Flushmount	24	9-24	15
	MW-071	234680.66	740832.08	6128.2	6127.80	N/A	N/A	Flushmount	24	9-24	15
	FEWRN01-MW001	234401.78	740945.32	6128.62	6129.06	20	19.2	Flushmount	20	9.44-19.44	10
	FEWRN01-MW002	234194.01	740625.92	6131.07	6131.49	21	17.0	Flushmount	21	10.05-20.05	10
Former FPTA 3 (AFFF Area 2)	FEWRN02-MW001	237253.64	736697.91	6151.97	6152.33	30	29.0	Flushmount	30	19.19-29.19	10
	FEWRN02-MW002	237150.56	736736.63	6152.27	6152.76	40	32.0	Flushmount	37.5	26.97-36.97	10
	FEWRN02-MW003	237304.25	736943.37	6147.12	6147.47	35	32.0	Flushmount	35	24.15-34.15	10
	FEWRN02-MW004	237463.58	737010.80	6146.52	6147.00	30	14.0	Flushmount	30	19.07-29.07	10
Building 1247– Base Fuels (AFFF Area 3)	FEWRN03-MW001	234716.19	738044.37	6154.46	6155.01	26.11	9.0	Flushmount	26.11	14.82-24.82	10
	FEWRN03-MW002	234763.09	738091.93	6154.59	6155.04	26	8.0	Flushmount	26	14.87-24.87	10
	FEWRN03-MW003	234817.24	738063.07	6154.06	6154.58	35	9.0	Flushmount	26	15.45-25.45	10

AFFF = aqueous film forming foam bgs = below ground surface FPTA = fire protection training area N/A = not applicable

Table F-2 GPS Coordinates

Sample Location	Northing	Easting
FEWRN-005-(SW&SD)-001	234825.59	741360.07
FEWRN02-006-(SW&SD)-001	234832.34	742101.89
FEWRN02-005-SS-001	237605.26	737196.77
FEWRN01-004-(SW SD)-001	237982.06	737019.68

Appendix G

Groundwater Level Measurements

Table G-1 F.E. Warren Air Force Base Groundwater Level Measurements

Station ID	Top of Casing Elevation[1]	Depth to Water (ft btoc)	Groundwater Elevation (amsl) September 5, 2017
FEWRN01-MW001	6128.62	11.14	6117.48
FEWRN01-MW002	6131.07	9.63	6121.44
MW-070	6133.20	12.28	6120.92
MW-071	6128.20	13.99	6114.21
FEWRN02-MW001	6151.97	15.84	6136.13
FEWRN02-MW002	6152.27	15.63	6136.64
FEWRN02-MW003	6147.12	14.22	6132.90
FEWRN02-MW004	6146.52	13.78	6132.74
FEWRN03-MW001	6154.46	8.42	6146.04
FEWRN03-MW002	6154.59	9.44	6145.15
FEWRN03-MW003	6154.06	8.53	6145.53

[1] NAVD 1988
amsl = above mean sea level
btoc = below top of casing
ft = foot/feet
ID = identification

FINAL
PRELIMINARY ASSESSMENT REPORT
FOR PERFLUORINATED COMPOUNDS
AT
F.E. WARREN AIR FORCE BASE
WYOMING

Prepared for:

Air Force Civil Engineer Center
2261 Hughes Avenue, Suite 155
Lackland AFB, Texas 78236-9853

Contract No. FA8903-08-D-8772
Task Order 0065
CDRL A001A

December 2015

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13. ABSTRACT (Maximum 200 words)

This is a Preliminary Assessment Report of sites or locations at F.E. Warren Air Force Base where perfluorinated compounds may have been released to the environment through the use or discharge of aqueous film-forming foam.

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LIST OF ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base
AFCEC	Air Force Civil Engineer Center
AFFF	aqueous film-forming foam
ANG	Air National Guard
Base	F.E. Warren Air Force Base
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
EDR	Environmental Data Resources, Inc.
FPTA	Fire Protection Training Area
FTA	Fire Training Area
HGL	HydroGeoLogic, Inc.
JP-4	jet propellant fuel number 4
JP-8	jet propellant fuel number 8
IRP	Installation Restoration Program
OWS	oil-water separator
PA	preliminary assessment
PFC	perfluorinated compound
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RIV	Rapid Intervention Vehicle
SI	Site Inspection
USAF	U.S. Air Force
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service

FINAL
PRELIMINARY ASSESSMENT REPORT
FOR PERFLUORINATED COMPOUNDS
F.E. WARREN AIR FORCE BASE
WYOMING

1.0 INTRODUCTION

The Air Force Civil Engineer Center (AFCEC) contracted with HydroGeoLogic, Inc. (HGL) and subcontractor CH2M HILL (the HGL Team) to perform preliminary assessment (PA) activities at multiple U.S. Air Force (Air Force or USAF) and Air National Guard (ANG) Fire Training Areas (FTAs) to determine probable environmental release of perfluorinated compounds (PFCs). Specifically, HGL is completing PA activities consistent with the U.S. Environmental Protection Agency (USEPA) Guidance for Preparing Preliminary Assessments under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) (USEPA, 1991) to determine potential releases of PFCs at 82 Air Force and ANG installations from FTAs and other known and suspected PFCs or aqueous film-forming foam (AFFF) usage or storage areas. The work is being performed by HGL and its team subcontractor, CH2M HILL, under the existing 4P Architecture and Engineering Contract, Contract Number FA8903-08-D-8772, Task Order 0065.

Under authority of CERCLA and the Superfund Amendments and Reauthorization Act of 1986, CH2M HILL conducted a PA visit at F.E. Warren Air Force Base (AFB) during the week of August 24, 2015. F.E. Warren AFB is an active Air Force installation in Laramie County, Wyoming. The location of F.E. Warren AFB and the locations identified on F.E. Warren AFB during this PA visit are shown on Figure 1.1.

1.1 BACKGROUND

PFCs are compounds used in the formulation of AFFF, which the Air Force has used in fire training exercises, suppressing aircraft and other vehicle fires, and in aircraft hangar fire suppression systems. Although PFCs are not regulated under CERCLA or the Resource Conservation and Recovery Act (RCRA), there is evidence that perfluorooctane sulfonate (PFOS) (and less so perfluorooctanoic acid [PFOA]) is a possible environmental contaminant following AFFF release. Both compounds may present potential, non-carcinogenic risks to human health and the environment (Chang et al., 2014; Porter, 2011; Rak and Vogel, 2009; USAF, 2012).

Several federal government documents confirm the initial use of AFFF by the Air Force beginning in 1970:

- Military Specification for AFFF (MIL-F-24385) formally issued in 1969
- General Accounting Office determination on sole source award protest to provide AFFF to the Navy in December 1969
- A History of USAF Fire Protection Training at Chanute Air Force Base, 1964-1976 (Coates, 1977)

Based on Air Force performance testing results on AFFF, the Air Force Director of Civil Engineering, M.G. Goddard, issued authorization in 1970 for the Air Force to procure AFFF. No usage within the Air Force is documented or suspected prior to 1970.

1.2 PURPOSE AND OBJECTIVES

The objective of this PA Report is to identify locations at F.E. Warren AFB where PFCs may have been released into the environment and to provide an initial assessment of possible migration pathways and receptors of potential contamination. In 1991, the Air Force began a program to replace existing non-engineered FTAs with new engineered FTAs that use propane fuel. At F.E. Warren AFB, an FTA is currently being constructed that will use propane.

This PA Report documents the known FTAs, as well as additional locations where AFFF may have been released into the environment at F.E. Warren AFB (Table 1.1). The purpose of the PA is to determine the potential environmental release of PFCs specifically from AFFF usage and storage. This PA Report differentiates locations that pose little or no potential threat to human health and the environment from locations that warrant further investigation.

Table 1.1
Fire Training Areas and Non-Fire Training Areas Identified for Potential AFFF Releases, F.E. Warren AFB, Wyoming

Fire Training Areas
Former Fire Protection Training Area (FPTA) 1
Former FPTA 2
Former FPTA 3
Non-Fire Training Areas
Fire Stations
Former Fire Station (Building 1501)
Fire Station 1 (Building 324)
Fire Station 2 (Building 1250)
Other
Building 930 (Hazardous Waste)
Building 1240 (Truck Maintenance)
Building 1247 (Base Fuels)
Building 1285 (Hazmart)

1.3 BASEWIDE ENVIRONMENTAL SETTING

A detailed description of the geology, hydrogeology, and hydrology is presented in the Final Supplemental Preliminary Assessment Report (Parsons Engineering, 2003) and is summarized in the sections below. Ecological receptors listed below are presented in the Environmental Data Resources (EDR) report (EDR, 2015).

1.3.1 Geology

The majority of the region is underlain by tertiary units that are of sedimentary origin and generally consist of sand, gravel, clay, siltstone, and limestone. These units are overlain by Quaternary sediments that include alluvial terrace and floodplain deposits. These sediments are generally unconsolidated and consist of lenticular beds of clay, silt, sand, gravel, and boulders.

Beneath the Base, the tertiary-age (late Miocene) Ogallala unit can be described as a heterogeneous mixture of sand and gravel beds, silt, clay, and thin limestone units. The beds are sometimes cemented by calcium carbonate. Lenses of sand and gravel are generally sporadic, but consistently occur from the surface to a depth of about 10 feet below ground surface (bgs) in the southwestern part of the Base. Below this depth, the predominant sediments are fine-grained, but sand and gravel still occur. The Ogallala is about 300 feet thick in the northern part of the Base, thinning to the south to approximately 30 feet in valleys where it has been deeply eroded.

1.3.2 Hydrogeologic Setting

The unconfined High Plains aquifer is the principal source for water supply wells in the area surrounding F.E. Warren AFB. Numerous wells near the Base are used for domestic and livestock water supply. Depth to the water table in this area is variable, being at the land surface near streams that act as discharge areas, and increasing in depth with distance from discharge areas. In the southern portion of the Base, the depth to the water table generally ranges from about 10 to 40 feet bgs. The direction of groundwater flow in the shallow aquifer zone is generally toward the discharge areas of Crow Creek, Diamond Creek, and the unnamed tributary to Crow Creek. Groundwater beneath the Base is recharged locally by some areal infiltration of precipitation despite the relatively dry climate. Groundwater is discharged via evapotranspiration in the riparian areas, flow into streams, and springs and seeps near the streams.

Drinking water at F.E. Warren AFB is obtained from the Cheyenne Public Utilities, which uses both groundwater and surface water sources. The City owns and operates about 35 groundwater wells located west and northwest of Cheyenne. The wells pump from the Ogallala and White River Aquifers. Surface water is collected from the Douglas Creek Drainage, located in the Snowy Range Mountains, about 75 miles west of Cheyenne. Surface water is also collected from the Crow Creek Drainage, located in the Pole Mountain/Vedauwoo area, about 30 miles west of Cheyenne (Board of Public Utilities, 2014). All drinking water sources used by the City of Cheyenne are located upstream or upgradient of the F.E. Warren watershed. No active or contingent drinking water wells are located on Base.

1.3.3 Hydrologic Setting

Surface water at the Base occurs as stream flow, seeps, and lakes. Stream flow results from groundwater discharge and from rainfall and snowmelt runoff. Crow Creek is the major perennial stream that drains southern areas of the Base. Overall, Crow Creek is a gaining stream (that is, receives groundwater discharge) through the Base area. Two tributaries to Crow Creek also drain the southern part of the Base: an unnamed tributary and Diamond Creek. The unnamed tributary is an interrupted stream, with alternating reaches that are perennial, intermittent, or ephemeral. Diamond Creek, the second largest stream on F.E. Warren AFB, is perennial along most of its length, with low flows maintained by groundwater discharge. The upper reach of Diamond Creek, covering the first 300 yards or so on the Base, is intermittent. Diamond Creek is also a gaining creek across the Base except in periods of loss during the warmer months of July through September. These stream discharge losses are likely due to evaporation. Seeps contribute to stream flows in Crow Creek and its unnamed tributary throughout the year.

1.3.4 Ecological Receptors

The following endangered species are known to inhabit Laramie County (EDR, 2015):

- Bald Eagle – Bird
- Mountain Plover – Bird
- Preble's Meadow Jumping Mouse – Mammal
- Black-footed Ferret – Mammal
- Colorado Butterfly Plant – Plant

It is possible that these endangered species may be found within the boundaries of F.E. Warren AFB. Additionally, the Colorado Butterfly Plant Research Natural Area is located across the majority of the Base.

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, Fire Training Areas, describes the FTAs identified during the PA visit.
- Section 3.0, Non-Fire Training Areas, describes the non-FTAs identified during the PA visit.
- Section 4.0, Summary and Conclusions, summarizes and provides conclusions for both FTAs and non-FTAs.
- Section 5.0, References, lists the references cited in this report.

In addition, the following support information is appended to this report:

- Appendix A, Photo Documentation
- Appendix B, Field Documentation
- Appendix C, Records of Communication

If a location's operational history indicates that AFFF was not used, then no pathway and environmental hazard assessments were completed for that particular location.

1.5 PRELIMINARY ASSESSMENT METHODS

This PA Report was prepared in accordance with the following guidance documents:

- CERCLA Guidance (USEPA, 1991)
- Interim Air Force Guidance (USAF, 2012)
- U.S. Fish and Wildlife Service (USFWS) Guidance (USFWS, 2015)

The performance of this PA included the following activities:

- Reviewing information and reports in the Administrative Record.
- Reviewing documents related to Air Force use of AFFF.

- Conducting a 1-day visit to F.E. Warren AFB.
- Conducting interviews with government personnel including the Water Program Manager; Fire Department staff (Fire Inspector, Health and Safety Officer, and Assistant Chief of Special Operations); Hazardous Waste staff; fuel technicians; and the Environmental Chief.
- Visiting and photographing locations where AFFF has been stored, released, or used.
- Performing an environmental data records search to document nearby populations and recording water supply well information and wetlands information.

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FIGURE

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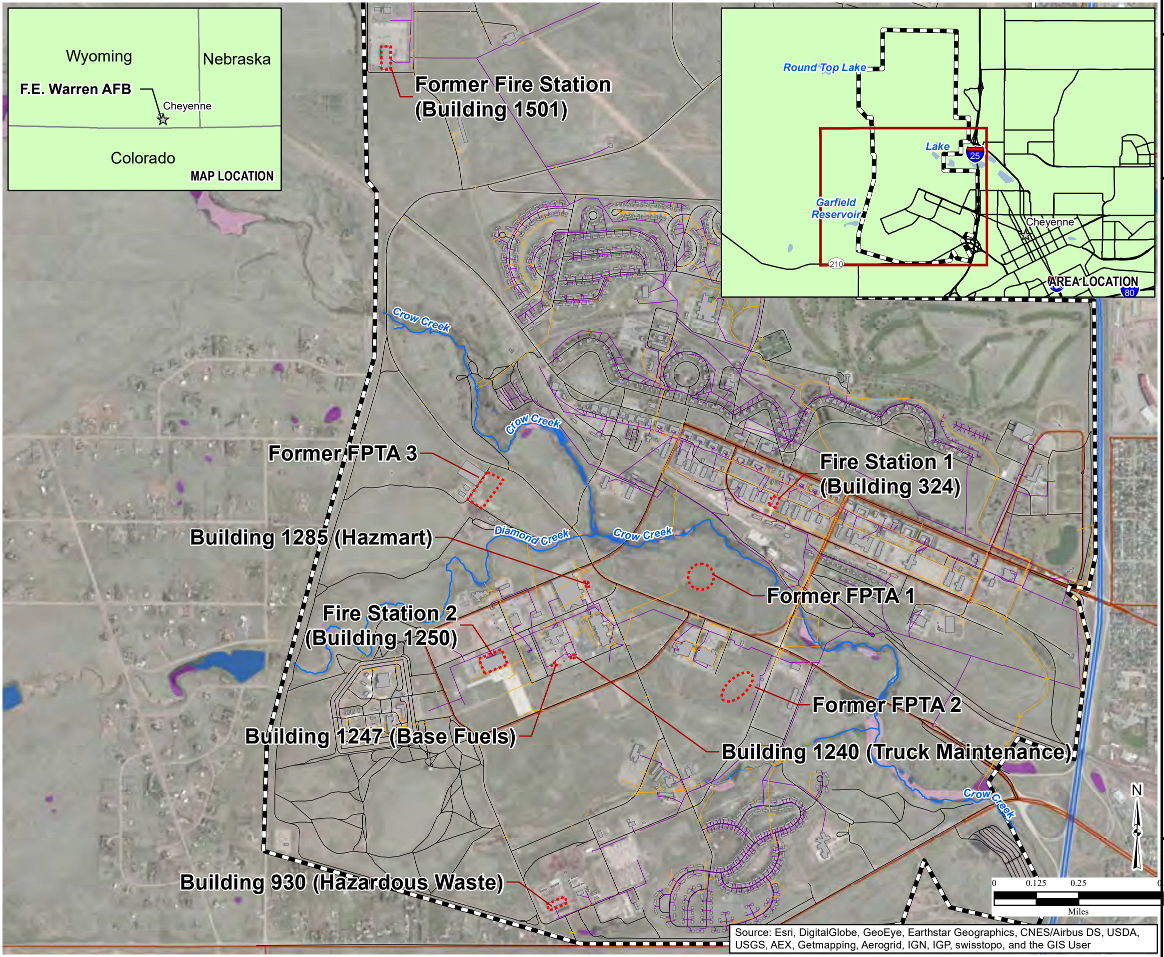

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User

Figure 1.1
All Identified Locations
F.E. Warren AFB, Wyoming

Legend

- Storm Sewer Line
- Wastewater Line
- Streams
- Road
- Primary Limited Acess or Interstate
- Primary US and State Highways
- Secondary State and County Highways
- Installation Boundary
- Approximate Locations
- Area View
- Buildings
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

Notes:
FPTA = fire protection training area

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9/14/2015 SA
Source: Wetland, National Wetlands Inventory - Wetland Polygons, Published September 2012, U.S. Fish and Wildlife Service, Division of Habitat and Resource Conservation, Washington, D.C. http://www.fws.gov/wetlands/

2.0 FIRE TRAINING AREAS

2.1 FORMER FPTA 1

2.1.1 Description and Operational History

Former FPTA 1 (also known as IRP Site FT008) was an FTA located in the central part of the Base. Former FPTA 1 was located about 150 yards south of Crow Creek and was used from 1950 to 1965. Two bermed pits were located at the FPTA, and these pits ranged from approximately 150 to 300 feet in diameter. No fuel storage facilities were present. Waste oils, solvents, gasoline, jet propellant fuel number 4 (JP-4), and other combustible liquids were used in the training exercises. Training exercises were conducted three to four times per month, and an estimated 500 gallons of flammable liquids were consumed in each exercise. The area was not pre-wet prior to training. Water and protein foam were used as extinguishing agents (U.S. Geological Survey, 1991). Activity at FPTA 1 ceased prior to the introduction of AFFF in 1970. This IRP site was remediated to address petroleum-hydrocarbon-contaminated soil. The geographical coordinates of former FPTA 1 are 41°8'50.72"N and 104°51'42.62"W. The location of former FPTA 1 is shown on Figures 1.1 and 2.1.

2.1.2 Waste Characteristics

Not applicable.

2.1.3 Pathway and Environmental Hazard Assessment

Not applicable.

2.1.3.1 <u>Groundwater Pathway and Targets</u>

Not applicable.

2.1.3.2 <u>Surface Water Pathway and Targets</u>

Not applicable.

2.1.3.3 <u>Soil and Air Exposure Pathways and Targets</u>

Not applicable.

2.2 FORMER FPTA 2

2.2.1 Description and Operational History

Former FPTA 2 (also known as IRP Site FT009) is located between Omaha and Missouri Avenues and between Third and Fourth Streets and is approximately 0.25 mile south of Crow Creek. FPTA 2 consisted of two unlined, bermed training pits that were used from 1965 to 1989. No retention ponds were present. Waste oils, solvents, hydraulic fluid, and other combustible liquids were used in training exercises until 1974. After 1974, only JP-4 was used in the training exercises.

No fuel storage facilities were at the site. Fire training exercises occurred twice per month, and 300 to 400 gallons of JP-4 were consumed per exercise. AFFF and water were used to extinguish fires from 1972 until the FPTA was closed in 1989 (U.S. Geological Survey, 1991). This site was considered to need no remedial action, as presented in the Final Record of Decision for Operable Unit 5 (USAF, 1994). The geographical coordinates are 41°8'34.40"N and 104°51'32.70"W. The location of former FPTA 2 is shown on Figures 1.1 and 2.1.

2.2.2 Waste Characteristics

An unknown amount of AFFF was used to extinguish flames during fire training activities at former FPTA 2. The burn pits were unlined, and water from the pits infiltrated soils and likely migrated to the uppermost, shallow groundwater.

2.2.3 Pathway and Environmental Hazard Assessment

A complete exposure pathway typically includes the following components: a source of contamination (an environmental medium contaminated at the source or a release mechanism by which chemicals are released from a source medium and transported), an exposure medium by which a receptor comes into contact, and a route of intake for the contaminant into the receptor's body at the exposure point. If any of these elements are missing, the pathway is incomplete. Other release mechanisms resulting in exposure media for receptors may include the uptake of soil contaminants by plants and animals and the emission of soil contaminants into the air in association with dust particles.

Database research (EDR, 2015) shows 63 day care facilities (includes large day care operations and small in-home day care facilities); 2 nursing homes; 26 schools (includes public and private schools and academies); 89 hospitals, clinics, and doctor offices (includes outpatient surgery centers, home health care agencies, rehabilitation centers, pharmacies, and urgent care centers); and 2 colleges within the potential migration area of 4 miles from any given potential release location of PFCs. One elementary school, Freedom Elementary, is located on Base, and one elementary school, Pioneer Park Elementary, is located nearby but off Base. The closest elementary school is at least 0.5 mile south-southeast (hydrologically upgradient) of former FPTA 2. The on-Base child development center is located approximately 1 mile northeast (hydrologically upgradient) of former FPTA 2.

2.2.3.1 Groundwater Pathway and Targets

The Basewide geologic and hydrogeologic settings are provided in Section 1.3. Groundwater in this area generally flows northeast toward Crow Creek, which is located approximately 0.2 mile northeast of former FPTA 2. AFFF likely infiltrated soils at former FPTA 2 and entered the uppermost, shallow groundwater beneath the training area. Shallow groundwater in this area flows to the northeast and discharges into Crow Creek.

F.E. Warren AFB drinking water sources are all located more than 4 miles upgradient of the Base and do not support a complete drinking water exposure pathway. The fact that F.E. Warren AFB does not use the groundwater below the Base as a supply of drinking water would also render this drinking water exposure pathway incomplete for F.E. Warren AFB workers and residents. However, because of the relatively shallow depth to groundwater in some areas (approximately

12 feet bgs at former FPTA 2 [AECOM Technical Services, Inc., 2013]), excavation workers could be exposed to groundwater.

No public water supply or residential wells are located between this location and Crow Creek, where groundwater likely daylights (EDR, 2015).

2.2.3.2 Surface Water Pathway and Targets

The surface water drainage near former FPTA 2 flows northeast to Crow Creek. Crow Creek flows east and discharges off Base via Outfall OFF 1. Crow Creek discharges into Wyoming Hereford Ranch Reservoir Number 1 approximately 6 miles off Base. F.E. Warren AFB drinking water does not come from surface water sources located within the watershed of F.E. Warren AFB, so there is no exposure pathway for surface water to residents or workers through domestic drinking water. Because runoff flows into nearby drainages, a complete exposure pathway for non-ingestion exposures exists, such as dermal exposure to humans. Ingestion by aquatic or other animals is also a potential pathway for ecological receptors.

A 100-year flood zone is along Crow Creek located north and northeast of former FPTA 2. The nearest waterbody is Crow Creek located approximately 0.2 mile northeast. Wetlands are also located along the banks of Crow Creek.

No surface water intakes, downstream fisheries, or sensitive environments are adjacent to the surface water migration path within 15 miles downstream of former FPTA 2 (EDR, 2015; USFWS, 2015). Local waterways, particularly Lake Pearson, are used for recreational fishing (Wright, 2015, personal communication; Appendix C). However, Lake Pearson is not located downstream of former FPTA 2.

2.2.3.3 Soil and Air Exposure Pathways and Targets

AFFF was released to the soils during fire training activities. The training pits were both unlined. No residents or workers are present at former FPTA 2. The nearest residents are approximately 0.3 mile south of former FPTA 2. Workers are present approximately 0.1 mile to the west. The well-vegetated area surrounding former FPTA 2 would preclude any fugitive dust emissions and potential exposures. Current and planned land use does not involve potential human health exposure, and no intrusive work is currently planned that would allow for dermal soil exposures to utility or construction workers. The potential of exposure to burrowing animals, if present, would exist.

The population within 4 miles of the area is approximately 32,580. No schools or day care facilities are within a 200-foot radius of the location. The nearest school is Freedom Elementary School, located approximately 0.5 mile to south-southeast of former FPTA 2 (EDR, 2015). The nearest day care facility is the F.E. Warren AFB Child Development Center, located approximately 1 mile to the northeast.

The former FPTA 2 area is not used for hunting, fishing, or harvesting of wild or farmed foods, and such activities are not anticipated in the future. The Colorado Butterfly Plant Research Natural Area is located within the former FPTA 2 area.

2.3 FORMER FPTA 3

2.3.1 Description and Operational History

Former FPTA 3 is located in the northern portion of the Base and was opened in 1990. FPTA 3 was operated until approximately 2000. FPTA 3 consisted of an aircraft carcass in a polyethylene-lined training pit and a polyethylene-lined retention pond. The training pit was connected to an oil-water separator (OWS), and water from the pit was piped to the retention pond. No outlet piping was present in the pond and it is presumed that the contents of the retention pond were left in place to evaporate. Jet propellant fuel number 8 (JP-8) was used as a fuel. FPTA 3 was shut down in 2000 because one of the liners beneath the training pit was found to be leaking; however, the leak did not extend beyond the second liner (Riedel, 2015, personal communication; Appendix C). Most of the recent training conducted at FPTA 3 was for structural training; therefore, AFFF was used only in a limited capacity (Kimble, 2015, personal communication; Appendix C).

Former FPTA 3 was decommissioned in 2007 (Riedel, 2015, personal communication; Appendix C) and a new FPTA being built at this location will use propane (Kimble, 2015, personal communication; Appendix). During the decommissioning, the retention pond was drained and the liner was removed. The pond was then backfilled with clean material. The site was then graded with 6 inches of topsoil and re-vegetated. In addition to removal of the retention pond, the OWS was removed, and inlet and outlet pipes on both sides of the OWS were capped and left in place (TolTest, 2008). Since this FPTA was decommissioned in 2007, no training using AFFF has occurred (Kimble, personal communication; Appendix C).

Because this system was contained, and both the pit and the pond were lined, AFFF is not likely to have impacted the surrounding environmental media. The geographic coordinates are 41°9'3.43"N and 104°52'26.32"W. The location of former FPTA 3 is shown on Figures 1.1 and 2.2.

2.3.2 Waste Characteristics

Not applicable.

2.3.3 Pathway and Environmental Hazard Assessment

Not applicable.

2.3.3.1 Groundwater Pathway and Targets

Not applicable.

2.3.3.2 Surface Water Pathway and Targets

Not applicable.

2.3.3.3 Soil and Air Exposure Pathways and Targets

Not applicable.

FIGURES

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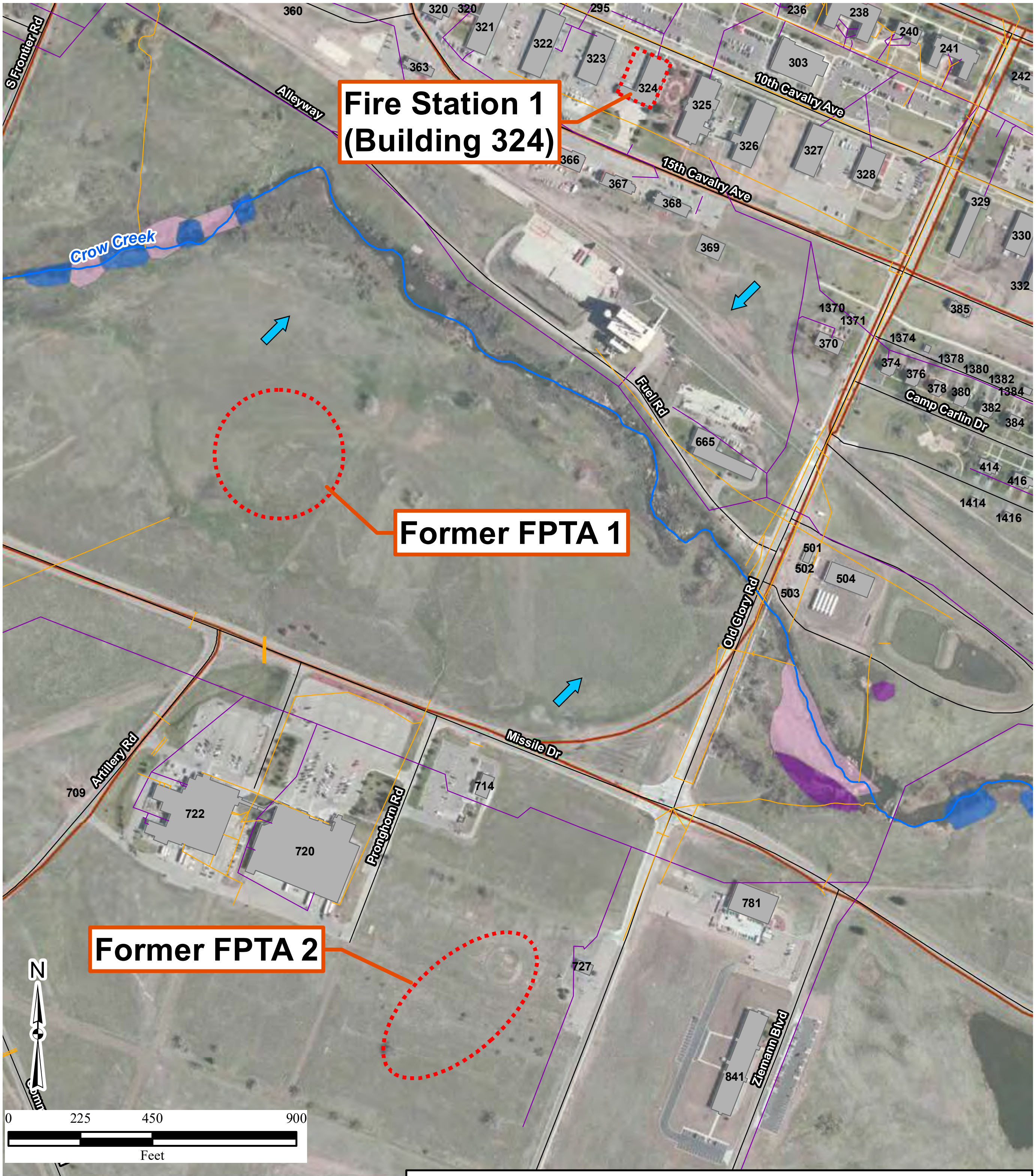

Note:
FPTA = fire protection training area

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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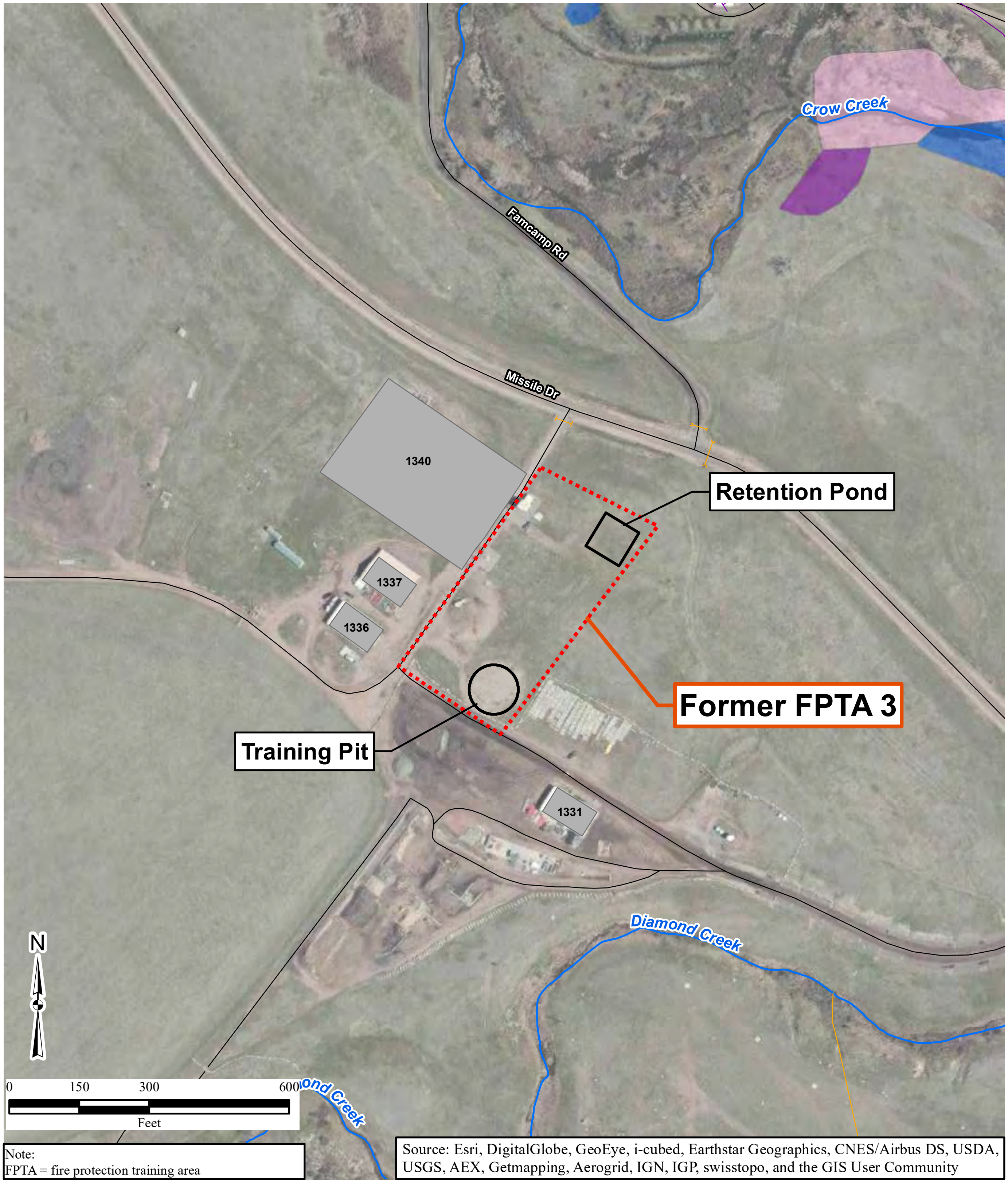
Source: Wetland, National Wetlands Inventory - Wetland Polygons, Published September 2012, U.S. Fish and Wildlife Service, Division of Habitat and Resource Conservation, Washington, D.C. http://www.fws.gov/wetlands/

Legend

- ⬆ Approximate Groundwater Flow
- — Storm Sewer Line
- — Wastewater Line
- — Streams
- — Road
- ▨ Buildings
- ⬚ Approximate Location
- ▨ Freshwater Emergent Wetland
- ▨ Freshwater Forested/Shrub Wetland
- ▨ Freshwater Pond

Figure 2.1
Locations in the Eastern Portion of F.E. Warren AFB, Wyoming



Note:
FPTA = fire protection training area

Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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9/11/2015 SA
Source: Wetland, National Wetlands Inventory - Wetland Polygons, Published September 2012, U.S. Fish and Wildlife Service, Division of Habitat and Resource Conservation, Washington, D.C. http://www.fws.gov/wetlands/

CH2MHILL.

Legend

- — Storm Sewer Line
- — Wastewater Line
- — Streams
- — Road
- ▨ Buildings
- ⬚ Approximate Location
- ▨ Freshwater Emergent Wetland
- ▨ Freshwater Forested/Shrub Wetland
- ▨ Freshwater Pond

Figure 2.2
Former FPTA 3
F.E. Warren AFB, Wyoming

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3.0 NON-FIRE TRAINING AREAS

3.1 FIRE STATIONS

3.1.1 Former Fire Station (Building 1501)

3.1.1.1 <u>Description and Operational History</u>

The former fire station (Building 1501) was located at the north end of the Base and was built in 1987 to support the Peacekeeper missile operations. This small two-bay fire station had two trucks. While AFFF was never used at the former fire station, it may have been stored in small quantities on the trucks (Riedel, 2015, personal communication; Appendix C). It is estimated that the former fire station was active until approximately 1998 (Watson, 2015, personal communication; Appendix C). No use, leaks, or spills of AFFF are known to have occurred (Riedel, 2015, personal communication; Appendix C). The geographical coordinates of the former fire station (Building 1501) are 41°10'8.77"N and 104°52'45.25"W. The location of the former fire station (Building 1501) is shown on Figures 1.1 and 3.1.

3.1.1.2 <u>Waste Characteristics</u>

Not applicable.

3.1.1.3 <u>Pathway and Environmental Hazard Assessment</u>

Not applicable.

3.1.1.3.1 Groundwater Pathway and Targets

Not applicable.

3.1.1.3.2 Surface Water Pathway and Targets

Not applicable.

3.1.1.3.3 Soil and Air Exposure Pathways and Targets

Not applicable.

3.1.2 Fire Station 1 (Building 324)

3.1.2.1 <u>Description and Operational History</u>

Fire Station 1 is located in Building 324, which was built in 1909 and currently serves as one of two fire stations on Base. The building originally served as a horse stable (Kimble, 2015, personal communication; Appendix C) but sometime prior to 1979, the building was converted to Fire Station 1 (Watson, 2015, personal communication; Appendix C). Fire Station 1 has two fire trucks, Engine 4 and Engine 8, that each holds 20 gallons of AFFF. The trucks are pump tested but not foam tested and, because the station does not have crash trucks, time and distance testing is not required. No washing or refilling of trucks with AFFF occurs at Fire Station 1 (Kimble, 2015, personal communication; Appendix C). All use of AFFF for training is currently suspended as directed by the Air Force (Kimble, 2015, personal communication; Appendix C). AFFF use at Fire Station 1 is very limited, and no leaks or spills are known to have occurred here (Kimble, 2015, personal communication; Appendix C). Floor drains in Building 324 connect to the sanitary sewer that goes off Base to a publicly owned treatment works (Wright, 2015, personal communication; Appendix C). The geographical coordinates of Fire Station 1 (Building 324) are 41°9'1.20"N and 104°51'26.72"W. The location of Fire Station 1 (Building 324) is shown on Figures 1.1 and 2.1.

3.1.2.2 <u>Waste Characteristics</u>

Not applicable.

3.1.2.3 <u>Pathway and Environmental Hazard Assessment</u>

Not applicable.

3.1.2.3.1 Groundwater Pathway and Targets

Not applicable.

3.1.2.3.2 Surface Water Pathway and Targets

Not applicable.

3.1.2.3.3 Soil and Air Exposure Pathways and Targets

Not applicable.

3.1.3 Fire Station 2 (Building 1250)

3.1.3.1 <u>Description and Operational History</u>

Fire Station 2 (Building 1250) was built in 1941 and currently serves as one of two fire stations on Base. Fire Station 2 likely became active in the 1950s or 1960s when helicopter use began (Wright, 2015, personal communication; Appendix C). Fire Station 2 has three fire trucks, Engine 5 and Rapid Intervention Vehicles (RIVs) 1 and 2, each of which holds 60 to 70 gallons of AFFF. The trucks are pump tested but not foam tested. While the RIVs are capable of serving as crash trucks and carry AFFF, they are not used in for that purpose (Kimble, 2015, personal communication; Appendix C). The trucks are refilled with AFFF inside Fire Station 2 using 5-gallon buckets that are stored onsite (Kimble, 2015, personal communication; Appendix C). Floor drains in Building 1250 discharge to an OWS that connects to the sanitary sewer (Watson, 2015, personal communication; Appendix C). AFFF use at Fire Station 2 is very limited, and no leaks or spills are known to have occurred here (Kimble, 2015, personal communication; Appendix C). The geographical coordinates of Fire Station 2 (Building 1250) are 41°9'1.20"N and 104°51'26.72"W. The location of Fire Station 2 (Building 1250) is shown on Figures 1.1 and 3.2.

3.1.3.2 Waste Characteristics

Not applicable.

3.1.3.3 Pathway and Environmental Hazard Assessment

Not applicable.

3.1.3.3.1 Groundwater Pathway and Targets

Not applicable.

3.1.3.3.2 Surface Water Pathway and Targets

Not applicable.

3.1.3.3.3 Soil and Air Exposure Pathways and Targets

Not applicable.

3.2 OTHER

3.2.1 Building 930 (Hazardous Waste)

3.2.1.1 Description and Operational History

Building 930, built in 1993, serves as the hazardous waste storage building. Waste AFFF has periodically been stored at this building until transport and final disposal off Base. Records from January 13, 2005, show that four 55-gallon drums of AFFF were submitted to the hazardous waste storage facility by the fire department for off-Base disposal. However, no leaks or spills of AFFF geographical coordinates of Building 930 (Hazardous Waste) are 41°7'59.88"N and 104°52'11.12"W. The location of Building 930 (Hazardous Waste) is shown on Figures 1.1 and 3.3.

3.2.1.2 Waste Characteristics

Not applicable.

3.2.1.3 Pathway and Environmental Hazard Assessment

Not applicable.

3.2.1.3.1 Groundwater Pathway and Targets

Not applicable.

3.2.1.3.2 Surface Water Pathway and Targets

Not applicable.

3.2.1.3.3 Soil and Air Exposure Pathways and Targets

Not applicable.

3.2.2 Building 1240 (Truck Maintenance)

3.2.2.1 Description and Operational History

Building 1240, built in 1995, serves as the truck maintenance facility. Building 1240 formerly had an AFFF system that was replaced with a water suppression system in 2012. No additional information is known about the former AFFF system; however, no known system discharges, leaks or spills are known to have occurred (Watson, 2015, personal communication; Appendix C). Building 1240 is connected to a polyethylene-lined containment pond located between Buildings 1240 and 1247, and if spills occur, they can be diverted to this pond as necessary (McKinley, 2015, personal communication; Appendix C). The pond liner was replaced with a new polyethylene liner in approximately 2013 (Watson, 2015, personal communication; Appendix C). In the past, the pond has filled with water and been pumped out to the nearby grassy areas, but this has been done only when the pond fills with rainwater (Watson, 2015, personal communication; Appendix C). The geographical coordinates of Building 1240 (Truck Maintenance) are 41°8'37.86"N and 104°52'8.10"W. Building 1240 (Truck Maintenance) is shown on Figures 1.1 and 3.2.

3.2.2.2 Waste Characteristics

Not applicable.

3.2.2.3 Pathway and Environmental Hazard Assessment

Not applicable.

3.2.2.3.1 Groundwater Pathway and Targets

Not applicable.

3.2.2.3.2 Surface Water Pathway and Targets

Not applicable.

3.2.2.3.3 Soil and Air Exposure Pathways and Targets

Not applicable.

3.2.3 Building 1247 (Base Fuels)

3.2.3.1 Description and Operational History

Building 1247 (Base Fuels) was built in 1995 and has an active AFFF system with overhead lines. The AFFF tank size is unknown, but it is estimated it to be 200 to 300 gallons (Shafer, 2015, personal communication; Appendix C). Building 1247 is connected to a polyethylene-lined containment pond located between Buildings 1240 and 1247, and spills can be diverted to this pond as necessary (McKinley, 2015, personal communication; Appendix C). The pond liner was replaced with a new polyethylene liner in approximately 2013 (Watson, 2015, personal communication; Appendix C). In the past, the pond has filled with water and been pumped out to the nearby grassy areas, but this has been done only when the pond fills with rainwater (Watson, 2015, personal communication; Appendix C).

An AFFF leak occurred in the bay of Building 1247 when a pipe in the fire suppression system froze and broke; however, the year of the leak is not known. All AFFF was contained inside the hangar (Shafer, 2015, personal communication; Appendix C). Floor drains in this building discharge to an OWS and then to the sanitary sewer (which flows to a publicly owned treatment works) unless manually diverted to the containment pond (Wright, 2015, personal communication; Appendix C). It is not clear if the valve to the containment pond was opened during the spill; however, the AFFF either entered the OWS (which flows to the sanitary sewer) or the containment pond (where it would have been left to evaporate). The geographical coordinates of Building 1247 (Base Fuels) are 41°8'36.36"N and 104°52'12.08"W. The location of Building 1247 (Base Fuels) is shown on Figures 1.1 and 3.2.

3.2.3.2 Waste Characteristics

If AFFF was diverted to the containment pond during the AFFF leak, AFFF may have been released when the pond filled with rainwater and was pumped out and released to nearby grassy areas.

3.2.3.3 Pathway and Environmental Hazard Assessment

A complete exposure pathway typically includes the following components: a source of contamination (an environmental medium contaminated at the source or a release mechanism by which chemicals are released from a source medium and transported), an exposure medium by which a receptor comes into contact, and a route of intake for the contaminant into the receptor's body at the exposure point. If any of these elements are missing, the pathway is incomplete. Other release mechanisms resulting in exposure media for receptors may include the uptake of soil contaminants by plants and animals and the emission of soil contaminants into the air in association with dust particles.

Database research (EDR, 2015) shows 63 day care facilities (includes large day care operations and small in-home day care facilities); 2 nursing homes; 26 schools (includes public and private schools and academies); 89 hospitals, clinics, and doctor offices (includes outpatient surgery centers, home health care agencies, rehabilitation centers, pharmacies, and urgent care centers); and 2 colleges within the potential migration area of 4 miles from any given potential release location of PFCs. One elementary school, Freedom Elementary, is located on Base, and one elementary school, Pioneer Park Elementary, is located nearby but off Base. The closest elementary school is at least 1 mile southeast (hydrologically upgradient) of Building 1247. The on-Base child development center is located approximately 1.5 miles northeast (hydrologically upgradient) of Building 1247.

3.2.3.3.1 Groundwater Pathway and Targets

The Basewide geologic and hydrogeologic settings are provided in Section 1.3. Groundwater in this area generally flows northeast toward Crow Creek, which is located approximately 0.7 mile northeast of Building 1247. If AFFF was contained in the rainwater that was released to surrounding grassy areas, it likely infiltrated soils and entered the uppermost, shallow groundwater beneath the area. Shallow groundwater in this area flows to the northeast and discharges into Crow Creek.

F.E. Warren AFB drinking water sources are all located more than 4 miles upgradient of the Base and do not support a complete drinking water exposure pathway. The fact that F.E. Warren AFB does not use the groundwater below the Base as a supply of drinking water would also render this drinking water exposure pathway incomplete for F.E. Warren AFB workers and residents. Because of the depth to groundwater in this area (approximately 18 feet bgs [AECOM Technical Services, Inc., 2013]), excavation workers would not be exposed to groundwater.

No public water supply or residential wells are located between this location and Crow Creek, where groundwater likely daylights (EDR, 2015).

3.2.3.3.2 Surface Water Pathway and Targets

The surface water drainage near Building 1247 flows northeast to Crow Creek. Crow Creek flows east and discharges off Base via Outfall OFF 1. Crow Creek discharges into Wyoming Hereford Ranch Reservoir Number 1 approximately 6 miles off Base. F.E. Warren AFB drinking water does not come from surface water sources located within the watershed of F.E. Warren AFB, so there is no exposure pathway for surface water to residents or workers through domestic drinking water. Because runoff flows into nearby drainages, a complete exposure pathway for non-ingestion exposures exists, such as dermal exposure to humans. Ingestion by aquatic or other animals is also a potential pathway for ecological receptors.

A 100-year flood zone is along Crow Creek located north and northeast of Building 1247. The nearest waterbody is Crow Creek located approximately 0.4 mile north-northeast. Wetlands are also located along the banks of Crow Creek.

No surface water intakes, downstream fisheries, or sensitive environments are adjacent to the surface water migration path within 15 miles downstream of Building 1247 (EDR, 2015; USFWS, 2015). Local waterways, particularly Lake Pearson, are used for recreational fishing (Wright, 2015, personal communication; Appendix C). However, Lake Pearson is not located downstream of Building 1247.

3.2.3.3.3 Soil and Air Exposure Pathways and Targets

AFFF may have been released to the soils during removal of rainwater from the containment pond. Workers are present in Building 1247. The nearest residents are approximately 0.7 mile south-southeast of Building 1247. The well-vegetated and/or paved area surrounding Building 1247 and the containment pond would preclude any fugitive dust emissions and potential exposures. Current and planned land use does not involve potential human health exposure, and no intrusive work is currently planned that would allow for dermal soil exposures to utility or construction workers. The potential of exposure to burrowing animals, if present, would exist.

The population within 4 miles of the area is approximately 32,580. No schools or day care facilities are within a 200-foot radius of the location. The nearest school is Freedom Elementary School, located approximately 1 mile southeast of Building 1247 (EDR, 2015). The nearest day care facility is the F.E. Warren AFB Child Development Center, located approximately 1.5 miles to the northeast.

The Building 1247 area is not used for hunting, fishing, or harvesting of wild or farmed foods, and such activities are not anticipated in the future. The Colorado Butterfly Plant Research Natural Area is located within the former Building 1247 area.

3.2.4 Building 1285 (Hazmart)

3.2.4.1 Description and Operational History

Building 1285, built in 1995, serves as the Base Hazmart. AFFF is stored here for distribution as needed on base. During the PA visit to Building 1285, thirty-nine 55-gallon drums of AFFF were being stored at the location. Building 1285 has a temporary berm inside the building but no floor drains. All AFFF is stored with secondary containment. If a spill occurs, it would be cleaned up by a contractor (Wright, 2015, personal communication; Appendix C). However, no leaks or spills are known to have occurred here (McKinley, 2015, personal communication; Appendix C). The approximate geographical coordinates of Building 1285 (Hazmart) are 41°8'48.78"N and 104°52'4.58"W. The location of Building 1285 (Hazmart) is shown on Figures 1.1 and 3.2.

3.2.4.2 Waste Characteristics

Not applicable.

3.2.4.3 Pathway and Environmental Hazard Assessment

Not applicable.

3.2.4.3.1 Groundwater Pathway and Targets

Not applicable.

3.2.4.3.2 Surface Water Pathway and Targets

Not applicable.

3.2.4.3.3 Soil and Air Exposure Pathways and Targets

Not applicable.

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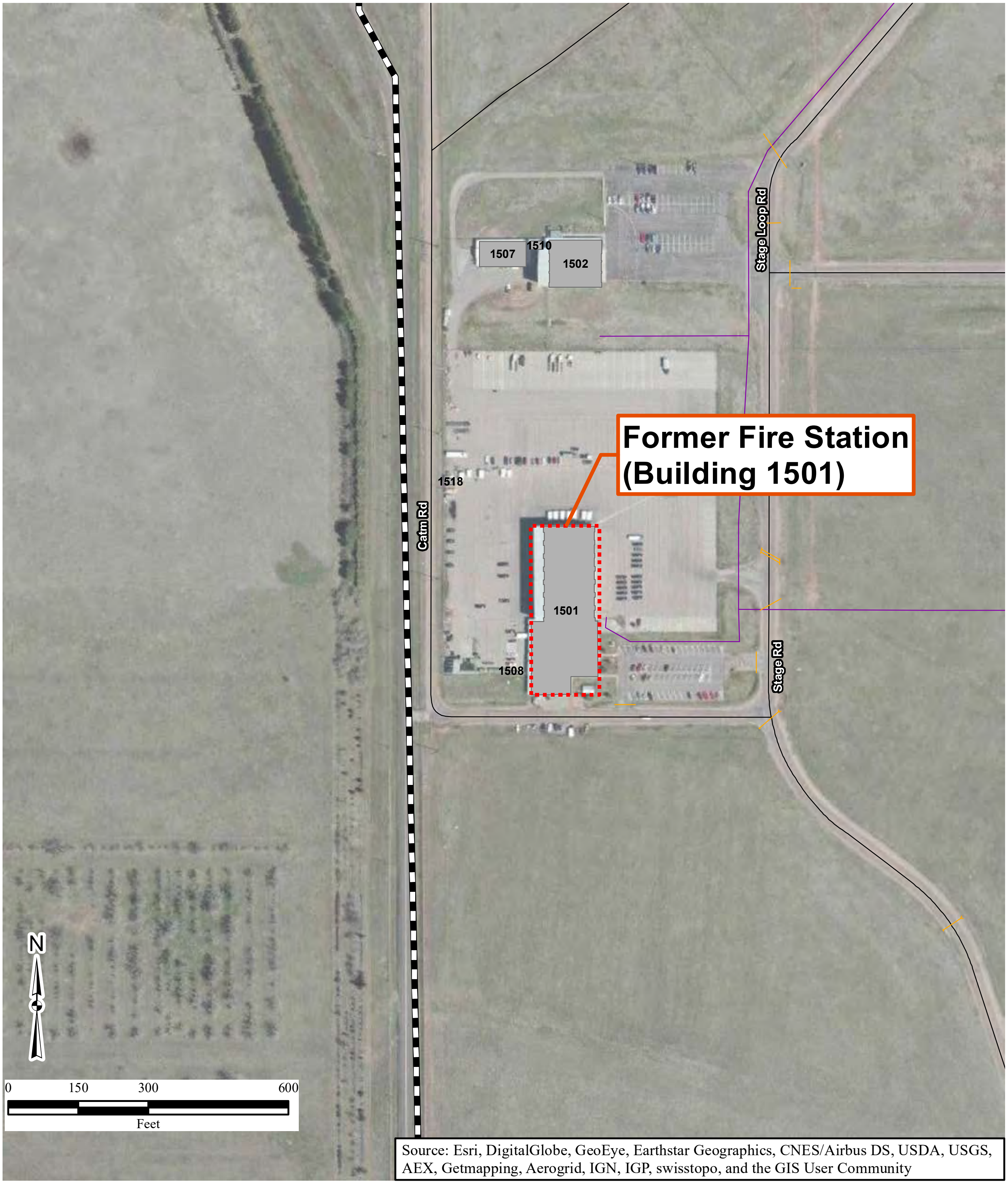
FIGURES



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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Legend

— Storm Sewer Line
— Wastewater Line
— Road
▨ Buildings
⬚ Approximate Location
▨ Installation Boundary

Figure 3.1
Former Fire Station
F.E. Warren AFB, Wyoming

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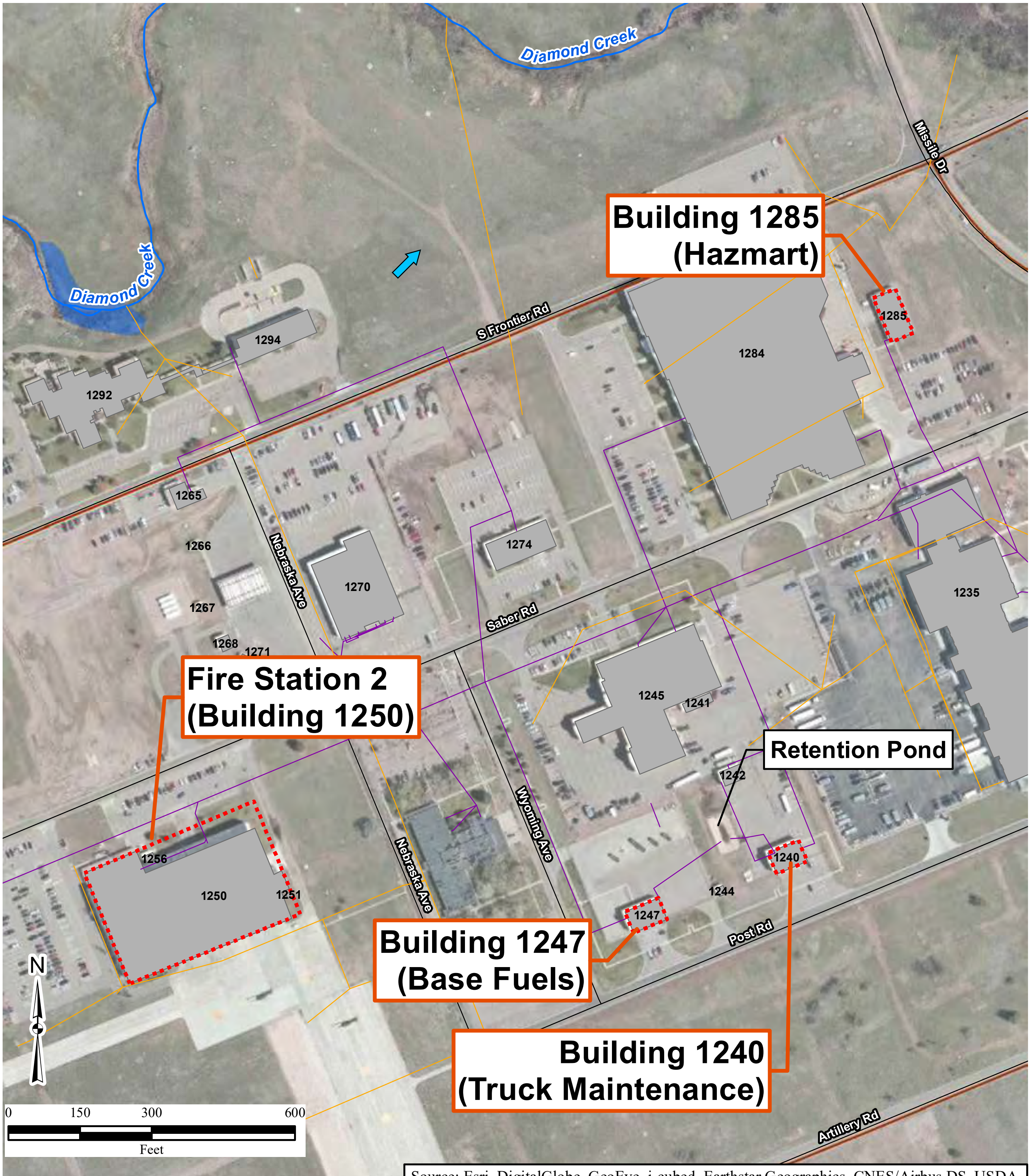

Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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Source: Wetland, National Wetlands Inventory - Wetland Polygons, Published September
2012, U.S. Fish and Wildlife Service, Division of Habitat and Resource
Conservation, Washington, D.C. http://www.fws.gov/wetlands/

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Legend

⬆ Approximate Groundwater Flow	— Road
— Storm Sewer Line	▨ Buildings
— Wastewater Line	⬚ Approximate Location
— Streams	🟦 Freshwater Pond

Figure 3.2
Locations in the Central Portion of F.E. Warren AFB, Wyoming

Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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9/11/2015 SA
Source: Wetland, National Wetlands Inventory - Wetland Polygons, Published September 2012, U.S. Fish and Wildlife Service, Division of Habitat and Resource Conservation, Washington, D.C. http://www.fws.gov/wetlands/

CH2MHILL.

Legend

— Storm Sewer Line
— Wastewater Line
— Road
▭ Buildings
⬚ Approximate Location
▨ Installation Boundary
🟪 Freshwater Emergent Wetland

Figure 3.3
Building 930
(Hazardous Waste)
F.E. Warren AFB,
Wyoming

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4.0 SUMMARY AND CONCLUSIONS

The following sections summarize the findings of the PA for AFFF on F.E. Warren AFB and provide conclusions based on those findings.

4.1 SUMMARY

4.1.1 Fire Training Areas

4.1.1.1 Fire Training Areas Closed Prior to 1970

FTAs that were closed prior to 1970 would not have had AFFF applied for firefighting and are not considered to have been impacted by PFOA or PFOS from AFFF use. Former FPTA 1 was closed prior to 1970.

4.1.1.2 Fire Training Areas Operational After 1970

Former FPTA 2 was used from 1965 until 1989. Former FPTA 3 was used from 1990 to 2000. Former FPTA 2 was unlined and could contain PFOA- and PFOS-impacted media. Therefore, contaminants could be present in soils and in groundwater underlying this location. Former FPTA 3 was a contained system with a lined pit and retention pond. Environmental media are not thought to have been impacted by fire training activities at former FPTA 3.

4.1.2 Non-Fire Training Areas

4.1.2.1 Fire Stations

F.E. Warren AFB currently has two fire stations on Base, Fire Station 1 (Building 324) and Fire Station 2 (Building 1250). Additionally, one former fire station exists (Building 1501). No operational activities at any of these fire stations are thought to have resulted in PFOA- or PFOS-impacted media.

4.1.2.2 Other

Other identified buildings are Building 930, where hazardous waste is held for off-Base disposal; Building 1240, where an AFFF system previously existed; Building 1247, where an AFFF system currently exists; and Building 1285, where AFFF is stored. No leaks or spills are known to have occurred in Buildings 930 and 1240, and they are not likely to have media impacted by PFOA and PFOS. A release of AFFF from the pipes in Building 1247 may have been released to the containment pond, which on occasion was pumped out when it filled with rainwater and released to the surrounding grassy areas. Nearby media may have been impacted by PFOA and PFOS.

4.2 CONCLUSIONS

Table 4.1 summarizes the findings from this PA Report and presents possible future location management decisions. The identified locations are categorized by group as follows:

- Group 1 – High mass of AFFF released and probability of groundwater contamination.

- Group 2 – Unknown mass or medium mass of AFFF released.
- Group 3 – Low mass of AFFF released.
- Group 4 – No AFFF released.

Based on the group designation and rationale for each location, recommendations are provided in Table 4.1. In accordance with the USEPA CERCLA PA and Site Inspection (SI) guidance documents (USEPA 1991; USEPA 1992), each identified location is recommended for one of the following actions: Implement removal action due to imminent threat; Close out due to no release; Initiate a Remedial Investigation (RI); or Initiate an SI.

- Removal actions, 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 (USEPA, 1991).
- Close out or no further remedial action planned is defined as a disposition decision that further response under the federal Superfund is not necessary (USEPA, 1991).
- RI is defined as a field investigation to characterize the nature and extent of contamination at a location. The RI supports development, evaluation, and selection of the appropriate response alternative (USEPA, 1991).
- SI is defined as an investigation to collect and analyze waste and environmental samples to support an evaluation (USEPA, 1992).

Table 4.1
Preliminary Assessment Report Summary and Findings
F.E. Warren Air Force Base, Wyoming

Locations	Group	Rationale	Recommendations
Former FPTA 1	Group 4	• Pre-1970. • AFFF not used.	Close out with no additional investigation.
Former FPTA 2	Group 1	• AFFF used to extinguish fires. • Training pit unlined. • Unknown quantity of AFFF used but likely significant due to years of operation.	Initiate SI.
Former FPTA 3	Group 4	• AFFF used to extinguish fires. • Contained system with lined training pit and retention pond that is not known to have released AFFF to the environment.	Close out with no additional investigation.
Former Fire Station (Building 1501)	Group 4	• Small two-bay station with only two trucks. • AFFF was not used at this station, although it may have been stored in small quantities on the trucks. • No known leaks or spills.	Close out with no additional investigation.

Table 4.1
Preliminary Assessment Report Summary and Findings
F.E. Warren Air Force Base, Wyoming

Locations	Group	Rationale	Recommendations
Fire Station 1 (Building 324)	Group 4	• No washing or refilling of trucks with AFFF occurs at this station. • Trucks are pump tested but not foam tested. • No storage of AFFF. • No known leaks or spills have occurred.	Close out with no additional investigation.
Fire Station 2 (Building 1250)	Group 4	• Trucks are filled using 5-gallon buckets inside the bays, and the floor drains flow to an OWS and then to the sanitary sewer to an off-Base treatment plant. • Trucks are pump tested but not foam tested. • AFFF use at this station is very limited. • No known leaks or spills have occurred.	Close out with no additional investigation.
Building 930 (Hazardous Waste)	Group 4	• AFFF stored until final disposal off Base. • No known leaks or spills.	Close out with no additional investigation.
Building 1240 (Truck Maintenance)	Group 4	• Former AFFF system from 1995 to 2012. • No known AFFF system discharges occurred.	Close out with no additional investigation.
Building 1247 (Base Fuels)	Group 3	• Has AFFF system. • One spill, but all AFFF was contained in building and in either containment pond or OWS. • Containment pond allowed to evaporate; however, when filled with rainwater, it was occasionally pumped out and released to grassy areas.	Initiate SI.
Building 1285 (Hazmart)	Group 4	• AFFF storage. • No known leaks or spills.	Close out with no additional investigation.

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5.0 REFERENCES

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APPENDIX A

PHOTO DOCUMENTATION

PHOTOGRAPH LOG

Team: FE Warren
Date: 8-26-15
Project Number:
Observation Period: Start: 1:30 Stop:
Weather: Sunny

Photo No.	Time	View Direction	Location/Description
1	130	—	Bldg 324 Station 1 Bay
2	131	—	" " " 1 Bay
3	135	—	Bldg 1250 Station 2 - RIVs
4	136	—	Station 2 AFFF Storage
5	140	—	Base Fuel Building 1247 Mec Room
6	141	—	Bldg 1247 bay overhead lines
7	147	—	" " " " "
8	148	—	" " diversion valve to pond
9	155	E	Retention pond which supports 1240 + 1247
10	210	WE	Former FTA
11	211		Crow Creek
12	215	—	Bldg 1285 Hazmart Storage - 39 drums
13	221	—	Bldg 1501 Former Fire Station
14	223	E	Storm water pond that discharges to Crow Creek
15	227	SE	FPTA 2 - former location

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

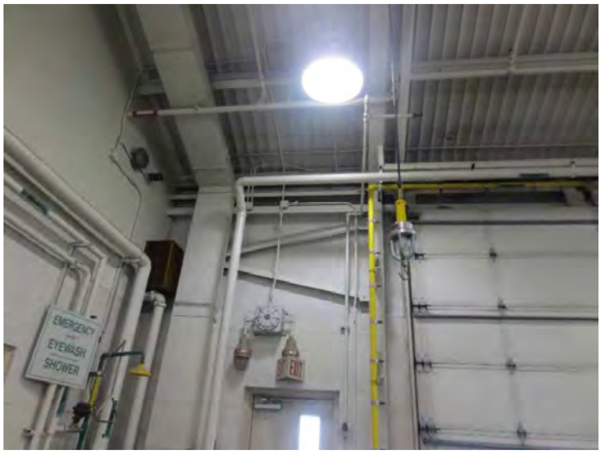

Photo 7

Photo 8

Photo 9

Photo 10

Photo 11

Photo 12

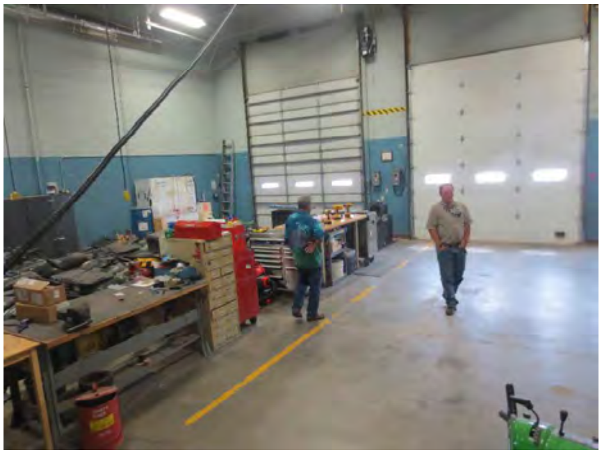

Photo 13

Photo 14

Photo 15

APPENDIX B

FIELD DOCUMENTATION

APPENDIX B.1

POTENTIAL HAZARDOUS WASTE SITE FORMS

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Potential Hazardous Waste Site Preliminary Assessment Form

Identification

State: WY
CERCLIS #:
CERCLIS Discovery Date:

1. General Site Information

Name: F.E. Warren AFB
Street Address:
City: Cheyenne
State: WY
Zip Code:
County: Laramie
Co. Code:
Cong. Dist:
Latitude: 41° 8'50.72"N
Longitude: 104°51'42.62"W
Approximate Area of Site: __3___ Acres ____________ Square Ft

Status of Site:
☐ Active
☑ Inactive
☐ Not Specified
☐ NA (GW plume, etc.)

Site Name: Former Fire Protection Training Area 1

Site Description: Used from 1950 to 1965. Used prior to 1970 so not a source of AFFF.

2. Owner/Operator Information

Owner: F.E. Warren AFB
Street Address:
City:
State: ND
Zip Code:
Telephone:

Type of Ownership:
☐ Private
☑ Federal Agency
Name: _DOD__
☐ State
☐ Indian
☐ County
☐ Municipal
☐ Not Specified
☐ Other_________

Operator: Same as owner
Street Address:
City:
State:
Zip Code:
Telephone:

Type of Ownership:
☐ Private
☐ Federal Agency
Name: _____
☐ State
☐ Indian
☐ County
☐ Municipal
☐ Not Specified
☐ Other_________

3. Site Evaluator Information

Name of Evaluator: Kelly Teplitsky
Agency/Organization: CH2M HILL
Date Prepared: 09/11/15
Street Address: 9191 South Jamaica Street
City: Englewood
State: CO
Name of EPA or State Agency Contact:
Street Address:
City:
State:
Telephone:

4. Site Disposition *(for EPA use only)*

Emergency Response/Removal Assessment Recommendation:
☐ Yes
☐ No
Date: _________

CERCLIS Recommendation:
☐ Higher Priority SI
☐ Lower Priority SI
☐ NFRAP
☐ RCRA
☐ Other: ________
Date: _________

Signature:
Name (typed):
Position:

5. General Site Characteristics

Predominant Land Use Within 1 Mile of Site (check all that apply):

☐ Industrial
☐ Commercial
☑ Residential
☐ Forest/Fields

☐ Agriculture
☐ Mining
☑ DOD
☐ DOE

☐ DOI
☐ Other Federal Facility: __________
☐ Other _______

Site Setting:

☐ Urban
☑ Suburban
☐ Rural

Years of Operation:

Beginning Year _1950s_

Ending Year 1965_

☐ Unknown

Type of Site Operations (check all that apply):

☐ Manufacturing (must check subcategory)
  ☐ Lumber and Wood Products
  ☐ Inorganic Chemicals
  ☐ Plastic and/or Rubber Products
  ☐ Paints, Varnishes
  ☐ Industrial Organic Chemicals
  ☐ Agricultural Chemicals
  ☐ Miscellaneous Chemical Products
  ☐ Primary Metals
  ☐ Metal Coating, Plating, Engraving
  ☐ Metal Forging, Stamping
  ☐ Fabricated Structural Metal Products
  ☐ Electronic Equipment
  ☐ Other Manufacturing
☐ Mining
  ☐ Metals
  ☐ Coal
  ☐ Oil and Gas
  ☐ Non-metallic Minerals

☐ Retail
☐ Recycling
☐ Junk/Salvage Yard
☐ Municipal Landfill
☐ Other Landfill
☑ DOD
☐ DOE
☐ DOI
☐ Other Federal Facility _______
☐ RCRA
  ☐ Treatment, Storage, or Disposal
  ☐ Large Quantity Generator
  ☐ Small Quantity Generator
  ☐ Subtitle D
    ☐ Municipal
    ☐ Industrial
  ☐ "Converter"
  ☐ "Protective Filer"
  ☐ "Non-or Late Filer"
☐ Note Specified
☐ Other______________

Waste Generated: NA

☐ Onsite
☐ Offsite
☐ Onsite and Offsite

Waste Deposition Authorized By:

☐ Present Owner
☐ Former Owner
☐ Present & Former Owner
☐ Unauthorized
☐ Unknown

Waste Accessible to the Public:

☐ Yes
☐ No

Distance to Nearest Dwelling, School, or Workplace:

NA__ feet

6. Waste Characteristics Information

(Refer to PA Table 1 for WC Score)

Source Type: (check all that apply)	Source Waste Quantity: (include unit)	Tier*:
☐ Landfill	_____________	_____
☐ Surface Impoundment	_____________	_____
☐ Drums	_____________	_____
☐ Tanks and Non-Dum Containers	_____________	_____
☐ Chemical Waste Pile	_____________	_____
☐ Scrap Metal or Junk Pile	_____________	_____
☐ Tailings Pile	_____________	_____
☐ Trash Pile (open drum)	_____________	_____
☐ Land Treatment	_____________	_____
☐ Contaminated GW Plume (unidentified source)	_____________	_____
☐ Contaminated SW/Sediment (unidentified source)	_____________	_____
☐ Contaminated Soil	_____________	_____
☐ Other_________	_____________	_____
☐ No Sources		

*C=Constituent, W=Wastestream, V=Volume, A=Area

General Type of Waste (check all that apply):

☐ Metals
☐ Organics
☐ Inorganics
☐ Solvents
☐ Paints/Pigments
☐ Laboratory/Hospital Waste
☐ Radioactive Waste
☐ Construction/Demolition Waste

☐ Pesticides/Herbicides
☐ Acids/Bases
☐ Oily Waste
☐ Municipal Waste
☐ Mining Waste
☐ Explosives
☐ Other _AFFF_

Physical State of Waste as Deposited (check all that apply):

☐ Solid
☐ Sludge
☐ Powder
☐ Liquid
☐ Gas

7. Ground Water Pathway

Is Ground Water Used for Drinking Within 4 Miles:

☐ Yes
☑ No

If Yes, Distance to nearest Drinking Well:
________ Feet

Type of Drinking Water Wells Within 4 Miles
(check all that apply):

☐ Municipal
☐ Private
☑ None

Is There a Suspected Release to Ground Water[1]:

☐ Yes
☑ No

Have Primary Target Drinking Water Wells Been Identified:

☐ Yes
☑ No

If Yes, Enter Primary Target Population:
_________ People[3]

List Secondary Target Population Served by Ground Water Withdrawn From:

0 - 1/4 Mile __NA_____
>1/4 - 1/2 Mile __NA______
>1/2 - 1 Mile __NA______
>1 - 2 Mile __NA______
>2 - 3 Mile __NA______
>3 - 4 Mile __NA______
Total Within 4 Miles[4] _NA______

*Use population #s for PA Table 2
*Note nearest well for #5 on GW Pathway Scoresheet

Depth to Shallowest Aquifer:
~ 12 Feet

Karst Terrain/Aquifer Present:

☐ Yes
☑ No

Nearest Designated Wellhead Protection Area[6]:

☐ Underlies Site
☐ >0-4 Miles
☑ None Within 4 Miles

8. Surface Water Pathway

Type of Surface Water Draining Site and 15 Miles Downstream (check all that apply):

☐ Stream ☐ River ☐ Pond ☐ Lake
☐ Bay ☐ Ocean ☐ Other________

Shortest Overland Distance From Any Source to Surface Water:
_NA_ Feet
________ Miles

Is There a Suspected Release to Surface Water[1]:

☐ Yes
☑ No

Site is Located in:

☐ Annual - 10 yr Floodplain
☐ >10yr - 100yr Floodplain
☐ >100yr - 500yr Floodplain
☐ >500yr Floodplain

Drinking Water Intake Located Along the Surface Water Migration Path:

☐ Yes
☑ No

Have Primary Target Drinking Water Intakes Been Identified:

☐ Yes
☑ No

If Yes, Distance to Nearest Drinking Water Intake : _________ Miles[6]

If Yes, Enter Population Served by Target Intake:
NA__ People[4]

List All Secondary Target Drinking Water Intakes:

Name:	Water Body:	Flow (cfs):	Population Served:
_______	________	_________	__________
_______	________	__________	_________
_______	________	__________	_________
_______	________	__________	_________

Total within 15 Miles [4] __________

Fisheries Located Along the Surface Water Migration Path:

☐ Yes ☑ No

If Yes, Distance to Nearest Fishery:
_________ Miles

Have Primary Target Fisheries Been Identified:

☐ Yes ☑ No

List All Secondary Target Fisheries[10]:

Water Body/ Fishery Name :	Flow (cfs):
_______________________	_________
_______________________	__________
_______________________	__________
_______________________	__________

8. Surface Water Pathway (continued)

Wetlands Located Along the Surface Water Migration Path:

☐ Yes
☐ No

Have Primary Target Wetlands Been Identified:

☐ Yes
☐ No

List All Wetlands:

Water Body :	Flow (cfs):	Frontage miles:

Other Sensitive Environments Located Along the Surface Water Migration Path:

☐ Yes
☐ No

If Yes, Distance to Nearest Sensitive Environment: _ Miles

Have Primary Target Sensitive Environments Been Identified:

☐ Yes
☐ No

List All Sensitive Environments[11]:

Water Body :	Flow (cfs):	Sensitive Environment Type:

9. Soil Exposure Pathway

Are People Occupying Residence or Attending School or Daycare on or Within 200 Feet of Area of Known or Suspected Contamination:

☐ Yes
☐ No

If Yes, Enter Total Residential Population:

__NA__ People[2]

Number of Workers Onsite[4]:

☑ None
☐ 1 - 100
☐ 101 - 1,000
☐ > 1,000

Population Within 1 Mile:

_NA___ People[7]

Have Terrestrial Sensitive Environments Been Identified on or Within 200 Feet of Areas of Known or Suspected Contamination:

☐ Yes
☐ No

If Yes, List Each Terrestrial Sensitive Environment[5]:

____
____
____

*Refer to PA Table 7 for environment types

10. Air Pathway

Is there a Suspected Release to Air[1]:

☐ Yes
☑ No

Enter Total Population on or Within:

Onsite ____________

0-1/4 Mile ____________

>1/4-1/2 Mile ____________

>1/2-1 Mile ____________

>1-2 Miles ____________

>2-3 Miles ____________

>3-4 Miles ____________

Total Within 4 Miles [3-5] _NA_

Wetlands Located Within 4 Miles of the Site[6]:

☐ Yes
☐ No

If Yes, How Many Acres: _______ Acres

Other Sensitive Environments Located Within 4 Miles of the Site:

☐ Yes
☐ No

List All Sensitive Environments Within 1/2 Mile of the Site[6]:

Distance:	Sensitive Environment Type/Wetlands Area (acres):
Onsite	
0-1/4 Mile	
>1/4-1/2 Mile	

*Refer to PA Table 10 for calculations on air pathway exposures

[1-11] Refers to question number on the PA scoresheet for each particular pathway

Potential Hazardous Waste Site Preliminary Assessment Form

Identification

State: WY

CERCLIS #:

CERCLIS Discovery Date:

1. General Site Information

Name: F.E. Warren AFB	Street Address:				
City: Cheyenne	State: WY	Zip Code:	County: Laramie	Co. Code:	Cong. Dist:
Latitude: 41° 8'34.40"N	Longitude: 104°51'32.70"W	Approximate Area of Site: __3___ Acres ____________ Square Ft	Status of Site: ☐ Active ☐ Not Specified ☑ Inactive ☐ NA (GW plume, etc.)		

Site Name: Former Fire Protection Training Area 2

Site Description: The Former FPTA 2 (also known as IRP site FT009) is located between Omaha and Missouri Avenues and between Third and Fourth Streets and is about a quarter of a mile south of Crow Creek. This FPTA consisted of two unlined, bermed training pits that were used from 1965 until 1989. No retention ponds were present.

2. Owner/Operator Information

Owner: F.E. Warren AFB	Operator: Same as owner
Street Address:	Street Address:
City:	City:
State: ND Zip Code: Telephone:	State: Zip Code: Telephone:
Type of Ownership: ☐ Private ☑ Federal Agency Name: _DOD__ ☐ State ☐ Indian ☐ County ☐ Municipal ☐ Not Specified ☐ Other_________	Type of Ownership: ☐ Private ☐ Federal Agency Name: _____ ☐ State ☐ Indian ☐ County ☐ Municipal ☐ Not Specified ☐ Other_________

3. Site Evaluator Information

Name of Evaluator: Kelly Teplitsky	Agency/Organization: CH2M HILL	Date Prepared: 09/11/15
Street Address: 9191 South Jamaica Street	City: Englewood	State: CO
Name of EPA or State Agency Contact:	Street Address:	
City:	State:	Telephone:

4. Site Disposition *(for EPA use only)*

Emergency Response/Removal Assessment Recommendation: ☐ Yes ☐ No Date: _________	CERCLIS Recommendation: ☐ Higher Priority SI ☐ Lower Priority SI ☐ NFRAP ☐ RCRA ☐ Other: _______ Date: _________	Signature: Name (typed): Position:

5. General Site Characteristics

Predominant Land Use Within 1 Mile of Site (check all that apply):

☐ Industrial
☐ Commercial
☑ Residential
☐ Forest/Fields

☐ Agriculture
☐ Mining
☑ DOD
☐ DOE

☐ DOI
☐ Other Federal Facility: __________
☐ Other _______

Site Setting:

☐ Urban
☑ Suburban
☐ Rural

Years of Operation:

Beginning Year _1965_

Ending Year 1989_

☐ Unknown

Type of Site Operations (check all that apply):

☐ Manufacturing (must check subcategory)
  ☐ Lumber and Wood Products
  ☐ Inorganic Chemicals
  ☐ Plastic and/or Rubber Products
  ☐ Paints, Varnishes
  ☐ Industrial Organic Chemicals
  ☐ Agricultural Chemicals
  ☐ Miscellaneous Chemical Products
  ☐ Primary Metals
  ☐ Metal Coating, Plating, Engraving
  ☐ Metal Forging, Stamping
  ☐ Fabricated Structural Metal Products
  ☐ Electronic Equipment
  ☐ Other Manufacturing

☐ Mining
  ☐ Metals
  ☐ Coal
  ☐ Oil and Gas
  ☐ Non-metallic Minerals

☐ Retail
☐ Recycling
☐ Junk/Salvage Yard
☐ Municipal Landfill
☐ Other Landfill
☑ DOD
☐ DOE
☐ DOI
☐ Other Federal Facility _______
☐ RCRA
  ☐ Treatment, Storage, or Disposal
  ☐ Large Quantity Generator
  ☐ Small Quantity Generator
  ☐ Subtitle D
    ☐ Municipal
    ☐ Industrial
  ☐ "Converter"
  ☐ "Protective Filer"
  ☐ "Non-or Late Filer"
☐ Note Specified
☐ Other______________

Waste Generated: NA

☑ Onsite
☐ Offsite
☐ Onsite and Offsite

Waste Deposition Authorized By:

☑ Present Owner
☐ Former Owner
☐ Present & Former Owner
☐ Unauthorized
☐ Unknown

Waste Accessible to the Public:

☐ Yes
☑ No

Distance to Nearest Dwelling, School, or Workplace:

350__ feet

6. Waste Characteristics Information

(Refer to PA Table 1 for WC Score)

Source Type: (check all that apply)	Source Waste Quantity: (include unit)	Tier*:
☐ Landfill	_____________	_____
☐ Surface Impoundment	_____________	_____
☐ Drums	_____________	_____
☐ Tanks and Non-Dum Containers	_____________	_____
☐ Chemical Waste Pile	_____________	_____
☐ Scrap Metal or Junk Pile	_____________	_____
☐ Tailings Pile	_____________	_____
☐ Trash Pile (open drum)	_____________	_____
☐ Land Treatment	_____________	_____
☐ Contaminated GW Plume (unidentified source)	_____________	_____
☐ Contaminated SW/Sediment (unidentified source)	_____________	_____
☐ Contaminated Soil	_____________	_____
☐ Other_________	_____________	_____
☐ No Sources		

*C=Constituent, W=Wastestream, V=Volume, A=Area

General Type of Waste (check all that apply):

☐ Metals
☐ Organics
☐ Inorganics
☐ Solvents
☐ Paints/Pigments
☐ Laboratory/Hospital Waste
☐ Radioactive Waste
☐ Construction/Demolition Waste

☐ Pesticides/Herbicides
☐ Acids/Bases
☐ Oily Waste
☐ Municipal Waste
☐ Mining Waste
☐ Explosives
☑ Other _AFFF_

Physical State of Waste as Deposited (check all that apply):

☐ Solid
☐ Sludge
☐ Powder
☑ Liquid
☐ Gas

7. Ground Water Pathway

Is Ground Water Used for Drinking Within 4 Miles:

☐ Yes
☑ No

If Yes, Distance to nearest Drinking Well:
________ Feet

Type of Drinking Water Wells Within 4 Miles
(check all that apply):

☐ Municipal
☐ Private
☑ None

Is There a Suspected Release to Ground Water[1]:

☑ Yes
☐ No

Have Primary Target Drinking Water Wells Been Identified:

☐ Yes
☑ No

If Yes, Enter Primary Target Population:
_________ People[3]

List Secondary Target Population Served by Ground Water Withdrawn From:

0 - 1/4 Mile __NA_____

>1/4 - 1/2 Mile __NA______

>1/2 - 1 Mile __NA______

>1 - 2 Mile __NA______

>2 - 3 Mile __NA______

>3 - 4 Mile __NA______

Total Within 4 Miles[4] _NA______

*Use population #s for PA Table 2
*Note nearest well for #5 on GW Pathway Scoresheet

Depth to Shallowest Aquifer:
~ 12 Feet

Karst Terrain/Aquifer Present:

☐ Yes
☑ No

Nearest Designated Wellhead Protection Area[6]:

☐ Underlies Site
☐ >0-4 Miles
☑ None Within 4 Miles

8. Surface Water Pathway

Type of Surface Water Draining Site and 15 Miles Downstream (check all that apply):

☑ Stream ☐ River ☐ Pond ☐ Lake
☐ Bay ☐ Ocean ☐ Other________

Shortest Overland Distance From Any Source to Surface Water:

__ Feet
__0.2___ Miles

Is There a Suspected Release to Surface Water[1]:

☑ Yes
☐ No

Site is Located in:

☐ Annual - 10 yr Floodplain
☑ >10yr - 100yr Floodplain
☐ >100yr - 500yr Floodplain
☐ >500yr Floodplain

Drinking Water Intake Located Along the Surface Water Migration Path:

☐ Yes
☑ No

Have Primary Target Drinking Water Intakes Been Identified:

☐ Yes
☑ No

If Yes, Distance to Nearest Drinking Water Intake : _________ Miles[6]

If Yes, Enter Population Served by Target Intake:

NA__ People[4]

List All Secondary Target Drinking Water Intakes:

Name:	Water Body:	Flow (cfs):	Population Served:
_______	_________	__________	__________
_______	_________	__________	__________
_______	_________	__________	__________
_______	_________	__________	__________

Total within 15 Miles [4] __________

Fisheries Located Along the Surface Water Migration Path:

☐ Yes ☑ No

If Yes, Distance to Nearest Fishery:
_________ Miles

Have Primary Target Fisheries Been Identified:

☐ Yes ☑ No

List All Secondary Target Fisheries[10]:

Water Body/ Fishery Name :	Flow (cfs):
______________________	_________
______________________	_________
______________________	_________
______________________	_________

8. Surface Water Pathway (continued)

Wetlands Located Along the Surface Water Migration Path:

☑ Yes
☐ No

Have Primary Target Wetlands Been Identified:

☐ Yes
☑ No

List All Wetlands:

Water Body :	Flow (cfs):	Frontage miles:

Other Sensitive Environments Located Along the Surface Water Migration Path:

☐ Yes
☑ No

If Yes, Distance to Nearest Sensitive Environment: _0 Miles

Have Primary Target Sensitive Environments Been Identified:

☐ Yes
☑ No

List All Sensitive Environments[11]:

Water Body :	Flow (cfs):	Sensitive Environment Type:

9. Soil Exposure Pathway

Are People Occupying Residence or Attending School or Daycare on or Within 200 Feet of Area of Known or Suspected Contamination:

☐ Yes
☑ No

If Yes, Enter Total Residential Population:

__NA__ People[2]

Number of Workers Onsite[4]:

☑ None
☐ 1 - 100
☐ 101 - 1,000
☐ > 1,000

Population Within 1 Mile:

_NA___ People[7]

Have Terrestrial Sensitive Environments Been Identified on or Within 200 Feet of Areas of Known or Suspected Contamination:

☑ Yes
☐ No

If Yes, List Each Terrestrial Sensitive Environment[5]:
_Colorado Butterfly Plant Research Natural Area___________________________________

10. Air Pathway

Is there a Suspected Release to Air[1]:

☐ Yes
☑ No

Enter Total Population on or Within:

Onsite ____________
0-1/4 Mile ____________
>1/4-1/2 Mile ____________
>1/2-1 Mile ____________
>1-2 Miles ____________
>2-3 Miles ____________
>3-4 Miles ____________
Total Within 4 Miles [3-5] _32,580_

Wetlands Located Within 4 Miles of the Site[6]:

☑ Yes
☐ No

If Yes, How Many Acres: _______ Acres

Other Sensitive Environments Located Within 4 Miles of the Site:

☑ Yes
☐ No

List All Sensitive Environments Within 1/2 Mile of the Site[6]:

Distance:	Sensitive Environment Type/Wetlands Area (acres):
Onsite	Colorado Butterfly Plant Research Natural Area
0-1/4 Mile	
>1/4-1/2 Mile	

*Refer to PA Table 10 for calculations on air pathway exposures

[1-11] Refers to question number on the PA scoresheet for each particular pathway

Potential Hazardous Waste Site Preliminary Assessment Form

Identification

State: WY
CERCLIS #:
CERCLIS Discovery Date:

1. General Site Information

Name: F.E. Warren AFB	Street Address:				
City: Cheyenne	State: WY	Zip Code:	County: Laramie	Co. Code:	Cong. Dist:

Latitude: 41° 9'3.43"N	Longitude: 104°52'26.32"W	Approximate Area of Site: __3___ Acres ____________ Square Ft	Status of Site: ☐ Active ☐ Not Specified ☑ Inactive ☐ NA (GW plume, etc.)

Site Name: Former Fire Protection Training Area 3

Site Description: The Former FPTA 3 is located in the northern portion of the Base and was opened in 1990. This FPTA was operated until approximately 2000. The FPTA consisted of an aircraft carcass in a poly-lined training pit surrounded by concrete and a poly-lined retention pond. The training pit was connected to an OWS and water from the pit was piped to the retention pond. Contents of the retention pond were left in place to evaporate.

2. Owner/Operator Information

Owner: F.E. Warren AFB			Operator: Same as owner		
Street Address:			Street Address:		
City:			City:		
State: ND	Zip Code:	Telephone:	State:	Zip Code:	Telephone:

Type of Ownership: ☐ Private ☑ Federal Agency Name: _DOD__ ☐ State ☐ Indian ☐ County ☐ Municipal ☐ Not Specified ☐ Other_________	Type of Ownership: ☐ Private ☐ Federal Agency Name: _____ ☐ State ☐ Indian ☐ County ☐ Municipal ☐ Not Specified ☐ Other_________

3. Site Evaluator Information

Name of Evaluator: Kelly Teplitsky	Agency/Organization: CH2M HILL	Date Prepared: 09/11/15
Street Address: 9191 South Jamaica Street	City: Englewood	State: CO
Name of EPA or State Agency Contact:	Street Address:	
City:	State:	Telephone:

4. Site Disposition *(for EPA use only)*

Emergency Response/Removal Assessment Recommendation: ☐ Yes ☐ No Date: _________	CERCLIS Recommendation: ☐ Higher Priority SI ☐ Lower Priority SI ☐ NFRAP ☐ RCRA ☐ Other: ________ Date: _________	Signature: Name (typed): Position:

5. General Site Characteristics

Predominant Land Use Within 1 Mile of Site (check all that apply):

☐ Industrial
☐ Commercial
☑ Residential
☐ Forest/Fields

☐ Agriculture
☐ Mining
☑ DOD
☐ DOE

☐ DOI
☐ Other Federal Facility: __________
☐ Other _______

Site Setting:

☐ Urban
☑ Suburban
☐ Rural

Years of Operation:

Beginning Year _1990_

Ending Year 2000_

☐ Unknown

Type of Site Operations (check all that apply):

☐ Manufacturing (must check subcategory)
  ☐ Lumber and Wood Products
  ☐ Inorganic Chemicals
  ☐ Plastic and/or Rubber Products
  ☐ Paints, Varnishes
  ☐ Industrial Organic Chemicals
  ☐ Agricultural Chemicals
  ☐ Miscellaneous Chemical Products
  ☐ Primary Metals
  ☐ Metal Coating, Plating, Engraving
  ☐ Metal Forging, Stamping
  ☐ Fabricated Structural Metal Products
  ☐ Electronic Equipment
  ☐ Other Manufacturing
☐ Mining
  ☐ Metals
  ☐ Coal
  ☐ Oil and Gas
  ☐ Non-metallic Minerals

☐ Retail
☐ Recycling
☐ Junk/Salvage Yard
☐ Municipal Landfill
☐ Other Landfill
☑ DOD
☐ DOE
☐ DOI
☐ Other Federal Facility _______
☐ RCRA
  ☐ Treatment, Storage, or Disposal
  ☐ Large Quantity Generator
  ☐ Small Quantity Generator
  ☐ Subtitle D
    ☐ Municipal
    ☐ Industrial
  ☐ "Converter"
  ☐ "Protective Filer"
  ☐ "Non-or Late Filer"
☐ Note Specified
☐ Other______________

Waste Generated: NA

☑ Onsite
☐ Offsite
☐ Onsite and Offsite

Waste Deposition Authorized By:

☑ Present Owner
☐ Former Owner
☐ Present & Former Owner
☐ Unauthorized
☐ Unknown

Waste Accessible to the Public:

☐ Yes
☑ No

Distance to Nearest Dwelling, School, or Workplace:

NA__ feet

6. Waste Characteristics Information

(Refer to PA Table 1 for WC Score)

Source Type: (check all that apply)	Source Waste Quantity: (include unit)	Tier*:
☐ Landfill	_____________	____
☐ Surface Impoundment	_____________	____
☐ Drums	_____________	____
☐ Tanks and Non-Dum Containers	_____________	____
☐ Chemical Waste Pile	_____________	____
☐ Scrap Metal or Junk Pile	_____________	____
☐ Tailings Pile	_____________	____
☐ Trash Pile (open drum)	_____________	____
☐ Land Treatment	_____________	____
☐ Contaminated GW Plume (unidentified source)	_____________	____
☐ Contaminated SW/Sediment (unidentified source)	_____________	____
☐ Contaminated Soil	_____________	____
☐ Other_________	_____________	____
☐ No Sources		

*C=Constituent, W=Wastestream, V=Volume, A=Area

General Type of Waste (check all that apply):

☐ Metals
☐ Organics
☐ Inorganics
☐ Solvents
☐ Paints/Pigments
☐ Laboratory/Hospital Waste
☐ Radioactive Waste
☐ Construction/Demolition Waste

☐ Pesticides/Herbicides
☐ Acids/Bases
☐ Oily Waste
☐ Municipal Waste
☐ Mining Waste
☐ Explosives
☑ Other _AFFF_

Physical State of Waste as Deposited (check all that apply):

☐ Solid
☐ Sludge
☐ Powder
☑ Liquid
☐ Gas

7. Ground Water Pathway

Is Ground Water Used for Drinking Within 4 Miles:

☐ Yes
☑ No

If Yes, Distance to nearest Drinking Well:

________ Feet

Type of Drinking Water Wells Within 4 Miles
(check all that apply):

☐ Municipal
☐ Private
☑ None

Depth to Shallowest Aquifer:

~ 12 Feet

Karst Terrain/Aquifer Present:

☐ Yes
☑ No

Is There a Suspected Release to Ground Water[1]:

☐ Yes
☑ No

Have Primary Target Drinking Water Wells Been Identified:

☐ Yes
☑ No

If Yes, Enter Primary Target Population:

_________ People[3]

Nearest Designated Wellhead Protection Area[6]:

☐ Underlies Site
☐ >0-4 Miles
☑ None Within 4 Miles

List Secondary Target Population Served by Ground Water Withdrawn From:

0 - 1/4 Mile __NA_____
>1/4 - 1/2 Mile __NA______
>1/2 - 1 Mile __NA______
>1 - 2 Mile __NA______
>2 - 3 Mile __NA______
>3 - 4 Mile __NA______

Total Within 4 Miles[4] _NA______

*Use population #s for PA Table 2
*Note nearest well for #5 on GW Pathway Scoresheet

8. Surface Water Pathway

Type of Surface Water Draining Site and 15 Miles Downstream (check all that apply):

☑ Stream ☐ River ☐ Pond ☐ Lake
☐ Bay ☐ Ocean ☐ Other________

Shortest Overland Distance From Any Source to Surface Water:

__ Feet
__NA___ Miles

Is There a Suspected Release to Surface Water[1]:

☐ Yes
☑ No

Site is Located in:

☐ Annual - 10 yr Floodplain
☐ >10yr - 100yr Floodplain
☐ >100yr - 500yr Floodplain
☐ >500yr Floodplain

Drinking Water Intake Located Along the Surface Water Migration Path:

☐ Yes
☑ No

Have Primary Target Drinking Water Intakes Been Identified:

☐ Yes
☑ No

If Yes, Distance to Nearest Drinking Water Intake : _________ Miles[6]

If Yes, Enter Population Served by Target Intake:

NA__ People[4]

List All Secondary Target Drinking Water Intakes:

Name:	Water Body:	Flow (cfs):	Population Served:
_______	_________	__________	__________
_______	_________	__________	__________
_______	_________	__________	__________
_______	_________	__________	__________

Total within 15 Miles [4] __________

Fisheries Located Along the Surface Water Migration Path:

☐ Yes ☑ No

If Yes, Distance to Nearest Fishery:

_________ Miles

Have Primary Target Fisheries Been Identified:

☐ Yes ☑ No

List All Secondary Target Fisheries[10]:

Water Body/ Fishery Name :	Flow (cfs):
______________________	__________
______________________	__________
______________________	__________
______________________	__________

8. Surface Water Pathway (continued)

Wetlands Located Along the Surface Water Migration Path:

☑ Yes
☐ No

Have Primary Target Wetlands Been Identified:

☐ Yes
☑ No

List All Wetlands:

Water Body :	Flow (cfs):	Frontage miles:

Other Sensitive Environments Located Along the Surface Water Migration Path:

☐ Yes
☑ No

If Yes, Distance to Nearest Sensitive Environment: _0 Miles

Have Primary Target Sensitive Environments Been Identified:

☐ Yes
☑ No

List All Sensitive Environments[11]:

Water Body :	Flow (cfs):	Sensitive Environment Type:

9. Soil Exposure Pathway

Are People Occupying Residence or Attending School or Daycare on or Within 200 Feet of Area of Known or Suspected Contamination:

☐ Yes
☑ No

If Yes, Enter Total Residential Population:

__NA__ People[2]

Number of Workers Onsite[4]:

☑ None
☐ 1 - 100
☐ 101 - 1,000
☐ > 1,000

Population Within 1 Mile:

_NA___ People[7]

Have Terrestrial Sensitive Environments Been Identified on or Within 200 Feet of Areas of Known or Suspected Contamination:

☑ Yes
☐ No

If Yes, List Each Terrestrial Sensitive Environment[5]:
_Colorado Butterfly Plant Research Natural Area

10. Air Pathway

Is there a Suspected Release to Air[1]:

☐ Yes
☑ No

Enter Total Population on or Within:

Onsite ____________

0-1/4 Mile ____________

>1/4-1/2 Mile ____________

>1/2-1 Mile ____________

>1-2 Miles ____________

>2-3 Miles ____________

>3-4 Miles ____________

Total Within 4 Miles [3-5] _NA

Wetlands Located Within 4 Miles of the Site[6]:

☑ Yes
☐ No

If Yes, How Many Acres: _______ Acres

Other Sensitive Environments Located Within 4 Miles of the Site:

☑ Yes
☐ No

List All Sensitive Environments Within 1/2 Mile of the Site[6]:

Distance:	Sensitive Environment Type/Wetlands Area (acres):
Onsite	Colorado Butterfly Plant Research Natural Area
0-1/4 Mile	
>1/4-1/2 Mile	

*Refer to PA Table 10 for calculations on air pathway exposures

[1-11] Refers to question number on the PA scoresheet for each particular pathway

Potential Hazardous Waste Site Preliminary Assessment Form

Identification	
State: WY	CERCLIS #:
CERCLIS Discovery Date:	

1. General Site Information

Name: F.E. Warren AFB	Street Address:				
City: Cheyenne	State: WY	Zip Code:	County: Laramie	Co. Code:	Cong. Dist:
Latitude: 41° 9'3.43"N	Longitude: 104°52'26.32"W	Approximate Area of Site: __1.1___ Acres ____________ Square Ft	Status of Site: ☐ Active ☐ Not Specified ☑ Inactive ☐ NA (GW plume, etc.)		

Site Name: Former Fire Station

Site Description: This former fire station was located at the north end of the Base in Building 1501 and was built in 1987 to support the peacekeeper missile operations. It was a small two bay station that had two trucks. While AFFF was never used at this station, it may have been stored in small quantities on the trucks (Riedel, 2015, personal communication; Appendix C). It is estimated that this station was active until approximately 1998 (Watson, 2015, personal communication; Appendix C). No use, leaks, or spills of AFFF is known to have occurred (Riedel, 2015, personal communication; Appendix C).

2. Owner/Operator Information

Owner: F.E. Warren AFB			Operator: Same as owner		
Street Address:			Street Address:		
City:			City:		
State: ND	Zip Code:	Telephone:	State:	Zip Code:	Telephone:

Type of Ownership:
- ☐ Private
- ☑ Federal Agency
  Name: _DOD__
- ☐ State
- ☐ Indian
- ☐ County
- ☐ Municipal
- ☐ Not Specified
- ☐ Other_________

Type of Ownership:
- ☐ Private
- ☐ Federal Agency
  Name: _____
- ☐ State
- ☐ Indian
- ☐ County
- ☐ Municipal
- ☐ Not Specified
- ☐ Other_________

3. Site Evaluator Information

Name of Evaluator: Kelly Teplitsky	Agency/Organization: CH2M HILL	Date Prepared: 09/11/15
Street Address: 9191 South Jamaica Street	City: Englewood	State: CO
Name of EPA or State Agency Contact:	Street Address:	
City:	State:	Telephone:

4. Site Disposition *(for EPA use only)*

Emergency Response/Removal Assessment Recommendation:
- ☐ Yes
- ☐ No

Date: _________

CERCLIS Recommendation:
- ☐ Higher Priority SI
- ☐ Lower Priority SI
- ☐ NFRAP
- ☐ RCRA
- ☐ Other: _______

Date: _________

Signature:

Name (typed):

Position:

5. General Site Characteristics

Predominant Land Use Within 1 Mile of Site (check all that apply):

☐ Industrial
☐ Commercial
☑ Residential
☐ Forest/Fields

☐ Agriculture
☐ Mining
☑ DOD
☐ DOE

☐ DOI
☐ Other Federal Facility: __________
☐ Other _______

Site Setting:

☐ Urban
☑ Suburban
☐ Rural

Years of Operation:

Beginning Year _1987_

Ending Year 1998_

☐ Unknown

Type of Site Operations (check all that apply):

☐ Manufacturing (must check subcategory)
  - ☐ Lumber and Wood Products
  - ☐ Inorganic Chemicals
  - ☐ Plastic and/or Rubber Products
  - ☐ Paints, Varnishes
  - ☐ Industrial Organic Chemicals
  - ☐ Agricultural Chemicals
  - ☐ Miscellaneous Chemical Products
  - ☐ Primary Metals
  - ☐ Metal Coating, Plating, Engraving
  - ☐ Metal Forging, Stamping
  - ☐ Fabricated Structural Metal Products
  - ☐ Electronic Equipment
  - ☐ Other Manufacturing

☐ Mining
  - ☐ Metals
  - ☐ Coal
  - ☐ Oil and Gas
  - ☐ Non-metallic Minerals

☐ Retail
☐ Recycling
☐ Junk/Salvage Yard
☐ Municipal Landfill
☐ Other Landfill
☑ DOD
☐ DOE
☐ DOI
☐ Other Federal Facility _______
☐ RCRA
  - ☐ Treatment, Storage, or Disposal
  - ☐ Large Quantity Generator
  - ☐ Small Quantity Generator
  - ☐ Subtitle D
    - ☐ Municipal
    - ☐ Industrial
  - ☐ "Converter"
  - ☐ "Protective Filer"
  - ☐ "Non-or Late Filer"

☐ Note Specified
☐ Other______________

Waste Generated: NA

☑ Onsite
☐ Offsite
☐ Onsite and Offsite

Waste Deposition Authorized By:

☑ Present Owner
☐ Former Owner
☐ Present & Former Owner
☐ Unauthorized
☐ Unknown

Waste Accessible to the Public:

☐ Yes
☑ No

Distance to Nearest Dwelling, School, or Workplace:

NA__ feet

6. Waste Characteristics Information

(Refer to PA Table 1 for WC Score)

Source Type: (check all that apply)	Source Waste Quantity: (include unit)	Tier*:
☐ Landfill	_____________	____
☐ Surface Impoundment	_____________	____
☐ Drums	_____________	____
☐ Tanks and Non-Dum Containers	_____________	____
☐ Chemical Waste Pile	_____________	____
☐ Scrap Metal or Junk Pile	_____________	____
☐ Tailings Pile	_____________	____
☐ Trash Pile (open drum)	_____________	____
☐ Land Treatment	_____________	____
☐ Contaminated GW Plume (unidentified source)	_____________	____
☐ Contaminated SW/Sediment (unidentified source)	_____________	____
☐ Contaminated Soil	_____________	____
☐ Other_________	_____________	____
☐ No Sources		

*C=Constituent, W=Wastestream, V=Volume, A=Area

General Type of Waste (check all that apply):

☐ Metals
☐ Organics
☐ Inorganics
☐ Solvents
☐ Paints/Pigments
☐ Laboratory/Hospital Waste
☐ Radioactive Waste
☐ Construction/Demolition Waste

☐ Pesticides/Herbicides
☐ Acids/Bases
☐ Oily Waste
☐ Municipal Waste
☐ Mining Waste
☐ Explosives
☑ Other _AFFF_

Physical State of Waste as Deposited (check all that apply):

☐ Solid
☐ Sludge
☐ Powder
☑ Liquid
☐ Gas

7. Ground Water Pathway

Is Ground Water Used for Drinking Within 4 Miles:

☐ Yes
☑ No

If Yes, Distance to nearest Drinking Well:

________ Feet

Type of Drinking Water Wells Within 4 Miles
(check all that apply):

☐ Municipal
☐ Private
☑ None

Is There a Suspected Release to Ground Water[1]:

☐ Yes
☑ No

Have Primary Target Drinking Water Wells Been Identified:

☐ Yes
☑ No

If Yes, Enter Primary Target Population:

_________ People[3]

List Secondary Target Population Served by Ground Water Withdrawn From:

0 - 1/4 Mile	__NA_____
>1/4 - 1/2 Mile	__NA______
>1/2 - 1 Mile	__NA______
>1 - 2 Mile	__NA______
>2 - 3 Mile	__NA______
>3 - 4 Mile	__NA______
Total Within 4 Miles[4]	_NA______

*Use population #s for PA Table 2
*Note nearest well for #5 on GW Pathway Scoresheet

Depth to Shallowest Aquifer:

NA

Karst Terrain/Aquifer Present:

☐ Yes
☑ No

Nearest Designated Wellhead Protection Area[6]:

☐ Underlies Site
☐ >0-4 Miles
☑ None Within 4 Miles

8. Surface Water Pathway

Type of Surface Water Draining Site and 15 Miles Downstream (check all that apply):

☑ Stream ☐ River ☐ Pond ☐ Lake
☐ Bay ☐ Ocean ☐ Other________

Shortest Overland Distance From Any Source to Surface Water:

__ Feet
__NA___ Miles

Is There a Suspected Release to Surface Water[1]:

☐ Yes
☑ No

Site is Located in:

☐ Annual - 10 yr Floodplain
☐ >10yr - 100yr Floodplain
☐ >100yr - 500yr Floodplain
☐ >500yr Floodplain

Drinking Water Intake Located Along the Surface Water Migration Path:

☐ Yes
☑ No

Have Primary Target Drinking Water Intakes Been Identified:

☐ Yes
☑ No

If Yes, Distance to Nearest Drinking Water Intake : _________ Miles[6]

If Yes, Enter Population Served by Target Intake:

NA__ People[4]

List All Secondary Target Drinking Water Intakes:

Name:	Water Body:	Flow (cfs):	Population Served:
_______	________	_________	__________
_______	________	__________	_________
_______	________	__________	_________
_______	________	__________	_________

Total within 15 Miles[4] __________

Fisheries Located Along the Surface Water Migration Path:

☐ Yes ☑ No

If Yes, Distance to Nearest Fishery:

_________ Miles

Have Primary Target Fisheries Been Identified:

☐ Yes ☑ No

List All Secondary Target Fisheries[10]:

Water Body/ Fishery Name :	Flow (cfs):
______________________	_________
______________________	__________
______________________	__________
______________________	__________

8. Surface Water Pathway (continued)

Wetlands Located Along the Surface Water Migration Path:

☑ Yes
☐ No

Have Primary Target Wetlands Been Identified:

☐ Yes
☑ No

List All Wetlands:

Water Body :	Flow (cfs):	Frontage miles:
____________	_________	__________
____________	__________	__________
____________	__________	__________

Other Sensitive Environments Located Along the Surface Water Migration Path:

☐ Yes
☑ No

If Yes, Distance to Nearest Sensitive Environment: _ Miles

Have Primary Target Sensitive Environments Been Identified:

☐ Yes
☑ No

List All Sensitive Environments[11]:

Water Body :	Flow (cfs):	Sensitive Environment Type:
_______________	_________	______ __________
_____________________		
_______________	__________	_____________________
_______________	__________	_____________________

9. Soil Exposure Pathway

Are People Occupying Residence or Attending School or Daycare on or Within 200 Feet of Area of Known or Suspected Contamination:

☐ Yes
☑ No

If Yes, Enter Total Residential Population:

__NA__ People[2]

Number of Workers Onsite[4]:

☑ None
☐ 1 - 100
☐ 101 - 1,000
☐ > 1,000

Population Within 1 Mile:

_NA___ People[7]

Have Terrestrial Sensitive Environments Been Identified on or Within 200 Feet of Areas of Known or Suspected Contamination:

☐ Yes
☑ No

If Yes, List Each Terrestrial Sensitive Environment[5]:

____
____
_

*Refer to PA Table 7 for environment types

10. Air Pathway

Is there a Suspected Release to Air[1]:

☐ Yes
☑ No

Enter Total Population on or Within:

Onsite ____________

0-1/4 Mile ____________

>1/4-1/2 Mile ____________

>1/2-1 Mile ____________

>1-2 Miles ____________

>2-3 Miles ____________

>3-4 Miles ____________

Total Within 4 Miles [3-5] _NA

Wetlands Located Within 4 Miles of the Site[6]:

☑ Yes
☐ No

If Yes, How Many Acres: _______ Acres

Other Sensitive Environments Located Within 4 Miles of the Site:

☑ Yes
☐ No

List All Sensitive Environments Within 1/2 Mile of the Site[6]:

Distance:	Sensitive Environment Type/Wetlands Area (acres):
Onsite	Colorado Butterfly Plant Research Natural Area
0-1/4 Mile	______________________________
>1/4-1/2 Mile	___________

*Refer to PA Table 10 for calculations on air pathway exposures

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[1-11] Refers to question number on the PA scoresheet for each particular pathway

Potential Hazardous Waste Site Preliminary Assessment Form

Identification

State: WY

CERCLIS #:

CERCLIS Discovery Date:

1. General Site Information

Name: F.E. Warren AFB

Street Address:

City: Cheyenne

State: WY

Zip Code:

County: Laramie

Co. Code:

Cong. Dist:

Latitude: 41° 9'3.43"N

Longitude: 104°52'26.32"W

Approximate Area of Site:
__<1___ Acres
____________ Square Ft

Status of Site:
☑ Active ☐ Not Specified
☐ Inactive ☐ NA (GW plume, etc.)

Site Name: Fire Station 1

Site Description: Fire Station 1 is located in Building 324, which was built in 1909, and currently serves as one of two fire stations on Base. The building originally served as a horse stable (Kimble, 2015, personal communication; Appendix C) but sometime prior to 1979, the building was converted to Fire Station 1 (Watson, 2015, personal communication; Appendix C). This station has two fire trucks, Engine 4 and Engine 8, that each hold 20 gallons of AFFF. The trucks are pump tested but not foam tested and because the station does not have crash trucks, no time and distance testing is required.

2. Owner/Operator Information

Owner: F.E. Warren AFB	Operator: Same as owner
Street Address:	Street Address:
City:	City:
State: ND	State:
Zip Code:	Zip Code:
Telephone:	Telephone:

Type of Ownership (Owner):
- ☐ Private
- ☑ Federal Agency
  Name: _DOD__
- ☐ State
- ☐ Indian
- ☐ County
- ☐ Municipal
- ☐ Not Specified
- ☐ Other_________

Type of Ownership (Operator):
- ☐ Private
- ☐ Federal Agency
  Name: _____
- ☐ State
- ☐ Indian
- ☐ County
- ☐ Municipal
- ☐ Not Specified
- ☐ Other_________

3. Site Evaluator Information

Name of Evaluator: Kelly Teplitsky

Agency/Organization: CH2M HILL

Date Prepared: 09/11/15

Street Address: 9191 South Jamaica Street

City: Englewood

State: CO

Name of EPA or State Agency Contact:

Street Address:

City:

State:

Telephone:

4. Site Disposition *(for EPA use only)*

Emergency Response/Removal Assessment Recommendation:
- ☐ Yes
- ☐ No

Date: _________

CERCLIS Recommendation:
- ☐ Higher Priority SI
- ☐ Lower Priority SI
- ☐ NFRAP
- ☐ RCRA
- ☐ Other: _______

Date: _________

Signature:

Name (typed):

Position:

5. General Site Characteristics

Predominant Land Use Within 1 Mile of Site (check all that apply):

☐ Industrial
☐ Commercial
☑ Residential
☐ Forest/Fields
☐ Agriculture
☐ Mining
☑ DOD
☐ DOE
☐ DOI
☐ Other Federal Facility: __________
☐ Other _______

Site Setting:

☐ Urban
☑ Suburban
☐ Rural

Years of Operation:

Beginning Year _?_

Ending Year present_

☐ Unknown

Type of Site Operations (check all that apply):

- ☐ Manufacturing (must check subcategory)
  - ☐ Lumber and Wood Products
  - ☐ Inorganic Chemicals
  - ☐ Plastic and/or Rubber Products
  - ☐ Paints, Varnishes
  - ☐ Industrial Organic Chemicals
  - ☐ Agricultural Chemicals
  - ☐ Miscellaneous Chemical Products
  - ☐ Primary Metals
  - ☐ Metal Coating, Plating, Engraving
  - ☐ Metal Forging, Stamping
  - ☐ Fabricated Structural Metal Products
  - ☐ Electronic Equipment
  - ☐ Other Manufacturing
- ☐ Mining
  - ☐ Metals
  - ☐ Coal
  - ☐ Oil and Gas
  - ☐ Non-metallic Minerals
- ☐ Retail
- ☐ Recycling
- ☐ Junk/Salvage Yard
- ☐ Municipal Landfill
- ☐ Other Landfill
- ☑ DOD
- ☐ DOE
- ☐ DOI
- ☐ Other Federal Facility _______
- ☐ RCRA
  - ☐ Treatment, Storage, or Disposal
  - ☐ Large Quantity Generator
  - ☐ Small Quantity Generator
  - ☐ Subtitle D
    - ☐ Municipal
    - ☐ Industrial
  - ☐ "Converter"
  - ☐ "Protective Filer"
  - ☐ "Non-or Late Filer"
- ☐ Note Specified
- ☐ Other______________

Waste Generated: NA

☑ Onsite
☐ Offsite
☐ Onsite and Offsite

Waste Deposition Authorized By:

☑ Present Owner
☐ Former Owner
☐ Present & Former Owner
☐ Unauthorized
☐ Unknown

Waste Accessible to the Public:

☐ Yes
☑ No

Distance to Nearest Dwelling, School, or Workplace:

NA__ feet

6. Waste Characteristics Information

(Refer to PA Table 1 for WC Score)

Source Type: (check all that apply)	Source Waste Quantity: (include unit)	Tier*:
☐ Landfill	____________	____
☐ Surface Impoundment	____________	____
☐ Drums	____________	____
☐ Tanks and Non-Dum Containers	____________	____
☐ Chemical Waste Pile	____________	____
☐ Scrap Metal or Junk Pile	____________	____
☐ Tailings Pile	____________	____
☐ Trash Pile (open drum)	____________	____
☐ Land Treatment	____________	____
☐ Contaminated GW Plume (unidentified source)	____________	____
☐ Contaminated SW/Sediment (unidentified source)	____________	____
☐ Contaminated Soil	____________	____
☐ Other_________	____________	____
☐ No Sources		

*C=Constituent, W=Wastestream, V=Volume, A=Area

General Type of Waste (check all that apply):

☐ Metals
☐ Organics
☐ Inorganics
☐ Solvents
☐ Paints/Pigments
☐ Laboratory/Hospital Waste
☐ Radioactive Waste
☐ Construction/Demolition Waste
☐ Pesticides/Herbicides
☐ Acids/Bases
☐ Oily Waste
☐ Municipal Waste
☐ Mining Waste
☐ Explosives
☑ Other _AFFF_

Physical State of Waste as Deposited (check all that apply):

☐ Solid
☐ Sludge
☐ Powder
☑ Liquid
☐ Gas

7. Ground Water Pathway

Is Ground Water Used for Drinking Within 4 Miles:

☐ Yes
☑ No

If Yes, Distance to nearest Drinking Well:

________ Feet

Type of Drinking Water Wells Within 4 Miles
(check all that apply):

☐ Municipal
☐ Private
☑ None

Is There a Suspected Release to Ground Water[1]:

☐ Yes
☑ No

Have Primary Target Drinking Water Wells Been Identified:

☐ Yes
☑ No

If Yes, Enter Primary Target Population:

_________ People[3]

List Secondary Target Population Served by Ground Water Withdrawn From:

0 - 1/4 Mile __NA_____

>1/4 - 1/2 Mile __NA______

>1/2 - 1 Mile __NA______

>1 - 2 Mile __NA______

>2 - 3 Mile __NA______

>3 - 4 Mile __NA______

Total Within 4 Miles[4] _NA______

*Use population #s for PA Table 2
*Note nearest well for #5 on GW Pathway Scoresheet

Depth to Shallowest Aquifer:

NA

Karst Terrain/Aquifer Present:

☐ Yes
☑ No

Nearest Designated Wellhead Protection Area[6]:

☐ Underlies Site
☐ >0-4 Miles
☑ None Within 4 Miles

8. Surface Water Pathway

Type of Surface Water Draining Site and 15 Miles Downstream (check all that apply):

☑ Stream ☐ River ☐ Pond ☐ Lake
☐ Bay ☐ Ocean ☐ Other________

Shortest Overland Distance From Any Source to Surface Water:

__ Feet
__NA___ Miles

Is There a Suspected Release to Surface Water[1]:

☐ Yes
☑ No

Site is Located in:

☐ Annual - 10 yr Floodplain
☐ >10yr - 100yr Floodplain
☐ >100yr - 500yr Floodplain
☐ >500yr Floodplain

Drinking Water Intake Located Along the Surface Water Migration Path:

☐ Yes
☑ No

Have Primary Target Drinking Water Intakes Been Identified:

☐ Yes
☑ No

If Yes, Distance to Nearest Drinking Water Intake : _________ Miles[6]

If Yes, Enter Population Served by Target Intake:

NA__ People[4]

List All Secondary Target Drinking Water Intakes:

Name:	Water Body:	Flow (cfs):	Population Served:
_______	_________	__________	__________
_______	_________	__________	__________
_______	_________	__________	__________
_______	_________	__________	__________

Total within 15 Miles [4] __________

Fisheries Located Along the Surface Water Migration Path:

☐ Yes ☑ No

If Yes, Distance to Nearest Fishery:

_________ Miles

Have Primary Target Fisheries Been Identified:

☐ Yes ☑ No

List All Secondary Target Fisheries[10]:

Water Body/ Fishery Name :	Flow (cfs):
_______________________	__________
_______________________	__________
_______________________	__________
_______________________	__________

8. Surface Water Pathway (continued)

Wetlands Located Along the Surface Water Migration Path:

☑ Yes
☐ No

Have Primary Target Wetlands Been Identified:

☐ Yes
☑ No

List All Wetlands:

Water Body : Flow (cfs): Frontage miles:

____________ _________ __________
____________ __________ __________
____________ __________ __________

Other Sensitive Environments Located Along the Surface Water Migration Path:

☐ Yes
☑ No

If Yes, Distance to Nearest Sensitive Environment: _ Miles

Have Primary Target Sensitive Environments Been Identified:

☐ Yes
☑ No

List All Sensitive Environments[11]:

Water Body : Flow (cfs): Sensitive Environment Type:

_______________ _________ ______ __________
____
_______________ __________ _____________________
_______________ __________ _____________________

9. Soil Exposure Pathway

Are People Occupying Residence or Attending School or Daycare on or Within 200 Feet of Area of Known or Suspected Contamination:

☐ Yes
☑ No

If Yes, Enter Total Residential Population:

__NA__ People[2]

Number of Workers Onsite[4]:

☐ None
☑ 1 - 100
☐ 101 - 1,000
☐ > 1,000

Population Within 1 Mile:

_NA___ People[7]

Have Terrestrial Sensitive Environments Been Identified on or Within 200 Feet of Areas of Known or Suspected Contamination:

☐ Yes
☑ No

If Yes, List Each Terrestrial Sensitive Environment[5]:

____
____
_

*Refer to PA Table 7 for environment types

10. Air Pathway

Is there a Suspected Release to Air[1]:

☐ Yes
☑ No

Enter Total Population on or Within:

Onsite ____________

0-1/4 Mile ____________

>1/4-1/2 Mile ____________

>1/2-1 Mile ____________

>1-2 Miles ____________

>2-3 Miles ____________

>3-4 Miles ____________

Total Within 4 Miles [3-5] _NA

Wetlands Located Within 4 Miles of the Site[6]:

☑ Yes
☐ No

If Yes, How Many Acres: _______ Acres

Other Sensitive Environments Located Within 4 Miles of the Site:

☑ Yes
☐ No

List All Sensitive Environments Within 1/2 Mile of the Site[6]:

Distance:	Sensitive Environment Type/Wetlands Area (acres):
Onsite	Colorado Butterfly Plant Research Natural Area
0-1/4 Mile	_______________________________
>1/4-1/2 Mile	____________

*Refer to PA Table 10 for calculations on air pathway exposures

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[1-11] Refers to question number on the PA scoresheet for each particular pathway

Potential Hazardous Waste Site Preliminary Assessment Form

Identification

State: WY

CERCLIS #:

CERCLIS Discovery Date:

1. General Site Information

Name: F.E. Warren AFB

Street Address:

City: Cheyenne

State: WY

Zip Code:

County: Laramie

Co. Code:

Cong. Dist:

Latitude: 41° 9'1.20"N

Longitude: 104°51'26.72"W

Approximate Area of Site:
__<1___ Acres
____________ Square Ft

Status of Site:
☑ Active ☐ Not Specified
☐ Inactive ☐ NA (GW plume, etc.)

Site Name: Fire Station 2

Site Description: Fire Station 2 is located in Building 1250, which was built in 1941, and currently serves as one of two fire stations on Base. This station likely became active in the 1950s or 1960s when helicopters use began (Wright, 2015, personal communication; Appendix C). This station has three fire trucks, Engine 5 and Rapid Intervention Vehicles (RIV) 1 and 2, that each hold 60 to 70 gallons of AFFF. The trucks are pump tested but not foam tested. While the RIVs can serve as crash trucks and carry AFFF, they are not used in that manner (Kimble, 2015, personal communication; Appendix C). The trucks are refilled with AFFF inside this station using 5-gallon buckets that are stored onsite (Kimble, 2015, personal communication; Appendix C). Drains in Building 1250 flow to an OWS that then connects to the sanitary sewer (Watson, 2015, personal communication; Appendix C).

2. Owner/Operator Information

Owner: F.E. Warren AFB

Street Address:

City:

State: ND

Zip Code:

Telephone:

Type of Ownership:
☐ Private
☑ Federal Agency
Name: _DOD__
☐ State
☐ Indian
☐ County
☐ Municipal
☐ Not Specified
☐ Other_________

Operator: Same as owner

Street Address:

City:

State:

Zip Code:

Telephone:

Type of Ownership:
☐ Private
☐ Federal Agency
Name: _____
☐ State
☐ Indian
☐ County
☐ Municipal
☐ Not Specified
☐ Other_________

3. Site Evaluator Information

Name of Evaluator: Kelly Teplitsky

Agency/Organization: CH2M HILL

Date Prepared: 09/11/15

Street Address: 9191 South Jamaica Street

City: Englewood

State: CO

Name of EPA or State Agency Contact:

Street Address:

City:

State:

Telephone:

4. Site Disposition *(for EPA use only)*

Emergency Response/Removal Assessment Recommendation:
☐ Yes
☐ No
Date: _________

CERCLIS Recommendation:
☐ Higher Priority SI
☐ Lower Priority SI
☐ NFRAP
☐ RCRA
☐ Other: _______
Date: _________

Signature:

Name (typed):

Position:

5. General Site Characteristics

Predominant Land Use Within 1 Mile of Site (check all that apply):

☐ Industrial
☐ Commercial
☑ Residential
☐ Forest/Fields
☐ Agriculture
☐ Mining
☑ DOD
☐ DOE
☐ DOI
☐ Other Federal Facility: __________
☐ Other _______

Site Setting:

☐ Urban
☑ Suburban
☐ Rural

Years of Operation:

Beginning Year _1950s?_

Ending Year present_

☐ Unknown

Type of Site Operations (check all that apply):

☐ Manufacturing (must check subcategory)
  ☐ Lumber and Wood Products
  ☐ Inorganic Chemicals
  ☐ Plastic and/or Rubber Products
  ☐ Paints, Varnishes
  ☐ Industrial Organic Chemicals
  ☐ Agricultural Chemicals
  ☐ Miscellaneous Chemical Products
  ☐ Primary Metals
  ☐ Metal Coating, Plating, Engraving
  ☐ Metal Forging, Stamping
  ☐ Fabricated Structural Metal Products
  ☐ Electronic Equipment
  ☐ Other Manufacturing
☐ Mining
  ☐ Metals
  ☐ Coal
  ☐ Oil and Gas
  ☐ Non-metallic Minerals

☐ Retail
☐ Recycling
☐ Junk/Salvage Yard
☐ Municipal Landfill
☐ Other Landfill
☑ DOD
☐ DOE
☐ DOI
☐ Other Federal Facility _______
☐ RCRA
  ☐ Treatment, Storage, or Disposal
  ☐ Large Quantity Generator
  ☐ Small Quantity Generator
  ☐ Subtitle D
    ☐ Municipal
    ☐ Industrial
  ☐ "Converter"
  ☐ "Protective Filer"
  ☐ "Non-or Late Filer"
☐ Note Specified
☐ Other______________

Waste Generated: NA

☑ Onsite
☐ Offsite
☐ Onsite and Offsite

Waste Deposition Authorized By:

☑ Present Owner
☐ Former Owner
☐ Present & Former Owner
☐ Unauthorized
☐ Unknown

Waste Accessible to the Public:

☐ Yes
☑ No

Distance to Nearest Dwelling, School, or Workplace:

NA__ feet

6. Waste Characteristics Information

(Refer to PA Table 1 for WC Score)

Source Type: (check all that apply)	Source Waste Quantity: (include unit)	Tier*:
☐ Landfill	_____________	_____
☐ Surface Impoundment	_____________	_____
☐ Drums	_____________	_____
☐ Tanks and Non-Dum Containers	_____________	_____
☐ Chemical Waste Pile	_____________	_____
☐ Scrap Metal or Junk Pile	_____________	_____
☐ Tailings Pile	_____________	_____
☐ Trash Pile (open drum)	_____________	_____
☐ Land Treatment	_____________	_____
☐ Contaminated GW Plume (unidentified source)	_____________	_____
☐ Contaminated SW/Sediment (unidentified source)	_____________	_____
☐ Contaminated Soil	_____________	_____
☐ Other_________	_____________	_____
☐ No Sources		

*C=Constituent, W=Wastestream, V=Volume, A=Area

General Type of Waste (check all that apply):

☐ Metals
☐ Organics
☐ Inorganics
☐ Solvents
☐ Paints/Pigments
☐ Laboratory/Hospital Waste
☐ Radioactive Waste
☐ Construction/Demolition Waste
☐ Pesticides/Herbicides
☐ Acids/Bases
☐ Oily Waste
☐ Municipal Waste
☐ Mining Waste
☐ Explosives
☑ Other _AFFF_

Physical State of Waste as Deposited (check all that apply):

☐ Solid
☐ Sludge
☐ Powder
☑ Liquid
☐ Gas

7. Ground Water Pathway

Is Ground Water Used for Drinking Within 4 Miles:

☐ Yes
☑ No

If Yes, Distance to nearest Drinking Well:
________ Feet

Type of Drinking Water Wells Within 4 Miles
(check all that apply):

☐ Municipal
☐ Private
☑ None

Is There a Suspected Release to Ground Water[1]:

☐ Yes
☑ No

Have Primary Target Drinking Water Wells Been Identified:

☐ Yes
☑ No

If Yes, Enter Primary Target Population:
_________ People[3]

List Secondary Target Population Served by Ground Water Withdrawn From:

0 - 1/4 Mile __NA_____
>1/4 - 1/2 Mile __NA______
>1/2 - 1 Mile __NA______
>1 - 2 Mile __NA______
>2 - 3 Mile __NA______
>3 - 4 Mile __NA______
Total Within 4 Miles[4] _NA______

*Use population #s for PA Table 2
*Note nearest well for #5 on GW Pathway Scoresheet

Depth to Shallowest Aquifer:
NA

Karst Terrain/Aquifer Present:

☐ Yes
☑ No

Nearest Designated Wellhead Protection Area[6]:

☐ Underlies Site
☐ >0-4 Miles
☑ None Within 4 Miles

8. Surface Water Pathway

Type of Surface Water Draining Site and 15 Miles Downstream (check all that apply):

☑ Stream ☐ River ☐ Pond ☐ Lake
☐ Bay ☐ Ocean ☐ Other________

Shortest Overland Distance From Any Source to Surface Water:

__ Feet
__NA___ Miles

Is There a Suspected Release to Surface Water[1]:

☐ Yes
☑ No

Site is Located in:

☐ Annual - 10 yr Floodplain
☐ >10yr - 100yr Floodplain
☐ >100yr - 500yr Floodplain
☐ >500yr Floodplain

Drinking Water Intake Located Along the Surface Water Migration Path:

☐ Yes
☑ No

Have Primary Target Drinking Water Intakes Been Identified:

☐ Yes
☑ No

If Yes, Distance to Nearest Drinking Water Intake : _________ Miles[6]

If Yes, Enter Population Served by Target Intake:

NA__ People[4]

List All Secondary Target Drinking Water Intakes:

Name:	Water Body:	Flow (cfs):	Population Served:
_______	________	_________	__________
_______	________	__________	_________
_______	________	__________	_________
_______	________	__________	_________

Total within 15 Miles [4] __________

Fisheries Located Along the Surface Water Migration Path:

☐ Yes ☑ No

If Yes, Distance to Nearest Fishery:
_________ Miles

Have Primary Target Fisheries Been Identified:

☐ Yes ☑ No

List All Secondary Target Fisheries[10]:

Water Body/ Fishery Name :	Flow (cfs):
______________________	_________
______________________	__________
______________________	__________
______________________	__________

8. Surface Water Pathway (continued)

Wetlands Located Along the Surface Water Migration Path:

☑ Yes
☐ No

Have Primary Target Wetlands Been Identified:

☐ Yes
☑ No

List All Wetlands:

Water Body : Flow (cfs): Frontage miles:

Other Sensitive Environments Located Along the Surface Water Migration Path:

☐ Yes
☑ No

If Yes, Distance to Nearest Sensitive Environment: _ Miles

Have Primary Target Sensitive Environments Been Identified:

☐ Yes
☑ No

List All Sensitive Environments[11]:

Water Body : Flow (cfs): Sensitive Environment Type:

9. Soil Exposure Pathway

Are People Occupying Residence or Attending School or Daycare on or Within 200 Feet of Area of Known or Suspected Contamination:

☐ Yes
☑ No

If Yes, Enter Total Residential Population:

__NA__ People[2]

Number of Workers Onsite[4]:

☐ None
☑ 1 - 100
☐ 101 - 1,000
☐ > 1,000

Population Within 1 Mile:

_NA___ People[7]

Have Terrestrial Sensitive Environments Been Identified on or Within 200 Feet of Areas of Known or Suspected Contamination:

☐ Yes
☑ No

If Yes, List Each Terrestrial Sensitive Environment[5]:

_

*Refer to PA Table 7 for environment types

10. Air Pathway

Is there a Suspected Release to Air[1]:

☐ Yes
☑ No

Enter Total Population on or Within:

Onsite	
0-1/4 Mile	
>1/4-1/2 Mile	
>1/2-1 Mile	
>1-2 Miles	
>2-3 Miles	
>3-4 Miles	

Total Within 4 Miles [3-5] _NA

Wetlands Located Within 4 Miles of the Site[6]:

☑ Yes
☐ No

If Yes, How Many Acres: _______ Acres

Other Sensitive Environments Located Within 4 Miles of the Site:

☑ Yes
☐ No

List All Sensitive Environments Within 1/2 Mile of the Site[6]:

Distance:	Sensitive Environment Type/Wetlands Area (acres):
Onsite	Colorado Butterfly Plant Research Natural Area
0-1/4 Mile	
>1/4-1/2 Mile	

*Refer to PA Table 10 for calculations on air pathway exposures

[1-11] Refers to question number on the PA scoresheet for each particular pathway

Potential Hazardous Waste Site Preliminary Assessment Form

Identification

State: WY

CERCLIS #:

CERCLIS Discovery Date:

1. General Site Information

Name: F.E. Warren AFB

Street Address:

City: Cheyenne

State: WY

Zip Code:

County: Laramie

Co. Code:

Cong. Dist:

Latitude: 41° 7'59.88"N

Longitude: 104°52'11.12"W

Approximate Area of Site:
__<1___ Acres
____________ Square Ft

Status of Site:
☑ Active ☐ Not Specified
☐ Inactive ☐ NA (GW plume, etc.)

Site Name: Building 930 (Hazardous waste)

Site Description: Building 930, built in 1993, serves as the hazardous waste building. AFFF has periodically been stored at this building until transport and final disposal off base. On January 13, 2005 records show that four 55-gallon drums were disposed of by the fire department. However, no leaks or spills of AFFF are known to have occurred here (Travinio, 2015, personal communication; Appendix C).

2. Owner/Operator Information

Owner: F.E. Warren AFB

Street Address:

City:

State: ND

Zip Code:

Telephone:

Type of Ownership:
☐ Private
☑ Federal Agency
Name: _DOD__
☐ State
☐ Indian
☐ County
☐ Municipal
☐ Not Specified
☐ Other_________

Operator: Same as owner

Street Address:

City:

State:

Zip Code:

Telephone:

Type of Ownership:
☐ Private
☐ Federal Agency
Name: _____
☐ State
☐ Indian
☐ County
☐ Municipal
☐ Not Specified
☐ Other_________

3. Site Evaluator Information

Name of Evaluator: Kelly Teplitsky

Agency/Organization: CH2M HILL

Date Prepared: 09/11/15

Street Address: 9191 South Jamaica Street

City: Englewood

State: CO

Name of EPA or State Agency Contact:

Street Address:

City:

State:

Telephone:

4. Site Disposition *(for EPA use only)*

Emergency Response/Removal Assessment Recommendation:
☐ Yes
☐ No
Date: _________

CERCLIS Recommendation:
☐ Higher Priority SI
☐ Lower Priority SI
☐ NFRAP
☐ RCRA
☐ Other: ________
Date: _________

Signature:

Name (typed):

Position:

5. General Site Characteristics

Predominant Land Use Within 1 Mile of Site (check all that apply):

☐ Industrial
☐ Commercial
☑ Residential
☐ Forest/Fields
☐ Agriculture
☐ Mining
☑ DOD
☐ DOE
☐ DOI
☐ Other Federal Facility: __________
☐ Other _______

Site Setting:

☐ Urban
☑ Suburban
☐ Rural

Years of Operation:

Beginning Year _1993_

Ending Year present_

☐ Unknown

Type of Site Operations (check all that apply):

☐ Manufacturing (must check subcategory)
  ☐ Lumber and Wood Products
  ☐ Inorganic Chemicals
  ☐ Plastic and/or Rubber Products
  ☐ Paints, Varnishes
  ☐ Industrial Organic Chemicals
  ☐ Agricultural Chemicals
  ☐ Miscellaneous Chemical Products
  ☐ Primary Metals
  ☐ Metal Coating, Plating, Engraving
  ☐ Metal Forging, Stamping
  ☐ Fabricated Structural Metal Products
  ☐ Electronic Equipment
  ☐ Other Manufacturing
☐ Mining
  ☐ Metals
  ☐ Coal
  ☐ Oil and Gas
  ☐ Non-metallic Minerals
☐ Retail
☐ Recycling
☐ Junk/Salvage Yard
☐ Municipal Landfill
☐ Other Landfill
☑ DOD
☐ DOE
☐ DOI
☐ Other Federal Facility _______
☐ RCRA
  ☐ Treatment, Storage, or Disposal
  ☐ Large Quantity Generator
  ☐ Small Quantity Generator
  ☐ Subtitle D
    ☐ Municipal
    ☐ Industrial
  ☐ "Converter"
  ☐ "Protective Filer"
  ☐ "Non-or Late Filer"
☐ Note Specified
☐ Other______________

Waste Generated: NA

☑ Onsite
☐ Offsite
☐ Onsite and Offsite

Waste Deposition Authorized By:

☑ Present Owner
☐ Former Owner
☐ Present & Former Owner
☐ Unauthorized
☐ Unknown

Waste Accessible to the Public:

☐ Yes
☑ No

Distance to Nearest Dwelling, School, or Workplace:

NA__ feet

6. Waste Characteristics Information

(Refer to PA Table 1 for WC Score)

Source Type: (check all that apply)	Source Waste Quantity: (include unit)	Tier*:
☐ Landfill	______________	_____
☐ Surface Impoundment	______________	_____
☐ Drums	______________	_____
☐ Tanks and Non-Dum Containers	______________	_____
☐ Chemical Waste Pile	______________	_____
☐ Scrap Metal or Junk Pile	______________	_____
☐ Tailings Pile	______________	_____
☐ Trash Pile (open drum)	______________	_____
☐ Land Treatment	______________	_____
☐ Contaminated GW Plume (unidentified source)	______________	_____
☐ Contaminated SW/Sediment (unidentified source)	______________	_____
☐ Contaminated Soil	______________	_____
☐ Other_________	______________	_____
☐ No Sources		

*C=Constituent, W=Wastestream, V=Volume, A=Area

General Type of Waste (check all that apply):

☐ Metals
☐ Organics
☐ Inorganics
☐ Solvents
☐ Paints/Pigments
☐ Laboratory/Hospital Waste
☐ Radioactive Waste
☐ Construction/Demolition Waste
☐ Pesticides/Herbicides
☐ Acids/Bases
☐ Oily Waste
☐ Municipal Waste
☐ Mining Waste
☐ Explosives
☑ Other _AFFF_

Physical State of Waste as Deposited (check all that apply):

☐ Solid
☐ Sludge
☐ Powder
☑ Liquid
☐ Gas

7. Ground Water Pathway

Is Ground Water Used for Drinking Within 4 Miles:

☐ Yes
☑ No

If Yes, Distance to nearest Drinking Well:
________ Feet

Type of Drinking Water Wells Within 4 Miles
(check all that apply):

☐ Municipal
☐ Private
☑ None

Is There a Suspected Release to Ground Water[1]:

☐ Yes
☑ No

Have Primary Target Drinking Water Wells Been Identified:

☐ Yes
☑ No

If Yes, Enter Primary Target Population:
_________ People[3]

List Secondary Target Population Served by Ground Water Withdrawn From:

0 - 1/4 Mile __NA_____
>1/4 - 1/2 Mile __NA______
>1/2 - 1 Mile __NA______
>1 - 2 Mile __NA______
>2 - 3 Mile __NA______
>3 - 4 Mile __NA______

Total Within 4 Miles[4] _NA______

*Use population #s for PA Table 2
*Note nearest well for #5 on GW Pathway Scoresheet

Depth to Shallowest Aquifer:
NA

Karst Terrain/Aquifer Present:

☐ Yes
☑ No

Nearest Designated Wellhead Protection Area[6]:

☐ Underlies Site
☐ >0-4 Miles
☑ None Within 4 Miles

8. Surface Water Pathway

Type of Surface Water Draining Site and 15 Miles Downstream (check all that apply):

☑ Stream ☐ River ☐ Pond ☐ Lake
☐ Bay ☐ Ocean ☐ Other________

Shortest Overland Distance From Any Source to Surface Water:
__ Feet
__NA___ Miles

Is There a Suspected Release to Surface Water[1]:

☐ Yes
☑ No

Site is Located in:

☐ Annual - 10 yr Floodplain
☐ >10yr - 100yr Floodplain
☐ >100yr - 500yr Floodplain
☐ >500yr Floodplain

Drinking Water Intake Located Along the Surface Water Migration Path:

☐ Yes
☑ No

Have Primary Target Drinking Water Intakes Been Identified:

☐ Yes
☑ No

If Yes, Distance to Nearest Drinking Water Intake : _________ Miles[6]

If Yes, Enter Population Served by Target Intake:

NA__ People[4]

List All Secondary Target Drinking Water Intakes:

Name:	Water Body:	Flow (cfs):	Population Served:
_______	_________	__________	__________
_______	_________	__________	__________
_______	_________	__________	__________
_______	_________	__________	__________

Total within 15 Miles [4] __________

Fisheries Located Along the Surface Water Migration Path:

☐ Yes ☑ No

If Yes, Distance to Nearest Fishery:
_________ Miles

Have Primary Target Fisheries Been Identified:

☐ Yes ☑ No

List All Secondary Target Fisheries[10]:

Water Body/ Fishery Name :	Flow (cfs):
______________________	_________
______________________	__________
______________________	__________
______________________	__________

8. Surface Water Pathway (continued)

Wetlands Located Along the Surface Water Migration Path:

☑ Yes
☐ No

Have Primary Target Wetlands Been Identified:

☐ Yes
☑ No

List All Wetlands:

Water Body : Flow (cfs): Frontage miles:

____________ __________ __________
____________ __________ __________
____________ __________ __________

Other Sensitive Environments Located Along the Surface Water Migration Path:

☐ Yes
☑ No

If Yes, Distance to Nearest Sensitive Environment: _ Miles

Have Primary Target Sensitive Environments Been Identified:

☐ Yes
☑ No

List All Sensitive Environments[11]:

Water Body : Flow (cfs): Sensitive Environment Type:

______________ _________ ______ __________
____
______________ _________ ____________________
______________ _________ ____________________

9. Soil Exposure Pathway

Are People Occupying Residence or Attending School or Daycare on or Within 200 Feet of Area of Known or Suspected Contamination:

☐ Yes
☑ No

If Yes, Enter Total Residential Population:

__NA__ People[2]

Number of Workers Onsite[4]:

☐ None
☑ 1 - 100
☐ 101 - 1,000
☐ > 1,000

Population Within 1 Mile:

_NA___ People[7]

Have Terrestrial Sensitive Environments Been Identified on or Within 200 Feet of Areas of Known or Suspected Contamination:

☐ Yes
☑ No

If Yes, List Each Terrestrial Sensitive Environment[5]:

____
____
_

*Refer to PA Table 7 for environment types

10. Air Pathway

Is there a Suspected Release to Air[1]:

☐ Yes
☑ No

Enter Total Population on or Within:

Onsite ____________

0-1/4 Mile ____________

>1/4-1/2 Mile ____________

>1/2-1 Mile ____________

>1-2 Miles ____________

>2-3 Miles ____________

>3-4 Miles ____________

Total Within 4 Miles [3-5] _NA

Wetlands Located Within 4 Miles of the Site[6]:

☑ Yes
☐ No

If Yes, How Many Acres: _______ Acres

Other Sensitive Environments Located Within 4 Miles of the Site:

☑ Yes
☐ No

List All Sensitive Environments Within 1/2 Mile of the Site[6]:

Distance:	Sensitive Environment Type/Wetlands Area (acres):
Onsite	Colorado Butterfly Plant Research Natural Area
0-1/4 Mile	______________________________
>1/4-1/2 Mile	___________

*Refer to PA Table 10 for calculations on air pathway exposures

[1-11] Refers to question number on the PA scoresheet for each particular pathway

Potential Hazardous Waste Site Preliminary Assessment Form

Identification

State: WY

CERCLIS #:

CERCLIS Discovery Date:

1. General Site Information

Name: F.E. Warren AFB

Street Address:

City: Cheyenne

State: WY

Zip Code:

County: Laramie

Co. Code:

Cong. Dist:

Latitude: 41° 8'37.86"N

Longitude: 104°52'8.10"W

Approximate Area of Site:
__<1___ Acres
____________ Square Ft

Status of Site:
- ☑ Active
- ☐ Inactive
- ☐ Not Specified
- ☐ NA (GW plume, etc.)

Site Name: Building 1240 (Truck maintenance)

Site Description: Building 1240, built in 1995, serves as the truck maintenance facility. This building formerly had an AFFF system that was replaced with a water suppression system in 2012. No additional information is known about the former AFFF system; however, no known leaks or spills are known to have occurred (Watson, 2015, personal communication; Appendix C). This building is connected to a poly-lined containment pond located between Buildings 1240 and 1247 and spills

2. Owner/Operator Information

Owner: F.E. Warren AFB

Street Address:

City:

State: ND

Zip Code:

Telephone:

Type of Ownership:
- ☐ Private
- ☑ Federal Agency
  Name: _DOD__
- ☐ State
- ☐ Indian
- ☐ County
- ☐ Municipal
- ☐ Not Specified
- ☐ Other_________

Operator: Same as owner

Street Address:

City:

State:

Zip Code:

Telephone:

Type of Ownership:
- ☐ Private
- ☐ Federal Agency
  Name: _____
- ☐ State
- ☐ Indian
- ☐ County
- ☐ Municipal
- ☐ Not Specified
- ☐ Other_________

3. Site Evaluator Information

Name of Evaluator: Kelly Teplitsky

Agency/Organization: CH2M HILL

Date Prepared: 09/11/15

Street Address: 9191 South Jamaica Street

City: Englewood

State: CO

Name of EPA or State Agency Contact:

Street Address:

City:

State:

Telephone:

4. Site Disposition *(for EPA use only)*

Emergency Response/Removal Assessment Recommendation:
- ☐ Yes
- ☐ No

Date: _________

CERCLIS Recommendation:
- ☐ Higher Priority SI
- ☐ Lower Priority SI
- ☐ NFRAP
- ☐ RCRA
- ☐ Other: _______

Date: _________

Signature:

Name (typed):

Position:

5. General Site Characteristics

Predominant Land Use Within 1 Mile of Site (check all that apply):

☐ Industrial
☐ Commercial
☑ Residential
☐ Forest/Fields
☐ Agriculture
☐ Mining
☑ DOD
☐ DOE
☐ DOI
☐ Other Federal Facility: __________
☐ Other _______

Site Setting:

☐ Urban
☑ Suburban
☐ Rural

Years of Operation:

Beginning Year _1995_

Ending Year present_

☐ Unknown

Type of Site Operations (check all that apply):

☐ Manufacturing (must check subcategory)
  ☐ Lumber and Wood Products
  ☐ Inorganic Chemicals
  ☐ Plastic and/or Rubber Products
  ☐ Paints, Varnishes
  ☐ Industrial Organic Chemicals
  ☐ Agricultural Chemicals
  ☐ Miscellaneous Chemical Products
  ☐ Primary Metals
  ☐ Metal Coating, Plating, Engraving
  ☐ Metal Forging, Stamping
  ☐ Fabricated Structural Metal Products
  ☐ Electronic Equipment
  ☐ Other Manufacturing
☐ Mining
  ☐ Metals
  ☐ Coal
  ☐ Oil and Gas
  ☐ Non-metallic Minerals
☐ Retail
☐ Recycling
☐ Junk/Salvage Yard
☐ Municipal Landfill
☐ Other Landfill
☑ DOD
☐ DOE
☐ DOI
☐ Other Federal Facility _______
☐ RCRA
  ☐ Treatment, Storage, or Disposal
  ☐ Large Quantity Generator
  ☐ Small Quantity Generator
  ☐ Subtitle D
    ☐ Municipal
    ☐ Industrial
  ☐ "Converter"
  ☐ "Protective Filer"
  ☐ "Non-or Late Filer"
☐ Note Specified
☐ Other______________

Waste Generated: NA

☑ Onsite
☐ Offsite
☐ Onsite and Offsite

Waste Deposition Authorized By:

☑ Present Owner
☐ Former Owner
☐ Present & Former Owner
☐ Unauthorized
☐ Unknown

Waste Accessible to the Public:

☐ Yes
☑ No

Distance to Nearest Dwelling, School, or Workplace:

NA__ feet

6. Waste Characteristics Information

(Refer to PA Table 1 for WC Score)

Source Type: (check all that apply)	Source Waste Quantity: (include unit)	Tier*:
☐ Landfill	_____________	____
☐ Surface Impoundment	_____________	____
☐ Drums	_____________	____
☐ Tanks and Non-Dum Containers	_____________	____
☐ Chemical Waste Pile	_____________	____
☐ Scrap Metal or Junk Pile	_____________	____
☐ Tailings Pile	_____________	____
☐ Trash Pile (open drum)	_____________	____
☐ Land Treatment	_____________	____
☐ Contaminated GW Plume (unidentified source)	_____________	____
☐ Contaminated SW/Sediment (unidentified source)	_____________	____
☐ Contaminated Soil	_____________	____
☐ Other_________	_____________	____
☐ No Sources		

*C=Constituent, W=Wastestream, V=Volume, A=Area

General Type of Waste (check all that apply):

☐ Metals
☐ Organics
☐ Inorganics
☐ Solvents
☐ Paints/Pigments
☐ Laboratory/Hospital Waste
☐ Radioactive Waste
☐ Construction/Demolition Waste
☐ Pesticides/Herbicides
☐ Acids/Bases
☐ Oily Waste
☐ Municipal Waste
☐ Mining Waste
☐ Explosives
☑ Other _AFFF_

Physical State of Waste as Deposited (check all that apply):

☐ Solid
☐ Sludge
☐ Powder
☑ Liquid
☐ Gas

7. Ground Water Pathway

Is Ground Water Used for Drinking Within 4 Miles:

☐ Yes
☑ No

If Yes, Distance to nearest Drinking Well:

________ Feet

Type of Drinking Water Wells Within 4 Miles
(check all that apply):

☐ Municipal
☐ Private
☑ None

Is There a Suspected Release to Ground Water[1]:

☐ Yes
☑ No

Have Primary Target Drinking Water Wells Been Identified:

☐ Yes
☑ No

If Yes, Enter Primary Target Population:

_________ People[3]

List Secondary Target Population Served by Ground Water Withdrawn From:

0 - 1/4 Mile	__NA_____
>1/4 - 1/2 Mile	__NA______
>1/2 - 1 Mile	__NA______
>1 - 2 Mile	__NA______
>2 - 3 Mile	__NA______
>3 - 4 Mile	__NA______
Total Within 4 Miles[4]	_NA______

*Use population #s for PA Table 2

*Note nearest well for #5 on GW Pathway Scoresheet

Depth to Shallowest Aquifer:

NA

Karst Terrain/Aquifer Present:

☐ Yes
☑ No

Nearest Designated Wellhead Protection Area[6]:

☐ Underlies Site
☐ >0-4 Miles
☑ None Within 4 Miles

8. Surface Water Pathway

Type of Surface Water Draining Site and 15 Miles Downstream (check all that apply):

☑ Stream ☐ River ☐ Pond ☐ Lake
☐ Bay ☐ Ocean ☐ Other________

Shortest Overland Distance From Any Source to Surface Water:

__ Feet
__NA___ Miles

Is There a Suspected Release to Surface Water[1]:

☐ Yes
☑ No

Site is Located in:

☐ Annual - 10 yr Floodplain
☐ >10yr - 100yr Floodplain
☐ >100yr - 500yr Floodplain
☐ >500yr Floodplain

Drinking Water Intake Located Along the Surface Water Migration Path:

☐ Yes
☑ No

Have Primary Target Drinking Water Intakes Been Identified:

☐ Yes
☑ No

If Yes, Distance to Nearest Drinking Water Intake : _________ Miles[6]

If Yes, Enter Population Served by Target Intake:

NA__ People[4]

List All Secondary Target Drinking Water Intakes:

Name:	Water Body:	Flow (cfs):	Population Served:
_______	________	_________	__________
_______	________	__________	_________
_______	________	__________	_________
_______	________	__________	_________

Total within 15 Miles [4] __________

Fisheries Located Along the Surface Water Migration Path:

☐ Yes ☑ No

If Yes, Distance to Nearest Fishery:

_________ Miles

Have Primary Target Fisheries Been Identified:

☐ Yes ☑ No

List All Secondary Target Fisheries[10]:

Water Body/ Fishery Name :	Flow (cfs):
______________________	_________
______________________	__________
______________________	__________
______________________	__________

8. Surface Water Pathway (continued)

Wetlands Located Along the Surface Water Migration Path:

☑ Yes
☐ No

Have Primary Target Wetlands Been Identified:

☐ Yes
☑ No

List All Wetlands:

Water Body :	Flow (cfs):	Frontage miles:
____________	_________	__________
____________	__________	__________
____________	__________	__________

Other Sensitive Environments Located Along the Surface Water Migration Path:

☐ Yes
☑ No

If Yes, Distance to Nearest Sensitive Environment: _ Miles

Have Primary Target Sensitive Environments Been Identified:

☐ Yes
☑ No

List All Sensitive Environments[11]:

Water Body :	Flow (cfs):	Sensitive Environment Type:
_______________	_________	______ __________
_____________________		
_______________	__________	_____________________
_______________	__________	_____________________

9. Soil Exposure Pathway

Are People Occupying Residence or Attending School or Daycare on or Within 200 Feet of Area of Known or Suspected Contamination:

☐ Yes
☑ No

If Yes, Enter Total Residential Population:

__NA__ People[2]

Number of Workers Onsite[4]:

☐ None
☑ 1 - 100
☐ 101 - 1,000
☐ > 1,000

Population Within 1 Mile:

_NA___ People[7]

Have Terrestrial Sensitive Environments Been Identified on or Within 200 Feet of Areas of Known or Suspected Contamination:

☐ Yes
☑ No

If Yes, List Each Terrestrial Sensitive Environment[5]:

____
____
_

*Refer to PA Table 7 for environment types

10. Air Pathway

Is there a Suspected Release to Air[1]:

☐ Yes
☑ No

Enter Total Population on or Within:

Onsite ____________
0-1/4 Mile ____________
>1/4-1/2 Mile ____________
>1/2-1 Mile ____________
>1-2 Miles ____________
>2-3 Miles ____________
>3-4 Miles ____________
Total Within 4 Miles [3-5] _NA

Wetlands Located Within 4 Miles of the Site[6]:

☑ Yes
☐ No

If Yes, How Many Acres: _______ Acres

Other Sensitive Environments Located Within 4 Miles of the Site:

☑ Yes
☐ No

List All Sensitive Environments Within 1/2 Mile of the Site[6]:

Distance:	Sensitive Environment Type/Wetlands Area (acres):
Onsite	Colorado Butterfly Plant Research Natural Area
0-1/4 Mile	_____________________________
>1/4-1/2 Mile	___________

*Refer to PA Table 10 for calculations on air pathway exposures

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[1-11] Refers to question number on the PA scoresheet for each particular pathway

Potential Hazardous Waste Site Preliminary Assessment Form

Identification

State: WY

CERCLIS #:

CERCLIS Discovery Date:

1. General Site Information

Name: F.E. Warren AFB

Street Address:

City: Cheyenne

State: WY

Zip Code:

County: Laramie

Co. Code:

Cong. Dist:

Latitude: 41° 8'37.86"N

Longitude: 104°52'8.10"W

Approximate Area of Site:
__<1___ Acres
____________ Square Ft

Status of Site:
- ☑ Active
- ☐ Not Specified
- ☐ Inactive
- ☐ NA (GW plume, etc.)

Site Name: Building 1247 (Base Fuels)

Site Description: Building 1247, Base Fuels, was built in 1995 and has an active AFFF system with overhead lines. The AFFF tank size is unknown but staff estimates it to be 200 to 300 gallons (Schafer, 2015, personal communication; Appendix C). This building is connected to a poly-lined containment pond located between Buildings 1240 and 1247 and spills can be diverted to this pond as necessary (McKinley, 2015, personal communication; Appendix C).

2. Owner/Operator Information

Owner: F.E. Warren AFB

Street Address:

City:

State: ND

Zip Code:

Telephone:

Type of Ownership:
- ☐ Private
- ☑ Federal Agency
  Name: _DOD__
- ☐ State
- ☐ Indian
- ☐ County
- ☐ Municipal
- ☐ Not Specified
- ☐ Other_________

Operator: Same as owner

Street Address:

City:

State:

Zip Code:

Telephone:

Type of Ownership:
- ☐ Private
- ☐ Federal Agency
  Name: _____
- ☐ State
- ☐ Indian
- ☐ County
- ☐ Municipal
- ☐ Not Specified
- ☐ Other_________

3. Site Evaluator Information

Name of Evaluator: Kelly Teplitsky

Agency/Organization: CH2M HILL

Date Prepared: 09/11/15

Street Address: 9191 South Jamaica Street

City: Englewood

State: CO

Name of EPA or State Agency Contact:

Street Address:

City:

State:

Telephone:

4. Site Disposition *(for EPA use only)*

Emergency Response/Removal Assessment Recommendation:
- ☐ Yes
- ☐ No

Date: _________

CERCLIS Recommendation:
- ☐ Higher Priority SI
- ☐ Lower Priority SI
- ☐ NFRAP
- ☐ RCRA
- ☐ Other: _______

Date: _________

Signature:

Name (typed):

Position:

5. General Site Characteristics

Predominant Land Use Within 1 Mile of Site (check all that apply):

☐ Industrial
☐ Commercial
☑ Residential
☐ Forest/Fields
☐ Agriculture
☐ Mining
☑ DOD
☐ DOE
☐ DOI
☐ Other Federal Facility: __________
☐ Other _______

Site Setting:

☐ Urban
☑ Suburban
☐ Rural

Years of Operation:

Beginning Year _1995_

Ending Year present_

☐ Unknown

Type of Site Operations (check all that apply):

☐ Manufacturing (must check subcategory)
  ☐ Lumber and Wood Products
  ☐ Inorganic Chemicals
  ☐ Plastic and/or Rubber Products
  ☐ Paints, Varnishes
  ☐ Industrial Organic Chemicals
  ☐ Agricultural Chemicals
  ☐ Miscellaneous Chemical Products
  ☐ Primary Metals
  ☐ Metal Coating, Plating, Engraving
  ☐ Metal Forging, Stamping
  ☐ Fabricated Structural Metal Products
  ☐ Electronic Equipment
  ☐ Other Manufacturing
☐ Mining
  ☐ Metals
  ☐ Coal
  ☐ Oil and Gas
  ☐ Non-metallic Minerals
☐ Retail
☐ Recycling
☐ Junk/Salvage Yard
☐ Municipal Landfill
☐ Other Landfill
☑ DOD
☐ DOE
☐ DOI
☐ Other Federal Facility _______
☐ RCRA
  ☐ Treatment, Storage, or Disposal
  ☐ Large Quantity Generator
  ☐ Small Quantity Generator
  ☐ Subtitle D
    ☐ Municipal
    ☐ Industrial
  ☐ "Converter"
  ☐ "Protective Filer"
  ☐ "Non-or Late Filer"
☐ Note Specified
☐ Other______________

Waste Generated: NA

☑ Onsite
☐ Offsite
☐ Onsite and Offsite

Waste Deposition Authorized By:

☑ Present Owner
☐ Former Owner
☐ Present & Former Owner
☐ Unauthorized
☐ Unknown

Waste Accessible to the Public:

☐ Yes
☑ No

Distance to Nearest Dwelling, School, or Workplace:

0__ feet

6. Waste Characteristics Information

(Refer to PA Table 1 for WC Score)

Source Type: (check all that apply)	Source Waste Quantity: (include unit)	Tier*:
☐ Landfill	_____________	_____
☐ Surface Impoundment	_____________	_____
☐ Drums	_____________	_____
☐ Tanks and Non-Dum Containers	_____________	_____
☐ Chemical Waste Pile	_____________	_____
☐ Scrap Metal or Junk Pile	_____________	_____
☐ Tailings Pile	_____________	_____
☐ Trash Pile (open drum)	_____________	_____
☐ Land Treatment	_____________	_____
☐ Contaminated GW Plume (unidentified source)	_____________	_____
☐ Contaminated SW/Sediment (unidentified source)	_____________	_____
☐ Contaminated Soil	_____________	_____
☐ Other_________	_____________	_____
☐ No Sources		

*C=Constituent, W=Wastestream, V=Volume, A=Area

General Type of Waste (check all that apply):

☐ Metals
☐ Organics
☐ Inorganics
☐ Solvents
☐ Paints/Pigments
☐ Laboratory/Hospital Waste
☐ Radioactive Waste
☐ Construction/Demolition Waste
☐ Pesticides/Herbicides
☐ Acids/Bases
☐ Oily Waste
☐ Municipal Waste
☐ Mining Waste
☐ Explosives
☑ Other _AFFF_

Physical State of Waste as Deposited (check all that apply):

☐ Solid
☐ Sludge
☐ Powder
☑ Liquid
☐ Gas

7. Ground Water Pathway

Is Ground Water Used for Drinking Within 4 Miles:

☐ Yes
☑ No

If Yes, Distance to nearest Drinking Well:
________ Feet

Type of Drinking Water Wells Within 4 Miles
(check all that apply):

☐ Municipal
☐ Private
☑ None

Is There a Suspected Release to Ground Water[1]:

☑ Yes
☐ No

Have Primary Target Drinking Water Wells Been Identified:

☐ Yes
☑ No

If Yes, Enter Primary Target Population:
_________ People[3]

List Secondary Target Population Served by Ground Water Withdrawn From:

0 - 1/4 Mile	__NA_____
>1/4 - 1/2 Mile	__NA______
>1/2 - 1 Mile	__NA______
>1 - 2 Mile	__NA______
>2 - 3 Mile	__NA______
>3 - 4 Mile	__NA______
Total Within 4 Miles[4]	_NA______

Depth to Shallowest Aquifer:
NA

Karst Terrain/Aquifer Present:

☐ Yes
☑ No

Nearest Designated Wellhead Protection Area[6]:

☐ Underlies Site
☐ >0-4 Miles
☑ None Within 4 Miles

*Use population #s for PA Table 2
*Note nearest well for #5 on GW Pathway Scoresheet

8. Surface Water Pathway

Type of Surface Water Draining Site and 15 Miles Downstream (check all that apply):

☑ Stream ☐ River ☐ Pond ☐ Lake
☐ Bay ☐ Ocean ☐ Other________

Shortest Overland Distance From Any Source to Surface Water:
__ Feet
__0.4___ Miles

Is There a Suspected Release to Surface Water[1]:

☑ Yes
☐ No

Site is Located in:

☐ Annual - 10 yr Floodplain
☐ >10yr - 100yr Floodplain
☐ >100yr - 500yr Floodplain
☐ >500yr Floodplain

Drinking Water Intake Located Along the Surface Water Migration Path:

☐ Yes
☑ No

Have Primary Target Drinking Water Intakes Been Identified:

☐ Yes
☑ No

If Yes, Distance to Nearest Drinking Water Intake : _________ Miles[6]

If Yes, Enter Population Served by Target Intake:

NA__ People[4]

List All Secondary Target Drinking Water Intakes:

Name:	Water Body:	Flow (cfs):	Population Served:
_______	________	_________	__________
_______	________	__________	_________
_______	________	__________	_________
_______	________	__________	_________

Total within 15 Miles [4] __________

Fisheries Located Along the Surface Water Migration Path:

☐ Yes ☑ No

If Yes, Distance to Nearest Fishery:
_________ Miles

Have Primary Target Fisheries Been Identified:

☐ Yes ☑ No

List All Secondary Target Fisheries[10]:

Water Body/ Fishery Name :	Flow (cfs):
______________________	_________
______________________	__________
______________________	__________
______________________	__________

8. Surface Water Pathway (continued)

Wetlands Located Along the Surface Water Migration Path:

☑ Yes
☐ No

Have Primary Target Wetlands Been Identified:

☐ Yes
☑ No

List All Wetlands:

Water Body :	Flow (cfs):	Frontage miles:

Other Sensitive Environments Located Along the Surface Water Migration Path:

☐ Yes
☑ No

If Yes, Distance to Nearest Sensitive Environment: _ Miles

Have Primary Target Sensitive Environments Been Identified:

☐ Yes
☑ No

List All Sensitive Environments[11]:

Water Body :	Flow (cfs):	Sensitive Environment Type:

9. Soil Exposure Pathway

Are People Occupying Residence or Attending School or Daycare on or Within 200 Feet of Area of Known or Suspected Contamination:

☐ Yes
☑ No

If Yes, Enter Total Residential Population:

__NA__ People[2]

Number of Workers Onsite[4]:

☐ None
☑ 1 - 100
☐ 101 - 1,000
☐ > 1,000

Population Within 1 Mile:

_NA___ People[7]

Have Terrestrial Sensitive Environments Been Identified on or Within 200 Feet of Areas of Known or Suspected Contamination:

☐ Yes
☑ No

If Yes, List Each Terrestrial Sensitive Environment[5]:

_

*Refer to PA Table 7 for environment types

10. Air Pathway

Is there a Suspected Release to Air[1]:

☐ Yes
☑ No

Enter Total Population on or Within:

Onsite ____________

0-1/4 Mile ____________

>1/4-1/2 Mile ____________

>1/2-1 Mile ____________

>1-2 Miles ____________

>2-3 Miles ____________

>3-4 Miles ____________

Total Within 4 Miles [3-5] _32,580

Wetlands Located Within 4 Miles of the Site[6]:

☑ Yes
☐ No

If Yes, How Many Acres: _______ Acres

Other Sensitive Environments Located Within 4 Miles of the Site:

☑ Yes
☐ No

List All Sensitive Environments Within 1/2 Mile of the Site[6]:

Distance:	Sensitive Environment Type/Wetlands Area (acres):
Onsite	Colorado Butterfly Plant Research Natural Area
0-1/4 Mile	______________________________
>1/4-1/2 Mile	___________

*Refer to PA Table 10 for calculations on air pathway exposures

[1-11] Refers to question number on the PA scoresheet for each particular pathway

Potential Hazardous Waste Site Preliminary Assessment Form

Identification

State: WY

CERCLIS #:

CERCLIS Discovery Date:

1. General Site Information

Name: F.E. Warren AFB

Street Address:

City: Cheyenne

State: WY

Zip Code:

County: Laramie

Co. Code:

Cong. Dist:

Latitude: 41° 8'48.78"N

Longitude: 104°52'4.58"W

Approximate Area of Site:
__<1___ Acres
____________ Square Ft

Status of Site:
☑ Active ☐ Not Specified
☐ Inactive ☐ NA (GW plume, etc.)

Site Name: Building 1285 (Hazmart)

Site Description: Building 1285, built in 1995, serves as the Base hazmart. AFFF is stored here for distribution as needed on base. During a visit to the building, 39 55-gallon drums of AFFF were stored here. The building has a temporary berm but no floor drains. If a spill occurs, it would be cleaned up by a contractor (Wright, 2015, personal communication; Appendix C). However, no leaks or spills are known to have occurred here (McKinley, 2105, personal communication; Appendix C).

2. Owner/Operator Information

Owner: F.E. Warren AFB	Operator: Same as owner
Street Address:	Street Address:
City:	City:
State: ND	State:
Zip Code:	Zip Code:
Telephone:	Telephone:

Type of Ownership:
☐ Private
☑ Federal Agency
Name: _DOD__
☐ State
☐ Indian
☐ County
☐ Municipal
☐ Not Specified
☐ Other_________

Type of Ownership:
☐ Private
☐ Federal Agency
Name: _____
☐ State
☐ Indian
☐ County
☐ Municipal
☐ Not Specified
☐ Other_________

3. Site Evaluator Information

Name of Evaluator: Kelly Teplitsky

Agency/Organization: CH2M HILL

Date Prepared: 09/11/15

Street Address: 9191 South Jamaica Street

City: Englewood

State: CO

Name of EPA or State Agency Contact:

Street Address:

City:

State:

Telephone:

4. Site Disposition *(for EPA use only)*

Emergency Response/Removal Assessment Recommendation:
☐ Yes
☐ No
Date: _________

CERCLIS Recommendation:
☐ Higher Priority SI
☐ Lower Priority SI
☐ NFRAP
☐ RCRA
☐ Other: _______
Date: _________

Signature:

Name (typed):

Position:

5. General Site Characteristics

Predominant Land Use Within 1 Mile of Site (check all that apply):

☐ Industrial
☐ Commercial
☑ Residential
☐ Forest/Fields

☐ Agriculture
☐ Mining
☑ DOD
☐ DOE

☐ DOI
☐ Other Federal Facility: __________
☐ Other _______

Site Setting:

☐ Urban
☑ Suburban
☐ Rural

Years of Operation:

Beginning Year _1995_

Ending Year present_

☐ Unknown

Type of Site Operations (check all that apply):

☐ Manufacturing (must check subcategory)
  ☐ Lumber and Wood Products
  ☐ Inorganic Chemicals
  ☐ Plastic and/or Rubber Products
  ☐ Paints, Varnishes
  ☐ Industrial Organic Chemicals
  ☐ Agricultural Chemicals
  ☐ Miscellaneous Chemical Products
  ☐ Primary Metals
  ☐ Metal Coating, Plating, Engraving
  ☐ Metal Forging, Stamping
  ☐ Fabricated Structural Metal Products
  ☐ Electronic Equipment
  ☐ Other Manufacturing
☐ Mining
  ☐ Metals
  ☐ Coal
  ☐ Oil and Gas
  ☐ Non-metallic Minerals

☐ Retail
☐ Recycling
☐ Junk/Salvage Yard
☐ Municipal Landfill
☐ Other Landfill
☑ DOD
☐ DOE
☐ DOI
☐ Other Federal Facility _______
☐ RCRA
  ☐ Treatment, Storage, or Disposal
  ☐ Large Quantity Generator
  ☐ Small Quantity Generator
  ☐ Subtitle D
    ☐ Municipal
    ☐ Industrial
  ☐ "Converter"
  ☐ "Protective Filer"
  ☐ "Non-or Late Filer"
☐ Note Specified
☐ Other______________

Waste Generated: NA

☑ Onsite
☐ Offsite
☐ Onsite and Offsite

Waste Deposition Authorized By:

☑ Present Owner
☐ Former Owner
☐ Present & Former Owner
☐ Unauthorized
☐ Unknown

Waste Accessible to the Public:

☐ Yes
☑ No

Distance to Nearest Dwelling, School, or Workplace:

NA__ feet

6. Waste Characteristics Information

(Refer to PA Table 1 for WC Score)

Source Type: (check all that apply)	Source Waste Quantity: (include unit)	Tier*:
☐ Landfill	_____________	____
☐ Surface Impoundment	_____________	____
☐ Drums	_____________	____
☐ Tanks and Non-Dum Containers	_____________	____
☐ Chemical Waste Pile	_____________	____
☐ Scrap Metal or Junk Pile	_____________	____
☐ Tailings Pile	_____________	____
☐ Trash Pile (open drum)	_____________	____
☐ Land Treatment	_____________	____
☐ Contaminated GW Plume (unidentified source)	_____________	____
☐ Contaminated SW/Sediment (unidentified source)	_____________	____
☐ Contaminated Soil	_____________	____
☐ Other_________	_____________	____
☐ No Sources		

*C=Constituent, W=Wastestream, V=Volume, A=Area

General Type of Waste (check all that apply):

☐ Metals
☐ Organics
☐ Inorganics
☐ Solvents
☐ Paints/Pigments
☐ Laboratory/Hospital Waste
☐ Radioactive Waste
☐ Construction/Demolition Waste

☐ Pesticides/Herbicides
☐ Acids/Bases
☐ Oily Waste
☐ Municipal Waste
☐ Mining Waste
☐ Explosives
☑ Other _AFFF_

Physical State of Waste as Deposited (check all that apply):

☐ Solid
☐ Sludge
☐ Powder
☑ Liquid
☐ Gas

7. Ground Water Pathway

Is Ground Water Used for Drinking Within 4 Miles:

☐ Yes
☑ No

If Yes, Distance to nearest Drinking Well:

________ Feet

Type of Drinking Water Wells Within 4 Miles
(check all that apply):

☐ Municipal
☐ Private
☑ None

Is There a Suspected Release to Ground Water[1]:

☐ Yes
☑ No

Have Primary Target Drinking Water Wells Been Identified:

☐ Yes
☑ No

If Yes, Enter Primary Target Population:

_________ People[3]

List Secondary Target Population Served by Ground Water Withdrawn From:

0 - 1/4 Mile __NA_____
>1/4 - 1/2 Mile __NA______
>1/2 - 1 Mile __NA______
>1 - 2 Mile __NA______
>2 - 3 Mile __NA______
>3 - 4 Mile __NA______
Total Within 4 Miles[4] _NA______

*Use population #s for PA Table 2
*Note nearest well for #5 on GW Pathway Scoresheet

Depth to Shallowest Aquifer:

NA

Karst Terrain/Aquifer Present:

☐ Yes
☑ No

Nearest Designated Wellhead Protection Area[6]:

☐ Underlies Site
☐ >0-4 Miles
☑ None Within 4 Miles

8. Surface Water Pathway

Type of Surface Water Draining Site and 15 Miles Downstream (check all that apply):

☑ Stream ☐ River ☐ Pond ☐ Lake
☐ Bay ☐ Ocean ☐ Other________

Shortest Overland Distance From Any Source to Surface Water:

__ Feet
__NA___ Miles

Is There a Suspected Release to Surface Water[1]:

☐ Yes
☑ No

Site is Located in:

☐ Annual - 10 yr Floodplain
☐ >10yr - 100yr Floodplain
☐ >100yr - 500yr Floodplain
☐ >500yr Floodplain

Drinking Water Intake Located Along the Surface Water Migration Path:

☐ Yes
☑ No

Have Primary Target Drinking Water Intakes Been Identified:

☐ Yes
☑ No

If Yes, Distance to Nearest Drinking Water Intake : _________ Miles[6]

If Yes, Enter Population Served by Target Intake:

NA__ People[4]

List All Secondary Target Drinking Water Intakes:

Name:	Water Body:	Flow (cfs):	Population Served:
_______	________	_________	__________
_______	________	__________	_________
_______	________	__________	_________
_______	________	__________	_________

Total within 15 Miles [4] __________

Fisheries Located Along the Surface Water Migration Path:

☐ Yes ☑ No

If Yes, Distance to Nearest Fishery:

_________ Miles

Have Primary Target Fisheries Been Identified:

☐ Yes ☑ No

List All Secondary Target Fisheries[10]:

Water Body/ Fishery Name :	Flow (cfs):
______________________	_________
______________________	__________
______________________	__________
______________________	__________

8. Surface Water Pathway (continued)

Wetlands Located Along the Surface Water Migration Path:

☑ Yes
☐ No

Have Primary Target Wetlands Been Identified:

☐ Yes
☑ No

List All Wetlands:

Water Body :	Flow (cfs):	Frontage miles:
____________	_________	__________
____________	_________	__________
____________	_________	__________

Other Sensitive Environments Located Along the Surface Water Migration Path:

☐ Yes
☑ No

If Yes, Distance to Nearest Sensitive Environment: _ Miles

Have Primary Target Sensitive Environments Been Identified:

☐ Yes
☑ No

List All Sensitive Environments[11]:

Water Body :	Flow (cfs):	Sensitive Environment Type:
_______________	_________	______ __________
_____________________		
_______________	_________	_____________________
_______________	_________	_____________________

9. Soil Exposure Pathway

Are People Occupying Residence or Attending School or Daycare on or Within 200 Feet of Area of Known or Suspected Contamination:

☐ Yes
☑ No

If Yes, Enter Total Residential Population:

__NA__ People[2]

Number of Workers Onsite[4]:

☐ None
☑ 1 - 100
☐ 101 - 1,000
☐ > 1,000

Population Within 1 Mile:

_NA___ People[7]

Have Terrestrial Sensitive Environments Been Identified on or Within 200 Feet of Areas of Known or Suspected Contamination:

☐ Yes
☑ No

If Yes, List Each Terrestrial Sensitive Environment[5]:

____
____
_

*Refer to PA Table 7 for environment types

10. Air Pathway

Is there a Suspected Release to Air[1]:

☐ Yes
☑ No

Enter Total Population on or Within:

Onsite ____________
0-1/4 Mile ____________
>1/4-1/2 Mile ____________
>1/2-1 Mile ____________
>1-2 Miles ____________
>2-3 Miles ____________
>3-4 Miles ____________

Total Within 4 Miles [3-5] _NA

Wetlands Located Within 4 Miles of the Site[6]:

☑ Yes
☐ No

If Yes, How Many Acres: _______ Acres

Other Sensitive Environments Located Within 4 Miles of the Site:

☑ Yes
☐ No

List All Sensitive Environments Within 1/2 Mile of the Site[6]:

Distance:	Sensitive Environment Type/Wetlands Area (acres):
Onsite	Colorado Butterfly Plant Research Natural Area
0-1/4 Mile	______________________________
>1/4-1/2 Mile	___________

*Refer to PA Table 10 for calculations on air pathway exposures

[1-11] Refers to question number on the PA scoresheet for each particular pathway

APPENDIX B.2

OTHER

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Yellow-ADD Red-DELETE Green-UPDATE	Base/Site	Hangar Bldg #	List of AF Hangars for Evaluation on Active Duty Bases				
			High Expansion Foam	AFFF	Deluge	MAJCOM	STATE/ COUNTRY
1	Altus AFB	509		X		AETC	OK
	Altus AFB	514		X		AETC	OK
	Altus AFB	518	X			AETC	OK
	Altus AFB	517		X		AETC	OK
	Altus AFB	435			X	AETC	OK
	Altus AFB	285	X			AETC	OK
2	Columbus	246	X			AETC	MS
	Columbus	406	X			AETC	MS
	Columbus	440		X		AETC	MS
	Columbus	450	X			AETC	MS
	Columbus	460	X			AETC	MS
	Columbus	995		X		AETC	MS
3	JBSA Lackland	826	X			AETC	TX
	JBSA Lackland	829		X		AETC	TX
	JBSA Lackland	933	X			AETC	TX
	JBSA Lackland	935	X			AETC	TX
	JBSA Lackland	946		X		AETC	TX
4	JBSA Randolph	40		X		AETC	TX
	JBSA Randolph	44		X		AETC	TX
	JBSA Randolph	82		X		AETC	TX
	JBSA Randolph	83		X		AETC	TX
5	Keesler AFB	4247	X			AETC	MS
	Keesler AFB	4278	X			AETC	MS
	Keesler AFB	4204		X		AETC	MS
	Keesler AFB	4254	X			AETC	MS
6	Laughlin AFB	33		X		AETC	TX
	Laughlin AFB	50	X			AETC	TX
	Laughlin AFB	414	X			AETC	TX
	Laughlin AFB	502	X			AETC	TX
	Laughlin AFB	508	X			AETC	TX
7	Luke AFB	408		X		AETC	AZ
	Luke AFB	431		X		AETC	AZ
	Luke AFB	485		X		AETC	AZ
	Luke AFB	840		X		AETC	AZ
	Luke AFB	913	X			AETC	AZ
	Luke AFB	914	X			AETC	AZ
	Luke AFB	915	X			AETC	AZ
	Luke AFB	922		X		AETC	AZ
	Luke AFB	968		X		AETC	AZ
	Luke AFB	984	X			AETC	AZ
	Luke AFB	*Dock #1*	X			AETC	AZ
	Luke AFB	*Dock #2*	X			AETC	AZ
	Luke AFB	*Dock #3*	X			AETC	AZ
	Luke AFB	*Dock #4*	X			AETC	AZ
	Luke AFB	995	X			AETC	AZ
	Luke AFB	999		X		AETC	AZ
	Luke AFB	1019		X		AETC	AZ
	Luke AFB	1022		X		AETC	AZ
8	Maxwell AFB	1454	X			AETC	AL
	Maxwell AFB	1455	X			AETC	AL
9	Sheppard	2414		X		AETC	TX
10	Vance AFB	195			X	AETC	OK
	Vance AFB	198	X			AETC	OK
	Vance AFB	141			x	AETC	OK
	Vance AFB	199	X			AETC	OK
11	Andrews AFB	1914	X			AFDW	MD
	Andrews AFB	1794	X			AFDW	MD
	Andrews AFB	1754	X			AFDW	MD
	Andrews AFB	1734	X			AFDW	MD
	Andrews AFB	1714	X			AFDW	MD
	Andrews AFB	1279	X			AFDW	MD
	Andrews AFB	1280	X			AFDW	MD
	Andrews AFB	1225	X	X		AFDW	MD
	Andrews AFB	1228	X	X		AFDW	MD
	Andrews AFB	5032	X			AFDW	MD
	Andrews AFB	5016	X			AFDW	MD
	Andrews AFB	3640	X	X		AFDW	MD
	Andrews AFB	3635	X	X		AFDW	MD
	Andrews AFB	3188			X	AFDW	MD
	Andrews AFB	3158	X			AFDW	MD
	Andrews AFB	3148			X	AFDW	MD
	Andrews AFB	3119	X			AFDW	MD
	Andrews AFB	3002	X	x		AFDW	MD
	Andrews AFB	2409	X			AFDW	MD

Yellow-ADD Red-DELETE Green-UPDATE	Base/Site	Hangar Bldg #	List of AF Hangars for Evaluation on Active Duty Bases				
			High Expansion Foam	AFFF	Deluge	MAJCOM	STATE/ COUNTRY
	Andrews AFB	1915	X			AFDW	MD
	Andrews AFB	1288	X	x		AFDW	MD
	Andrews AFB	3629	X			AFDW	MD
12	Barksdale	6200	X			AFGSC	LA
	Barksdale	6050	X			AFGSC	LA
	Barksdale	6214		X		AFGSC	LA
	Barksdale	6215		X		AFGSC	LA
	Barksdale	6604	X			AFGSC	LA
	Barksdale	6626		X		AFGSC	LA
	Barksdale	6628		X		AFGSC	LA
	Barksdale	6824		X		AFGSC	LA
	Barksdale	6825	X			AFGSC	LA
	Barksdale	6850	X			AFGSC	LA
13	F.E. Warren	1250	X			AFGSC	WY
	F.E. Warren	7600-Delete	X			AFGSC	WY
14	Malmstrom AFB	1440/ Bay 5		X		AFGSC	MT
15	Minot AFB	836	X			AFGSC	ND
	Minot AFB	837	X			AFGSC	ND
	Minot AFB	863	X			AFGSC	ND
	Minot AFB	867	X			AFGSC	ND
	Minot AFB	899		X		AFGSC	ND
	Minot AFB	970		X		AFGSC	ND
16	Whiteman AFB	1		X (Cannons)		AFGSC	MO
	Whiteman AFB	T-9		X (Cannons)		AFGSC	MO
	Whiteman AFB	52	X		X	AFGSC	MO
	Whiteman AFB	27		X		AFGSC	MO
	Whiteman AFB	1125		X		AFGSC	MO
	Whiteman AFB	91			X	AFGSC	MO
	Whiteman AFB	1117			X	AFGSC	MO
	Whiteman AFB	1118			X	AFGSC	MO
	Whiteman AFB	5050		X	X	AFGSC	MO
	Whiteman AFB	5051		X		AFGSC	MO
	Whiteman AFB	5052		X		AFGSC	MO
	Whiteman AFB	5053		X		AFGSC	MO
	Whiteman AFB	5054		X		AFGSC	MO
	Whiteman AFB	5055		X		AFGSC	MO
	Whiteman AFB	5058		X		AFGSC	MO
	Whiteman AFB	5059		X		AFGSC	MO
	Whiteman AFB	5060		X		AFGSC	MO
	Whiteman AFB	5061		X		AFGSC	MO
	Whiteman AFB	5062		X		AFGSC	MO
	Whiteman AFB	5063		X		AFGSC	MO
	Whiteman AFB	5064		X		AFGSC	MO
	Whiteman AFB	5065		X		AFGSC	MO
	Whiteman AFB	5205		X		AFGSC	MO
	Whiteman AFB	5206		X		AFGSC	MO
17	Eglin AFB	71	X			AFMC	FL
	Eglin AFB	72		X		AFMC	FL
	Eglin AFB	130	X			AFMC	FL
	Eglin AFB	138		X		AFMC	FL
	Eglin AFB	440		X		AFMC	FL
	Eglin AFB	441		X		AFMC	FL
	Eglin AFB	985	X			AFMC	FL
	Eglin AFB	1318	X			AFMC	FL
	Eglin AFB	1332	X			AFMC	FL
	Eglin AFB	1344	X			AFMC	FL
	Eglin AFB	1386		X		AFMC	FL
	Eglin AFB	1412		X		AFMC	FL
	Eglin AFB	1417	X			AFMC	FL
	Eglin AFB	3020	X			AFMC	FL
	Eglin AFB	3029	X			AFMC	FL
	Eglin AFB	3057		X		AFMC	FL
	Eglin AFB	3087		X		AFMC	FL
	Eglin AFB	3150		X		AFMC	FL
	Eglin AFB	110			X	AFMC	FL
18	Hill AFB	25		X		AFMC	UT
	Hill AFB	37		X		AFMC	UT
	Hill AFB	40		X		AFMC	UT
	Hill AFB	42		X		AFMC	UT
	Hill AFB	43		X		AFMC	UT
	Hill AFB	45		X		AFMC	UT

Yellow-ADD Red-DELETE Green-UPDATE			List of AF Hangars for Evaluation on Active Duty Bases				
	Base/Site	Hangar Bldg #	High Expansion Foam	AFFF	Deluge	MAJCOM	STATE/ COUNTRY
	Hill AFB	48		X		AFMC	UT
	Hill AFB	204	X			AFMC	UT
	Hill AFB	206	X			AFMC	UT
	Hill AFB	220		X		AFMC	UT
	Hill AFB	222	X			AFMC	UT
	Hill AFB	227		X		AFMC	UT
	Hill AFB	228		X		AFMC	UT
	Hill AFB	236		X		AFMC	UT
	Hill AFB	237	X			AFMC	UT
	Hill AFB	269	X			AFMC	UT
	Hill AFB	270		X		AFMC	UT
	Hill AFB	275			X	AFMC	UT
	Hill AFB	5187	X			AFMC	UT
	Hill AFB	5196			X	AFMC	UT
	Hill AFB	674	X			AFMC	UT
19	Hanscom	1715	x		X	AFMC	MA
20	Kirtland AFB	481	X			AFMC	NM
	Kirtland AFB	985	X			AFMC	NM
	Kirtland AFB	986	X			AFMC	NM
	Kirtland AFB	1037		X		AFMC	NM
	Kirtland AFB	1069		X		AFMC	NM
	Kirtland AFB	1000			X	AFMC	NM
	Kirtland AFB	1001			X	AFMC	NM
	Kirtland AFB	1002			X	AFMC	NM
	Kirtland AFB	760			X	AFMC	NM
21	Robins AFB					AFMC	GA
	Robins AFB	47			X	AFMC	GA
	Robins AFB	48			X	AFMC	GA
	Robins AFB	49			X	AFMC	GA
	Robins AFB	50		X		AFMC	GA
	Robins AFB	54		X		AFMC	GA
	Robins AFB	59			X	AFMC	GA
	Robins AFB	89		X		AFMC	GA
	Robins AFB	110				AFMC	GA
	Robins AFB	125				AFMC	GA
	Robins AFB	131		X		AFMC	GA
	Robins AFB	137			X	AFMC	GA
	Robins AFB	2026		X		AFMC	GA
	Robins AFB	2030		X		AFMC	GA
	Robins AFB	2036		X		AFMC	GA
	Robins AFB	2071		X		AFMC	GA
	Robins AFB	2316		X		AFMC	GA
	Robins AFB	2328		X		AFMC	GA
22	Tinker AFB	230 Dock 1		X		AFMC	OK
	Tinker AFB	230 Dock 2	X			AFMC	OK
	Tinker AFB	230 Dock 3		X		AFMC	OK
	Tinker AFB	230 Dock 4	X			AFMC	OK
	Tinker AFB	289		X		AFMC	OK
	Tinker AFB	820		X		AFMC	OK
	Tinker AFB	976		X		AFMC	OK
	Tinker AFB	1053	X			AFMC	OK
	Tinker AFB	1082		X		AFMC	OK
	Tinker AFB	2136		X		AFMC	OK
	Tinker AFB	2280		X		AFMC	OK
	Tinker AFB	3102 Center Dock		X		AFMC	OK
	Tinker AFB	3102 S Dock		X		AFMC	OK
	Tinker AFB	3105		X		AFMC	OK
23	Edwards AFB	151		X		AFMC	CA
	Edwards AFB	160		X		AFMC	CA
	Edwards AFB	1030			x	AFMC	CA
	Edwards AFB	1207	X			AFMC	CA
	Edwards AFB	1210	X			AFMC	CA
	Edwards AFB	1414			x	AFMC	CA
	Edwards AFB	1600a-delete		x			
	Edwards AFB	1600		X		AFMC	CA
	Edwards AFB	1608		X		AFMC	CA
	Edwards AFB	1623			X	AFMC	CA
	Edwards AFB	1624		X		AFMC	CA
	Edwards AFB	1630	X			AFMC	CA
	Edwards AFB	1634			X	AFMC	CA
	Edwards AFB	1635			X	AFMC	CA
	Edwards AFB	1810	X			AFMC	CA

Yellow-ADD Red-DELETE Green-UPDATE			List of AF Hangars for Evaluation on Active Duty Bases				
	Base/Site	Hangar Bldg #	High Expansion Foam	AFFF	Deluge	MAJCOM	STATE/ COUNTRY
	Edwards AFB	1820	X			AFMC	CA
	Edwards AFB	1830			X	AFMC	CA
	Edwards AFB	1864			X	AFMC	CA
	Edwards AFB	1870		X		AFMC	CA
	Edwards AFB	1874		X		AFMC	CA
	Edwards AFB	1881		X		AFMC	CA
	Edwards AFB	4305	X			AFMC	CA
	Edwards AFB	4505			X	AFMC	CA
	Edwards (NASA)	4801-Delete		X		AFMC	CA
	Edwards (NASA)	4802-Delete		X		AFMC	CA
	Edwards (NASA)	4820-Delete		X		AFMC	CA
	Edwards (NASA)	4840-Delete		X		AFMC	CA
	Edwards (NASA)	4826-Delete		X		AFMC	CA
	Edwards (NASA)	4833-Delete			X	AFMC	CA
24	Wright-Pat	34007	X			AFMC	OH
	Wright-Pat	34015	X			AFMC	OH
	Wright-Pat	34016	X			AFMC	OH
	Wright-Pat	34020		X		AFMC	OH
	Wright-Pat	30206S	X			AFMC	OH
	Wright-Pat	30206N	X			AFMC	OH
	Wright-Pat	30268		X		AFMC	OH
	Wright-Pat	30148		X		AFMC	OH
25	Cannon	109		X		AFSOC	NM
	Cannon	119		X		AFSOC	NM
	Cannon	125		X		AFSOC	NM
	Cannon	126		X		AFSOC	NM
	Cannon	133		X		AFSOC	NM
	Cannon	173	X			AFSOC	NM
	Cannon	174	X			AFSOC	NM
	Cannon	194	X			AFSOC	NM
	Cannon	195	X			AFSOC	NM
	Cannon	196	X			AFSOC	NM
	Cannon	197		X		AFSOC	NM
	Cannon	199	X			AFSOC	NM
	Cannon	204		X		AFSOC	NM
	Cannon	208	X			AFSOC	NM
	Cannon	4605	X			AFSOC	NM
	Cannon	4606	X			AFSOC	NM
	Cannon	4607	X			AFSOC	NM
	Cannon	4609	X			AFSOC	NM
26	Hurlburt Field	90029		X		AFSOC	FL
	Hurlburt Field	90032	X			AFSOC	FL
	Hurlburt Field	90225		X		AFSOC	FL
	Hurlburt Field	90700	X			AFSOC	FL
	Hurlburt Field	90800	X			AFSOC	FL
	Hurlburt Field	90810		X		AFSOC	FL
	Hurlburt Field	90815	X			AFSOC	FL
	Hurlburt Field	90816		X		AFSOC	FL
	Hurlburt Field	90825	X			AFSOC	FL
	Hurlburt Field	91262	X			AFSOC	FL
	Hurlburt Field	91266	X			AFSOC	FL
	Hurlburt Field	90580		X		AFSOC	FL
27	Patrick	630		X		AFSPC	FL
	Patrick	647		X		AFSPC	FL
	Patrick	750	X			AFSPC	FL
	Patrick	751		X		AFSPC	FL
	Patrick	985		X		AFSPC	FL
	Patrick	986		X		AFSPC	FL
28	Peterson	133		X		AFSPC	CO
	Peterson	122		X		AFSPC	CO
	Peterson	140	x			AFSPC	CO
	Peterson	121		X		AFSPC	CO
	Peterson	214		X		AFSPC	CO
	Peterson	210		X		AFSPC	CO
29	Thule AB	HG.7/Bldg 623		X		AFSPC	Greenland
	Thule AB	HG.8/Bldg 624		X		AFSPC	Greenland
30	JB Charleston	519		X		AMC	SC
	JB Charleston	578		X		AMC	SC
	JB Charleston	700	X			AMC	SC
	JB Charleston	63		X		AMC	SC
	JB Charleston	532	X			AMC	SC

Yellow-ADD Red-DELETE Green-UPDATE	Base/Site	Hangar Bldg #	List of AF Hangars for Evaluation on Active Duty Bases				
			High Expansion Foam	AFFF	Deluge	MAJCOM	STATE/ COUNTRY
	JB Charleston	570	X			AMC	SC
	JB Charleston	515	X			AMC	SC
31	Dover AFB	706	X			AMC	DE
	Dover AFB	711			X	AMC	DE
	Dover AFB	714		X		AMC	DE
	Dover AFB	715		X		AMC	DE
	Dover AFB	945	X			AMC	DE
32	Fairchild AFB	1019	X			AMC	WA
	Fairchild AFB	1029	X			AMC	WA
	Fairchild AFB	1037	X			AMC	WA
	Fairchild AFB	1033	X			AMC	WA
	Fairchild AFB	1012	X			AMC	WA
33	Grand Forks AFB	601		X		AMC	ND
	Grand Forks AFB	603		XX		AMC	ND
	Grand Forks AFB	605		X		AMC	ND
	Grand Forks AFB	649 Bay 1		X		AMC	ND
	Grand Forks AFB	649 Bay 2		X		AMC	ND
	Grand Forks AFB	649 Bay 3		X		AMC	ND
34	Little Rock AFB	207	X			AMC	AR
	Little Rock AFB	233	X			AMC	AR
	Little Rock AFB	222 North		X		AMC	AR
	Little Rock AFB	222 South		X		AMC	AR
	Little Rock AFB	228	X			AMC	AR
	Little Rock AFB	245	X			AMC	AR
	Little Rock AFB	250	X			AMC	AR
	Little Rock AFB	255 North		X		AMC	AR
	Little Rock AFB	255 South		X		AMC	AR
	Little Rock AFB	276	X			AMC	AR
	Little Rock AFB	280		X		AMC	AR
	Little Rock AFB	282	X			AMC	AR
35	MacDill AFB	1071	X			AMC	FL
36	McConnell AFB	10		X		AMC	KA
	McConnell AFB	1106	X			AMC	KA
	McConnell AFB	1107		X		AMC	KA
	McConnell AFB	1166		X		AMC	KA
	McConnell AFB	1176		X		AMC	KA
37	JB-MDL	4401 DIX		X		AMC	NJ
	JB-MDL	3333		X		AMC	NJ
	JB-MDL	3370		X		AMC	NJ
	JB-MDL	3209			X	AMC	NJ
	JB-MDL	307 LKH			X	AMC	NJ
	JB-MDL	3336		X		AMC	NJ
	JB-MDL	3211	X			AMC	NJ
	JB-MDL	2201	X			AMC	NJ
	JB-MDL	1823	X			AMC	NJ
	JB-MDL	1837	X			AMC	NJ
38	Scott AFB	433	X			AMC	IL
	Scott AFB	506	X			AMC	IL
	Scott AFB	742	X			AMC	IL
	Scott AFB	5024		X		AMC	IL
	Scott AFB	5026			X	AMC	IL
39	Travis AFB	14		X		AMC	CA
	Travis AFB	808	X			AMC	CA
	Travis AFB	809	X			AMC	CA
	Travis AFB	810			X	AMC	CA
	Travis AFB	811		X		AMC	CA
	Travis AFB	818	X			AMC	CA
	Travis AFB	837	X			AMC	CA
40	Eielson AFB	1335		X		PACAF	AK
	Eielson AFB	1338		X		PACAF	AK
	Eielson AFB	1340		X		PACAF	AK
	Eielson AFB	1344		X		PACAF	AK
	Eielson AFB	1346-Delete			X	PACAF	AK
	Eielson AFB	1348		X		PACAF	AK
	Eielson AFB	1232-Delete		X		PACAF	A
	Eielson AFB	1227		X		PACAF	AK
	Eielson AFB	1176	X			PACAF	AK
	Eielson AFB	1171		X		PACAF	AK
	Eielson AFB	1140		X		PACAF	AK
	Eielson AFB	1300	X			PACAF	AK

Yellow-ADD Red-DELETE Green-UPDATE	Base/Site	Hangar Bldg #	List of AF Hangars for Evaluation on Active Duty Bases				
			High Expansion Foam	AFFF	Deluge	MAJCOM	STATE/ COUNTRY
41	JBER - Elmendorf	1 - 11551	X			PACAF	AK
	JBER - Elmendorf	6 - 9311		X		PACAF	AK
	JBER - Elmendorf	8 - 14410		X		PACAF	AK
	JBER - Elmendorf	10 - 15455		X		PACAF	AK
	JBER - Elmendorf	11 - 16430	X			PACAF	AK
	JBER - Elmendorf	12 - 16456	X			PACAF	AK
	JBER - Elmendorf	15 -16716	X			PACAF	AK
	JBER - Elmendorf	16 - 15668		X		PACAF	AK
	JBER - Elmendorf	17 - 16670		X		PACAF	AK
	JBER - Elmendorf	18 - 17470		X		PACAF	AK
	JBER - Elmendorf	19 - 8681	X			PACAF	AK
	JBER - Elmendorf	20 - 17534	X			PACAF	AK
	JBER - Elmendorf	21 - 17508	X			PACAF	AK
	JBER - Elmendorf	23 - 17660	X			PACAF	AK
	JBER - Elmendorf	24 - 9684	X			PACAF	AK
	JBER - Elmendorf	25 - 9694	X			PACAF	AK
	JBER - Elmendorf	869	X			PACAF	AK
	JBER - Elmendorf	26 - 10682	X			PACAF	AK
	JBER - Elmendorf	9696	X			PACAF	AK
	JBER - Elmendorf	6263		X		PACAF	AK
	JBER - Elmendorf	47433			X	PACAF	AK
	JBER - Elmendorf	47431			X	PACAF	AK
	JBER - Elmendorf	47427			X	PACAF	AK
42	Kadena AB	3559	X			PACAF	Japan
	Kadena AB	3667			X	PACAF	Japan
	Kadena AB	3672			X	PACAF	Japan
	Kadena AB	1 -781		X		PACAF	Japan
	Kadena AB	2 -780		X		PACAF	Japan
	Kadena AB	3 -762			X	PACAF	Japan
	Kadena AB	3448	X			PACAF	Japan
	Kadena AB	3534		X		PACAF	Japan
	Kadena AB	3542			X	PACAF	Japan
	Kadena AB	3560	X			PACAF	Japan
	Kadena AB	3660		X		PACAF	Japan
	Kadena AB	3671			X	PACAF	Japan
	Kadena AB	3339		X		PACAF	Japan
	Kadena AB	3541			X	PACAF	Japan
	Kadena AB	3548		X		PACAF	Japan
70	Kunsan AB	2257		X		PACAF	Korea
	Kunsan AB	2820		X		PACAF	Korea
	Kunsan AB	2827		X		PACAF	Korea
43	Misawa AB	909		X		PACAF	Japan
	Misawa AB	911		X		PACAF	Japan
	Misawa AB	949			X	PACAF	Japan
	Misawa AB	963	x	X		PACAF	Japan
	Misawa AB	970		X		PACAF	Japan
	Misawa AB	971		X		PACAF	Japan
	Misawa AB	1208	x	X		PACAF	Japan
	Misawa AB	3005		X		PACAF	Japan
	Misawa AB	3008		X		PACAF	Japan
	Misawa AB	3012		X		PACAF	Japan
	Misawa AB	3015		X		PACAF	Japan
	Misawa AB	3020		X		PACAF	Japan
	Misawa AB	3021		X		PACAF	Japan
	Misawa AB	3025		X		PACAF	Japan
	Misawa AB	3102		X		PACAF	Japan
	Misawa AB	3130			X	PACAF	Japan
	Misawa AB	3140		X		PACAF	Japan
	Misawa AB	3141		X		PACAF	Japan
	Misawa AB	3216		X		PACAF	Japan
	Misawa AB	3217		X		PACAF	Japan
	Misawa AB	3220		X		PACAF	Japan
	Misawa AB	3226		X		PACAF	Japan
	Misawa AB	3280	x	X		PACAF	Japan
	Misawa AB	3294		X		PACAF	Japan

Yellow-ADD Red-DELETE Green-UPDATE			List of AF Hangars for Evaluation on Active Duty Bases				
	Base/Site	**Hangar Bldg #**	**High Expansion Foam**	**AFFF**	**Deluge**	**MAJCOM**	**STATE/ COUNTRY**
	Misawa AB	3295		X		PACAF	Japan
	Misawa AB	3307		X		PACAF	Japan
	Misawa AB	3313		X		PACAF	Japan
44	Osan AB	849		X		PACAF	Korea
	Osan AB	851		X		PACAF	Korea
	Osan AB	1104		X		PACAF	Korea
	Osan AB	1173		X		PACAF	Korea
	Osan AB	1215		X	x	PACAF	Korea
	Osan AB	1731		X		PACAF	Korea
	Osan AB	1732		X		PACAF	Korea
	Osan AB	1782		X		PACAF	Korea
	Osan AB	1783		X		PACAF	Korea
	Osan AB	1784		X		PACAF	Korea
	Osan AB	1785		X		PACAF	Korea
	Osan AB	1786		X		PACAF	Korea
	Osan AB	1787		X		PACAF	Korea
45	Yokota AB	1	X			PACAF	Japan
	Yokota AB	702		X		PACAF	Japan
	Yokota AB	906		X		PACAF	Japan
	Yokota AB	1503		X		PACAF	Japan
	Yokota AB	1587	X			PACAF	Japan
46	Aviano AB	933	X			USAFE	Italy
	Aviano AB	925	X			USAFE	Italy
	Aviano AB	921	X			USAFE	Italy
47	Incirlik AB	345		X		USAFE	Turkey
	Incirlik AB	116	X			USAFE	Turkey
	Incirlik AB	2115	X			USAFE	Turkey
48	RAF Fairford	1205		X		USAFE	United Kingdom
	RAF Fairford	1217		X		USAFE	United Kingdom
49	RAF Lakenheath	1219		X		USAFE	United Kingdom
	RAF Lakenheath	1220		X		USAFE	United Kingdom
	RAF Lakenheath	1229		X		USAFE	United Kingdom
	RAF Lakenheath	1212	X			USAFE	United Kingdom
	RAF Lakenheath	1304	X			USAFE	United Kingdom
	RAF Lakenheath	1473	X			USAFE	United Kingdom
	RAF Lakenheath	1470	X			USAFE	United Kingdom
	RAF Lakenheath	1260	X			USAFE	United Kingdom
50	RAF Mildenhall	539		X		USAFE	United Kingdom
	RAF Mildenhall	711		X		USAFE	United Kingdom
	RAF Mildenhall	715		X		USAFE	United Kingdom
	RAF Mildenhall	769		X		USAFE	United Kingdom
	RAF Mildenhall	772		X		USAFE	United Kingdom
	RAF Mildenhall	775	X			USAFE	United Kingdom
	RAF Mildenhall	803		X		USAFE	United Kingdom
	RAF Mildenhall	814	X			USAFE	United Kingdom
51	Ramstein AB	2018	X			USAFE	Germany
	Ramstein AB	2210	X			USAFE	Germany
	Ramstein AB	2331		X		USAFE	Germany
	Ramstein AB	2512		X		USAFE	Germany
	Ramstein AB	2291E	X			USAFE	Germany
	Ramstein AB	2291F	X			USAFE	Germany
	Ramstein AB	2310A	X			USAFE	Germany
	Ramstein AB	2311A	X			USAFE	Germany
	Ramstein AB	2311C	X			USAFE	Germany
	Ramstein AB	2509A		X		USAFE	Germany
	Ramstein AB	2509B		X		USAFE	Germany
	Ramstein AB	3330E	X			USAFE	Germany
52	Spangdahlem AB	157		X		USAFE	Germany
	Spangdahlem AB	364		X		USAFE	Germany
53	Beale AFB	1042		X		ACC	CA
	Beale AFB	1043		X		ACC	CA
	Beale AFB	1044	X			ACC	CA
	Beale AFB	1045	X			ACC	CA
	Beale AFB	1067	X			ACC	CA

Yellow-ADD Red-DELETE Green-UPDATE			List of AF Hangars for Evaluation on Active Duty Bases				
	Base/Site	Hangar Bldg #	High Expansion Foam	AFFF	Deluge	MAJCOM	STATE/ COUNTRY
	Beale AFB	1068	X			ACC	CA
	Beale AFB	1069	X			ACC	CA
	Beale AFB	1074	X			ACC	CA
	Beale AFB	1075	X			ACC	CA
	Beale AFB	1077	X			ACC	CA
	Beale AFB	11200	X			ACC	CA
54	Davis-Mothan	128		X		ACC	AZ
	Davis-Mothan	129	X			ACC	AZ
	Davis-Mothan	136	X			ACC	AZ
	Davis-Mothan	269	X			ACC	AZ
	Davis-Mothan	1440	X			ACC	AZ
	Davis-Mothan	1447			X	ACC	AZ
	Davis-Mothan	1550	X			ACC	AZ
	Davis-Mothan	1750	X			ACC	AZ
	Davis-Mothan	4844	X			ACC	AZ
	Davis-Mothan	5255 Bay 1	X			ACC	AZ
	Davis-Mothan	5255 Bay 2		X		ACC	AZ
	Davis-Mothan	5256	X			ACC	AZ
	Davis-Mothan	5430	X			ACC	AZ
	Davis-Mothan	7506		X		ACC	AZ
55	Dyess AFB	5112		X		ACC	TX
	Dyess AFB	5110		X		ACC	TX
	Dyess AFB	5105		X		ACC	TX
	Dyess AFB	5020		X		ACC	TX
	Dyess AFB	4314	X			ACC	TX
	Dyess AFB	4315		X		ACC	TX
	Dyess AFB	4312		X		ACC	TX
	Dyess AFB	4317-Delete		X		ACC	TX
	Dyess AFB	4225		X		ACC	TX
	Dyess AFB	4230	X			ACC	TX
56	Ellsworth AFB	7230	X			ACC	SD
	Ellsworth AFB	7232	X			ACC	SD
	Ellsworth AFB	7234	X			ACC	SD
	Ellsworth AFB	7236	X			ACC	SD
	Ellsworth AFB	7242	X			ACC	SD
	Ellsworth AFB	7246	X			ACC	SD
	Ellsworth AFB	7248	X			ACC	SD
	Ellsworth AFB	7250	X			ACC	SD
	Ellsworth AFB	7252	X			ACC	SD
	Ellsworth AFB	7254	X			ACC	SD
	Ellsworth AFB	618	X			ACC	SD
57	Holloman AFB	285		X		ACC	NM
	Holloman AFB	286		X		ACC	NM
	Holloman AFB	301	X			ACC	NM
	Holloman AFB	500	X			ACC	NM
	Holloman AFB	564	X			ACC	NM
	Holloman AFB	578	X			ACC	NM
	Holloman AFB	868		X		ACC	NM
	Holloman AFB	898	X			ACC	NM
	Holloman AFB	1020		X		ACC	NM
	Holloman AFB	11285		X		ACC	NM
	Holloman AFB	21295		X		ACC	NM
	Holloman AFB	21296		X		ACC	NM
	Holloman AFB	21297		X		ACC	NM
	Holloman AFB	21808		X		ACC	NM
	Holloman AFB	21810		X		ACC	NM
	Holloman AFB	21811		X		ACC	NM
	Holloman AFB	21812		X		ACC	NM
	Holloman AFB	21813		X		ACC	NM
	Holloman AFB	21814		X		ACC	NM
	Holloman AFB	21815		X		ACC	NM
	Holloman AFB	21816		X		ACC	NM
	Holloman AFB	21817		X		ACC	NM
	Holloman AFB	21818		X		ACC	NM
	Holloman AFB	21819		X		ACC	NM
58	JBLE - Ft Eustis	2402			X	ACC	VA
	JBLE - Ft Eustis	2406			X	ACC	VA
	JBLE - Ft Eustis	2413			X	ACC	VA
	JBLE - Ft Eustis	2448		X		ACC	VA
59	JBLE - Langley	338		X		ACC	VA
	JBLE - Langley	342		X		ACC	VA
	JBLE - Langley	361	X			ACC	VA

Yellow-ADD Red-DELETE Green-UPDATE	Base/Site	Hangar Bldg #	**List of AF Hangars for Evaluation on Active Duty Bases**				
			High Expansion Foam	**AFFF**	**Deluge**	**MAJCOM**	**STATE/ COUNTRY**
	JBLE - Langley	369	X			ACC	VA
	JBLE - Langley	371			X	ACC	VA
	JBLE - Langley	373		X		ACC	VA
	JBLE - Langley	374		X		ACC	VA
	JBLE - Langley	750	X			ACC	VA
	JBLE - Langley	751	X			ACC	VA
	JBLE - Langley	752			X	ACC	VA
	JBLE - Langley	753		X		ACC	VA
	JBLE - Langley	789	X			ACC	VA
	JBLE - Langley	790	X			ACC	VA
	JBLE - Langley	791	X			ACC	VA
	JBLE - Langley	1362		X		ACC	VA
60	Moody AFB	609	X			ACC	GA
	Moody AFB	642	X			ACC	GA
	Moody AFB	644		X		ACC	GA
	Moody AFB	646	X			ACC	GA
	Moody AFB	658		X		ACC	GA
	Moody AFB	701		X		ACC	GA
	Moody AFB	718	X			ACC	GA
	Moody AFB	730	X			ACC	GA
	Moody AFB	744	X			ACC	GA
	Moody AFB	774		X		ACC	GA
	Moody AFB	775		X		ACC	GA
	Moody AFB	788		X		ACC	GA
61	Mtn Home AFB	198		X		ACC	ID
	Mtn Home AFB	200		X		ACC	ID
	Mtn Home AFB	205	X			ACC	ID
	Mtn Home AFB	211	X			ACC	ID
	Mtn Home AFB	1330		X		ACC	ID
	Mtn Home AFB	1332		X		ACC	ID
62	Nellis/Creech	190	X			ACC	AZ
	Nellis/Creech	199		X		ACC	AZ
	Nellis/Creech	220	X			ACC	AZ
	Nellis/Creech	232	X			ACC	AZ
	Nellis/Creech	244	X			ACC	AZ
	Nellis/Creech	252	X			ACC	AZ
	Nellis/Creech	256	X	X		ACC	AZ
	Nellis/Creech	283	X			ACC	AZ
	Nellis/Creech	285		X		ACC	AZ
	Nellis/Creech	297	X			ACC	AZ
	Nellis/Creech	2211		X		ACC	AZ
	Nellis/Creech	61664		X		ACC	AZ
	Nellis/Creech	259	X			ACC	AZ
	Nellis/Creech	CREECH 120	X			ACC	AZ
	Nellis/Creech	CREECH 707		X		ACC	AZ
	Nellis/Creech	CRREECH 719	X			ACC	AZ
	Nellis/Creech	CREECH 718		X		ACC	AZ
	Nellis/Creech	CREECH 791	X			ACC	AZ
	Nellis/Creech	CREECH 792	X			ACC	AZ
	Nellis/Creech	CREECH 1000	X			ACC	AZ
	Nellis/Creech	CREECH 1003	X			ACC	AZ
	Nellis/Creech	CREECH 1009	X			ACC	AZ
	Nellis/Creech	CREECH 1130	X			ACC	AZ
63	Offutt AFB	306-1			X	ACC	NE
	Offutt AFB	306-2			X	ACC	NE
	Offutt AFB	306-3			X	ACC	NE
	Offutt AFB	307-3			X	ACC	NE
	Offutt AFB	491		X		ACC	NE
	Offutt AFB	492		X		ACC	NE
	Offutt AFB	493		X		ACC	NE
	Offutt AFB	457		X		ACC	NE
	Offutt AFB	565	X			ACC	NE
64	Seymour- Johnson AFB	4909	X			ACC	NC
	Seymour- Johnson AFB	4822	X			ACC	NC
	Seymour- Johnson AFB	4828		X		ACC	NC
	Seymour- Johnson AFB	4735		X		ACC	NC
	Seymour- Johnson AFB	4538		X		ACC	NC
	Seymour- Johnson AFB	4537		X		ACC	NC
	Seymour- Johnson AFB	4535		X		ACC	NC

Yellow-ADD Red-DELETE Green-UPDATE			**List of AF Hangars for Evaluation on Active Duty Bases**				
	Base/Site	**Hangar Bldg #**	**High Expansion Foam**	**AFFF**	**Deluge**	**MAJCOM**	**STATE/ COUNTRY**
	Seymour- Johnson AFB	4522	X	X		ACC	NC
65	Shaw AFB	1511	X			ACC	SC
	Shaw AFB	712	X			ACC	SC
	Shaw AFB	1200	X			ACC	SC
	Shaw AFB	1614	X			ACC	SC
66	Tyndall AFB	295		X		ACC	FL
	Tyndall AFB	280		X		ACC	FL
	Tyndall AFB	290		X		ACC	FL
	Tyndall AFB	316		X		ACC	FL
	Tyndall AFB	335	X			ACC	FL
	Tyndall AFB	180	X			ACC	FL
	Tyndall AFB	182	X			ACC	FL
	Tyndall AFB	156			X	ACC	FL
	Tyndall AFB	227			X	ACC	FL
	Tyndall AFB	315			X	ACC	FL
67	Eareckson AFB	754		X	X	PACAF	AK
	Eareckson AFB	755		X	X	PACAF	AK
68	King Salmon AFB	160		X		PACAF	AK
69	Curacao	900		X		ACC	Curacao Netherlands Antilles

APPENDIX C

RECORDS OF COMMUNICATION

FE Warren AFB AFFF Preliminary Assessment Meeting
August 26, 2105 10am to noon
Sign In Sheet

Meeting Attendee	Organization	Job Title	How Long in Current Position?	How Long at this Base in Current and Previous Positions?	Have you held similar positions at other bases? Which Bases?	How Long?
Name Floydzell Kimble	90 CES CEF	AC Special Ops	6 mnths	2years	yes 10 Jr's AFB	2years
Name JAMIN WRIGHT Pl Ei	90/CES/CEIE	WATER mgr	6MONTHS	4½ YRS	NO	NO
Name Tom WATSON	90MXG/MXQ	UEC		8 YES	No	No
Name Andy McKinley	90CES/CEIE	Environmental chief	4 years	7 Years	NO	—
Name Adam Galicia	90MXG/MXAH	QCI	9 YRS	28YRS	no	—
Name Chris ShAfeR	90LRS TSL	Fuel Tech	17yRS	17yRS	NO	—
Name LOU Latendresse Email	90CES/ CEF	Fire Inspector	10	38 yrs		

FE Warren AFB AFFF Preliminary Assessment Meeting
August 26, 2105 10am to noon
Sign In Sheet

Meeting Attendee	Organization	Job Title	How Long in Current Position?	How Long at this Base in Current and Previous Positions?	Have you held similar positions at other bases? Which Bases?	How Long?
Name Ronnie Riedel Email	90 CES/ CEF	H+S Officer	2003-PRESENT	1988	N	
Name Phone Email						
Name Phone Email						
Name Phone Email						
Name Phone Email						

Subject: Meeting Minutes for Preliminary Assessment Kickoff Meeting at F.E. Warren Air Force Base

Date: August 26, 2015

Time: 10:00 a.m. to 11:00 a.m.

Attendees: See attached sign in sheet

Fire Station 1 – Building 324, Built in 1909

> Serves as current station. Was a fire station in 1979 (Watson). All trucks refilled using 5-gallon buckets. No AFFF tanks. Trucks washed at the Base car wash (Kimble). No refilling done here and no foam tanks in this building because refilling is done at Building 1250. AFFF is not currently used for testing (Kimble). No time/distance required b/c no crash trucks (Kimble).
>
> Engine 8 and 4 are kept here. Each hold 20 gallons of AFFF.
>
> Trucks are pump tested but not foam tested (Kimble).
>
> Drains to OWS and then sanitary sewer (Wright).

Fire Station 2 – Building 1250, Built in 1941

> Likely started operations in the 1960s when helicopters were used (Wright). Served as overflow because Station 1 is too small.
>
> Drains in this building flow to OWS and then to sanitary sewer (Watson).
>
> Store 5-gallon buckets here for truck refilling (Kimble).
>
> Engine 5, RIV 1 and RIV 2 located here. Engine 5 and RIV 1 carries 60 gallons; RIV 2 carries 71 gallons. Trucks are pump tested but not foam tested (Kimble).

Former Fire Station – Building 1501, Built in 1987

> This station was built to support the peacekeeper missile operations and was a small two-bay station (Riedel). Limited knowledge about this station, but Watson thinks it may have been in use until 1998. No storage of AFFF at the station. Two trucks were used here, and foam was never shot from vehicles (Riedel).

Former FPTA 3

> Opened in 1990 and was operated until approximately 2000. Used JP-8 fuel. Aircraft carcass present. Retention pond was present and lined. Shut down because one of the poly-liners beneath the pit was found to be leaking. Not known to have caused contamination because leak did not extend beyond second liner (Riedel). The actual training area was decommissioned in 2007 (Riedel). Training pit most often used for structural training (Kimble). In last several years, used more for structural training with no foam used (Kimble).

Drainage would have gone to Diamond Creek (Wright).

New FTA is being built at this location and will be propane (Kimble).

Former FPTA 1

IRP site. No one was aware of operational history or location of this FPTA.

Former FPTA 2

IRP site. Used until 1989. A depression served as a training pit but not sure if a liner existed (Latendresse). AFFF may have been used here per Mr. Latendresse. No retention pond was present (Riedel).

Building 930 – Hazardous Waste

Some AFFF was disposed of here. On January 13, 2005, records show that four 55-gallon drums were disposed of by the fire department. No leaks or spills have occurred (Joe Travinio [haz waste technician]).

Building 1285 – Hazmart, built in 1995

Observed thirty-nine 55-gallon drums stored here during on site visit. No leaks/spills known to have occurred (McKinley). Temporary berm but no drains. Cleaned up by contractor if spilled (Wright).

Building 1240 –Truck Maintenance, built in 1995

Formerly had an AFFF system that was replaced with water only in 2012. No known leaks or spills (Watson). Served by a poly-lined containment pit located b/n Buildings 1240 and 1247 (McKinley). Liner was replaced approximately 2 years ago. When pit fills with water, it is pumped out to grass but this has only been done when pond is full of rainwater (Watson).

Building 1250 –

Only has an HEF system that was installed in 2008 or 2009, never had AFFF (McKinley, Watson). Had roll-around fire extinguisher systems prior to HEF system (Watson). Drains go to OWS to sanitary sewer (Wright).

Building 1247 – Base Fuel Building, built in 1995

Has an active AFFF system with overhead lines. Size of AFFF tank is unknown, but staff estimate it to be 200 to 300 gallons. A diversion valve is located inside the building that can divert floor drains from OWS to the retention pond (Wright). Bypass to go to storm (Wright).

There was a leak in the bay when a pipe froze/broke. All discharge was contained inside the hangar (Shafer). Drains flow to OWS then sanitary sewer (Wright). Served by a poly-lined containment pit located b/n Buildings 1240 and 1247. Liner was replaced approximately 2 years ago. Pit never known to be used to contain AFFF. When pit fills with water, it is pumped out to grass, but this has only been done when pond is full of rainwater (McKinley).

AFFF tank estimated at 200 to 300 gallons (Shafer)

Building 7600 –

Has HEF system but is not under Air Force control b/c it is on Army property.

Drinking water – comes from Cheyenne Public Utilities, and all sources are located well upgradient of F.E. Warren watershed.

Used to be a residential well in Nob Hill, but it was connected to the city in the 1990s.

No on Base emergency response events.

Jet crash during frontier days in ~1978 but was off Base. Not likely to have used foam (Watson).

Crow Creek diminishes on its way to Pine Bluffs and goes away. Doesn't make it out of state. Recharges groundwater (Wright).

Fax To: AECOM
Contact: Brittany Kirchmann
Fax : 000-000-0000
Date: 01/08/2019

Fax From: Sean McLaughlin
EDR
Phone: 1-800-352-0050

EDR PUR-IQ® Report

"the intelligent way to conduct historical research"

for
Cheyenne AASF
Cheyenne AASF
Fe Warren AFB, WY 82005
Lat./Long. 41.196149 / 104.870486
EDR Inquiry # 5528367.2s

The EDR PUR-IQ report facilitates historical research planning required to complete the Phase I ESA process. The report identifies the *likelihood* of prior use coverage by searching proprietary EDR-Prior Use Reports® comprising nationwide information on: city directories, fire insurance maps, aerial photographs, historical topographic maps, flood maps and National Wetland Inventory maps.

Potential for EDR Historical (Prior Use) Coverage - Coverage in the following historical information sources may be used as a guide to develop your historical research strategy:

1. City Directory:	Coverage may exist for portions of Laramie County, WY.
2. Fire Insurance Map:	When you order online any EDR Package or the EDR Radius Map with EDR Sanborn Map Search/Print, you receive site specific Sanborn Map coverage information at no charge.
3. Aerial Photograph:	Aerial photography coverage may exist for portions of Laramie County. Please contact your EDR Account Executive for information about USGS photos available through EDR.
4. Topographic Map:	The USGS 7.5 min. quad topo sheet(s) associated with this site:

Historical: Coverage exists for LARAMIE County

Current:	Target Property:	TP | 2012 | 5645427 Cheyenne North, WY
	Additional required for 1 Mile radius:	W | 2012 | 5649463 Round Top Lake, WY

EDR's network of professional researchers, located throughout the United States, accesses the most extensive national collections of city directory, fire insurance maps, aerial photographs and historical topographic map resources available for Fe Warren AFB, WY. These collections may be located in multiple libraries throughout the country. To ensure maximum coverage, EDR will often assign researchers at these multiple locations on your behalf. Please call or fax your EDR representative to authorize a search.

EDR™ Environmental
Data Resources Inc

EDR - HISTORICAL SOURCE(S) ORDER FORM

AECOM
Brittany Kirchmann
Account # 1861179

Cheyenne AASF
Cheyenne AASF
Fe Warren AFB, WY 82005
LARAMIE County
Lat./Long. 41.196149 / 104.870486
EDR Inquiry # 5528367.2s

Should you wish to change or add to your order, fax this form to your EDR account executive:

Sean McLaughlin
Ph: 1-800-352-0050 Fax: 1-800-231-6802

Reports

___ EDR Sanborn Map® Search/Print

___ EDR Fire Insurance Map Abstract

___ EDR Multi-Tenant Retail Facility® Report

___ EDR City Directory Abstract

___ EDR Aerial Photo Decade Package

___ USGS Aerial 5 Package

___ USGS Aerial 3 Package

___ EDR Historical Topographic Maps

___ Paper Current USGS Topo (7.5 min.)

___ Environmental Lien Search

___ Chain of Title Search

___ NJ MacRaes Industrial Directory Report

___ EDR Telephone Interview

Shipping:

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___ Express, Next Day Delivery RUSH SERVICE IS AVAILABLE
___ Express, Second Day Delivery
___ Express, Next day Delivery Customer Account Acct # ________________
___ Express, Second Day Delivery Customer Account Acct # ________________
___ U.S. Mail

Thank you

Cheyenne AASF
Cheyenne AASF
Fe Warren AFB, WY 82005

Inquiry Number: 5528367.3
January 08, 2019

Certified Sanborn® Map Report

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

Certified Sanborn® Map Report

01/08/19

Site Name:

Cheyenne AASF
Cheyenne AASF
Fe Warren AFB, WY 82005
EDR Inquiry # 5528367.3

Client Name:

AECOM
12120 Shamrock Plaza
Omaha, NE 68154
Contact: Brittany Kirchmann

The Sanborn Library has been searched by EDR and maps covering the target property location as provided by AECOM were identified for the years listed below. The Sanborn Library is the largest, most complete collection of fire insurance maps. The collection includes maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow, and others. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by the Sanborn Library LLC, the copyright holder for the collection. Results can be authenticated by visiting www.edrnet.com/sanborn.

The Sanborn Library is continually enhanced with newly identified map archives. This report accesses all maps in the collection as of the day this report was generated.

Certified Sanborn Results:

Certification # C981-46C9-974A

PO # NA

Project Cheyenne AASF

UNMAPPED PROPERTY

This report certifies that the complete holdings of the Sanborn Library, LLC collection have been searched based on client supplied target property information, and fire insurance maps covering the target property were not found.

Sanborn® Library search results

Certification #: C981-46C9-974A

The Sanborn Library includes more than 1.2 million fire insurance maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow and others which track historical property usage in approximately 12,000 American cities and towns. Collections searched:

- ☑ Library of Congress
- ☑ University Publications of America
- ☑ EDR Private Collection

The Sanborn Library LLC Since 1866™

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AECOM (the client) is permitted to make up to FIVE photocopies of this Sanborn Map transmittal and each fire insurance map accompanying this report solely for the limited use of its customer. No one other than the client is authorized to make copies. Upon request made directly to an EDR Account Executive, the client may be permitted to make a limited number of additional photocopies. This permission is conditioned upon compliance by the client, its customer and their agents with EDR's copyright policy; a copy of which is available upon request.

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Cheyenne AASF

Cheyenne AASF
Fe Warren AFB, WY 82005

Inquiry Number: 5528367.5
January 08, 2019

The EDR Aerial Photo Decade Package

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

01/08/19

Site Name:	**Client Name:**
Cheyenne AASF	AECOM
Cheyenne AASF	12120 Shamrock Plaza
Fe Warren AFB, WY 82005	Omaha, NE 68154
EDR Inquiry # 5528367.5	Contact: Brittany Kirchmann

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

Search Results:

Year	Scale	Details	Source
2017	1"=500'	Flight Year: 2017	USDA/NAIP
2012	1"=500'	Flight Year: 2012	USDA/NAIP
2009	1"=500'	Flight Year: 2009	USDA/NAIP
2006	1"=500'	Flight Year: 2006	USDA/NAIP
2002	1"=750'	Flight Date: June 24, 2002	USGS
1994	1"=500'	Acquisition Date: June 23, 1994	USGS/DOQQ
1990	1"=1000'	Flight Date: June 17, 1990	USGS
1980	1"=500'	Flight Date: August 21, 1980	USDA
1978	1"=1000'	Flight Date: September 07, 1978	USGS
1947	1"=750'	Flight Date: June 15, 1947	USGS

When delivered electronically by EDR, the aerial photo images included with this report are for ONE TIME USE ONLY. Further reproduction of these aerial photo images is prohibited without permission from EDR. For more information contact your EDR Account Executive.

INQUIRY #: 5528367.5

YEAR: 2017

= 500'

INQUIRY #: 5528367.5

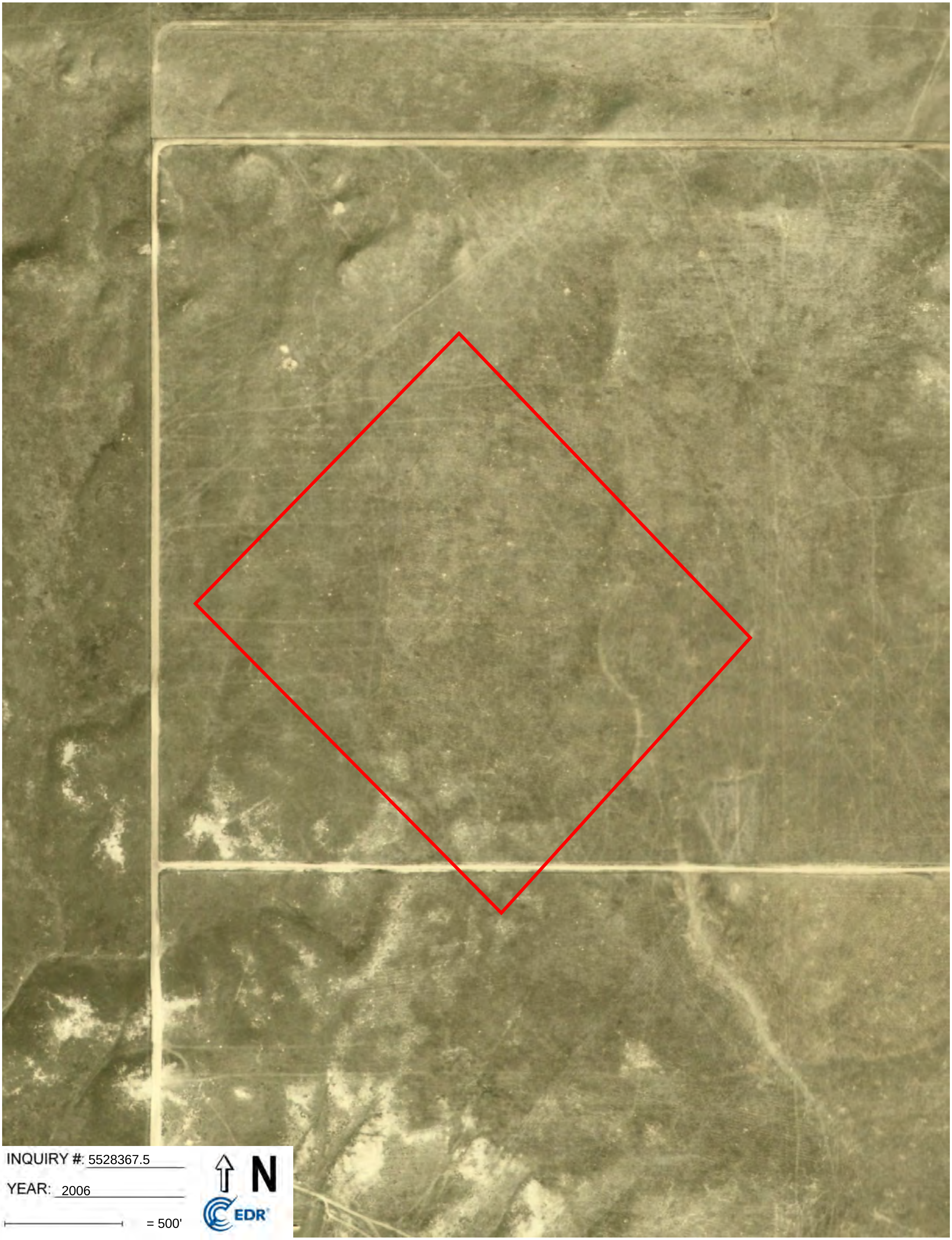
YEAR: 2012

= 500'

INQUIRY #: 5528367.5

YEAR: 2009

= 500'



INQUIRY #: 5528367.5

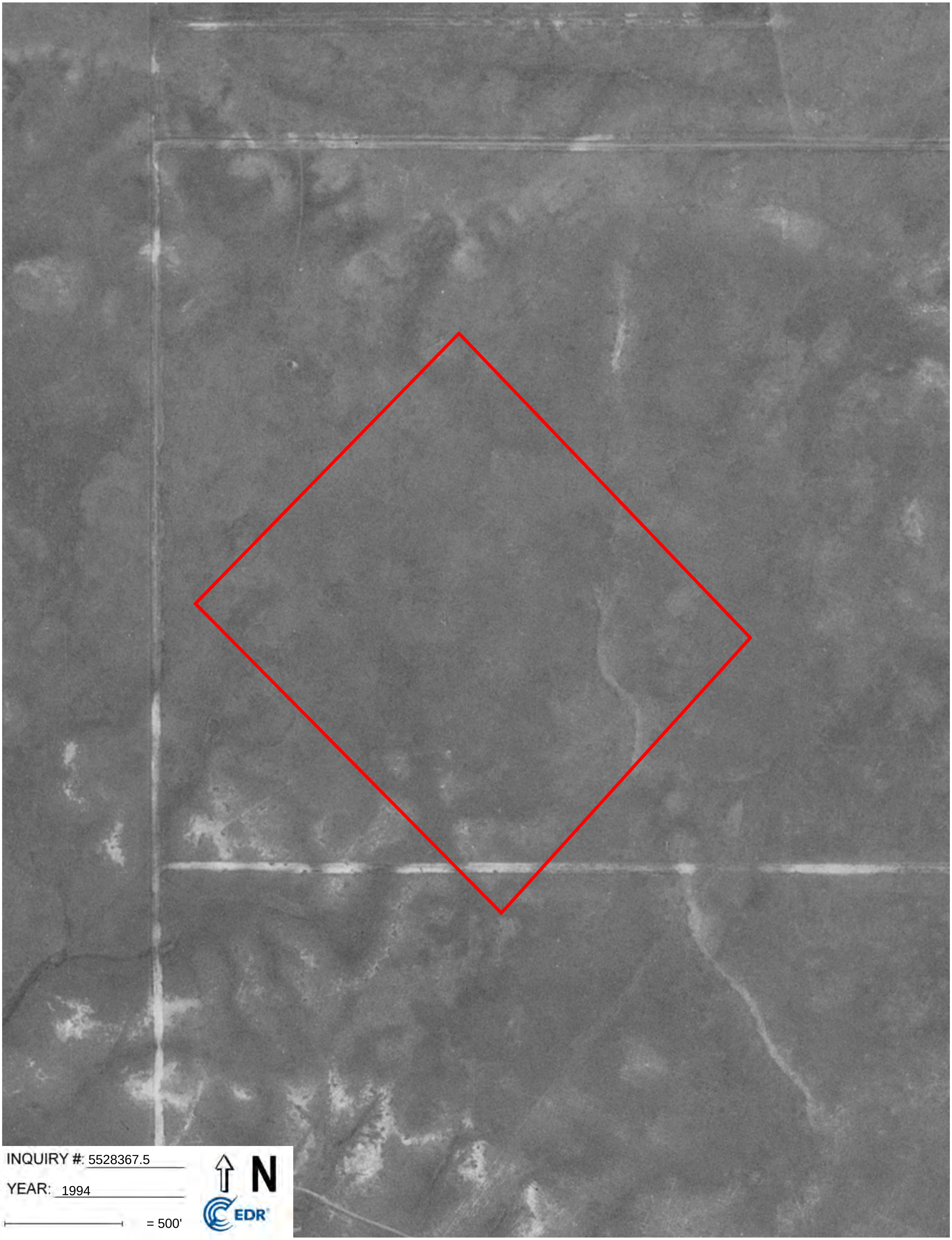
YEAR: 2006

= 500'

INQUIRY #: 5528367.5

YEAR: 2002

Subject boundary not shown because it exceeds image extent or image is not georeferenced.

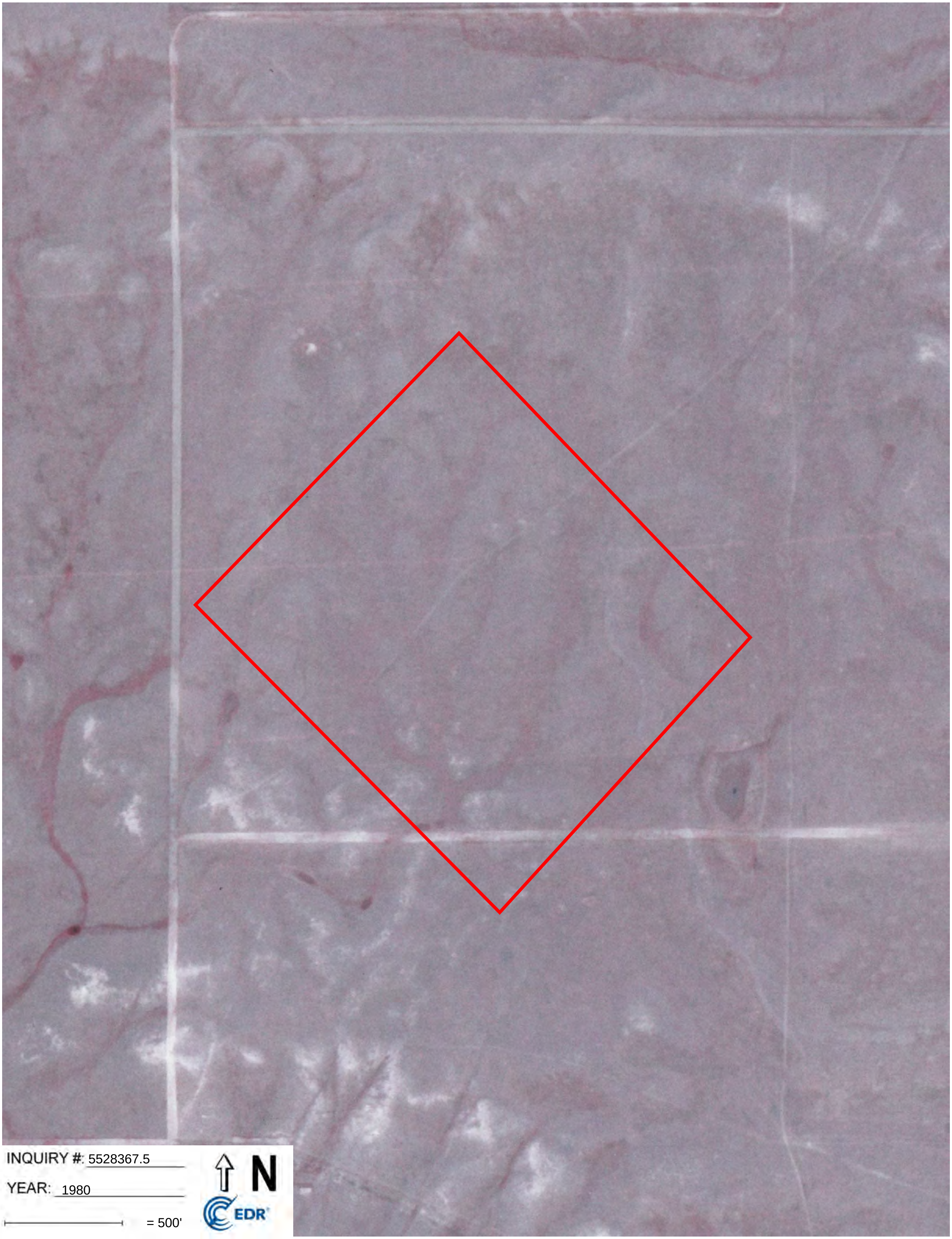


INQUIRY #: 5528367.5

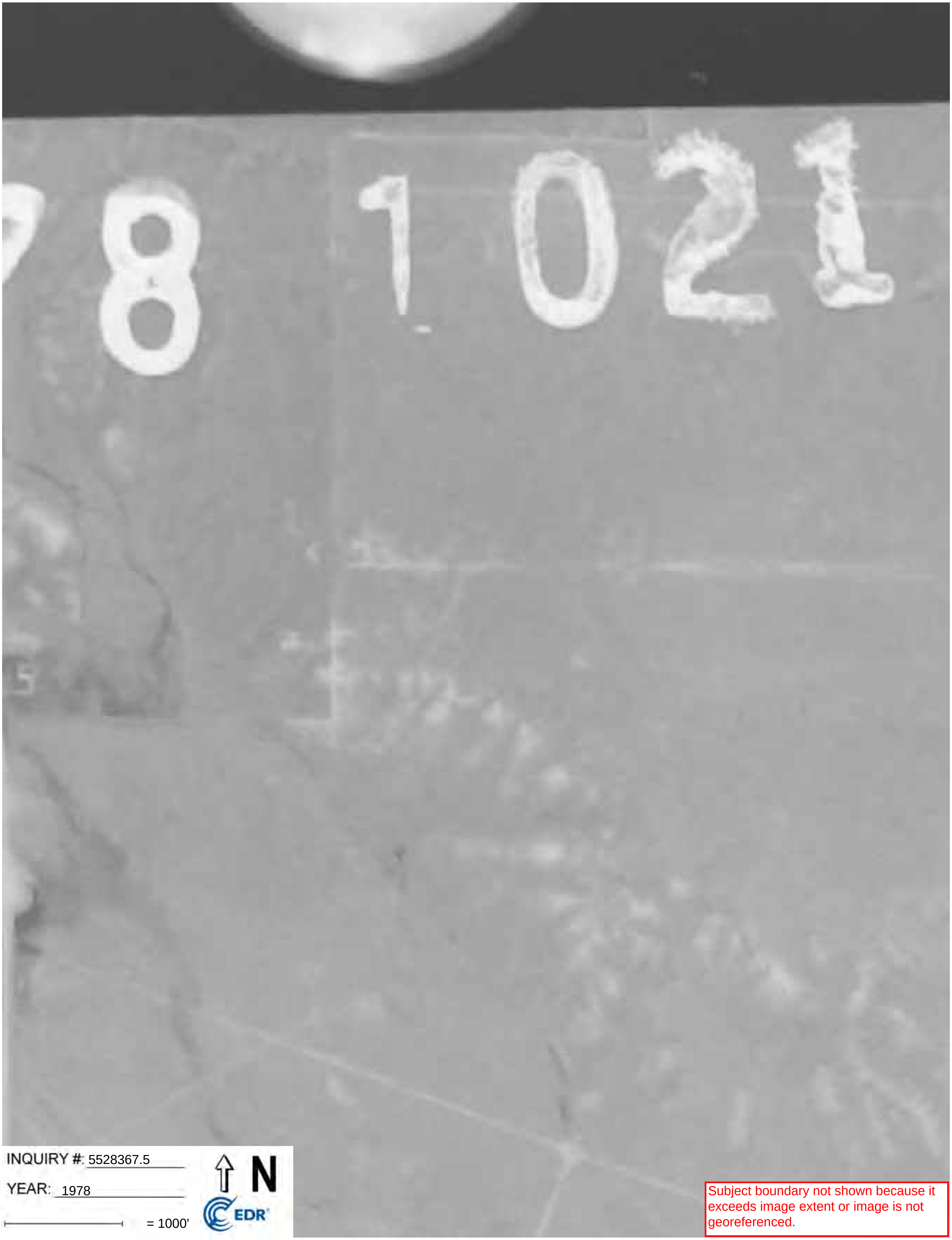
YEAR: 1994

= 500'

Subject boundary not shown because it exceeds image extent or image is not georeferenced.



INQUIRY #: 5528367.5
YEAR: 1980
= 500'
N
EDR



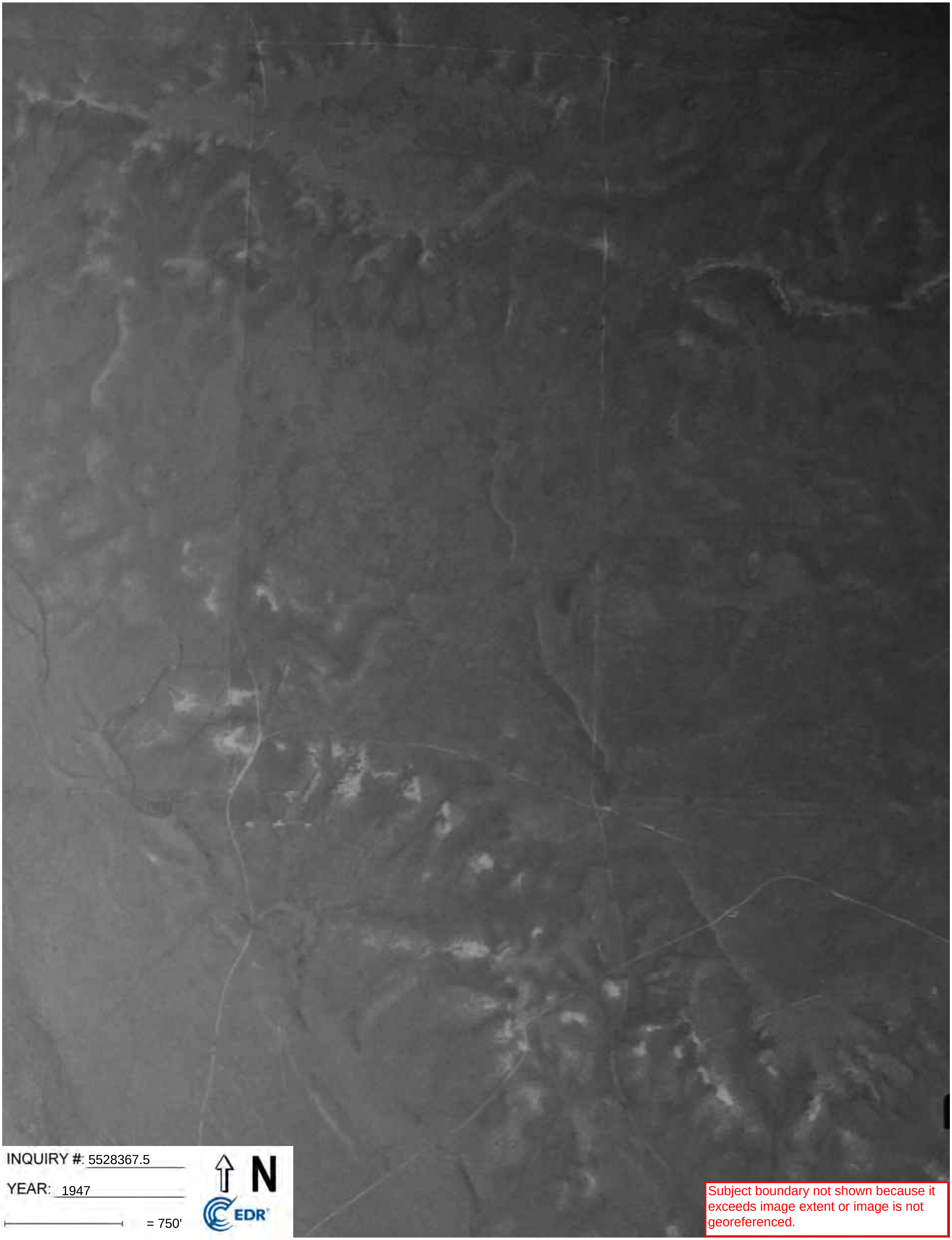
INQUIRY #: 5528367.5

YEAR: 1978

= 1000'

N

Subject boundary not shown because it exceeds image extent or image is not georeferenced.



INQUIRY #: 5528367.5

YEAR: 1947

= 750'

Subject boundary not shown because it exceeds image extent or image is not georeferenced.

Cheyenne AASF
Cheyenne AASF
Fe Warren AFB, WY 82005

Inquiry Number: 5528367.2s
January 08, 2019

The EDR Radius Map™ Report with GeoCheck®

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

TABLE OF CONTENTS

SECTION **PAGE**

GEOCHECK ADDENDUM

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13), the ASTM Standard Practice for Environmental Site Assessments for Forestland or Rural Property (E 2247-16), the ASTM Standard Practice for Limited Environmental Due Diligence: Transaction Screen Process (E 1528-14) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

CHEYENNE AASF
FE WARREN AFB, WY 82005

COORDINATES

Latitude (North):	41.1961490 - 41˚ 11' 46.13''
Longitude (West):	104.8704860 - 104˚ 52' 13.74''
Universal Tranverse Mercator:	Zone 13
UTM X (Meters):	510860.2
UTM Y (Meters):	4560327.5
Elevation:	6290 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	5645427 CHEYENNE NORTH, WY
Version Date:	2012
West Map:	5649463 ROUND TOP LAKE, WY
Version Date:	2012

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20150620
Source:	USDA

MAPPED SITES SUMMARY

Target Property Address:
CHEYENNE AASF
FE WARREN AFB, WY 82005

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
Reg	FRANCIS E. WARREN AI		DOD	Same	1 ft.
1	HUNNICUTT OFF-BASE P		UXO	Higher	1529, 0.290, West

EXECUTIVE SUMMARY

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL	National Priority List
Proposed NPL	Proposed National Priority List Sites
NPL LIENS	Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL	National Priority List Deletions

Federal CERCLIS list

FEDERAL FACILITY	Federal Facility Site Information listing
SEMS	Superfund Enterprise Management System

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE	Superfund Enterprise Management System Archive

Federal RCRA CORRACTS facilities list

CORRACTS	Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF	RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG	RCRA - Large Quantity Generators
RCRA-SQG	RCRA - Small Quantity Generators
RCRA-CESQG	RCRA - Conditionally Exempt Small Quantity Generator

Federal institutional controls / engineering controls registries

LUCIS	Land Use Control Information System
US ENG CONTROLS	Engineering Controls Sites List

US INST CONTROL	Sites with Institutional Controls

Federal ERNS list

ERNS	Emergency Response Notification System

State- and tribal - equivalent CERCLIS

SHWS	This state does not maintain a SHWS list. See the Federal CERCLIS list and Federal NPL list.

State and tribal landfill and/or solid waste disposal site lists

SWF/LF	Solid Waste Facility Database
SHWF	Solid & Hazardous Waste Facility Database

State and tribal leaking storage tank lists

INDIAN LUST	Leaking Underground Storage Tanks on Indian Land
LTANKS	Known Contaminated Sites

State and tribal registered storage tank lists

FEMA UST	Underground Storage Tank Listing
UST	Underground Storage Tanks
AST	Wyoming Aboveground Storage Tanks
INDIAN UST	Underground Storage Tanks on Indian Land
TANKS	Storage Tank Listing

State and tribal institutional control / engineering control registries

ENG CONTROLS	Engineering Controls Site Listing
INST CONTROL	Sites with Institutional Controls

State and tribal voluntary cleanup sites

INDIAN VCP	Voluntary Cleanup Priority Listing
VCP	List of Voluntary Remediation Program Sites

State and tribal Brownfields sites

BROWNFIELDS	Brownfields Sites Listing

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS	A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

SWRCY	Recycling Facilities
INDIAN ODI	Report on the Status of Open Dumps on Indian Lands
DEBRIS REGION 9	Torres Martinez Reservation Illegal Dump Site Locations

EXECUTIVE SUMMARY

ODI	Open Dump Inventory
IHS OPEN DUMPS	Open Dumps on Indian Land

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL	Delisted National Clandestine Laboratory Register
CDL	Clandestine Drug Lab Site Locations
US CDL	National Clandestine Laboratory Register

Local Land Records

LIENS 2	CERCLA Lien Information

Records of Emergency Release Reports

HMIRS	Hazardous Materials Information Reporting System
SPILLS	SPILL Database

Other Ascertainable Records

RCRA NonGen / NLR	RCRA - Non Generators / No Longer Regulated
FUDS	Formerly Used Defense Sites
SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing
US FIN ASSUR	Financial Assurance Information
EPA WATCH LIST	EPA WATCH LIST
2020 COR ACTION	2020 Corrective Action Program List
TSCA	Toxic Substances Control Act
TRIS	Toxic Chemical Release Inventory System
SSTS	Section 7 Tracking Systems
ROD	Records Of Decision
RMP	Risk Management Plans
RAATS	RCRA Administrative Action Tracking System
PRP	Potentially Responsible Parties
PADS	PCB Activity Database System
ICIS	Integrated Compliance Information System
FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
MLTS	Material Licensing Tracking System
COAL ASH DOE	Steam-Electric Plant Operation Data
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List
PCB TRANSFORMER	PCB Transformer Registration Database
RADINFO	Radiation Information Database
HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing
DOT OPS	Incident and Accident Data
CONSENT	Superfund (CERCLA) Consent Decrees
INDIAN RESERV	Indian Reservations
FUSRAP	Formerly Utilized Sites Remedial Action Program
UMTRA	Uranium Mill Tailings Sites
LEAD SMELTERS	Lead Smelter Sites
US AIRS	Aerometric Information Retrieval System Facility Subsystem
US MINES	Mines Master Index File
ABANDONED MINES	Abandoned Mines
FINDS	Facility Index System/Facility Registry System
ECHO	Enforcement & Compliance History Information
DOCKET HWC	Hazardous Waste Compliance Docket Listing

FUELS PROGRAM	EPA Fuels Program Registered Listing
EMI	Air Quality Permit Listing
ASBESTOS	ASBESTOS
DRYCLEANERS	DRYCLEANERS
Financial Assurance	Financial Assurance Information listing
MINES	Mine Locations Listing
UIC	UIC Well Locations List
NPDES	Wastewater Permit Listing

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP	EDR Proprietary Manufactured Gas Plants
EDR Hist Auto	EDR Exclusive Historical Auto Stations
EDR Hist Cleaner	EDR Exclusive Historical Cleaners

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LF	Recovered Government Archive Solid Waste Facilities List
RGA LUST	Recovered Government Archive Leaking Underground Storage Tank

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

ADDITIONAL ENVIRONMENTAL RECORDS

Other Ascertainable Records

DOD: Consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

A review of the DOD list, as provided by EDR, and dated 12/31/2005 has revealed that there is 1 DOD site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
FRANCIS E. WARREN AI		0 - 1/8 (0.000 mi.)	0	8

EXECUTIVE SUMMARY

UXO: A listing of unexploded ordnance site locations

A review of the UXO list, as provided by EDR, and dated 09/30/2017 has revealed that there is 1 UXO site within approximately 1 mile of the target property.

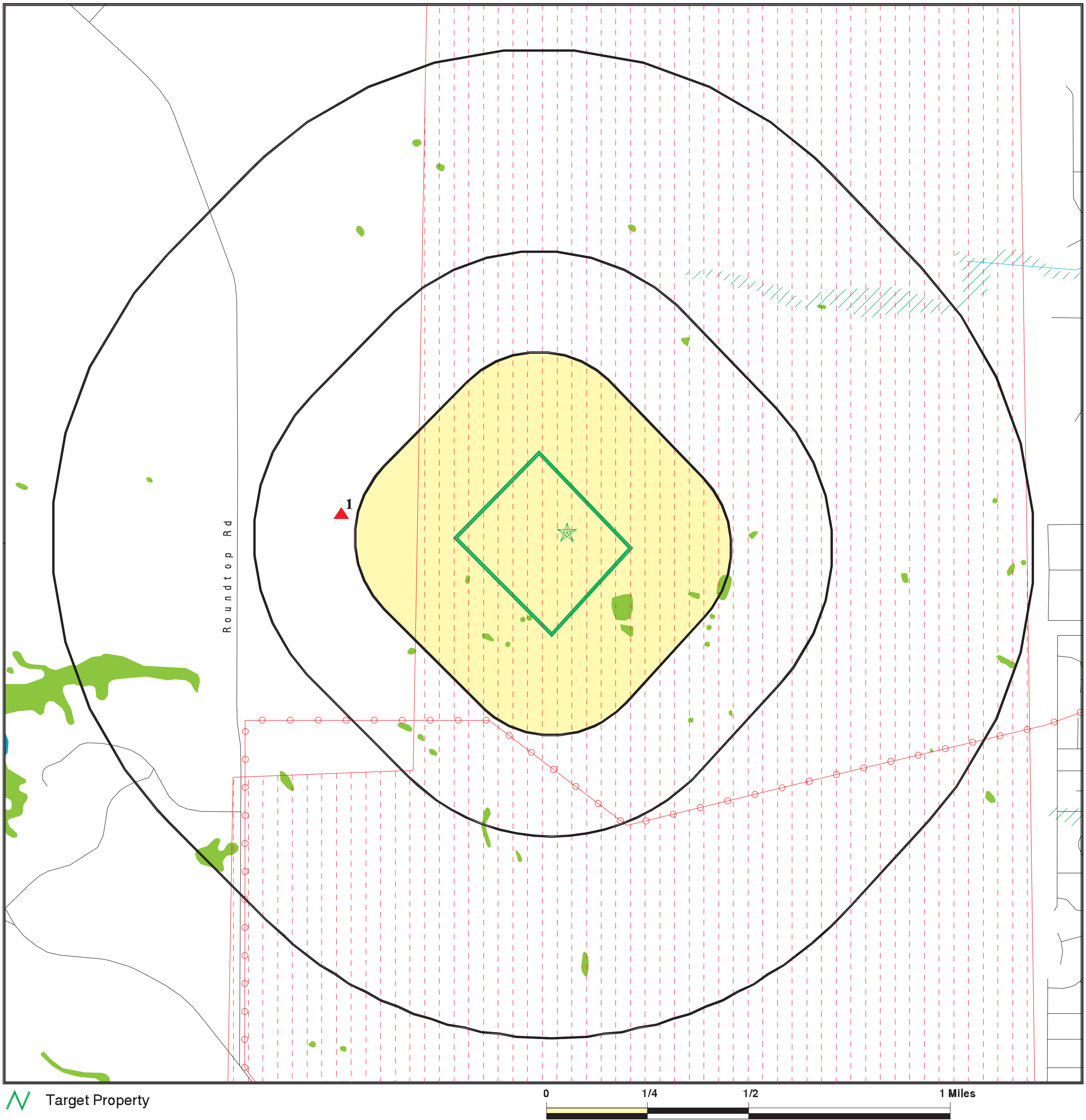
Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
HUNNICUTT OFF-BASE P		W 1/4 - 1/2 (0.290 mi.)	1	8

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped. Count: 2 records.

Site Name	Database(s)
NIELSEN TRUST PROPERTY	VCP
CHEYENNE ATCT	RGA LUST

OVERVIEW MAP - 5528367.2S



Target Property

▲ Sites at elevations higher than or equal to the target property

◆ Sites at elevations lower than the target property

Manufactured Gas Plants

🟥 National Priority List Sites

Dept. Defense Sites

Indian Reservations BIA

Power transmission lines

▨ 100-year flood zone

▨ 500-year flood zone

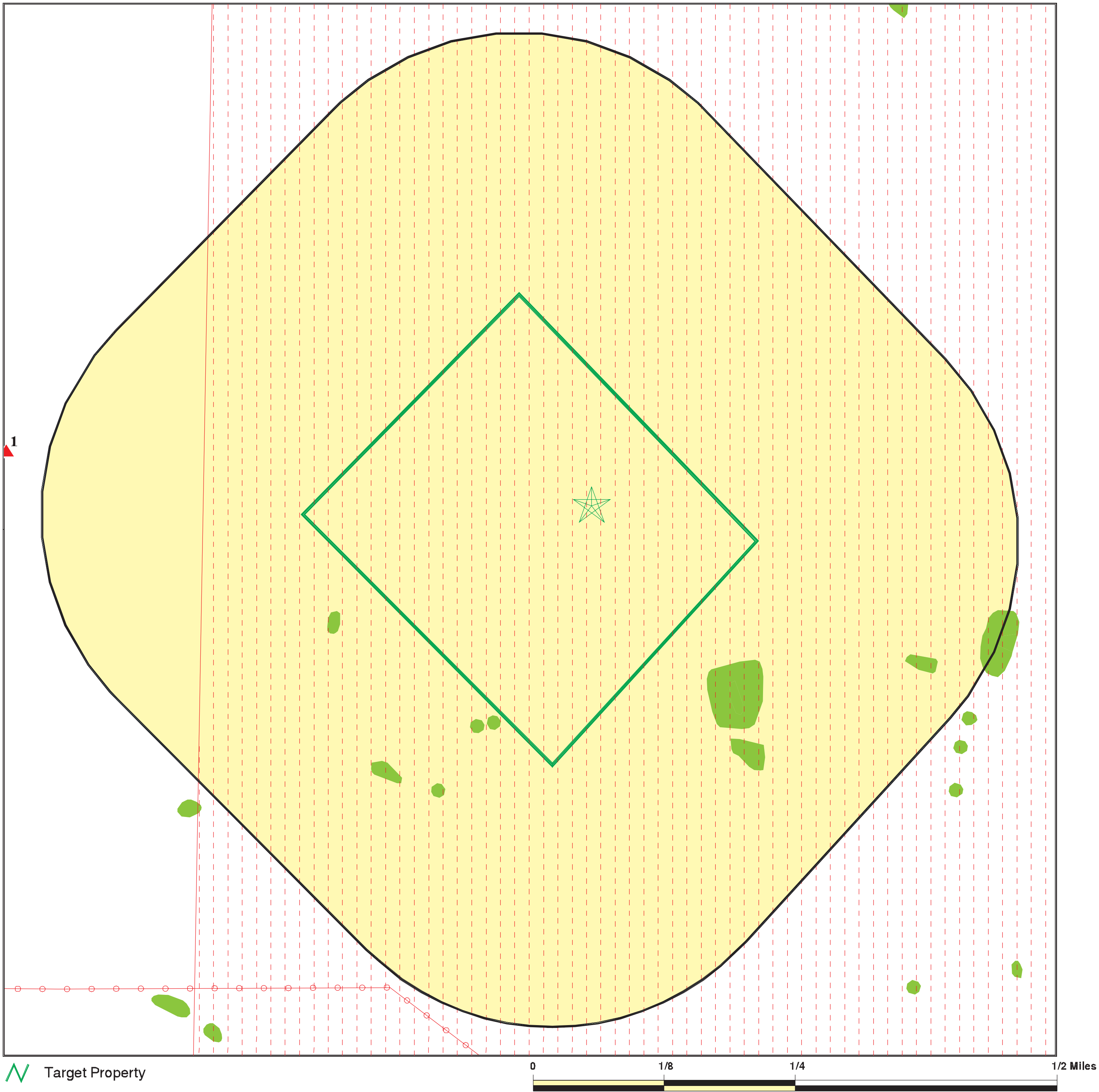
🟩 National Wetland Inventory

🟩 State Wetlands

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	Cheyenne AASF	CLIENT:	AECOM
ADDRESS:	Cheyenne AASF Fe Warren AFB WY 82005	CONTACT:	Brittany Kirchmann
		INQUIRY #:	5528367.2s
LAT/LONG:	41.196149 / 104.870486	DATE:	January 08, 2019 9:18 am

DETAIL MAP - 5528367.2S



- 🟩 Target Property
- ▲ Sites at elevations higher than or equal to the target property
- ◆ Sites at elevations lower than the target property
- ♟ Manufactured Gas Plants
- Sensitive Receptors
- 🟥 National Priority List Sites
- ▨ Dept. Defense Sites
- ▨ Indian Reservations BIA
- Power transmission lines
- ▨ 100-year flood zone
- ▨ 500-year flood zone
- 🟩 National Wetland Inventory
- 🟩 State Wetlands

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Cheyenne AASF
ADDRESS: Cheyenne AASF
Fe Warren AFB WY 82005
LAT/LONG: 41.196149 / 104.870486

CLIENT: AECOM
CONTACT: Brittany Kirchmann
INQUIRY #: 5528367.2s
DATE: January 08, 2019 9:19 am

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	1.000		0	0	0	0	NR	0
Federal Delisted NPL site list								
Delisted NPL	1.000		0	0	0	0	NR	0
Federal CERCLIS list								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
SEMS	0.500		0	0	0	NR	NR	0
Federal CERCLIS NFRAP site list								
SEMS-ARCHIVE	0.500		0	0	0	NR	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS	1.000		0	0	0	0	NR	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Federal RCRA generators list								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		0	0	NR	NR	NR	0
RCRA-CESQG	0.250		0	0	NR	NR	NR	0
Federal institutional controls / engineering controls registries								
LUCIS	0.500		0	0	0	NR	NR	0
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROL	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	TP		NR	NR	NR	NR	NR	0
State- and tribal - equivalent CERCLIS								
SHWS	N/A		N/A	N/A	N/A	N/A	N/A	N/A
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF	0.500		0	0	0	NR	NR	0
SHWF	0.500		0	0	0	NR	NR	0
State and tribal leaking storage tank lists								
INDIAN LUST	0.500		0	0	0	NR	NR	0
LTANKS	0.500		0	0	0	NR	NR	0
State and tribal registered storage tank lists								
FEMA UST	0.250		0	0	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
UST	0.250		0	0	NR	NR	NR	0
AST	0.250		0	0	NR	NR	NR	0
INDIAN UST	0.250		0	0	NR	NR	NR	0
TANKS	0.250		0	0	NR	NR	NR	0
State and tribal institutional control / engineering control registries								
ENG CONTROLS	0.500		0	0	0	NR	NR	0
INST CONTROL	0.500		0	0	0	NR	NR	0
State and tribal voluntary cleanup sites								
INDIAN VCP	0.500		0	0	0	NR	NR	0
VCP	0.500		0	0	0	NR	NR	0
State and tribal Brownfields sites								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
SWRCY	0.500		0	0	0	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
IHS OPEN DUMPS	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US HIST CDL	TP		NR	NR	NR	NR	NR	0
CDL	TP		NR	NR	NR	NR	NR	0
US CDL	TP		NR	NR	NR	NR	NR	0
Local Land Records								
LIENS 2	TP		NR	NR	NR	NR	NR	0
Records of Emergency Release Reports								
HMIRS	TP		NR	NR	NR	NR	NR	0
SPILLS	TP		NR	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		0	0	NR	NR	NR	0
FUDS	1.000		0	0	0	0	NR	0
DOD	1.000		1	0	0	0	NR	1
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
US FIN ASSUR	TP		NR	NR	NR	NR	NR	0
EPA WATCH LIST	TP		NR	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	TP		NR	NR	NR	NR	NR	0
TRIS	TP		NR	NR	NR	NR	NR	0
SSTS	TP		NR	NR	NR	NR	NR	0
ROD	1.000		0	0	0	0	NR	0
RMP	TP		NR	NR	NR	NR	NR	0
RAATS	TP		NR	NR	NR	NR	NR	0
PRP	TP		NR	NR	NR	NR	NR	0
PADS	TP		NR	NR	NR	NR	NR	0
ICIS	TP		NR	NR	NR	NR	NR	0
FTTS	TP		NR	NR	NR	NR	NR	0
MLTS	TP		NR	NR	NR	NR	NR	0
COAL ASH DOE	TP		NR	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	TP		NR	NR	NR	NR	NR	0
RADINFO	TP		NR	NR	NR	NR	NR	0
HIST FTTS	TP		NR	NR	NR	NR	NR	0
DOT OPS	TP		NR	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	1.000		0	0	0	0	NR	0
FUSRAP	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	TP		NR	NR	NR	NR	NR	0
US AIRS	TP		NR	NR	NR	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
ABANDONED MINES	0.250		0	0	NR	NR	NR	0
FINDS	TP		NR	NR	NR	NR	NR	0
ECHO	TP		NR	NR	NR	NR	NR	0
UXO	1.000		0	0	1	0	NR	1
DOCKET HWC	TP		NR	NR	NR	NR	NR	0
FUELS PROGRAM	0.250		0	0	NR	NR	NR	0
EMI	TP		NR	NR	NR	NR	NR	0
ASBESTOS	TP		NR	NR	NR	NR	NR	0
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
Financial Assurance	TP		NR	NR	NR	NR	NR	0
MINES	0.250		0	0	NR	NR	NR	0
UIC	TP		NR	NR	NR	NR	NR	0
NPDES	TP		NR	NR	NR	NR	NR	0

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP	1.000		0	0	0	0	NR	0
EDR Hist Auto	0.125		0	NR	NR	NR	NR	0
EDR Hist Cleaner	0.125		0	NR	NR	NR	NR	0

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LF	TP		NR	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
RGA LUST	TP		NR	NR	NR	NR	NR	0
- Totals --		0	1	0	1	0	0	2

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

N/A = This State does not maintain a SHWS list. See the Federal CERCLIS list.

DOD
Region

< 1/8
1 ft.

FRANCIS E. WARREN AIR FORCE BASE **DOD** **CUSA122479**
N/A

FRANCIS E. WARREN AIR FOR (County), WY

DOD:
Feature 1: Air Force DOD
Feature 2: Not reported
Feature 3: Not reported
URL: Not reported
Name 1: Francis E. Warren Air Force Base
Name 2: Not reported
Name 3: Not reported
State: WY
DOD Site: Yes
Tile name: WYLARAMIE

1
West
1/4-1/2
0.290 mi.
1529 ft.

Relative:
Higher

Actual:
6295 ft.

HUNNICUTT OFF-BASE PROPERTY **UXO** **1018153746**
N/A

F. E. WARREN AFB, WY

UXO:
DoD Component: Air Force
Installation Name: FRANCIS E WARREN AIR FORCE BASE
Facility Address 2: Not reported
Site ID: TG300A
Site Type: Target Area
Latitude: 41.196886
Longitude: -104.881210

Count: 2 records.

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
CHEYENNE	S106862002	NIELSEN TRUST PROPERTY	ADJACENT TO SW CORNER OF CHEYE		VCP
CHEYENNE	S116439392	CHEYENNE ATCT	ON CHEYENNE AIRPORT		RGA LUST

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 11/14/2018
Date Data Arrived at EDR: 11/27/2018
Date Made Active in Reports: 12/07/2018
Number of Days to Update: 10

Source: EPA
Telephone: N/A
Last EDR Contact: 12/28/2018
Next Scheduled EDR Contact: 04/15/2019
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 3
Telephone 215-814-5418

EPA Region 4
Telephone 404-562-8033

EPA Region 5
Telephone 312-886-6686

EPA Region 10
Telephone 206-553-8665

EPA Region 6
Telephone: 214-655-6659

EPA Region 7
Telephone: 913-551-7247

EPA Region 8
Telephone: 303-312-6774

EPA Region 9
Telephone: 415-947-4246

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 11/14/2018
Date Data Arrived at EDR: 11/27/2018
Date Made Active in Reports: 12/07/2018
Number of Days to Update: 10

Source: EPA
Telephone: N/A
Last EDR Contact: 12/28/2018
Next Scheduled EDR Contact: 04/15/2019
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

Federal Delisted NPL site list

Delisted NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 11/14/2018
Date Data Arrived at EDR: 11/27/2018
Date Made Active in Reports: 12/07/2018
Number of Days to Update: 10

Source: EPA
Telephone: N/A
Last EDR Contact: 12/28/2018
Next Scheduled EDR Contact: 04/15/2019
Data Release Frequency: Quarterly

Federal CERCLIS list

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 11/07/2016
Date Data Arrived at EDR: 01/05/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 92

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 01/04/2019
Next Scheduled EDR Contact: 04/15/2019
Data Release Frequency: Varies

SEMS: Superfund Enterprise Management System

SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA’s Superfund Program across the United States. The list was formerly know as CERCLIS, renamed to SEMS by the EPA in 2015. The list contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This dataset also contains sites which are either proposed to or on the National Priorities List (NPL) and the sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 11/14/2018
Date Data Arrived at EDR: 11/27/2018
Date Made Active in Reports: 12/07/2018
Number of Days to Update: 10

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 12/28/2018
Next Scheduled EDR Contact: 01/28/2019
Data Release Frequency: Quarterly

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE: Superfund Enterprise Management System Archive

SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, renamed to SEMS ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. Archived sites have been removed and archived from the inventory of SEMS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list the site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. The decision does not necessarily mean that there is no hazard associated with a given site; it only means that. based upon available information, the location is not judged to be potential NPL site.

Date of Government Version: 11/14/2018
Date Data Arrived at EDR: 11/28/2018
Date Made Active in Reports: 12/07/2018
Number of Days to Update: 9

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 12/28/2018
Next Scheduled EDR Contact: 01/28/2019
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 03/01/2018
Date Data Arrived at EDR: 03/28/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 86

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 12/03/2018
Next Scheduled EDR Contact: 04/08/2019
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 03/01/2018
Date Data Arrived at EDR: 03/28/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 86

Source: Environmental Protection Agency
Telephone: 303-312-6149
Last EDR Contact: 12/03/2018
Next Scheduled EDR Contact: 04/08/2019
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 03/01/2018
Date Data Arrived at EDR: 03/28/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 86

Source: Environmental Protection Agency
Telephone: 303-312-6149
Last EDR Contact: 12/03/2018
Next Scheduled EDR Contact: 04/08/2019
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 03/01/2018	Source: Environmental Protection Agency
Date Data Arrived at EDR: 03/28/2018	Telephone: 303-312-6149
Date Made Active in Reports: 06/22/2018	Last EDR Contact: 12/03/2018
Number of Days to Update: 86	Next Scheduled EDR Contact: 04/08/2019
	Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 03/01/2018	Source: Environmental Protection Agency
Date Data Arrived at EDR: 03/28/2018	Telephone: 303-312-6149
Date Made Active in Reports: 06/22/2018	Last EDR Contact: 12/03/2018
Number of Days to Update: 86	Next Scheduled EDR Contact: 04/08/2019
	Data Release Frequency: Quarterly

Federal institutional controls / engineering controls registries

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 10/17/2018	Source: Department of the Navy
Date Data Arrived at EDR: 10/25/2018	Telephone: 843-820-7326
Date Made Active in Reports: 12/07/2018	Last EDR Contact: 10/15/2018
Number of Days to Update: 43	Next Scheduled EDR Contact: 02/25/2019
	Data Release Frequency: Varies

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 07/31/2018	Source: Environmental Protection Agency
Date Data Arrived at EDR: 08/28/2018	Telephone: 703-603-0695
Date Made Active in Reports: 09/14/2018	Last EDR Contact: 11/28/2018
Number of Days to Update: 17	Next Scheduled EDR Contact: 03/11/2019
	Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 07/31/2018	Source: Environmental Protection Agency
Date Data Arrived at EDR: 08/28/2018	Telephone: 703-603-0695
Date Made Active in Reports: 09/14/2018	Last EDR Contact: 11/28/2018
Number of Days to Update: 17	Next Scheduled EDR Contact: 03/11/2019
	Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 09/24/2018
Date Data Arrived at EDR: 09/25/2018
Date Made Active in Reports: 11/09/2018
Number of Days to Update: 45

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 12/21/2018
Next Scheduled EDR Contact: 04/08/2019
Data Release Frequency: Quarterly

State- and tribal - equivalent CERCLIS

SHWS: This state does not maintain a SHWS list. See the Federal CERCLIS list and Federal NPL list.

State Hazardous Waste Sites. State hazardous waste site records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. Available information varies by state.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: Department of Environmental Quality
Telephone: 307-777-7752
Last EDR Contact: 11/16/2018
Next Scheduled EDR Contact: 03/04/2019
Data Release Frequency: N/A

State and tribal landfill and/or solid waste disposal site lists

SWF/LF: Solid Waste Facility Database

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 01/26/2017
Date Data Arrived at EDR: 03/01/2017
Date Made Active in Reports: 08/29/2017
Number of Days to Update: 181

Source: Department of Environmental Quality
Telephone: 307-777-7752
Last EDR Contact: 11/30/2018
Next Scheduled EDR Contact: 03/11/2019
Data Release Frequency: Varies

SHWF: Solid & Hazardous Waste Facility Database

A listing of Solid and Hazardous waste facility locations in the state.

Date of Government Version: 01/26/2017
Date Data Arrived at EDR: 03/01/2017
Date Made Active in Reports: 08/29/2017
Number of Days to Update: 181

Source: Department of Environmental Quality
Telephone: 307-777-7752
Last EDR Contact: 11/30/2018
Next Scheduled EDR Contact: 03/11/2019
Data Release Frequency: Annually

State and tribal leaking storage tank lists

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 04/12/2018
Date Data Arrived at EDR: 05/18/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 63

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 10/26/2018
Next Scheduled EDR Contact: 02/04/2019
Data Release Frequency: Varies

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land
Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 04/12/2018	Source: EPA, Region 5
Date Data Arrived at EDR: 05/18/2018	Telephone: 312-886-7439
Date Made Active in Reports: 07/20/2018	Last EDR Contact: 10/26/2018
Number of Days to Update: 63	Next Scheduled EDR Contact: 02/04/2019
	Data Release Frequency: Varies

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 04/13/2018	Source: EPA Region 1
Date Data Arrived at EDR: 05/18/2018	Telephone: 617-918-1313
Date Made Active in Reports: 07/20/2018	Last EDR Contact: 10/26/2018
Number of Days to Update: 63	Next Scheduled EDR Contact: 02/04/2019
	Data Release Frequency: Varies

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 04/10/2018	Source: Environmental Protection Agency
Date Data Arrived at EDR: 05/18/2018	Telephone: 415-972-3372
Date Made Active in Reports: 07/20/2018	Last EDR Contact: 10/26/2018
Number of Days to Update: 63	Next Scheduled EDR Contact: 02/04/2019
	Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 04/25/2018	Source: EPA Region 8
Date Data Arrived at EDR: 05/18/2018	Telephone: 303-312-6271
Date Made Active in Reports: 07/20/2018	Last EDR Contact: 10/26/2018
Number of Days to Update: 63	Next Scheduled EDR Contact: 02/04/2019
	Data Release Frequency: Varies

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 04/24/2018	Source: EPA Region 7
Date Data Arrived at EDR: 05/18/2018	Telephone: 913-551-7003
Date Made Active in Reports: 07/20/2018	Last EDR Contact: 10/26/2018
Number of Days to Update: 63	Next Scheduled EDR Contact: 02/04/2019
	Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 04/01/2018	Source: EPA Region 6
Date Data Arrived at EDR: 05/18/2018	Telephone: 214-665-6597
Date Made Active in Reports: 07/20/2018	Last EDR Contact: 10/26/2018
Number of Days to Update: 63	Next Scheduled EDR Contact: 02/04/2019
	Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 05/08/2018	Source: EPA Region 4
Date Data Arrived at EDR: 05/18/2018	Telephone: 404-562-8677
Date Made Active in Reports: 07/20/2018	Last EDR Contact: 10/26/2018
Number of Days to Update: 63	Next Scheduled EDR Contact: 02/04/2019
	Data Release Frequency: Varies

LTANKS: Known Contaminated Sites
Leaking storage tank sites.

Date of Government Version: 07/09/2018
Date Data Arrived at EDR: 07/13/2018
Date Made Active in Reports: 08/28/2018
Number of Days to Update: 46

Source: Department of Environmental Quality
Telephone: 307-777-7781
Last EDR Contact: 10/12/2018
Next Scheduled EDR Contact: 01/21/2019
Data Release Frequency: Annually

State and tribal registered storage tank lists

FEMA UST: Underground Storage Tank Listing
A listing of all FEMA owned underground storage tanks.

Date of Government Version: 05/15/2017
Date Data Arrived at EDR: 05/30/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 136

Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 12/20/2018
Next Scheduled EDR Contact: 01/21/2019
Data Release Frequency: Varies

UST: Underground Storage Tanks
Registered Underground Storage Tanks. UST’s are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 05/23/2008
Date Data Arrived at EDR: 07/24/2008
Date Made Active in Reports: 08/12/2008
Number of Days to Update: 19

Source: Department of Environmental Quality
Telephone: 307-777-7781
Last EDR Contact: 12/20/2018
Next Scheduled EDR Contact: 04/08/2019
Data Release Frequency: Annually

AST: Wyoming Aboveground Storage Tanks
Registered Aboveground Storage Tanks.

Date of Government Version: 05/23/2008
Date Data Arrived at EDR: 07/24/2008
Date Made Active in Reports: 08/13/2008
Number of Days to Update: 20

Source: Department of Environmental Quality
Telephone: 307-777-7781
Last EDR Contact: 12/20/2018
Next Scheduled EDR Contact: 04/08/2019
Data Release Frequency: Annually

INDIAN UST R6: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 04/01/2018
Date Data Arrived at EDR: 05/18/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 63

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 10/26/2018
Next Scheduled EDR Contact: 02/04/2019
Data Release Frequency: Varies

INDIAN UST R7: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 04/24/2018
Date Data Arrived at EDR: 05/18/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 63

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 10/26/2018
Next Scheduled EDR Contact: 02/04/2019
Data Release Frequency: Varies

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 04/25/2018
Date Data Arrived at EDR: 05/18/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 63

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 10/26/2018
Next Scheduled EDR Contact: 02/04/2019
Data Release Frequency: Varies

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 04/10/2018
Date Data Arrived at EDR: 05/18/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 63

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 10/26/2018
Next Scheduled EDR Contact: 02/04/2019
Data Release Frequency: Varies

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 04/12/2018
Date Data Arrived at EDR: 05/18/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 63

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 10/26/2018
Next Scheduled EDR Contact: 02/04/2019
Data Release Frequency: Varies

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 04/13/2018
Date Data Arrived at EDR: 05/18/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 63

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 10/26/2018
Next Scheduled EDR Contact: 02/04/2019
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 05/08/2018
Date Data Arrived at EDR: 05/18/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 63

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 10/26/2018
Next Scheduled EDR Contact: 02/04/2019
Data Release Frequency: Varies

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 04/12/2018
Date Data Arrived at EDR: 05/18/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 63

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 10/26/2018
Next Scheduled EDR Contact: 02/04/2019
Data Release Frequency: Varies

TANKS: Storage Tank Listing
A listing of aboveground and underground storage tank locations.

Date of Government Version: 07/09/2018	Source: Department of Environmetnal Quality
Date Data Arrived at EDR: 07/13/2018	Telephone: 307-777-7752
Date Made Active in Reports: 08/28/2018	Last EDR Contact: 10/12/2018
Number of Days to Update: 46	Next Scheduled EDR Contact: 01/21/2019
	Data Release Frequency: Varies

State and tribal institutional control / engineering control registries

ENG CONTROLS: Engineering Controls Site Listing
A listing of sites with engineering controls in place.

Date of Government Version: 11/19/2018	Source: Department of Environmental Quality
Date Data Arrived at EDR: 11/19/2018	Telephone: 307-777-5547
Date Made Active in Reports: 01/04/2019	Last EDR Contact: 11/16/2018
Number of Days to Update: 46	Next Scheduled EDR Contact: 03/04/2019
	Data Release Frequency: Quarterly

INST CONTROL: Sites with Institutional Controls
Voluntary Remediation Program sites with institutional Controls in place.

Date of Government Version: 11/19/2018	Source: Department of Environmental Quality
Date Data Arrived at EDR: 11/19/2018	Telephone: 307-777-7752
Date Made Active in Reports: 01/04/2019	Last EDR Contact: 11/16/2018
Number of Days to Update: 46	Next Scheduled EDR Contact: 03/04/2019
	Data Release Frequency: Varies

State and tribal voluntary cleanup sites

VCP: List of Voluntary Remediation Program Sites
A listing of sites participating in the Voluntary Remediation Program.

Date of Government Version: 11/19/2018	Source: Department of Environmental Quality
Date Data Arrived at EDR: 11/19/2018	Telephone: 307-777-5447
Date Made Active in Reports: 01/04/2019	Last EDR Contact: 11/16/2018
Number of Days to Update: 46	Next Scheduled EDR Contact: 03/04/2019
	Data Release Frequency: Varies

INDIAN VCP R1: Voluntary Cleanup Priority Listing
A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 07/27/2015	Source: EPA, Region 1
Date Data Arrived at EDR: 09/29/2015	Telephone: 617-918-1102
Date Made Active in Reports: 02/18/2016	Last EDR Contact: 12/19/2018
Number of Days to Update: 142	Next Scheduled EDR Contact: 04/08/2019
	Data Release Frequency: Varies

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng
A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008	Source: EPA, Region 7
Date Data Arrived at EDR: 04/22/2008	Telephone: 913-551-7365
Date Made Active in Reports: 05/19/2008	Last EDR Contact: 04/20/2009
Number of Days to Update: 27	Next Scheduled EDR Contact: 07/20/2009
	Data Release Frequency: Varies

State and tribal Brownfields sites

BROWNFIELDS: Brownfields Sites Listing

A listing of Brownfields sites locations. Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment.

Date of Government Version: 11/19/2018
Date Data Arrived at EDR: 11/19/2018
Date Made Active in Reports: 01/04/2019
Number of Days to Update: 46

Source: Department of Environmental Quality
Telephone: 307-777-7752
Last EDR Contact: 11/16/2018
Next Scheduled EDR Contact: 03/04/2019
Data Release Frequency: Varies

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 09/18/2018
Date Data Arrived at EDR: 09/18/2018
Date Made Active in Reports: 11/09/2018
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 12/18/2018
Next Scheduled EDR Contact: 04/01/2019
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

SWRCY: Recycling Facilities

A listing of recycling facility locations.

Date of Government Version: 09/30/2009
Date Data Arrived at EDR: 11/02/2009
Date Made Active in Reports: 11/25/2009
Number of Days to Update: 23

Source: Department of Environmental Quality
Telephone: 307-777-7752
Last EDR Contact: 11/27/2018
Next Scheduled EDR Contact: 03/11/2019
Data Release Frequency: Annually

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands

Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 10/25/2018
Next Scheduled EDR Contact: 02/11/2019
Data Release Frequency: Varies

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations

A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137

Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 10/22/2018
Next Scheduled EDR Contact: 02/04/2019
Data Release Frequency: No Update Planned

ODI: Open Dump Inventory

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

IHS OPEN DUMPS: Open Dumps on Indian Land

A listing of all open dumps located on Indian Land in the United States.

Date of Government Version: 04/01/2014
Date Data Arrived at EDR: 08/06/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 176

Source: Department of Health & Human Serivces, Indian Health Service
Telephone: 301-443-1452
Last EDR Contact: 11/02/2018
Next Scheduled EDR Contact: 02/11/2019
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations that have been removed from the DEAs National Clandestine Laboratory Register.

Date of Government Version: 09/21/2018
Date Data Arrived at EDR: 09/21/2018
Date Made Active in Reports: 11/09/2018
Number of Days to Update: 49

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 11/26/2018
Next Scheduled EDR Contact: 03/11/2019
Data Release Frequency: No Update Planned

CDL: Clandestine Drug Lab Site Locations

Information collected by the Wyoming Department of Health concerning Drug Lab Sites.

Date of Government Version: 05/01/2018
Date Data Arrived at EDR: 06/08/2018
Date Made Active in Reports: 07/27/2018
Number of Days to Update: 49

Source: Department of Health
Telephone: 307-777-8736
Last EDR Contact: 12/14/2018
Next Scheduled EDR Contact: 03/18/2019
Data Release Frequency: Varies

US CDL: Clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 09/21/2018
Date Data Arrived at EDR: 09/21/2018
Date Made Active in Reports: 11/09/2018
Number of Days to Update: 49

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 11/26/2018
Next Scheduled EDR Contact: 03/11/2019
Data Release Frequency: Quarterly

Local Land Records

LIENS 2: CERCLA Lien Information

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 08/13/2018
Date Data Arrived at EDR: 10/04/2018
Date Made Active in Reports: 11/16/2018
Number of Days to Update: 43

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 12/28/2018
Next Scheduled EDR Contact: 02/04/2019
Data Release Frequency: Semi-Annually

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 03/26/2018
Date Data Arrived at EDR: 03/27/2018
Date Made Active in Reports: 06/08/2018
Number of Days to Update: 73

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 12/21/2018
Next Scheduled EDR Contact: 04/08/2019
Data Release Frequency: Quarterly

SPILLS: SPILL Database

Spills reported to the Department of Environmental Quality

Date of Government Version: 07/03/2018
Date Data Arrived at EDR: 08/10/2018
Date Made Active in Reports: 09/06/2018
Number of Days to Update: 27

Source: Department of Environmental Quality
Telephone: 307-777-7783
Last EDR Contact: 11/16/2018
Next Scheduled EDR Contact: 02/25/2019
Data Release Frequency: Varies

Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators / No Longer Regulated

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 03/01/2018
Date Data Arrived at EDR: 03/28/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 86

Source: Environmental Protection Agency
Telephone: 303-312-6149
Last EDR Contact: 12/03/2018
Next Scheduled EDR Contact: 04/08/2019
Data Release Frequency: Quarterly

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 01/31/2015
Date Data Arrived at EDR: 07/08/2015
Date Made Active in Reports: 10/13/2015
Number of Days to Update: 97

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 11/19/2018
Next Scheduled EDR Contact: 03/04/2019
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 10/12/2018
Next Scheduled EDR Contact: 01/21/2019
Data Release Frequency: Semi-Annually

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 10/12/2018
Next Scheduled EDR Contact: 01/21/2019
Data Release Frequency: N/A

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 01/01/2017
Date Data Arrived at EDR: 02/03/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 63

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 11/16/2018
Next Scheduled EDR Contact: 02/25/2019
Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 08/31/2018
Date Data Arrived at EDR: 09/25/2018
Date Made Active in Reports: 11/09/2018
Number of Days to Update: 45

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 12/21/2018
Next Scheduled EDR Contact: 04/08/2019
Data Release Frequency: Quarterly

EPA WATCH LIST: EPA WATCH LIST

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013
Date Data Arrived at EDR: 03/21/2014
Date Made Active in Reports: 06/17/2014
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 11/05/2018
Next Scheduled EDR Contact: 02/18/2019
Data Release Frequency: Quarterly

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 09/30/2017
Date Data Arrived at EDR: 05/08/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 73

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 11/09/2018
Next Scheduled EDR Contact: 02/18/2019
Data Release Frequency: Varies

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2016	Source: EPA
Date Data Arrived at EDR: 06/21/2017	Telephone: 202-260-5521
Date Made Active in Reports: 01/05/2018	Last EDR Contact: 12/21/2018
Number of Days to Update: 198	Next Scheduled EDR Contact: 04/01/2019
	Data Release Frequency: Every 4 Years

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2016	Source: EPA
Date Data Arrived at EDR: 01/10/2018	Telephone: 202-566-0250
Date Made Active in Reports: 01/12/2018	Last EDR Contact: 11/16/2018
Number of Days to Update: 2	Next Scheduled EDR Contact: 03/04/2019
	Data Release Frequency: Annually

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009	Source: EPA
Date Data Arrived at EDR: 12/10/2010	Telephone: 202-564-4203
Date Made Active in Reports: 02/25/2011	Last EDR Contact: 10/24/2018
Number of Days to Update: 77	Next Scheduled EDR Contact: 02/04/2019
	Data Release Frequency: Annually

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 08/13/2018	Source: EPA
Date Data Arrived at EDR: 10/04/2018	Telephone: 703-416-0223
Date Made Active in Reports: 11/16/2018	Last EDR Contact: 12/28/2018
Number of Days to Update: 43	Next Scheduled EDR Contact: 03/18/2019
	Data Release Frequency: Annually

RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 08/01/2018
Date Data Arrived at EDR: 08/22/2018
Date Made Active in Reports: 10/05/2018
Number of Days to Update: 44

Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 10/23/2018
Next Scheduled EDR Contact: 02/04/2019
Data Release Frequency: Varies

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

PRP: Potentially Responsible Parties

A listing of verified Potentially Responsible Parties

Date of Government Version: 08/13/2018
Date Data Arrived at EDR: 10/04/2018
Date Made Active in Reports: 11/09/2018
Number of Days to Update: 36

Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 12/28/2018
Next Scheduled EDR Contact: 02/18/2019
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB’s who are required to notify the EPA of such activities.

Date of Government Version: 09/14/2018
Date Data Arrived at EDR: 10/11/2018
Date Made Active in Reports: 12/07/2018
Number of Days to Update: 57

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 10/11/2018
Next Scheduled EDR Contact: 01/21/2019
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 11/18/2016
Date Data Arrived at EDR: 11/23/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 79

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 01/07/2019
Next Scheduled EDR Contact: 04/22/2019
Data Release Frequency: Quarterly

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Quarterly

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 08/30/2016
Date Data Arrived at EDR: 09/08/2016
Date Made Active in Reports: 10/21/2016
Number of Days to Update: 43

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 10/11/2018
Next Scheduled EDR Contact: 02/04/2019
Data Release Frequency: Quarterly

COAL ASH DOE: Steam-Electric Plant Operation Data

A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 76

Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 12/05/2018
Next Scheduled EDR Contact: 03/18/2019
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List

A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 07/01/2014
Date Data Arrived at EDR: 09/10/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 12/03/2018
Next Scheduled EDR Contact: 03/18/2019
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database

The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 05/24/2017
Date Data Arrived at EDR: 11/30/2017
Date Made Active in Reports: 12/15/2017
Number of Days to Update: 15

Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 10/26/2018
Next Scheduled EDR Contact: 02/04/2019
Data Release Frequency: Varies

RADINFO: Radiation Information Database

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 10/02/2018
Date Data Arrived at EDR: 10/03/2018
Date Made Active in Reports: 11/09/2018
Number of Days to Update: 37

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 01/03/2019
Next Scheduled EDR Contact: 04/15/2019
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing

A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 07/31/2012
Date Data Arrived at EDR: 08/07/2012
Date Made Active in Reports: 09/18/2012
Number of Days to Update: 42

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 10/30/2018
Next Scheduled EDR Contact: 02/11/2019
Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 09/30/2018
Date Data Arrived at EDR: 10/12/2018
Date Made Active in Reports: 12/07/2018
Number of Days to Update: 56

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 01/07/2019
Next Scheduled EDR Contact: 04/22/2019
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2015
Date Data Arrived at EDR: 02/22/2017
Date Made Active in Reports: 09/28/2017
Number of Days to Update: 218

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 11/21/2018
Next Scheduled EDR Contact: 03/04/2019
Data Release Frequency: Biennially

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2014	Source: USGS
Date Data Arrived at EDR: 07/14/2015	Telephone: 202-208-3710
Date Made Active in Reports: 01/10/2017	Last EDR Contact: 01/07/2019
Number of Days to Update: 546	Next Scheduled EDR Contact: 04/22/2019
	Data Release Frequency: Semi-Annually

FUSRAP: Formerly Utilized Sites Remedial Action Program

DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations.

Date of Government Version: 08/08/2017	Source: Department of Energy
Date Data Arrived at EDR: 09/11/2018	Telephone: 202-586-3559
Date Made Active in Reports: 09/14/2018	Last EDR Contact: 11/01/2018
Number of Days to Update: 3	Next Scheduled EDR Contact: 02/18/2019
	Data Release Frequency: Varies

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 06/23/2017	Source: Department of Energy
Date Data Arrived at EDR: 10/11/2017	Telephone: 505-845-0011
Date Made Active in Reports: 11/03/2017	Last EDR Contact: 12/14/2018
Number of Days to Update: 23	Next Scheduled EDR Contact: 03/04/2019
	Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 08/13/2018	Source: Environmental Protection Agency
Date Data Arrived at EDR: 10/04/2018	Telephone: 703-603-8787
Date Made Active in Reports: 11/16/2018	Last EDR Contact: 12/28/2018
Number of Days to Update: 43	Next Scheduled EDR Contact: 04/15/2019
	Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001	Source: American Journal of Public Health
Date Data Arrived at EDR: 10/27/2010	Telephone: 703-305-6451
Date Made Active in Reports: 12/02/2010	Last EDR Contact: 12/02/2009
Number of Days to Update: 36	Next Scheduled EDR Contact: N/A
	Data Release Frequency: No Update Planned

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data

A listing of minor source facilities.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 08/01/2018
Date Data Arrived at EDR: 08/29/2018
Date Made Active in Reports: 10/05/2018
Number of Days to Update: 37

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 11/30/2018
Next Scheduled EDR Contact: 03/11/2019
Data Release Frequency: Semi-Annually

US MINES 2: Ferrous and Nonferrous Metal Mines Database Listing

This map layer includes ferrous (ferrous metal mines are facilities that extract ferrous metals, such as iron ore or molybdenum) and nonferrous (Nonferrous metal mines are facilities that extract nonferrous metals, such as gold, silver, copper, zinc, and lead) metal mines in the United States.

Date of Government Version: 12/05/2005
Date Data Arrived at EDR: 02/29/2008
Date Made Active in Reports: 04/18/2008
Number of Days to Update: 49

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 11/30/2018
Next Scheduled EDR Contact: 03/11/2019
Data Release Frequency: Varies

US MINES 3: Active Mines & Mineral Plants Database Listing

Active Mines and Mineral Processing Plant operations for commodities monitored by the Minerals Information Team of the USGS.

Date of Government Version: 04/14/2011
Date Data Arrived at EDR: 06/08/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 97

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 11/30/2018
Next Scheduled EDR Contact: 03/11/2019
Data Release Frequency: Varies

ABANDONED MINES: Abandoned Mines

An inventory of land and water impacted by past mining (primarily coal mining) is maintained by OSMRE to provide information needed to implement the Surface Mining Control and Reclamation Act of 1977 (SMCRA). The inventory contains information on the location, type, and extent of AML impacts, as well as, information on the cost associated with the reclamation of those problems. The inventory is based upon field surveys by State, Tribal, and OSMRE program officials. It is dynamic to the extent that it is modified as new problems are identified and existing problems are reclaimed.

Date of Government Version: 09/10/2018
Date Data Arrived at EDR: 09/11/2018
Date Made Active in Reports: 09/14/2018
Number of Days to Update: 3

Source: Department of Interior
Telephone: 202-208-2609
Last EDR Contact: 12/19/2018
Next Scheduled EDR Contact: 03/25/2019
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 08/07/2018
Date Data Arrived at EDR: 09/05/2018
Date Made Active in Reports: 10/05/2018
Number of Days to Update: 30

Source: EPA
Telephone: (303) 312-6312
Last EDR Contact: 12/05/2018
Next Scheduled EDR Contact: 03/18/2019
Data Release Frequency: Quarterly

ECHO: Enforcement & Compliance History Information

ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

Date of Government Version: 09/02/2018
Date Data Arrived at EDR: 09/05/2018
Date Made Active in Reports: 09/14/2018
Number of Days to Update: 9

Source: Environmental Protection Agency
Telephone: 202-564-2280
Last EDR Contact: 01/07/2019
Next Scheduled EDR Contact: 03/18/2019
Data Release Frequency: Quarterly

DOCKET HWC: Hazardous Waste Compliance Docket Listing

A complete list of the Federal Agency Hazardous Waste Compliance Docket Facilities.

Date of Government Version: 05/31/2018
Date Data Arrived at EDR: 07/26/2018
Date Made Active in Reports: 10/05/2018
Number of Days to Update: 71

Source: Environmental Protection Agency
Telephone: 202-564-0527
Last EDR Contact: 11/30/2018
Next Scheduled EDR Contact: 03/11/2019
Data Release Frequency: Varies

UXO: Unexploded Ordnance Sites

A listing of unexploded ordnance site locations

Date of Government Version: 09/30/2017
Date Data Arrived at EDR: 06/19/2018
Date Made Active in Reports: 09/14/2018
Number of Days to Update: 87

Source: Department of Defense
Telephone: 703-704-1564
Last EDR Contact: 10/15/2018
Next Scheduled EDR Contact: 01/28/2019
Data Release Frequency: Varies

FUELS PROGRAM: EPA Fuels Program Registered Listing

This listing includes facilities that are registered under the Part 80 (Code of Federal Regulations) EPA Fuels Programs. All companies now are required to submit new and updated registrations.

Date of Government Version: 08/22/2018
Date Data Arrived at EDR: 08/22/2018
Date Made Active in Reports: 10/05/2018
Number of Days to Update: 44

Source: EPA
Telephone: 800-385-6164
Last EDR Contact: 11/19/2018
Next Scheduled EDR Contact: 03/04/2019
Data Release Frequency: Quarterly

AIRS: Air Quality Permit Listing

A listing of Air Quality permits included in the DEQa??s current database and their legacy system AQDS.

Date of Government Version: 08/27/2018
Date Data Arrived at EDR: 08/29/2018
Date Made Active in Reports: 11/01/2018
Number of Days to Update: 64

Source: Department of Environmental Quality
Telephone: 307-777-7872
Last EDR Contact: 11/26/2018
Next Scheduled EDR Contact: 03/11/2019
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

ASBESTOS: Asbestos Notification Listing
Asbestos site notifications

Date of Government Version: 06/13/2018	Source: Department of Environmental Quality
Date Data Arrived at EDR: 06/15/2018	Telephone: 307-777-7394
Date Made Active in Reports: 07/27/2018	Last EDR Contact: 12/07/2018
Number of Days to Update: 42	Next Scheduled EDR Contact: 03/25/2019
	Data Release Frequency: Varies

DRYCLEANERS: Drycleaner Facility Listing
Drycleaner sites

Date of Government Version: 02/02/2017	Source: Department of Environmental Quality
Date Data Arrived at EDR: 06/01/2017	Telephone: 307-777-6105
Date Made Active in Reports: 05/11/2018	Last EDR Contact: 11/30/2018
Number of Days to Update: 344	Next Scheduled EDR Contact: 03/11/2019
	Data Release Frequency: Varies

Financial Assurance: Financial Assurance Information listing
Information for underground storage tanks. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 05/23/2008	Source: Department of Environmental Quality
Date Data Arrived at EDR: 06/17/2008	Telephone: 307-777-7095
Date Made Active in Reports: 07/24/2008	Last EDR Contact: 12/20/2018
Number of Days to Update: 37	Next Scheduled EDR Contact: 04/08/2019
	Data Release Frequency: Annually

MINES: Mine Locations Listing
Coal mine locations and production; commodity mine locations; mining lease boundaries for the Powder River Basin; Mine permit boundaries for the BLM Rawlins Field Office.

Date of Government Version: 04/09/2018	Source: Wyoming Geographic Information Science Center
Date Data Arrived at EDR: 06/28/2018	Telephone: 307-766-2532
Date Made Active in Reports: 07/27/2018	Last EDR Contact: 12/26/2018
Number of Days to Update: 29	Next Scheduled EDR Contact: 04/08/2019
	Data Release Frequency: Varies

UIC: UIC Well Locations List
A listing of Class I and Class V UIC wells.

Date of Government Version: 08/28/2018	Source: Department of Environmental Quality
Date Data Arrived at EDR: 08/30/2018	Telephone: 307-777-5623
Date Made Active in Reports: 10/09/2018	Last EDR Contact: 11/29/2018
Number of Days to Update: 40	Next Scheduled EDR Contact: 03/11/2019
	Data Release Frequency: Varies

NPDES: Wastewater Permit Listing
A listing of facilities with wastewater permits.

Date of Government Version: 06/04/2018	Source: Department of Environmental Quality
Date Data Arrived at EDR: 06/08/2018	Telephone: 307-777-7570
Date Made Active in Reports: 07/27/2018	Last EDR Contact: 12/03/2018
Number of Days to Update: 49	Next Scheduled EDR Contact: 03/18/2019
	Data Release Frequency: Varies

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A	Source: EDR, Inc.
Date Data Arrived at EDR: N/A	Telephone: N/A
Date Made Active in Reports: N/A	Last EDR Contact: N/A
Number of Days to Update: N/A	Next Scheduled EDR Contact: N/A
	Data Release Frequency: No Update Planned

EDR Hist Auto: EDR Exclusive Historical Auto Stations

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A	Source: EDR, Inc.
Date Data Arrived at EDR: N/A	Telephone: N/A
Date Made Active in Reports: N/A	Last EDR Contact: N/A
Number of Days to Update: N/A	Next Scheduled EDR Contact: N/A
	Data Release Frequency: Varies

EDR Hist Cleaner: EDR Exclusive Historical Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A	Source: EDR, Inc.
Date Data Arrived at EDR: N/A	Telephone: N/A
Date Made Active in Reports: N/A	Last EDR Contact: N/A
Number of Days to Update: N/A	Next Scheduled EDR Contact: N/A
	Data Release Frequency: Varies

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LF: Recovered Government Archive Solid Waste Facilities List

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Environmental Quality in Wyoming.

Date of Government Version: N/A	Source: Department of Environmental Quality
Date Data Arrived at EDR: 07/01/2013	Telephone: N/A
Date Made Active in Reports: 01/17/2014	Last EDR Contact: 06/01/2012
Number of Days to Update: 200	Next Scheduled EDR Contact: N/A
	Data Release Frequency: Varies

RGA LUST: Recovered Government Archive Leaking Underground Storage Tank

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Environmental Quality in Wyoming.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/04/2014
Number of Days to Update: 187

Source: Department of Environmental Quality
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

NY MANIFEST: Facility and Manifest Data

Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 10/01/2018
Date Data Arrived at EDR: 10/31/2018
Date Made Active in Reports: 12/20/2018
Number of Days to Update: 50

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 10/31/2018
Next Scheduled EDR Contact: 02/11/2019
Data Release Frequency: Quarterly

Oil/Gas Pipelines

Source: PennWell Corporation

Petroleum Bundle (Crude Oil, Refined Products, Petrochemicals, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)) N = Natural Gas Bundle (Natural Gas, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)). This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Electric Power Transmission Line Data

Source: PennWell Corporation

This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association’s annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Day Care Provider List
Source: Department of Family Services
Telephone: 307-777-6595

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: National Wetlands Inventory
Source: Wyoming Geospatial Hub
Telephone: 307-777-4600

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

STREET AND ADDRESS INFORMATION

GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

CHEYENNE AASF
CHEYENNE AASF
FE WARREN AFB, WY 82005

TARGET PROPERTY COORDINATES

Latitude (North):	41.196149 - 41˚ 11' 46.14''
Longitude (West):	104.870486 - 104˚ 52' 13.75''
Universal Tranverse Mercator:	Zone 13
UTM X (Meters):	510860.2
UTM Y (Meters):	4560327.5
Elevation:	6290 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	5645427 CHEYENNE NORTH, WY
Version Date:	2012
West Map:	5649463 ROUND TOP LAKE, WY
Version Date:	2012

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principle investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

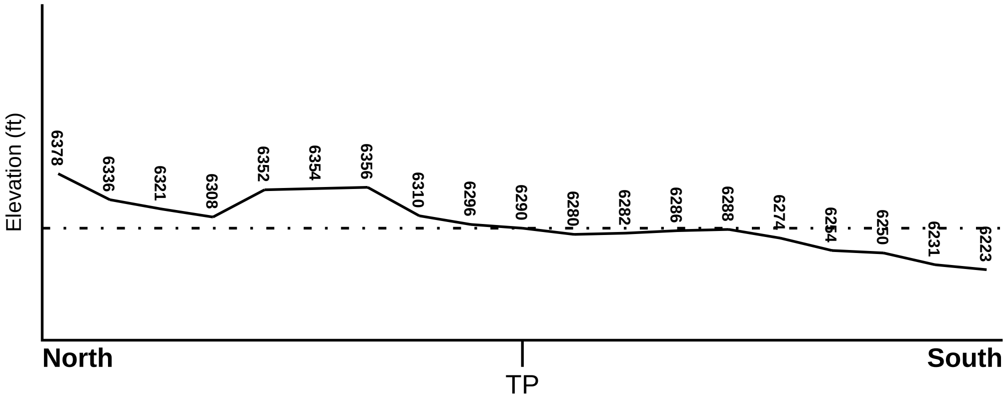
TOPOGRAPHIC INFORMATION

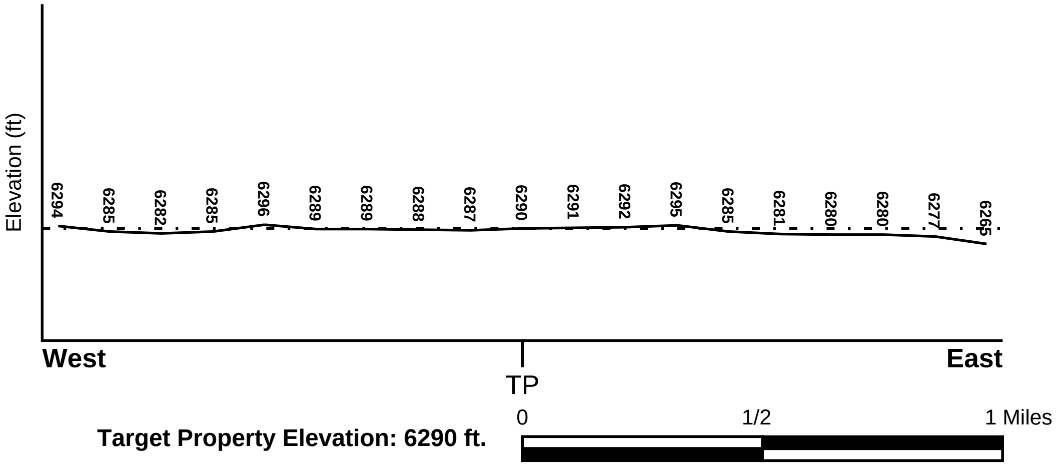
Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General South

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES





Target Property Elevation: 6290 ft.

Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Flood Plain Panel at Target Property	FEMA Source Type
56021C1078F	FEMA FIRM Flood data

Additional Panels in search area:	FEMA Source Type
56021C1059F	FEMA FIRM Flood data
56021C1067F	FEMA FIRM Flood data
56021C1086F	FEMA FIRM Flood data

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
CHEYENNE NORTH	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

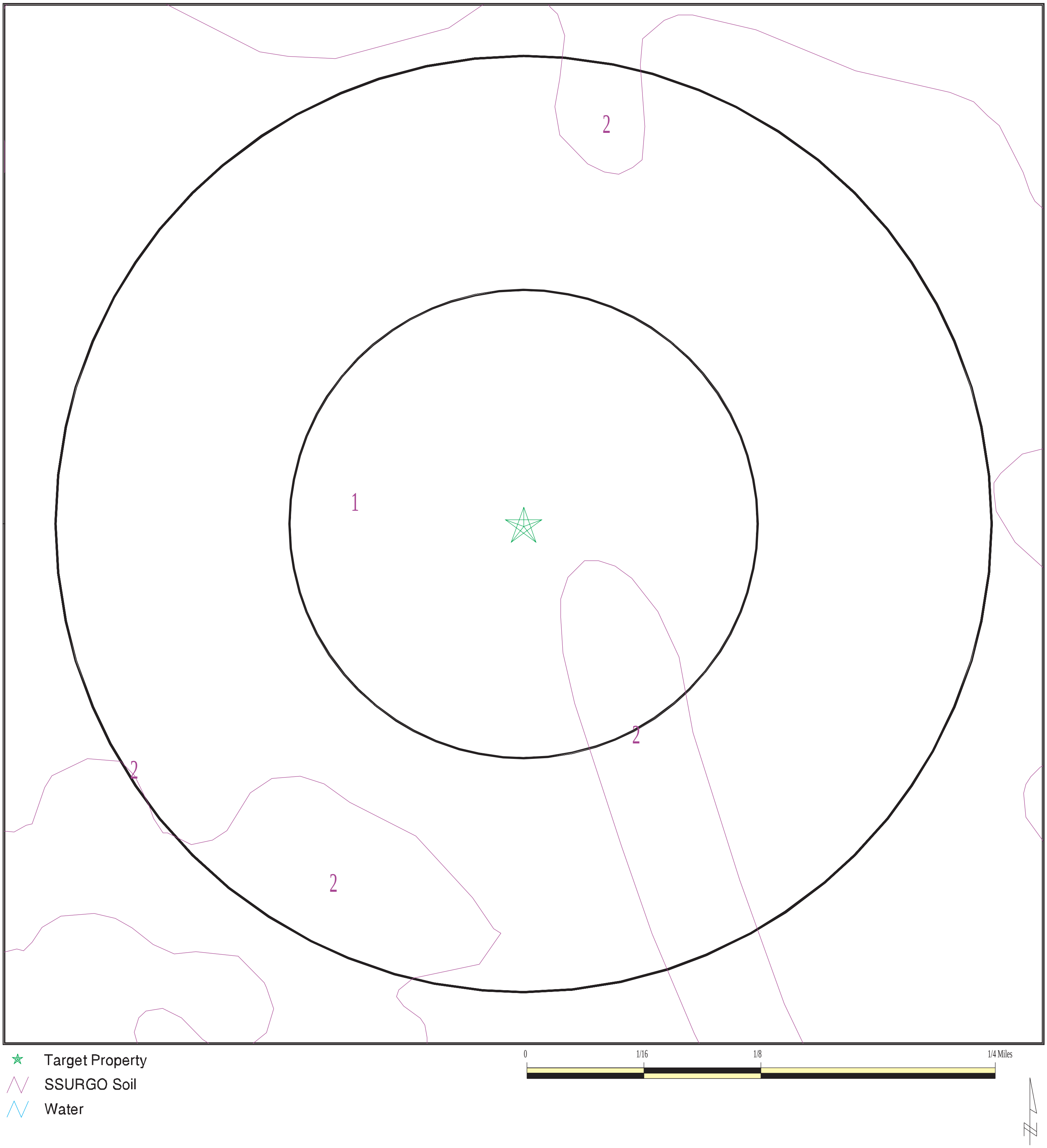
Era:	Cenozoic
System:	Tertiary
Series:	Pliocene
Code:	Tpc *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Continental Deposits

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 5528367.2s



SITE NAME:	Cheyenne AASF	CLIENT:	AECOM
ADDRESS:	Cheyenne AASF Fe Warren AFB WY 82005	CONTACT:	Brittany Kirchmann
		INQUIRY #:	5528367.2s
LAT/LONG:	41.196149 / 104.870486	DATE:	January 08, 2019 9:19 am

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name:	Evanston
Soil Surface Texture:	loam
Hydrologic Group:	Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.
Soil Drainage Class:	Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel:	High
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

Soil Layer Information

	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	
Layer	**Upper**	**Lower**	**Soil Texture Class**	**AASHTO Group**	**Unified Soil**		**Soil Reaction (pH)**
1	0 inches	3 inches	loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14.11 Min: 4.233	Max: 8.4 Min: 7.4
2	3 inches	14 inches	clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14.11 Min: 4.233	Max: 8.4 Min: 7.4
3	14 inches	59 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14.11 Min: 4.233	Max: 8.4 Min: 7.4

Soil Map ID: 2

Soil Component Name:	Poposhia
Soil Surface Texture:	silt loam
Hydrologic Group:	Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.
Soil Drainage Class:	Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel:	High
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

Soil Layer Information

	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	
Layer	**Upper**	**Lower**	**Soil Texture Class**	**AASHTO Group**	**Unified Soil**		**Soil Reaction (pH)**
1	0 inches	7 inches	silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14.11 Min: 4.233	Max: 8.4 Min: 7.9
2	7 inches	25 inches	silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14.11 Min: 4.233	Max: 8.4 Min: 7.9
3	25 inches	59 inches	silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14.11 Min: 4.233	Max: 8.4 Min: 7.9

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
A5	USGS40001334813	1/2 - 1 Mile WSW
15	USGS40001334980	1/2 - 1 Mile NW
A17	USGS40001334811	1/2 - 1 Mile WSW

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

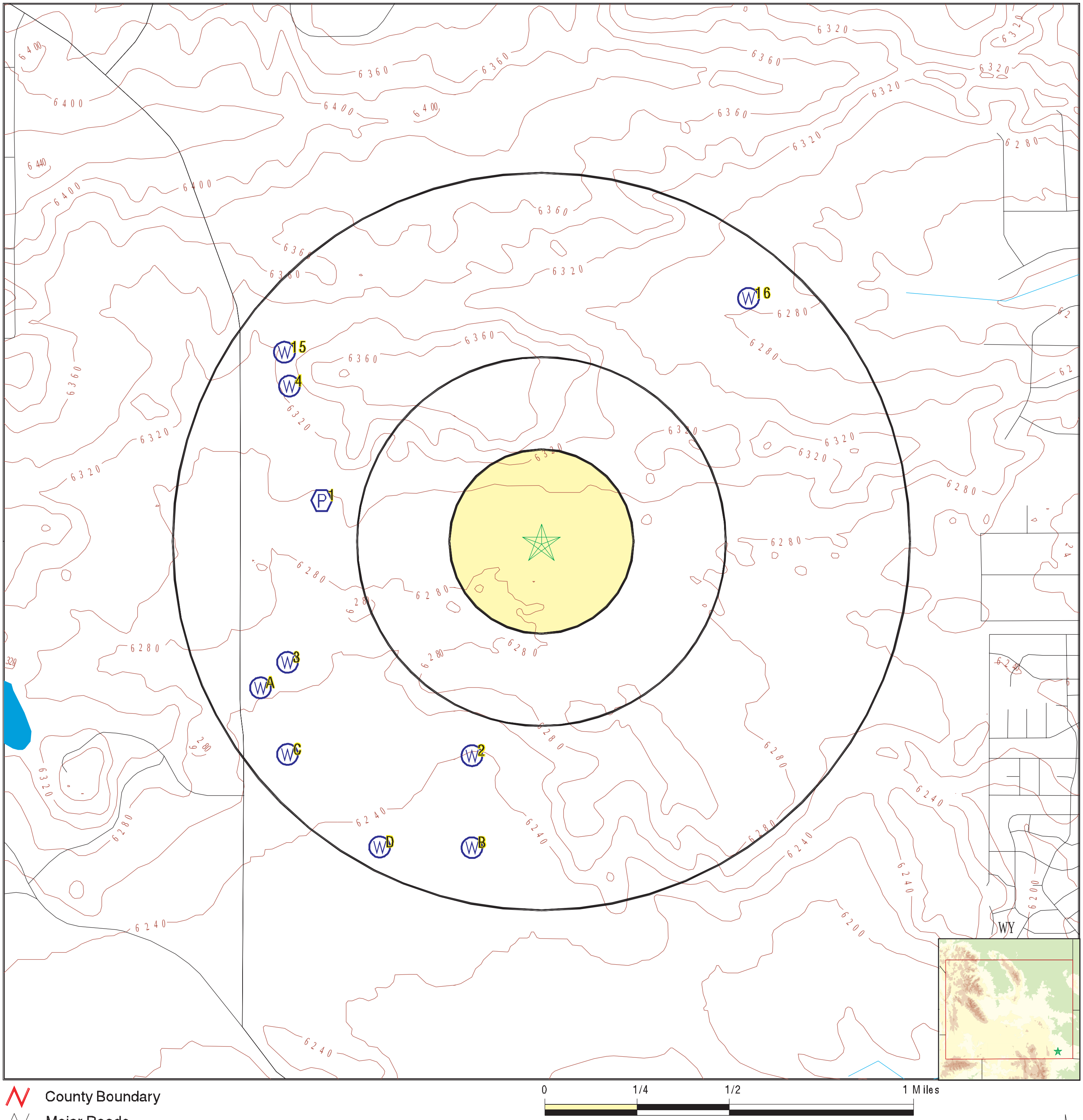
MAP ID	WELL ID	LOCATION FROM TP
1	WY5600011	1/2 - 1 Mile West

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
2	WYSE50000143153	1/2 - 1 Mile SSW
3	WYSE50000033225	1/2 - 1 Mile WSW
4	WYSE50000042868	1/2 - 1 Mile WNW
B6	WYSE50000016904	1/2 - 1 Mile SSW
B7	WYSE50000018665	1/2 - 1 Mile SSW
B8	WYSE50000015028	1/2 - 1 Mile SSW
B9	WYSE50000016571	1/2 - 1 Mile SSW
B10	WYSE50000018867	1/2 - 1 Mile SSW
B11	WYSE50000117396	1/2 - 1 Mile SSW
B12	WYSE50000123706	1/2 - 1 Mile SSW
B13	WYSE50000116892	1/2 - 1 Mile SSW
B14	WYSE50000117326	1/2 - 1 Mile SSW
16	WYSE50000040108	1/2 - 1 Mile NE
C18	WYSE50000117119	1/2 - 1 Mile SW
C19	WYSE50000127045	1/2 - 1 Mile SW
D20	WYSE50000142449	1/2 - 1 Mile SSW
D21	WYSE50000113296	1/2 - 1 Mile SSW
D22	WYSE50000117337	1/2 - 1 Mile SSW

PHYSICAL SETTING SOURCE MAP - 5528367.2s



- County Boundary
- Major Roads
- Contour Lines
- ◎ Earthquake epicenter, Richter 5 or greater
- Ⓦ Water Wells
- Ⓟ Public Water Supply Wells
- ● Cluster of Multiple Icons
- ↑ Groundwater Flow Direction
- GI Indeterminate Groundwater Flow at Location
- GV Groundwater Flow Varies at Location
- ● Oil, gas or related wells

SITE NAME: Cheyenne AASF
ADDRESS: Cheyenne AASF
Fe Warren AFB WY 82005
LAT/LONG: 41.196149 / 104.870486

CLIENT: AECOM
CONTACT: Brittany Kirchmann
INQUIRY #: 5528367.2s
DATE: January 08, 2019 9:19 am

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID Direction Distance Elevation	Database	EDR ID Number
1 **West** **1/2 - 1 Mile** **Higher**	**FRDS PWS**	**WY5600011**

Epa region:	08	State:	WY
Pwsid:	WY5600011	Pwsname:	CHEYENNE BOARD PUB UTILITIES
Cityserved:	Not Reported	Stateserved:	WY
Zipserved:	Not Reported	Fipscounty:	56021
Status:	Active	Retpopsrvd:	58182
Pwssvcconn:	21800	Psource longname:	Surface_water
Pwstype:	CWS	Owner:	Local_Govt
Contact:	KAILEY, RON	Contactorgname:	KAILEY, RON
Contactphone:	307-635-7693	Contactaddress1:	P.O. Box 1469
Contactaddress2:	Not Reported	Contactcity:	CHEYENNE
Contactstate:	WY	Contactzip:	82003
Pwsactivitycode:	A		

Pwsid:	WY5600011	Facid:	15662
Facname:	SHERARD WTP	Factype:	Treatment_plant
Facactivitycode:	A	Trtobjective:	disinfection
Trtprocess:	chlorine dioxide	Factypecode:	TP

Pwsid:	WY5600011	Facid:	15662
Facname:	SHERARD WTP	Factype:	Treatment_plant
Facactivitycode:	A	Trtobjective:	disinfection
Trtprocess:	ozonation, pre	Factypecode:	TP

Pwsid:	WY5600011	Facid:	15662
Facname:	SHERARD WTP	Factype:	Treatment_plant
Facactivitycode:	A	Trtobjective:	particulate removal
Trtprocess:	coagulation	Factypecode:	TP

Pwsid:	WY5600011	Facid:	15662
Facname:	SHERARD WTP	Factype:	Treatment_plant
Facactivitycode:	A	Trtobjective:	particulate removal
Trtprocess:	filtration, rapid sand	Factypecode:	TP

Pwsid:	WY5600011	Facid:	15662
Facname:	SHERARD WTP	Factype:	Treatment_plant
Facactivitycode:	A	Trtobjective:	particulate removal
Trtprocess:	flocculation	Factypecode:	TP

Pwsid:	WY5600011	Facid:	15662
Facname:	SHERARD WTP	Factype:	Treatment_plant
Facactivitycode:	A	Trtobjective:	particulate removal
Trtprocess:	sedimentation	Factypecode:	TP

Pwsid:	WY5600011	Facid:	15662
Facname:	SHERARD WTP	Factype:	Treatment_plant
Facactivitycode:	A	Trtobjective:	other
Trtprocess:	fluoridation	Factypecode:	TP

Pwsid:	WY5600011	Facid:	15662
Facname:	SHERARD WTP	Factype:	Treatment_plant
Facactivitycode:	A	Trtobjective:	disinfection
Trtprocess:	gaseous chlorination, post		
Factypecode:	TP		

PWS ID:	WY5600011	PWS name:	CHEYENNE BOARD PUB UTILITIES

Address:	P.O. BOX 1469	Care of:	Not Reported
City:	CHEYENNE	State:	WY
Zip:	82003	Owner:	CHEYENNE BOARD PUB UTILITIES
Source code:	Surface water	Population:	54500
PWS ID:	WY5600011	PWS type:	Not Reported
PWS name:	Not Reported	PWS address:	Not Reported
PWS city:	Not Reported	PWS state:	Not Reported
PWS zip:	Not Reported	PWS ID:	WY5600011
Activity status:	Active	Date system activated:	Not Reported
Date system deactivated:	Not Reported	Retail population:	00064000
System name:	CHEYENNE BOARD PUB. UTILITIES		
System address:	Not Reported	System address:	P.O. BOX 1469
System city:	CHEYENNE	System state:	WY
System zip:	82003		
Population served:	50,001 - 75,000 Persons	Treatment:	Not Reported
Latitude:	410759	Longitude:	1044900
State:	WY	Latitude degrees:	41
Latitude minutes:	8	Latitude seconds:	51.0000
Longitude degrees:	105	Longitude minutes:	0
Longitude seconds:	1.0000		
State:	WY	Latitude degrees:	41
Latitude minutes:	9	Latitude seconds:	4.0000
Longitude degrees:	104	Longitude minutes:	58
Longitude seconds:	11.0000		
State:	WY	Latitude degrees:	41
Latitude minutes:	9	Latitude seconds:	9.0000
Longitude degrees:	104	Longitude minutes:	58
Longitude seconds:	58.0000		
State:	WY	Latitude degrees:	41
Latitude minutes:	9	Latitude seconds:	14.0000
Longitude degrees:	104	Longitude minutes:	57
Longitude seconds:	25.0000		
State:	WY	Latitude degrees:	41
Latitude minutes:	9	Latitude seconds:	32.0000
Longitude degrees:	105	Longitude minutes:	10
Longitude seconds:	10.0000		
State:	WY	Latitude degrees:	41
Latitude minutes:	9	Latitude seconds:	55.0000
Longitude degrees:	104	Longitude minutes:	56
Longitude seconds:	56.0000		
State:	WY	Latitude degrees:	41
Latitude minutes:	9	Latitude seconds:	56.0000
Longitude degrees:	104	Longitude minutes:	55
Longitude seconds:	20.0000		
State:	WY	Latitude degrees:	41
Latitude minutes:	10	Latitude seconds:	15.0000
Longitude degrees:	105	Longitude minutes:	14
Longitude seconds:	39.0000		
State:	WY	Latitude degrees:	41
Latitude minutes:	10	Latitude seconds:	26.0000

Longitude degrees:	104	Longitude minutes:	56
Longitude seconds:	3.0000		

State:	WY	Latitude degrees:	41
Latitude minutes:	10	Latitude seconds:	28.0000
Longitude degrees:	104	Longitude minutes:	48
Longitude seconds:	57.0000		

State:	WY	Latitude degrees:	41
Latitude minutes:	10	Latitude seconds:	46.0000
Longitude degrees:	104	Longitude minutes:	35
Longitude seconds:	14.0000		

State:	WY	Latitude degrees:	41
Latitude minutes:	11	Latitude seconds:	2.0000
Longitude degrees:	104	Longitude minutes:	57
Longitude seconds:	32.0000		

State:	WY	Latitude degrees:	41
Latitude minutes:	11	Latitude seconds:	3.0000
Longitude degrees:	104	Longitude minutes:	55
Longitude seconds:	45.0000		

State:	WY	Latitude degrees:	41
Latitude minutes:	11	Latitude seconds:	11.0000
Longitude degrees:	104	Longitude minutes:	54
Longitude seconds:	29.0000		

State:	WY	Latitude degrees:	41
Latitude minutes:	11	Latitude seconds:	14.0000
Longitude degrees:	104	Longitude minutes:	56
Longitude seconds:	5.0000		

State:	WY	Latitude degrees:	41
Latitude minutes:	11	Latitude seconds:	25.0000
Longitude degrees:	104	Longitude minutes:	58
Longitude seconds:	18.0000		

State:	WY	Latitude degrees:	41
Latitude minutes:	11	Latitude seconds:	26.0000
Longitude degrees:	104	Longitude minutes:	55
Longitude seconds:	56.0000		

State:	WY	Latitude degrees:	41
Latitude minutes:	11	Latitude seconds:	52.0000
Longitude degrees:	104	Longitude minutes:	52
Longitude seconds:	53.0000		

State:	WY	Latitude degrees:	41
Latitude minutes:	12	Latitude seconds:	11.0000
Longitude degrees:	104	Longitude minutes:	52
Longitude seconds:	46.0000		

State:	WY	Latitude degrees:	41
Latitude minutes:	12	Latitude seconds:	29.0000
Longitude degrees:	106	Longitude minutes:	17
Longitude seconds:	2.0000		

State:	WY	Latitude degrees:	41
Latitude minutes:	12	Latitude seconds:	40.0000
Longitude degrees:	104	Longitude minutes:	50
Longitude seconds:	58.0000		

State:	WY	Latitude degrees:	41
Latitude minutes:	12	Latitude seconds:	57.0000
Longitude degrees:	105	Longitude minutes:	12
Longitude seconds:	57.0000		

State:	WY	Latitude degrees:	41
Latitude minutes:	12	Latitude seconds:	58.0000
Longitude degrees:	105	Longitude minutes:	12
Longitude seconds:	40.0000		

State:	WY	Latitude degrees:	41
Latitude minutes:	14	Latitude seconds:	14.0000
Longitude degrees:	105	Longitude minutes:	5
Longitude seconds:	22.0000		

State:	WY	Latitude degrees:	41
Latitude minutes:	14	Latitude seconds:	25.0000
Longitude degrees:	105	Longitude minutes:	5
Longitude seconds:	16.0000		

State:	WY	Latitude degrees:	41
Latitude minutes:	14	Latitude seconds:	35.0000
Longitude degrees:	105	Longitude minutes:	4
Longitude seconds:	27.0000		

State:	WY	Latitude degrees:	41
Latitude minutes:	14	Latitude seconds:	49.0000
Longitude degrees:	105	Longitude minutes:	6
Longitude seconds:	22.0000		

State:	WY	Latitude degrees:	41
Latitude minutes:	15	Latitude seconds:	17.0000
Longitude degrees:	105	Longitude minutes:	5
Longitude seconds:	56.0000		

State:	WY	Latitude degrees:	41
Latitude minutes:	15	Latitude seconds:	34.0000
Longitude degrees:	105	Longitude minutes:	1
Longitude seconds:	35.0000		

State:	WY	Latitude degrees:	41
Latitude minutes:	17	Latitude seconds:	29.0000
Longitude degrees:	105	Longitude minutes:	1
Longitude seconds:	50.0000		

State:	WY	Latitude degrees:	41
Latitude minutes:	19	Latitude seconds:	16.0000
Longitude degrees:	105	Longitude minutes:	3
Longitude seconds:	53.0000		

State:	WY	Latitude degrees:	31
Latitude minutes:	8	Latitude seconds:	45.0000
Longitude degrees:	106	Longitude minutes:	16
Longitude seconds:	15.0000		

State:	WY	Latitude degrees:	41
Latitude minutes:	4	Latitude seconds:	12.0000
Longitude degrees:	104	Longitude minutes:	58
Longitude seconds:	37.0000		

State:	WY	Latitude degrees:	41
Latitude minutes:	5	Latitude seconds:	25.0000

Longitude degrees: 104
Longitude minutes: 55
Longitude seconds: 29.0000

State: WY
Latitude degrees: 41
Latitude minutes: 5
Latitude seconds: 26.0000
Longitude degrees: 104
Longitude minutes: 55
Longitude seconds: 50.0000

State: WY
Latitude degrees: 41
Latitude minutes: 5
Latitude seconds: 46.0000
Longitude degrees: 104
Longitude minutes: 57
Longitude seconds: 37.0000

State: WY
Latitude degrees: 41
Latitude minutes: 5
Latitude seconds: 47.0000
Longitude degrees: 104
Longitude minutes: 59
Longitude seconds: 57.0000

State: WY
Latitude degrees: 41
Latitude minutes: 6
Latitude seconds: 21.0000
Longitude degrees: 104
Longitude minutes: 57
Longitude seconds: 57.0000

State: WY
Latitude degrees: 41
Latitude minutes: 7
Latitude seconds: 55.0000
Longitude degrees: 104
Longitude minutes: 57
Longitude seconds: 59.0000

State: WY
Latitude degrees: 41
Latitude minutes: 8
Latitude seconds: 2.0000
Longitude degrees: 104
Longitude minutes: 58
Longitude seconds: 16.0000

State: WY
Latitude degrees: 41
Latitude minutes: 8
Latitude seconds: 16.0000
Longitude degrees: 105
Longitude minutes: 0
Longitude seconds: 7.0000

State: WY
Latitude degrees: 41
Latitude minutes: 8
Latitude seconds: 22.0000
Longitude degrees: 104
Longitude minutes: 57
Longitude seconds: 35.0000

State: WY
Latitude degrees: 41
Latitude minutes: 8
Latitude seconds: 24.0000
Longitude degrees: 104
Longitude minutes: 56
Longitude seconds: 52.0000

State: WY
Latitude degrees: 41
Latitude minutes: 8
Latitude seconds: 25.0000
Longitude degrees: 104
Longitude minutes: 58
Longitude seconds: 7.0000

State: WY
Latitude degrees: 41
Latitude minutes: 8
Latitude seconds: 35.0000
Longitude degrees: 105
Longitude minutes: 0
Longitude seconds: 13.0000

PWS currently has or had major violation(s) or enforcement:Yes

Violation ID: 9300006
Violation source ID: Not Reported
PWS telephone: Not Reported
Contaminant: Turbidity

Violation type:	Monitoring, Regular	Violation start date:	020193
Violation end date:	022893	Violation period (months):	001
Violation awareness date:	Not Reported	Major violator:	No
Maximum contaminant level:	Not Reported	Number of required samples:	028
Number of samples taken:	025	Analysis method:	Not Reported
Analysis result:	Not Reported		

PWS currently has or had major violation(s) or enforcement:Yes

Violation ID:	9400008	Violation source ID:	Not Reported
PWS telephone:	Not Reported	Contaminant:	COLIFORM (TCR)
Violation type:	Monitoring, Routine Minor (TCR)		
Violation start date:	100193	Violation end date:	103193
Violation period (months):	001	Violation awareness date:	Not Reported
Major violator:	No	Maximum contaminant level:	Not Reported
Number of required samples:	Not Reported	Number of samples taken:	Not Reported
Analysis method:	Not Reported	Analysis result:	Not Reported

PWS currently has or had major violation(s) or enforcement:Yes

Violation ID:	9400001	Violation source ID:	Not Reported
PWS telephone:	Not Reported	Contaminant:	LEAD & COPPER RULE
Violation type:	Initial Tap Sampling for Pb and Cu		
Violation start date:	010194	Violation end date:	063094
Violation period (months):	006	Violation awareness date:	Not Reported
Major violator:	Not Reported	Maximum contaminant level:	Not Reported
Number of required samples:	Not Reported	Number of samples taken:	Not Reported
Analysis method:	Not Reported	Analysis result:	Not Reported

PWS currently has or had major violation(s) or enforcement:Yes

Violation ID:	9400009	Violation source ID:	Not Reported
PWS telephone:	Not Reported	Contaminant:	COLIFORM (TCR)
Violation type:	Monitoring, Routine Minor (TCR)		
Violation start date:	030194	Violation end date:	033194
Violation period (months):	001	Violation awareness date:	Not Reported
Major violator:	No	Maximum contaminant level:	Not Reported
Number of required samples:	Not Reported	Number of samples taken:	Not Reported
Analysis method:	Not Reported	Analysis result:	Not Reported

System Name:	CHEYENNE BOARD PUB UTILITI		
Violation Type:	51	Contaminant:	5000
Compliance Begin:	1994-01-01	Compliance End:	2015-12-31
Violation ID:	9400001	Enforcement Date:	1999-04-13
Enforcement Action:	EOX		

System Name:	CHEYENNE BOARD PUB UTILITI		
Violation Type:	51	Contaminant:	5000
Compliance Begin:	1994-01-01	Compliance End:	1994-06-30
Violation ID:	9400001	Enforcement Date:	Not Reported
Enforcement Action:	Not Reported		

System Name:	CHEYENNE BOARD PUB UTILITIE		
Violation Type:	51	Contaminant:	5000
Compliance Begin:	1994-01-01	Compliance End:	2015-12-31
Violation ID:	9400001	Enforcement Date:	Not Reported
Enforcement Action:	Not Reported		

System Name:	CHEYENNE BOARD PUB UTILITI		
Violation Type:	24	Contaminant:	3100
Compliance Begin:	1994-03-01	Compliance End:	1994-03-31
Violation ID:	9400009	Enforcement Date:	Not Reported

Enforcement Action:	Not Reported		
System Name:	CHEYENNE BOARD PUB UTILITI		
Violation Type:	24	Contaminant:	3100
Compliance Begin:	1995-07-01	Compliance End:	1995-07-31
Violation ID:	9500001	Enforcement Date:	Not Reported
Enforcement Action:	Not Reported		

2
SSW
1/2 - 1 Mile
Lower

WY WELLS **WYSE50000143153**

Permit #:	P81716.0W	Permit Issue Date:	29-JAN-90
Status:	Complete	Well Applicant:	USDI, GEOLOGICAL SURVEY
Facility Name:	P 33	Uses:	Monitoring
Yield (Gal/Min):	0	Static Depth (ft):	10
Well Depth:	20	Depth to top of Main Water Zone:	-1
Depth to bottom of Main Water Zone:	-1	Well Log:	NULL
Chemical Analysis on File:	No		

3
WSW
1/2 - 1 Mile
Lower

WY WELLS **WYSE50000033225**

Permit #:	P13246.0P	Permit Issue Date:	31-DEC-29
Status:	Complete		
Well Applicant:	WICKHAM ORRIS L. & ALICE B.		
Facility Name:	WICKHAM #13	Uses:	Domestic_GW; Stock
Yield (Gal/Min):	24.5	Static Depth (ft):	24
Well Depth:	72	Depth to top of Main Water Zone:	-1
Depth to bottom of Main Water Zone:	-1	Well Log:	NULL
Chemical Analysis on File:	Yes		

4
WNW
1/2 - 1 Mile
Higher

WY WELLS **WYSE50000042868**

Permit #:	P10116.0P	Permit Issue Date:	08-OCT-91
Status:	Complete	Well Applicant:	HUNNICUTT DELL C.
Facility Name:	HUNNICUTT #2	Uses:	Stock
Yield (Gal/Min):	4	Static Depth (ft):	180
Well Depth:	200	Depth to top of Main Water Zone:	-1
Depth to bottom of Main Water Zone:	-1	Well Log:	NULL
Chemical Analysis on File:	No		

A5
WSW
1/2 - 1 Mile
Lower

FED USGS **USGS40001334813**

Organization ID:	USGS-WY	Organization Name:	USGS Wyoming Water Science Center
Monitor Location:	14-067-10ccc02	Type:	Well

Description: Not Reported HUC: 10190009
Drainage Area: Not Reported Drainage Area Units: Not Reported
Contrib Drainage Area: Not Reported Contrib Drainage Area Unts: Not Reported
Aquifer: High Plains aquifer Formation Type: Ogallala Formation
Aquifer Type: Not Reported Construction Date: Not Reported
Well Depth: 77 Well Depth Units: ft
Well Hole Depth: Not Reported Well Hole Depth Units: Not Reported

Ground water levels,Number of Measurements: 51 Level reading date: 1951-12-31
Feet below surface: 19.80 Feet to sea level: Not Reported
Note: Not Reported

Level reading date: 1950-02-27 Feet below surface: 14.19
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1945-08-29 Feet below surface: 13.45
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1945-02-14 Feet below surface: 14.76
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1944-05-10 Feet below surface: 14.09
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1944-01-29 Feet below surface: 15.42
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1943-12-27 Feet below surface: 14.67
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1943-11-16 Feet below surface: 15.07
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1943-10-04 Feet below surface: 15.64
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1943-09-09 Feet below surface: 15.33
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1943-08-12 Feet below surface: 14.42
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1943-07-12 Feet below surface: 13.70
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1943-06-08 Feet below surface: 13.60
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1943-05-27 Feet below surface: 16.79
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1943-05-10 Feet below surface: 13.97
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1943-04-14 Feet below surface: 14.44
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1943-03-08 Feet below surface: 14.83
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1943-02-04 Feet below surface: 14.61

Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1942-12-23 Feet below surface: 14.83
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1942-11-27 Feet below surface: 14.60
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1942-10-25 Feet below surface: 15.47
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1942-09-22 Feet below surface: 15.86
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1942-08-24 Feet below surface: 15.64
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1942-08-12 Feet below surface: 15.75
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1942-08-05 Feet below surface: 16.20
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1942-07-29 Feet below surface: 16.13
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1942-07-22 Feet below surface: 16.23
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1942-07-15 Feet below surface: 15.90
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1942-07-08 Feet below surface: 15.84
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1942-07-01 Feet below surface: 16.26
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1942-06-24 Feet below surface: 16.19
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1942-06-17 Feet below surface: 16.61
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1942-06-10 Feet below surface: 16.76
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1942-06-03 Feet below surface: 17.02
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1942-05-27 Feet below surface: 16.79
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1942-05-22 Feet below surface: 17.19
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1942-05-13 Feet below surface: 17.33
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1942-04-29 Feet below surface: 18.28
Feet to sea level: Not Reported Note: Not Reported

Level reading date:	1942-04-15	Feet below surface:	19.12
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1942-04-08	Feet below surface:	19.28
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1942-04-01	Feet below surface:	19.55
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1942-03-25	Feet below surface:	19.63
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1942-03-04	Feet below surface:	20.30
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1942-02-18	Feet below surface:	20.09
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1942-02-11	Feet below surface:	19.89
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1942-01-21	Feet below surface:	20.34
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1941-12-31	Feet below surface:	19.80
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1941-12-18	Feet below surface:	19.89
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1941-12-11	Feet below surface:	19.71
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1941-11-13	Feet below surface:	20.17
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1941-10-30	Feet below surface:	20.27
Feet to sea level:	Not Reported	Note:	Not Reported

B6
SSW
1/2 - 1 Mile
Lower

WY WELLS **WYSE50000016904**

Permit #:	P82221.0W	Permit Issue Date:	16-APR-90
Status:	Complete	Well Applicant:	U. S. GEOLOGICAL SURVEY
Facility Name:	155	Uses:	Monitoring
Yield (Gal/Min):	0	Static Depth (ft):	20
Well Depth:	33.5	Depth to top of Main Water Zone:	-1
Depth to bottom of Main Water Zone:	-1	Well Log:	NULL
Chemical Analysis on File:	No		

B7
SSW
1/2 - 1 Mile
Lower

WY WELLS **WYSE50000018665**

Permit #:	P82219.0W	Permit Issue Date:	16-APR-90
Status:	Complete	Well Applicant:	U. S. GEOLOGICAL SURVEY

Facility Name:	153	Uses:	Monitoring
Yield (Gal/Min):	0	Static Depth (ft):	28
Well Depth:	40	Depth to top of Main Water Zone:	-1
Depth to bottom of Main Water Zone:	-1	Well Log:	NULL
Chemical Analysis on File:	No		

B8
SSW
1/2 - 1 Mile
Lower

WY WELLS **WYSE50000015028**

Permit #:	P81714.0W	Permit Issue Date:	29-JAN-90
Status:	Complete	Well Applicant:	USDI, GEOLOGICAL SURVEY
Facility Name:	P 31	Uses:	Monitoring
Yield (Gal/Min):	0	Static Depth (ft):	26
Well Depth:	40	Depth to top of Main Water Zone:	-1
Depth to bottom of Main Water Zone:	-1	Well Log:	NULL
Chemical Analysis on File:	No		

B9
SSW
1/2 - 1 Mile
Lower

WY WELLS **WYSE50000016571**

Permit #:	P82218.0W	Permit Issue Date:	16-APR-90
Status:	Complete	Well Applicant:	U. S. GEOLOGICAL SURVEY
Facility Name:	152	Uses:	Monitoring
Yield (Gal/Min):	0	Static Depth (ft):	23
Well Depth:	39	Depth to top of Main Water Zone:	-1
Depth to bottom of Main Water Zone:	-1	Well Log:	NULL
Chemical Analysis on File:	No		

B10
SSW
1/2 - 1 Mile
Lower

WY WELLS **WYSE50000018867**

Permit #:	P82220.0W	Permit Issue Date:	16-APR-90
Status:	Complete	Well Applicant:	U. S. GEOLOGICAL SURVEY
Facility Name:	154	Uses:	Monitoring
Yield (Gal/Min):	0	Static Depth (ft):	25
Well Depth:	43	Depth to top of Main Water Zone:	-1
Depth to bottom of Main Water Zone:	-1	Well Log:	NULL
Chemical Analysis on File:	No		

B11
SSW
1/2 - 1 Mile
Lower

WY WELLS **WYSE50000117396**

Permit #:	P97126.0W	Permit Issue Date:	09-SEP-94
Status:	Complete	Well Applicant:	U.S. Geological Survey
Facility Name:	601R	Uses:	Monitoring
Yield (Gal/Min):	0	Static Depth (ft):	30

Well Depth:	39	Depth to top of Main Water Zone:	-1
Depth to bottom of Main Water Zone:	-1	Well Log:	NULL
Chemical Analysis on File:	No		

B12
SSW
1/2 - 1 Mile
Lower

WY WELLS WYSE50000123706

Permit #:	P97123.0W	Permit Issue Date:	09-SEP-94
Status:	Complete	Well Applicant:	U.S. Geological Survey
Facility Name:	604	Uses:	Monitoring
Yield (Gal/Min):	0	Static Depth (ft):	34
Well Depth:	46	Depth to top of Main Water Zone:	-1
Depth to bottom of Main Water Zone:	-1	Well Log:	NULL
Chemical Analysis on File:	No		

B13
SSW
1/2 - 1 Mile
Lower

WY WELLS WYSE50000116892

Permit #:	P97124.0W	Permit Issue Date:	09-SEP-94
Status:	Complete	Well Applicant:	U.S. Geological Survey
Facility Name:	603	Uses:	Monitoring
Yield (Gal/Min):	0	Static Depth (ft):	37
Well Depth:	44	Depth to top of Main Water Zone:	-1
Depth to bottom of Main Water Zone:	-1	Well Log:	NULL
Chemical Analysis on File:	No		

B14
SSW
1/2 - 1 Mile
Lower

WY WELLS WYSE50000117326

Permit #:	P97120.0W	Permit Issue Date:	09-SEP-94
Status:	Complete	Well Applicant:	U.S. Geological Survey
Facility Name:	607R	Uses:	Monitoring
Yield (Gal/Min):	0	Static Depth (ft):	31
Well Depth:	40	Depth to top of Main Water Zone:	-1
Depth to bottom of Main Water Zone:	-1	Well Log:	NULL
Chemical Analysis on File:	No		

15
NW
1/2 - 1 Mile
Higher

FED USGS USGS40001334980

Organization ID:	USGS-WY	Organization Name:	USGS Wyoming Water Science Center
Monitor Location:	14-067-10bbb01	Type:	Well
Description:	Not Reported	HUC:	10190009
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	High Plains aquifer	Formation Type:	Ogallala Formation

Aquifer Type:	Not Reported	Construction Date:	Not Reported
Well Depth:	Not Reported	Well Depth Units:	Not Reported
Well Hole Depth:	Not Reported	Well Hole Depth Units:	Not Reported

---

16
NE
1/2 - 1 Mile
Lower

WY WELLS **WYSE50000040108**

Permit #:	P39960.0W	Permit Issue Date:	19-SEP-77
Status:	Complete		
Well Applicant:	LARAMIE COUNTY SCHOOL DISTRICT #1		
Facility Name:	LARAMIE COUNTY SCHOOL DISTRICT #1		
Uses:	Domestic_GW; Stock		
Yield (Gal/Min):	8	Static Depth (ft):	135
Well Depth:	315	Depth to top of Main Water Zone:	255
Depth to bottom of Main Water Zone:	315	Well Log:	NULL
Chemical Analysis on File:	No		

A17
WSW
1/2 - 1 Mile
Lower

FED USGS **USGS40001334811**

Organization ID:	USGS-WY	Organization Name:	USGS Wyoming Water Science Center
Monitor Location:	14-067-10ccc01	Type:	Well
Description:	Not Reported	HUC:	10190009
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	High Plains aquifer	Formation Type:	Ogallala Formation
Aquifer Type:	Not Reported	Construction Date:	Not Reported
Well Depth:	77	Well Depth Units:	ft
Well Hole Depth:	Not Reported	Well Hole Depth Units:	Not Reported

Ground water levels,Number of Measurements:	1	Level reading date:	1941-10-01
Feet below surface:	20.00	Feet to sea level:	Not Reported
Note:	Not Reported		

C18
SW
1/2 - 1 Mile
Lower

WY WELLS **WYSE50000117119**

Permit #:	P97128.0W	Permit Issue Date:	09-SEP-94
Status:	Complete	Well Applicant:	U.S. Geological Survey
Facility Name:	310	Uses:	Monitoring
Yield (Gal/Min):	0	Static Depth (ft):	11
Well Depth:	21	Depth to top of Main Water Zone:	-1
Depth to bottom of Main Water Zone:	-1	Well Log:	NULL
Chemical Analysis on File:	No		

Map ID Direction Distance Elevation	Database	EDR ID Number
C19 **SW** **1/2 - 1 Mile** **Lower**	**WY WELLS**	**WYSE50000127045**

Permit #:	P97125.0W	Permit Issue Date:	09-SEP-94
Status:	Complete	Well Applicant:	U.S. Geological Survey
Facility Name:	602	Uses:	Monitoring
Yield (Gal/Min):	0	Static Depth (ft):	37
Well Depth:	46	Depth to top of Main Water Zone:	-1
Depth to bottom of Main Water Zone:	-1	Well Log:	NULL
Chemical Analysis on File:	No		

D20 **SSW** **1/2 - 1 Mile** **Lower**	**WY WELLS**	**WYSE50000142449**

Permit #:	P81717.0W	Permit Issue Date:	29-JAN-90
Status:	Complete	Well Applicant:	USDI, GEOLOGICAL SURVEY
Facility Name:	P 34	Uses:	Monitoring
Yield (Gal/Min):	0	Static Depth (ft):	7
Well Depth:	20	Depth to top of Main Water Zone:	-1
Depth to bottom of Main Water Zone:	-1	Well Log:	NULL
Chemical Analysis on File:	No		

D21 **SSW** **1/2 - 1 Mile** **Lower**	**WY WELLS**	**WYSE50000113296**

Permit #:	P97127.0W	Permit Issue Date:	09-SEP-94
Status:	Complete	Well Applicant:	U.S. Geological Survey
Facility Name:	600R	Uses:	Monitoring
Yield (Gal/Min):	0	Static Depth (ft):	27
Well Depth:	36.5	Depth to top of Main Water Zone:	-1
Depth to bottom of Main Water Zone:	-1	Well Log:	NULL
Chemical Analysis on File:	No		

D22 **SSW** **1/2 - 1 Mile** **Lower**	**WY WELLS**	**WYSE50000117337**

Permit #:	P97122.0W	Permit Issue Date:	09-SEP-94
Status:	Complete	Well Applicant:	U.S. Geological Survey
Facility Name:	605R	Uses:	Monitoring
Yield (Gal/Min):	0	Static Depth (ft):	27
Well Depth:	29.5	Depth to top of Main Water Zone:	-1
Depth to bottom of Main Water Zone:	-1	Well Log:	NULL
Chemical Analysis on File:	No		

AREA RADON INFORMATION

State Database: WY Radon

Radon Test Results

% Elev.	Total kits	# tests 4-10 pCi/L	# tests 10-20 pCi/L	# Tests>20 pCi/L
22%	2358	396	89	42

Federal EPA Radon Zone for LARAMIE County: 1

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for LARAMIE COUNTY, WY

Number of sites tested: 55

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	1.750 pCi/L	100%	0%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	3.020 pCi/L	75%	24%	2%

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

HYDROLOGIC INFORMATION

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: National Wetlands Inventory
Source: Wyoming Geospatial Hub
Telephone: 307-777-4600

HYDROGEOLOGIC INFORMATION

AQUIFLOW^{R} Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Service, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Wyoming Well Permits
Source: Wyoming State Engineer’s Office
Telephone: 307-777-6148
Wyoming well permit locations on file with the Wyoming State Engineer’s Office.

OTHER STATE DATABASE INFORMATION

Oil and Gas Well Location Information
Source: Oil and Gas Conservation Commission
Telephone: 307-234-7147

RADON

State Database: WY Radon
Source: Department of Health
Telephone: 307-777-6015
Wyoming Radon Project

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

Earthquake Fault Lines: The fault lines displayed on EDR’s Topographic map are digitized quaternary faultlines, prepared in 1975 by the United State Geological Survey

PHYSICAL SETTING SOURCE RECORDS SEARCHED

STREET AND ADDRESS INFORMATION

Cheyenne AASF
Cheyenne AASF
Fe Warren AFB, WY 82005

Inquiry Number: 5528367.2s
January 08, 2019

EDR Summary Radius Map Report

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

TABLE OF CONTENTS

SECTION **PAGE**

GEOCHECK ADDENDUM

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13), the ASTM Standard Practice for Environmental Site Assessments for Forestland or Rural Property (E 2247-16), the ASTM Standard Practice for Limited Environmental Due Diligence: Transaction Screen Process (E 1528-14) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

CHEYENNE AASF
FE WARREN AFB, WY 82005

COORDINATES

Latitude (North):	41.1961490 - 41˚ 11' 46.13''
Longitude (West):	104.8704860 - 104˚ 52' 13.74''
Universal Tranverse Mercator:	Zone 13
UTM X (Meters):	510860.2
UTM Y (Meters):	4560327.5
Elevation:	6290 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property:	TP
Source:	U.S. Geological Survey
Target Property:	W
Source:	U.S. Geological Survey

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20150620
Source:	USDA

MAPPED SITES SUMMARY

Target Property Address:
CHEYENNE AASF
FE WARREN AFB, WY 82005

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
Reg	FRANCIS E. WARREN AI		DOD	Same	1 ft.
1	HUNNICUTT OFF-BASE P		UXO	Higher	1529, 0.290, West

EXECUTIVE SUMMARY

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.
DOD: A review of the DOD list, as provided by EDR, and dated 12/31/2005 has revealed that there is 1 DOD site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
FRANCIS E. WARREN AI		0 - 1/8 (0.000 mi.)	0	8

UXO: A review of the UXO list, as provided by EDR, and dated 09/30/2017 has revealed that there is 1 UXO site within approximately 1 mile of the target property.

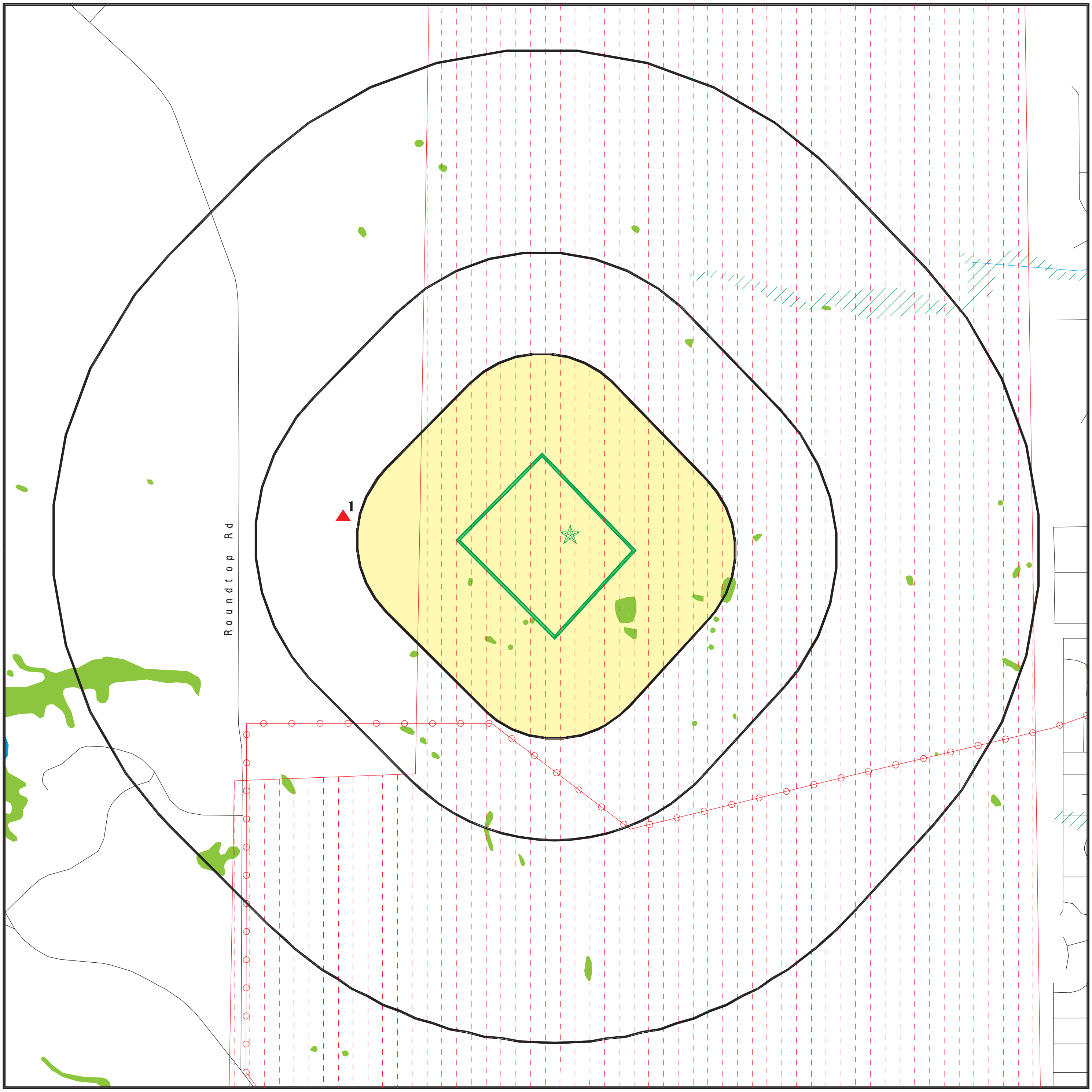
Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
HUNNICUTT OFF-BASE P		W 1/4 - 1/2 (0.290 mi.)	1	8

Count: 2 records.

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
CHEYENNE	S106862002	NIELSEN TRUST PROPERTY	ADJACENT TO SW CORNER OF CHEYE		VCP
CHEYENNE	S116439392	CHEYENNE ATCT	ON CHEYENNE AIRPORT		RGA LUST

OVERVIEW MAP - 5528367.2S



0 1/4 1/2 1 Miles

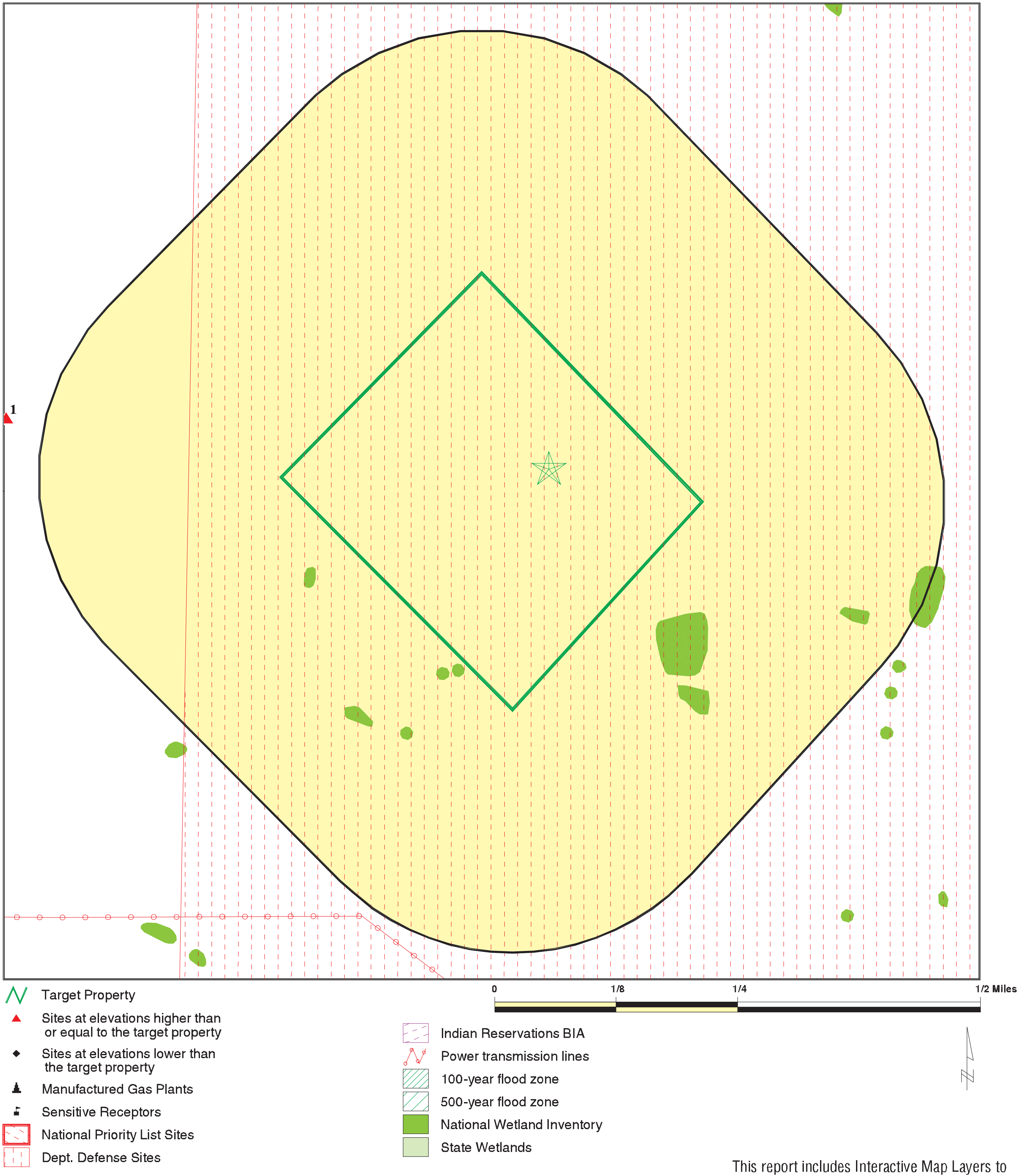
- Target Property
- ▲ Sites at elevations higher than or equal to the target property
- ◆ Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Power transmission lines
- ▨ 100-year flood zone
- ▨ 500-year flood zone
- 🟩 National Wetland Inventory
- State Wetlands

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Cheyenne AASF
ADDRESS: Cheyenne AASF
Fe Warren AFB WY 82005
LAT/LONG: 41.196149 / 104.870486

CLIENT: AECOM
CONTACT: Brittany Kirchmann
INQUIRY #: 5528367.2s
DATE: January 08, 2019 9:18 am

DETAIL MAP - 5528367.2S



This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Cheyenne AASF
ADDRESS: Cheyenne AASF
Fe Warren AFB WY 82005
LAT/LONG: 41.196149 / 104.870486

CLIENT: AECOM
CONTACT: Brittany Kirchmann
INQUIRY #: 5528367.2s
DATE: January 08, 2019 9:19 am

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	1.000		0	0	0	0	NR	0
Federal Delisted NPL site list								
Delisted NPL	1.000		0	0	0	0	NR	0
Federal CERCLIS list								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
SEMS	0.500		0	0	0	NR	NR	0
Federal CERCLIS NFRAP site list								
SEMS-ARCHIVE	0.500		0	0	0	NR	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS	1.000		0	0	0	0	NR	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Federal RCRA generators list								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		0	0	NR	NR	NR	0
RCRA-CESQG	0.250		0	0	NR	NR	NR	0
Federal institutional controls / engineering controls registries								
LUCIS	0.500		0	0	0	NR	NR	0
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROL	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	TP		NR	NR	NR	NR	NR	0
State- and tribal - equivalent CERCLIS								
SHWS	N/A		N/A	N/A	N/A	N/A	N/A	N/A
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF	0.500		0	0	0	NR	NR	0
SHWF	0.500		0	0	0	NR	NR	0
State and tribal leaking storage tank lists								
INDIAN LUST	0.500		0	0	0	NR	NR	0
LTANKS	0.500		0	0	0	NR	NR	0
State and tribal registered storage tank lists								
FEMA UST	0.250		0	0	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
UST	0.250		0	0	NR	NR	NR	0
AST	0.250		0	0	NR	NR	NR	0
INDIAN UST	0.250		0	0	NR	NR	NR	0
TANKS	0.250		0	0	NR	NR	NR	0
State and tribal institutional control / engineering control registries								
ENG CONTROLS	0.500		0	0	0	NR	NR	0
INST CONTROL	0.500		0	0	0	NR	NR	0
State and tribal voluntary cleanup sites								
INDIAN VCP	0.500		0	0	0	NR	NR	0
VCP	0.500		0	0	0	NR	NR	0
State and tribal Brownfields sites								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
SWRCY	0.500		0	0	0	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
IHS OPEN DUMPS	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US HIST CDL	TP		NR	NR	NR	NR	NR	0
CDL	TP		NR	NR	NR	NR	NR	0
US CDL	TP		NR	NR	NR	NR	NR	0
Local Land Records								
LIENS 2	TP		NR	NR	NR	NR	NR	0
Records of Emergency Release Reports								
HMIRS	TP		NR	NR	NR	NR	NR	0
SPILLS	TP		NR	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		0	0	NR	NR	NR	0
FUDS	1.000		0	0	0	0	NR	0
DOD	1.000		1	0	0	0	NR	1
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
US FIN ASSUR	TP		NR	NR	NR	NR	NR	0
EPA WATCH LIST	TP		NR	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	TP		NR	NR	NR	NR	NR	0
TRIS	TP		NR	NR	NR	NR	NR	0
SSTS	TP		NR	NR	NR	NR	NR	0
ROD	1.000		0	0	0	0	NR	0
RMP	TP		NR	NR	NR	NR	NR	0
RAATS	TP		NR	NR	NR	NR	NR	0
PRP	TP		NR	NR	NR	NR	NR	0
PADS	TP		NR	NR	NR	NR	NR	0
ICIS	TP		NR	NR	NR	NR	NR	0
FTTS	TP		NR	NR	NR	NR	NR	0
MLTS	TP		NR	NR	NR	NR	NR	0
COAL ASH DOE	TP		NR	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	TP		NR	NR	NR	NR	NR	0
RADINFO	TP		NR	NR	NR	NR	NR	0
HIST FTTS	TP		NR	NR	NR	NR	NR	0
DOT OPS	TP		NR	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	1.000		0	0	0	0	NR	0
FUSRAP	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	TP		NR	NR	NR	NR	NR	0
US AIRS	TP		NR	NR	NR	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
ABANDONED MINES	0.250		0	0	NR	NR	NR	0
FINDS	TP		NR	NR	NR	NR	NR	0
ECHO	TP		NR	NR	NR	NR	NR	0
UXO	1.000		0	0	1	0	NR	1
DOCKET HWC	TP		NR	NR	NR	NR	NR	0
FUELS PROGRAM	0.250		0	0	NR	NR	NR	0
EMI	TP		NR	NR	NR	NR	NR	0
ASBESTOS	TP		NR	NR	NR	NR	NR	0
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
Financial Assurance	TP		NR	NR	NR	NR	NR	0
MINES	0.250		0	0	NR	NR	NR	0
UIC	TP		NR	NR	NR	NR	NR	0
NPDES	TP		NR	NR	NR	NR	NR	0

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP	1.000		0	0	0	0	NR	0
EDR Hist Auto	0.125		0	NR	NR	NR	NR	0
EDR Hist Cleaner	0.125		0	NR	NR	NR	NR	0

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LF	TP		NR	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
RGA LUST	TP		NR	NR	NR	NR	NR	0
- Totals --		0	1	0	1	0	0	2

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

N/A = This State does not maintain a SHWS list. See the Federal CERCLIS list.

Map ID Direction Distance Elevation	Site	Database(s)	EDR ID Number EPA ID Number
DOD **Region** **< 1/8** **1 ft.**	**FRANCIS E. WARREN AIR FORCE BASE** **FRANCIS E. WARREN AIR FOR (County), WY** **Click here for full text details**	**DOD**	**CUSA122479** **N/A**
1 **West** **1/4-1/2** **0.290 mi.** **1529 ft.** **Relative:** **Higher**	**HUNNICUTT OFF-BASE PROPERTY** **F. E. WARREN AFB, WY** **Click here for full text details**	**UXO**	**1018153746** **N/A**

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

St	Acronym	Full Name	Government Agency	Gov Date	Arvl. Date	Active Date
WY	AIRS	Air Quality Permit Listing	Department of Environmental Quality	08/27/2018	08/29/2018	11/01/2018
WY	ASBESTOS	Asbestos Notification Listing	Department of Environmental Quality	06/13/2018	06/15/2018	07/27/2018
WY	AST	Wyoming Aboveground Storage Tanks	Department of Environmental Quality	05/23/2008	07/24/2008	08/13/2008
WY	BROWNFIELDS	Brownfields Sites Listing	Department of Environmental Quality	11/19/2018	11/19/2018	01/04/2019
WY	CDL	Clandestine Drug Lab Site Locations	Department of Health	05/01/2018	06/08/2018	07/27/2018
WY	DRYCLEANERS	Drycleaner Facility Listing	Department of Environmental Quality	02/02/2017	06/01/2017	05/11/2018
WY	ENG CONTROLS	Engineering Controls Site Listing	Department of Environmental Quality	11/19/2018	11/19/2018	01/04/2019
WY	Financial Assurance	Financial Assurance Information listing	Department of Environmental Quality	05/23/2008	06/17/2008	07/24/2008
WY	INST CONTROL	Sites with Institutional Controls	Department of Environmental Quality	11/19/2018	11/19/2018	01/04/2019
WY	LTANKS	Known Contaminated Sites	Department of Environmental Quality	07/09/2018	07/13/2018	08/28/2018
WY	MINES	Mine Locations Listing	Wyoming Geographic Information Science Center	04/09/2018	06/28/2018	07/27/2018
WY	NPDES	Wastewater Permit Listing	Department of Environmental Quality	06/04/2018	06/08/2018	07/27/2018
WY	RGA LF	Recovered Government Archive Solid Waste Facilities List	Department of Environmental Quality		07/01/2013	01/17/2014
WY	RGA LUST	Recovered Government Archive Leaking Underground Storage Tan	Department of Environmental Quality		07/01/2013	01/04/2014
WY	SHWF	Solid & Hazardous Waste Facility Database	Department of Environmental Quality	01/26/2017	03/01/2017	08/29/2017
WY	SHWS	This state does not maintain a SHWS list. See the Federal CE	Department of Environmental Quality			
WY	SPILLS	SPILL Database	Department of Environmental Quality	07/03/2018	08/10/2018	09/06/2018
WY	SWF/LF	Solid Waste Facility Database	Department of Environmental Quality	01/26/2017	03/01/2017	08/29/2017
WY	SWRCY	Recycling Facilities	Department of Environmental Quality	09/30/2009	11/02/2009	11/25/2009
WY	TANKS	Storage Tank Listing	Department of Environmetnal Quality	07/09/2018	07/13/2018	08/28/2018
WY	UIC	UIC Well Locations List	Department of Environmental Quality	08/28/2018	08/30/2018	10/09/2018
WY	UST	Underground Storage Tanks	Department of Environmental Quality	05/23/2008	07/24/2008	08/12/2008
WY	VCP	List of Voluntary Remediation Program Sites	Department of Environmental Quality	11/19/2018	11/19/2018	01/04/2019
US	2020 COR ACTION	2020 Corrective Action Program List	Environmental Protection Agency	09/30/2017	05/08/2018	07/20/2018
US	ABANDONED MINES	Abandoned Mines	Department of Interior	09/10/2018	09/11/2018	09/14/2018
US	BRS	Biennial Reporting System	EPA/NTIS	12/31/2015	02/22/2017	09/28/2017
US	COAL ASH DOE	Steam-Electric Plant Operation Data	Department of Energy	12/31/2005	08/07/2009	10/22/2009
US	COAL ASH EPA	Coal Combustion Residues Surface Impoundments List	Environmental Protection Agency	07/01/2014	09/10/2014	10/20/2014
US	CONSENT	Superfund (CERCLA) Consent Decrees	Department of Justice, Consent Decree Library	09/30/2018	10/12/2018	12/07/2018
US	CORRACTS	Corrective Action Report	EPA	03/01/2018	03/28/2018	06/22/2018
US	DEBRIS REGION 9	Torres Martinez Reservation Illegal Dump Site Locations	EPA, Region 9	01/12/2009	05/07/2009	09/21/2009
US	DOCKET HWC	Hazardous Waste Compliance Docket Listing	Environmental Protection Agency	05/31/2018	07/26/2018	10/05/2018
US	DOD	Department of Defense Sites	USGS	12/31/2005	11/10/2006	01/11/2007
US	DOT OPS	Incident and Accident Data	Department of Transporation, Office of Pipeli	07/31/2012	08/07/2012	09/18/2012
US	Delisted NPL	National Priority List Deletions	EPA	11/14/2018	11/27/2018	12/07/2018
US	ECHO	Enforcement & Compliance History Information	Environmental Protection Agency	09/02/2018	09/05/2018	09/14/2018
US	EDR Hist Auto	EDR Exclusive Historical Auto Stations	EDR, Inc.			
US	EDR Hist Cleaner	EDR Exclusive Historical Cleaners	EDR, Inc.			
US	EDR MGP	EDR Proprietary Manufactured Gas Plants	EDR, Inc.			
US	EPA WATCH LIST	EPA WATCH LIST	Environmental Protection Agency	08/30/2013	03/21/2014	06/17/2014
US	ERNS	Emergency Response Notification System	National Response Center, United States Coast	09/24/2018	09/25/2018	11/09/2018
US	FEDERAL FACILITY	Federal Facility Site Information listing	Environmental Protection Agency	11/07/2016	01/05/2017	04/07/2017
US	FEDLAND	Federal and Indian Lands	U.S. Geological Survey	12/31/2005	02/06/2006	01/11/2007
US	FEMA UST	Underground Storage Tank Listing	FEMA	05/15/2017	05/30/2017	10/13/2017
US	FINDS	Facility Index System/Facility Registry System	EPA	08/07/2018	09/05/2018	10/05/2018
US	FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fu	EPA/Office of Prevention, Pesticides and Toxi	04/09/2009	04/16/2009	05/11/2009
US	FTTS INSP	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fu	EPA	04/09/2009	04/16/2009	05/11/2009

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

St	Acronym	Full Name	Government Agency	Gov Date	Arvl. Date	Active Date
US	FUDS	Formerly Used Defense Sites	U.S. Army Corps of Engineers	01/31/2015	07/08/2015	10/13/2015
US	FUELS PROGRAM	EPA Fuels Program Registered Listing	EPA	08/22/2018	08/22/2018	10/05/2018
US	FUSRAP	Formerly Utilized Sites Remedial Action Program	Department of Energy	08/08/2017	09/11/2018	09/14/2018
US	HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing	Environmental Protection Agency	10/19/2006	03/01/2007	04/10/2007
US	HIST FTTS INSP	FIFRA/TSCA Tracking System Inspection & Enforcement Case Lis	Environmental Protection Agency	10/19/2006	03/01/2007	04/10/2007
US	HMIRS	Hazardous Materials Information Reporting System	U.S. Department of Transportation	03/26/2018	03/27/2018	06/08/2018
US	ICIS	Integrated Compliance Information System	Environmental Protection Agency	11/18/2016	11/23/2016	02/10/2017
US	IHS OPEN DUMPS	Open Dumps on Indian Land	Department of Health & Human Serivces, Indian	04/01/2014	08/06/2014	01/29/2015
US	INDIAN LUST R1	Leaking Underground Storage Tanks on Indian Land	EPA Region 1	04/13/2018	05/18/2018	07/20/2018
US	INDIAN LUST R10	Leaking Underground Storage Tanks on Indian Land	EPA Region 10	04/12/2018	05/18/2018	07/20/2018
US	INDIAN LUST R4	Leaking Underground Storage Tanks on Indian Land	EPA Region 4	05/08/2018	05/18/2018	07/20/2018
US	INDIAN LUST R5	Leaking Underground Storage Tanks on Indian Land	EPA, Region 5	04/12/2018	05/18/2018	07/20/2018
US	INDIAN LUST R6	Leaking Underground Storage Tanks on Indian Land	EPA Region 6	04/01/2018	05/18/2018	07/20/2018
US	INDIAN LUST R7	Leaking Underground Storage Tanks on Indian Land	EPA Region 7	04/24/2018	05/18/2018	07/20/2018
US	INDIAN LUST R8	Leaking Underground Storage Tanks on Indian Land	EPA Region 8	04/25/2018	05/18/2018	07/20/2018
US	INDIAN LUST R9	Leaking Underground Storage Tanks on Indian Land	Environmental Protection Agency	04/10/2018	05/18/2018	07/20/2018
US	INDIAN ODI	Report on the Status of Open Dumps on Indian Lands	Environmental Protection Agency	12/31/1998	12/03/2007	01/24/2008
US	INDIAN RESERV	Indian Reservations	USGS	12/31/2014	07/14/2015	01/10/2017
US	INDIAN UST R1	Underground Storage Tanks on Indian Land	EPA, Region 1	04/13/2018	05/18/2018	07/20/2018
US	INDIAN UST R10	Underground Storage Tanks on Indian Land	EPA Region 10	04/12/2018	05/18/2018	07/20/2018
US	INDIAN UST R4	Underground Storage Tanks on Indian Land	EPA Region 4	05/08/2018	05/18/2018	07/20/2018
US	INDIAN UST R5	Underground Storage Tanks on Indian Land	EPA Region 5	04/12/2018	05/18/2018	07/20/2018
US	INDIAN UST R6	Underground Storage Tanks on Indian Land	EPA Region 6	04/01/2018	05/18/2018	07/20/2018
US	INDIAN UST R7	Underground Storage Tanks on Indian Land	EPA Region 7	04/24/2018	05/18/2018	07/20/2018
US	INDIAN UST R8	Underground Storage Tanks on Indian Land	EPA Region 8	04/25/2018	05/18/2018	07/20/2018
US	INDIAN UST R9	Underground Storage Tanks on Indian Land	EPA Region 9	04/10/2018	05/18/2018	07/20/2018
US	INDIAN VCP R1	Voluntary Cleanup Priority Listing	EPA, Region 1	07/27/2015	09/29/2015	02/18/2016
US	INDIAN VCP R7	Voluntary Cleanup Priority Lisitng	EPA, Region 7	03/20/2008	04/22/2008	05/19/2008
US	LEAD SMELTER 1	Lead Smelter Sites	Environmental Protection Agency	08/13/2018	10/04/2018	11/16/2018
US	LEAD SMELTER 2	Lead Smelter Sites	American Journal of Public Health	04/05/2001	10/27/2010	12/02/2010
US	LIENS 2	CERCLA Lien Information	Environmental Protection Agency	08/13/2018	10/04/2018	11/16/2018
US	LUCIS	Land Use Control Information System	Department of the Navy	10/17/2018	10/25/2018	12/07/2018
US	MLTS	Material Licensing Tracking System	Nuclear Regulatory Commission	08/30/2016	09/08/2016	10/21/2016
US	NPL	National Priority List	EPA	11/14/2018	11/27/2018	12/07/2018
US	NPL LIENS	Federal Superfund Liens	EPA	10/15/1991	02/02/1994	03/30/1994
US	ODI	Open Dump Inventory	Environmental Protection Agency	06/30/1985	08/09/2004	09/17/2004
US	PADS	PCB Activity Database System	EPA	09/14/2018	10/11/2018	12/07/2018
US	PCB TRANSFORMER	PCB Transformer Registration Database	Environmental Protection Agency	05/24/2017	11/30/2017	12/15/2017
US	PRP	Potentially Responsible Parties	EPA	08/13/2018	10/04/2018	11/09/2018
US	Proposed NPL	Proposed National Priority List Sites	EPA	11/14/2018	11/27/2018	12/07/2018
US	RAATS	RCRA Administrative Action Tracking System	EPA	04/17/1995	07/03/1995	08/07/1995
US	RADINFO	Radiation Information Database	Environmental Protection Agency	10/02/2018	10/03/2018	11/09/2018
US	RCRA NonGen / NLR	RCRA - Non Generators / No Longer Regulated	Environmental Protection Agency	03/01/2018	03/28/2018	06/22/2018
US	RCRA-CESQG	RCRA - Conditionally Exempt Small Quantity Generators	Environmental Protection Agency	03/01/2018	03/28/2018	06/22/2018
US	RCRA-LQG	RCRA - Large Quantity Generators	Environmental Protection Agency	03/01/2018	03/28/2018	06/22/2018
US	RCRA-SQG	RCRA - Small Quantity Generators	Environmental Protection Agency	03/01/2018	03/28/2018	06/22/2018
US	RCRA-TSDF	RCRA - Treatment, Storage and Disposal	Environmental Protection Agency	03/01/2018	03/28/2018	06/22/2018

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

St	Acronym	Full Name	Government Agency	Gov Date	Arvl. Date	Active Date
US	RMP	Risk Management Plans	Environmental Protection Agency	08/01/2018	08/22/2018	10/05/2018
US	ROD	Records Of Decision	EPA	08/13/2018	10/04/2018	11/16/2018
US	SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing	Environmental Protection Agency	01/01/2017	02/03/2017	04/07/2017
US	SEMS	Superfund Enterprise Management System	EPA	11/14/2018	11/27/2018	12/07/2018
US	SEMS-ARCHIVE	Superfund Enterprise Management System Archive	EPA	11/14/2018	11/28/2018	12/07/2018
US	SSTS	Section 7 Tracking Systems	EPA	12/31/2009	12/10/2010	02/25/2011
US	TRIS	Toxic Chemical Release Inventory System	EPA	12/31/2016	01/10/2018	01/12/2018
US	TSCA	Toxic Substances Control Act	EPA	12/31/2016	06/21/2017	01/05/2018
US	UMTRA	Uranium Mill Tailings Sites	Department of Energy	06/23/2017	10/11/2017	11/03/2017
US	US AIRS (AFS)	Aerometric Information Retrieval System Facility Subsystem (	EPA	10/12/2016	10/26/2016	02/03/2017
US	US AIRS MINOR	Air Facility System Data	EPA	10/12/2016	10/26/2016	02/03/2017
US	US BROWNFIELDS	A Listing of Brownfields Sites	Environmental Protection Agency	09/18/2018	09/18/2018	11/09/2018
US	US CDL	Clandestine Drug Labs	Drug Enforcement Administration	09/21/2018	09/21/2018	11/09/2018
US	US ENG CONTROLS	Engineering Controls Sites List	Environmental Protection Agency	07/31/2018	08/28/2018	09/14/2018
US	US FIN ASSUR	Financial Assurance Information	Environmental Protection Agency	08/31/2018	09/25/2018	11/09/2018
US	US HIST CDL	National Clandestine Laboratory Register	Drug Enforcement Administration	09/21/2018	09/21/2018	11/09/2018
US	US INST CONTROL	Sites with Institutional Controls	Environmental Protection Agency	07/31/2018	08/28/2018	09/14/2018
US	US MINES	Mines Master Index File	Department of Labor, Mine Safety and Health A	08/01/2018	08/29/2018	10/05/2018
US	US MINES 2	Ferrous and Nonferrous Metal Mines Database Listing	USGS	12/05/2005	02/29/2008	04/18/2008
US	US MINES 3	Active Mines & Mineral Plants Database Listing	USGS	04/14/2011	06/08/2011	09/13/2011
US	UXO	Unexploded Ordnance Sites	Department of Defense	09/30/2017	06/19/2018	09/14/2018
NY	NY MANIFEST	Facility and Manifest Data	Department of Environmental Conservation	10/01/2018	10/31/2018	12/20/2018
US	AHA Hospitals	Sensitive Receptor: AHA Hospitals	American Hospital Association, Inc.			
US	Medical Centers	Sensitive Receptor: Medical Centers	Centers for Medicare & Medicaid Services			
US	Nursing Homes	Sensitive Receptor: Nursing Homes	National Institutes of Health			
US	Public Schools	Sensitive Receptor: Public Schools	National Center for Education Statistics			
US	Private Schools	Sensitive Receptor: Private Schools	National Center for Education Statistics			
WY	Daycare Centers	Sensitive Receptor: Day Care Provider List	Department of Family Services			
US	Flood Zones	100-year and 500-year flood zones	Emergency Management Agency (FEMA)			
US	NWI	National Wetlands Inventory	U.S. Fish and Wildlife Service			
WY	State Wetlands	National Wetlands Inventory	Wyoming Geospatial Hub			
US	Topographic Map		U.S. Geological Survey			
US	Oil/Gas Pipelines		PennWell Corporation			
US	Electric Power Transmission Line Data		PennWell Corporation			

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

St	Acronym	Full Name	Government Agency	Gov Date	Arvl. Date	Active Date

STREET AND ADDRESS INFORMATION

GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

CHEYENNE AASF
CHEYENNE AASF
FE WARREN AFB, WY 82005

TARGET PROPERTY COORDINATES

Latitude (North):	41.196149 - 41˚ 11’ 46.14’’
Longitude (West):	104.870486 - 104˚ 52’ 13.75’’
Universal Tranverse Mercator:	Zone 13
UTM X (Meters):	510860.2
UTM Y (Meters):	4560327.5
Elevation:	6290 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	5645427 CHEYENNE NORTH, WY
Version Date:	2012
West Map:	5649463 ROUND TOP LAKE, WY
Version Date:	2012

EDR’s GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principle investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

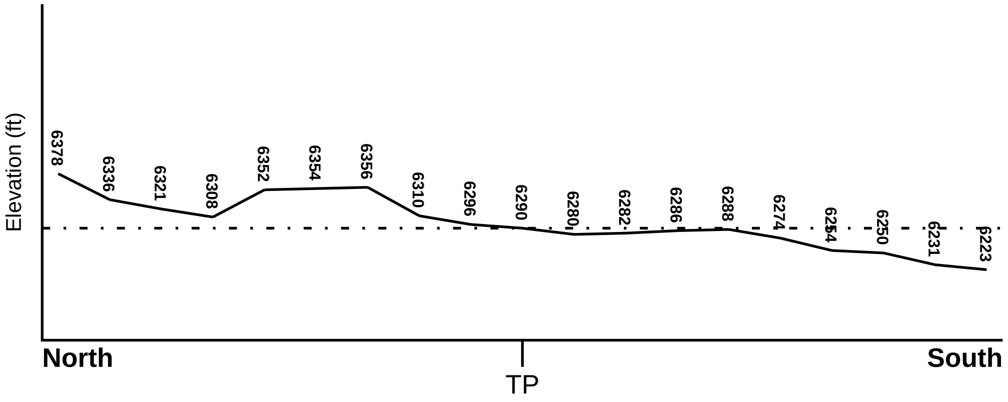
TOPOGRAPHIC INFORMATION

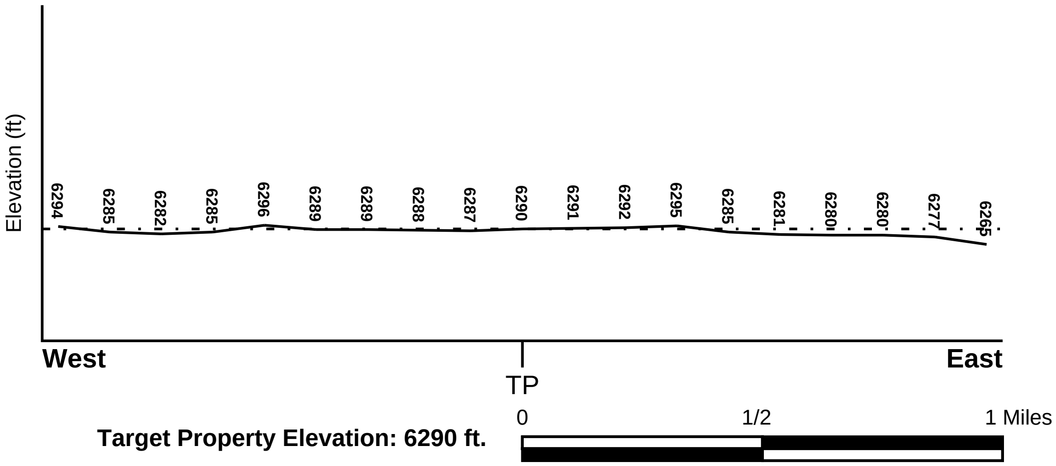
Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General South

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES





Target Property Elevation: 6290 ft.

Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Flood Plain Panel at Target Property	FEMA Source Type
56021C1078F	FEMA FIRM Flood data

Additional Panels in search area:	FEMA Source Type
56021C1059F	FEMA FIRM Flood data
56021C1067F	FEMA FIRM Flood data
56021C1086F	FEMA FIRM Flood data

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
CHEYENNE NORTH	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

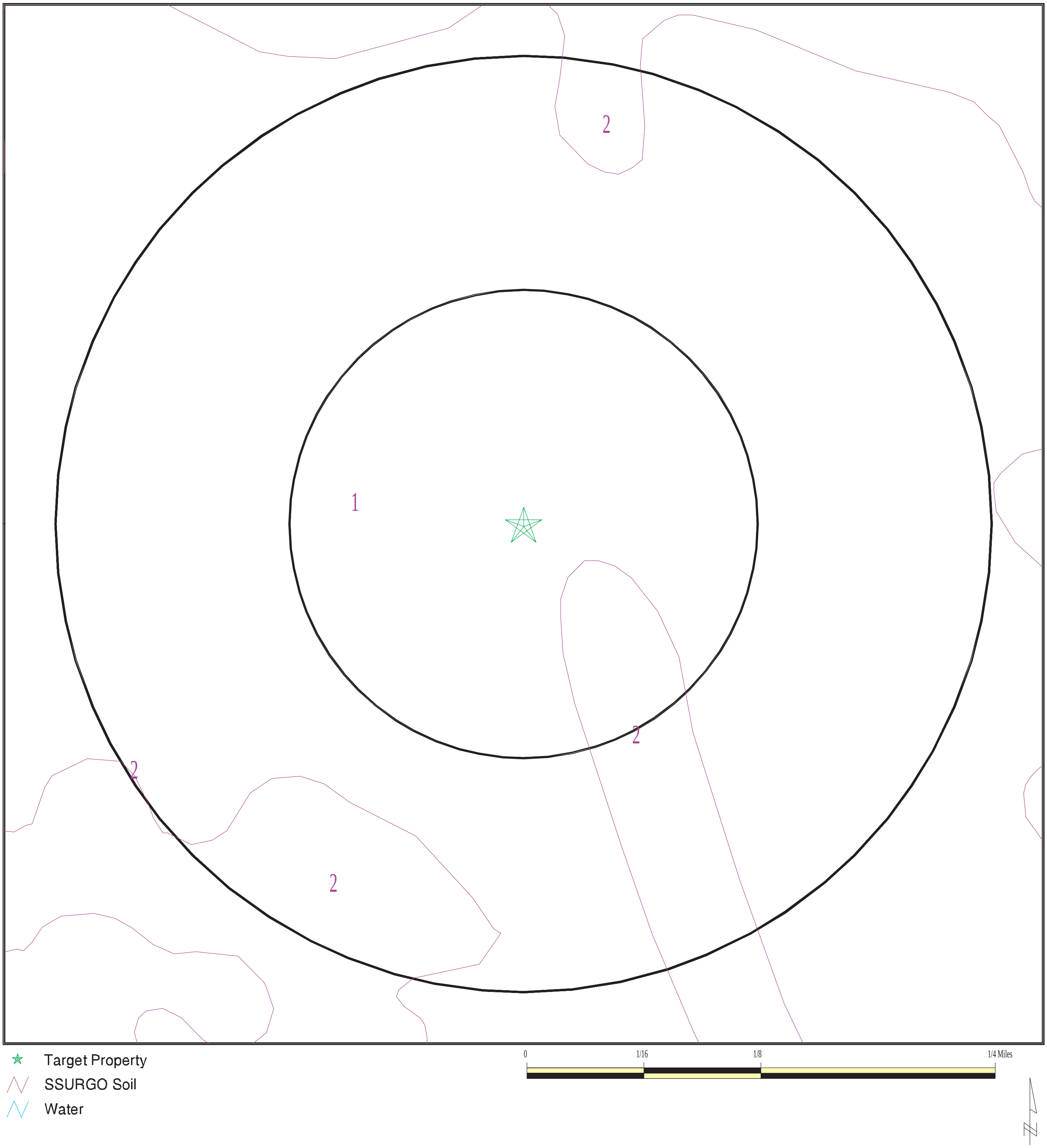
GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT		GEOLOGIC AGE IDENTIFICATION	
Era:	Cenozoic	Category:	Continental Deposits
System:	Tertiary		
Series:	Pliocene		
Code:	Tpc *(decoded above as Era, System & Series)*		

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 5528367.2s



SITE NAME:	Cheyenne AASF	CLIENT:	AECOM
ADDRESS:	Cheyenne AASF Fe Warren AFB WY 82005	CONTACT:	Brittany Kirchmann
		INQUIRY #:	5528367.2s
LAT/LONG:	41.196149 / 104.870486	DATE:	January 08, 2019 9:19 am

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture’s (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name:	Evanston
Soil Surface Texture:	loam
Hydrologic Group:	Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.
Soil Drainage Class:	Well drained
Hydric Status: Not hydric	
Corrosion Potential - Uncoated Steel:	High
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

Soil Layer Information

	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		Soil Reaction (pH)
1	0 inches	3 inches	loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14.11 Min: 4.233	Max: 8.4 Min: 7.4
2	3 inches	14 inches	clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14.11 Min: 4.233	Max: 8.4 Min: 7.4
3	14 inches	59 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14.11 Min: 4.233	Max: 8.4 Min: 7.4

Soil Map ID: 2

Soil Component Name:	Poposhia
Soil Surface Texture:	silt loam
Hydrologic Group:	Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.
Soil Drainage Class:	Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel:	High
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

Soil Layer Information

	Boundary			Classification			
Layer	**Upper**	**Lower**	**Soil Texture Class**	**AASHTO Group**	**Unified Soil**	**Saturated hydraulic conductivity micro m/sec**	**Soil Reaction (pH)**
1	0 inches	7 inches	silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14.11 Min: 4.233	Max: 8.4 Min: 7.9
2	7 inches	25 inches	silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14.11 Min: 4.233	Max: 8.4 Min: 7.9
3	25 inches	59 inches	silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14.11 Min: 4.233	Max: 8.4 Min: 7.9

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
A5	USGS40001334813	1/2 - 1 Mile WSW
15	USGS40001334980	1/2 - 1 Mile NW
A17	USGS40001334811	1/2 - 1 Mile WSW

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

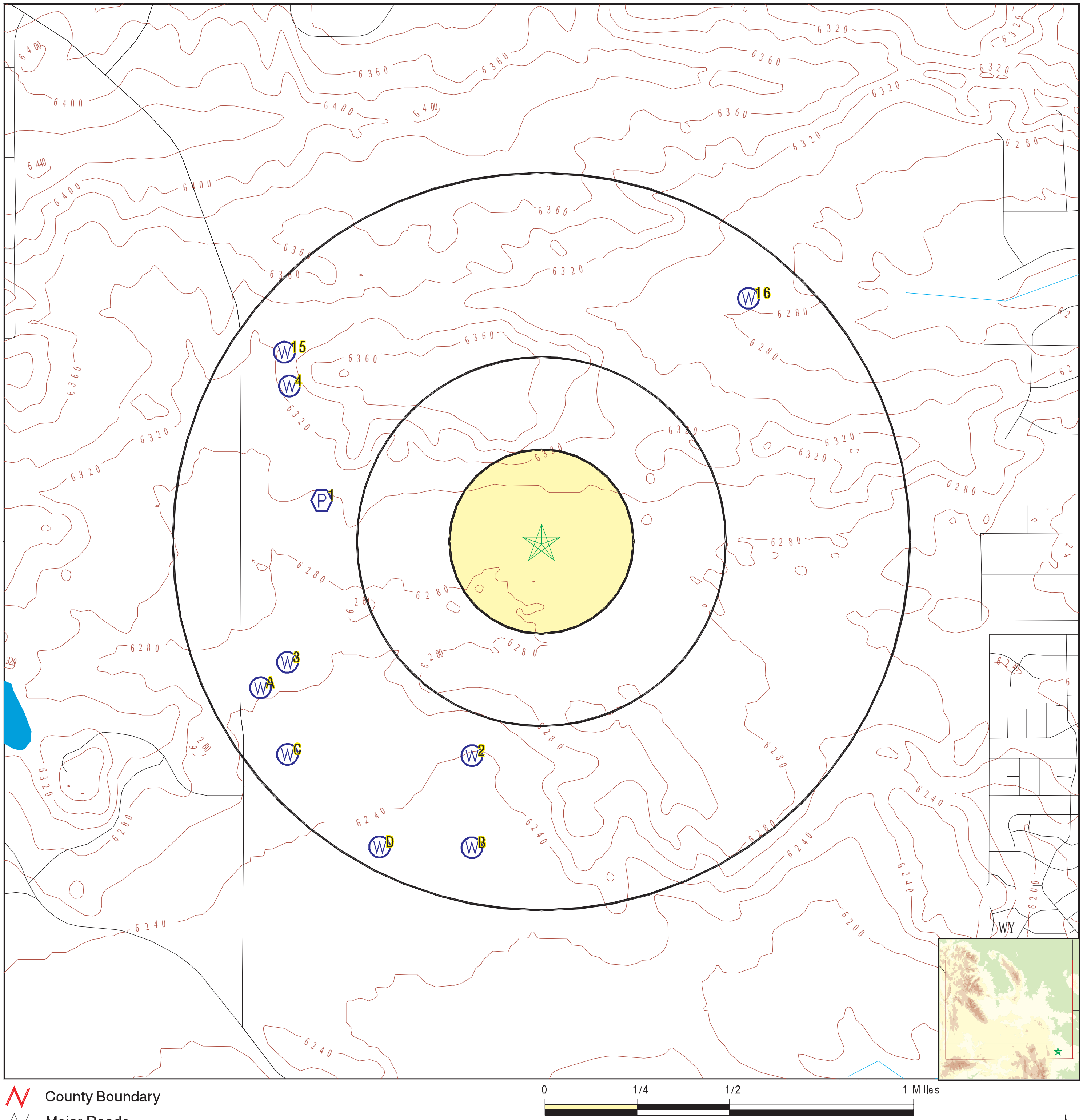
MAP ID	WELL ID	LOCATION FROM TP
1	WY5600011	1/2 - 1 Mile West

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
2	WYSE50000143153	1/2 - 1 Mile SSW
3	WYSE50000033225	1/2 - 1 Mile WSW
4	WYSE50000042868	1/2 - 1 Mile WNW
B6	WYSE50000016904	1/2 - 1 Mile SSW
B7	WYSE50000018665	1/2 - 1 Mile SSW
B8	WYSE50000015028	1/2 - 1 Mile SSW
B9	WYSE50000016571	1/2 - 1 Mile SSW
B10	WYSE50000018867	1/2 - 1 Mile SSW
B11	WYSE50000117396	1/2 - 1 Mile SSW
B12	WYSE50000123706	1/2 - 1 Mile SSW
B13	WYSE50000116892	1/2 - 1 Mile SSW
B14	WYSE50000117326	1/2 - 1 Mile SSW
16	WYSE50000040108	1/2 - 1 Mile NE
C18	WYSE50000117119	1/2 - 1 Mile SW
C19	WYSE50000127045	1/2 - 1 Mile SW
D20	WYSE50000142449	1/2 - 1 Mile SSW
D21	WYSE50000113296	1/2 - 1 Mile SSW
D22	WYSE50000117337	1/2 - 1 Mile SSW

PHYSICAL SETTING SOURCE MAP - 5528367.2s



- County Boundary
- Major Roads
- Contour Lines
- Earthquake epicenter, Richter 5 or greater
- Ⓦ Water Wells
- Ⓟ Public Water Supply Wells
- ● Cluster of Multiple Icons

- Groundwater Flow Direction
- GI Indeterminate Groundwater Flow at Location
- GV Groundwater Flow Varies at Location
- ● Oil, gas or related wells

SITE NAME: Cheyenne AASF
ADDRESS: Cheyenne AASF
Fe Warren AFB WY 82005
LAT/LONG: 41.196149 / 104.870486

CLIENT: AECOM
CONTACT: Brittany Kirchmann
INQUIRY #: 5528367.2s
DATE: January 08, 2019 9:19 am

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID Direction Distance Elevation		Database	EDR ID Number
1 **West** **1/2 - 1 Mile** **Higher**	Click here for full text details	**FRDS PWS**	**WY5600011**
2 **SSW** **1/2 - 1 Mile** **Lower**	Click here for full text details	**WY WELLS**	**WYSE50000143153**
3 **WSW** **1/2 - 1 Mile** **Lower**	Click here for full text details	**WY WELLS**	**WYSE50000033225**
4 **WNW** **1/2 - 1 Mile** **Higher**	Click here for full text details	**WY WELLS**	**WYSE50000042868**
A5 **WSW** **1/2 - 1 Mile** **Lower**	Click here for full text details	**FED USGS**	**USGS40001334813**
B6 **SSW** **1/2 - 1 Mile** **Lower**	Click here for full text details	**WY WELLS**	**WYSE50000016904**
B7 **SSW** **1/2 - 1 Mile** **Lower**	Click here for full text details	**WY WELLS**	**WYSE50000018665**
B8 **SSW** **1/2 - 1 Mile** **Lower**	Click here for full text details	**WY WELLS**	**WYSE50000015028**
B9 **SSW** **1/2 - 1 Mile** **Lower**	Click here for full text details	**WY WELLS**	**WYSE50000016571**

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID Direction Distance Elevation		Database	EDR ID Number
B10 **SSW** **1/2 - 1 Mile** **Lower**	Click here for full text details	**WY WELLS**	**WYSE50000018867**
B11 **SSW** **1/2 - 1 Mile** **Lower**	Click here for full text details	**WY WELLS**	**WYSE50000117396**
B12 **SSW** **1/2 - 1 Mile** **Lower**	Click here for full text details	**WY WELLS**	**WYSE50000123706**
B13 **SSW** **1/2 - 1 Mile** **Lower**	Click here for full text details	**WY WELLS**	**WYSE50000116892**
B14 **SSW** **1/2 - 1 Mile** **Lower**	Click here for full text details	**WY WELLS**	**WYSE50000117326**
15 **NW** **1/2 - 1 Mile** **Higher**	Click here for full text details	**FED USGS**	**USGS40001334980**
16 **NE** **1/2 - 1 Mile** **Lower**	Click here for full text details	**WY WELLS**	**WYSE50000040108**
A17 **WSW** **1/2 - 1 Mile** **Lower**	Click here for full text details	**FED USGS**	**USGS40001334811**
C18 **SW** **1/2 - 1 Mile** **Lower**	Click here for full text details	**WY WELLS**	**WYSE50000117119**

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID Direction Distance Elevation		Database	EDR ID Number
C19 **SW** **1/2 - 1 Mile** **Lower**	Click here for full text details	**WY WELLS**	**WYSE50000127045**
D20 **SSW** **1/2 - 1 Mile** **Lower**	Click here for full text details	**WY WELLS**	**WYSE50000142449**
D21 **SSW** **1/2 - 1 Mile** **Lower**	Click here for full text details	**WY WELLS**	**WYSE50000113296**
D22 **SSW** **1/2 - 1 Mile** **Lower**	Click here for full text details	**WY WELLS**	**WYSE50000117337**

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

State Database: WY Radon

Radon Test Results

% Elev.	Total kits	# tests 4-10 pCi/L	# tests 10-20 pCi/L	# Tests>20 pCi/L
22%	2358	396	89	42

Federal EPA Radon Zone for LARAMIE County: 1

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for LARAMIE COUNTY, WY

Number of sites tested: 55

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	1.750 pCi/L	100%	0%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	3.020 pCi/L	75%	24%	2%

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5’ Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5’ Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Source: U.S. Geological Survey

HYDROLOGIC INFORMATION

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: National Wetlands Inventory
Source: Wyoming Geospatial Hub
Telephone: 307-777-4600

HYDROGEOLOGIC INFORMATION

AQUIFLOW^R Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
The U.S. Department of Agriculture’s (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Service, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Wyoming Well Permits
Source: Wyoming State Engineer’s Office
Telephone: 307-777-6148
Wyoming well permit locations on file with the Wyoming State Engineer’s Office.

OTHER STATE DATABASE INFORMATION

Oil and Gas Well Location Information
Source: Oil and Gas Conservation Commission
Telephone: 307-234-7147

RADON

State Database: WY Radon
Source: Department of Health
Telephone: 307-777-6015
Wyoming Radon Project

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

Earthquake Fault Lines: The fault lines displayed on EDR’s Topographic map are digitized quaternary faultlines, prepared in 1975 by the United State Geological Survey

PHYSICAL SETTING SOURCE RECORDS SEARCHED

STREET AND ADDRESS INFORMATION

Appendix B
Preliminary Assessment Documentation

Appendix B.1

Interview Record

HEF Activation 11 June 2011

On 11 June 2011 at 1448, the fire alarm went off in the AASF. I left my office to check the fire alarm panel and it indicated the HEF system. I proceeded to the HEF room and as I approached the east hangar I observed the HEF dumping in the east hangar which had no aircraft. After a quick confirmation of no fire I proceeded to the HEF room to block in the foam and water. I blocked in the foam discharge first, water supply to the foam tank second and then blocked in the risers. I then called Warren Fire Department to notify them of the false alarm and notified [redacted] of the event. There was approximately 5' of foam in the east hangar. Bay 5 and 8 doors were opened by [redacted] during the event because he realized there was no fire and was trying to minimize the effects of the foam.

The Warren Fire Department responded and investigated why the HEF activated. The HEF fire panel indicated that L1M07 Hangar 2 North Pull was activated.

Upon investigation, it was found that L1M07 pull (located by egress door SE corner of hangar 2) was not activated, nor were any other pulls. Of note, the L1M04 glass pull indicator was missing but suspect that it was never replaced after commissioning test(s). L1M07 indication on the fire panel disappeared approximately 1 hour after the event. Witnesses [redacted] being one of them) who were in bay 8 near the fire pull said the fire alarm just went off and foam started dispensing.

Clean up of the hangar was started with the supervision of the fire department. This involved individuals of C. Co. 5-159 and subordinates who were conducting AT. After a review of the MSDS, a roster of those exposed to the foam and potential damages to equipment was started. 1SG [redacted] indicated that when the alarm went off, there was an organized evacuation with good accountability.

Base environmental ([redacted] [redacted]) responded and coordinated with Wyoming Guard environmental ([redacted] and [redacted]). They notified the city utility office of the release into the oil water separator which would eventually migrate to the public sewer system. No foam was observed in the ramp storm water system.

[redacted] notified Westfire of the event and coordinated for them to come out on the following morning. [redacted] arrived at the AASF at approximately 0830 and was notified that the L1M07 alarm had cleared itself. Here is what [redacted] found:

I went ahead and had Westfire come out on Sunday at 8:00 to repair and investigate the pull that was shown as the reason for the foam going off. Otherwise we had the panel showing as alarm and the fire dept would not have known if a real situation came about. West fire could not identify a problem with the pull and its components so he will get us new parts. Temporarily we are without a pull but have put a notice with it. We will show just a trouble alarm because the pull is missing but everything else will work if needed. The only thing he thought is that the components got wet. The inside of the box was wet today but not sure if that was due to the foam. I have Western States coming tomorrow to refill the foam bladder. Until then we would only get water not foam in the hangar if something would happen, but again the fire dept will now know to respond for emergency action.

So for now this is all the info I have but will let you know more as I get more feedback.

[redacted]

PA Interview Questionnaire - Other

Facility: Cheyenne AASF
Interviewer: [redacted] & [redacted]
Date/Time: 8 May 2018/0830

Interviewee: [redacted], [redacted], [redacted], [redacted], [redacted] **Title:** AASF WYARG **Phone Number:** (307) 772-5981 **Email:**______________________________	Can your name/role be used in the PA Report? Y or N Can you recommend anyone we can interview? Y or N ________________________

Roles or activities with the Facility/Years working at the Facility:

AASF maintenance and facility personnel

PFAS Use: Identify accidental/intentional release locations, time frame of release, frequency of releases, storage container size (maintenance, fire training, firefighting, buildings with suppression systems (as builts), fueling stations, crash sites, pest management, recreational, dining facilities, metals plating, or waterproofing). How are materials ordered/purchased/disposed/shared with others?

AFFF used in AASF fire suppression system.	**Known Uses**
Material ordered as part of facility construction. No additional material ordered since 2010.	Use
3 releases: 2 April 2010 (facility commissioning); 11 June and 8 Aug 2011	Procurement
	Disposition
	Storage (Mixed)
	Storage (Solution)
	Inventory, Off-Spec
	Containment
	SOP on Filling
	Leaking Vehicles
	Nozzle and Suppression System Testing
	Dining Facilities
	Vehicle Washing
	Ramp Washing
	Fuel Spill Washing and Fueling Stations
	Chrome Plating or Waterproofing

Appendix B.2
Visual Site Inspection Checklists

Visual Site Inspection Checklist

Names(s) of people performing VSI: [redacted] & [redacted]

Recorded by: [redacted]

ARNG Contact: [redacted]

Date and Time: 8 May 2010/0830

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

Source/Release Information

Site Name / Area Name / Unique ID: WYARNG AASF

Site / Area Acreage: 44 acres

Historic Site Use (Brief Description): N/A

Current Site Use (Brief Description): AASF

Physical barriers or access restrictions: On active AFB (F.E. Warren)

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

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

Hanger fire suppression system.

2. Has usage been documented? **NA**

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

Yes

3. What types of businesses are located near the site? **None**

3a. Indicate what businesses are located near the site

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

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

Visual Survey Inspection Log

Other Significant Site Features:

1. Does the facility have a fire suppression system? **Y**

1a. If yes, indicate which type of AFFF has been used: **Jet-X (23/4% concentrate)**

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

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

After each release

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

Yes

Transport / Pathway Information

Migration Potential:

1. Does site/area drainage flow off installation? **Y**

1a. If so, note observation and location:

2. Is there channelized flow within the site/area? **N**

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

3. Are monitoring or drinking water wells located near the site? **N**

3a. If so, please note the location:

4. Are surface water intakes located near the site? **N**

4a. If so, please note the location:

5. Can wind dispersion information be obtained? **N**

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

6. Does an adjacent non-ARNG PFAS source exist? **N**

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

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

Visual Survey Inspection Log

Significant Topographical Features:

1. Has the infrastructure changed at the site/area? **N**

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

2. Is the site/area vegetated? **Y**

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

3. Does the site or area exhibit evidence of erosion? **N**

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

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

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

Receptor Information

1. Is access to the site restricted? **Y**

1a. If so, please note to what extent: **Facility located on F.E. Warren AFB**

2. Who can access the site? **Site Workers / Construction Workers**

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

3. Are residential areas located near the site? **N**

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

4. Are any schools/day care centers located near the site? **N**

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

5. Are any wetlands located near the site? **N**

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

Visual Survey Inspection Log

Additional Notes

Photographic Log

Photo ID/Name	Date & Location	Photograph Description

Appendix B.3
Conceptual Site Model Information

Preliminary Assessment – Conceptual Site Model Information

Site Name: WYARNG AASF

Why has this location been identified as a site? Use/storage of AFFF

Are there any other activities nearby that could also impact this location? Located on F.E. Warren AFB, which also has AOIs.

Training Events

Have any training events with AFFF occurred at this site? No

If so, how often?

How much material was used? Is it documented?

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

Surface Water:

Surface water flow direction? Northeast

Average rainfall? 13.62”

Any flooding during rainy season? UNK

Direct or indirect pathway to ditches? Yes

Direct or indirect pathway to larger bodies of water? No

Does surface water pond any place on site? No

Any impoundment areas or retention ponds? Yes

Any NPDES location points near the site? UNK

How does surface water drain on and around the flight line?

Preliminary Assessment – Conceptual Site Model Information

Groundwater:

Groundwater flow direction? Northeast

Depth to groundwater? variable

Uses (agricultural, drinking water, irrigation)? UNK

Any groundwater treatment systems? No

Any groundwater monitoring well locations near the site? No

Is groundwater used for drinking water? No

Are there drinking water supply wells on installation? No

Do they serve off-post populations? No

Are there off-post drinking water wells downgradient No

Waste Water Treatment Plant:

Has the installation ever had a WWTP, past or present? UNK

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

Do we understand the fate of sludge waste?

Is surface water from potential contaminated sites treated?

Equipment Rinse Water

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

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

3. Other?

Preliminary Assessment – Conceptual Site Model Information

Identify Potential Receptors:

Site Worker Yes

Construction Worker Yes

Recreational User No

Residential No

Child No

Ecological No

Note what is located near by the site (e.g. daycare, schools, hospitals, churches, agricultural, livestock)?

Documentation

Ask for Engineering drawings (if applicable).

Has there been a reconstruction or changes to the drainage system? When did that occur?

Appendix C
Photographic Log

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	WYARNG Army Aviation Support Facility	Cheyenne, WY

Photograph No. 1

Description:

Oil water separator entrance

Photograph No. 2

Description:

Swall

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	WYARNG Army Aviation Support Facility	Cheyenne, WY

Photograph No. 3

Description:

Helicopter sitting on tarmac

Photograph No. 4

Description:

Facility bay doors

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	WYARNG Army Aviation Support Facility	Cheyenne, WY

Photograph No. 5

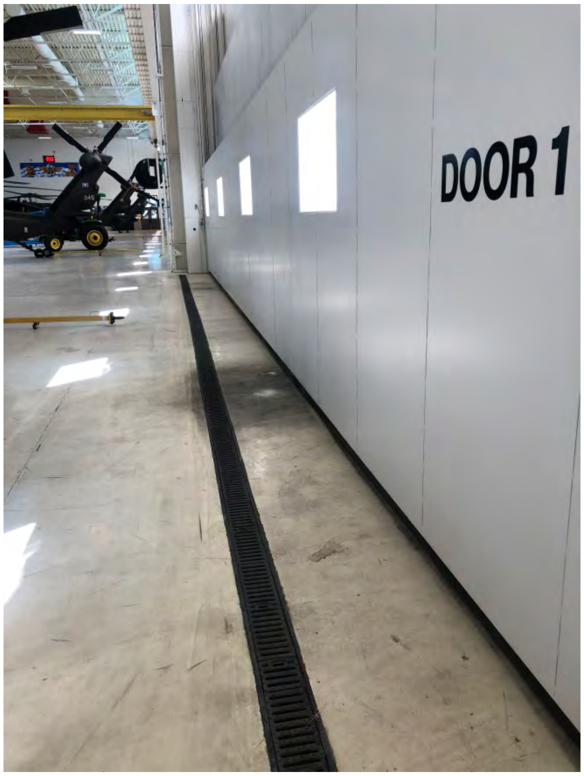
Description:

Airfield. Looking west.

Photograph No. 6

Description:

Drainage running length of facility



APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	WYARNG Army Aviation Support Facility	Cheyenne, WY

Photograph No. 7

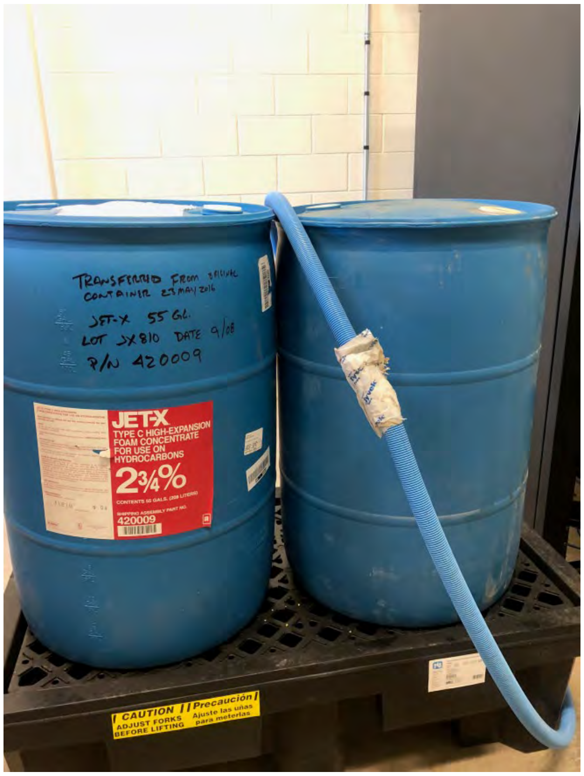
Description:

AFFF tank

Photograph No. 8

Description:

Stock of AFFF



APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	WYARNG Army Aviation Support Facility	Cheyenne, WY

Photograph No. 9

Description:

Pump system

Photograph No. 10

Description:

Only shutoff valve (is not located in bay)

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	**WYARNG Army Aviation Support Facility**	**Cheyenne, WY**

Photograph No. 11

Description:

Pre-filter unit

Photograph No. 12

Description:

Runoff

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	WYARNG Army Aviation Support Facility	Cheyenne, WY

Photograph No. 13

Description:

Retention pond

Photograph No. 13

Description:

Spill prevention corrective action taken: palletized

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	WYARNG Army Aviation Support Facility	Cheyenne, WY

Photograph No. 145

Description:

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