FINAL Preliminary Assessment Report Joint Forces Headquarters, Rapid City, South Dakota

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

June 2020

Prepared for:



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

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Acronyms and Abbreviations

°F	degrees Fahrenheit
AASF	Army Aviation Support Facility
AECOM	AECOM Technical Services, Inc.
AFB	Air Force Base
AFFF	Army Aviation Support Facility
AOI	Area of Interest
ARNG	Army National Guard
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
EDR™	Environmental Data Resources, Inc.™
FTA	fire training area
ft	feet
JFHQ	Joint Forces Headquarter
PA	Preliminary Assessment
PFAS	per- and poly-fluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
SDARNG	South Dakota Army National Guard
SI	Site Inspection
US	United States
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency

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 Joint Forces Headquarters (JFHQ; also referred to as the "facility") in Rapid City, South Dakota, to assess potential PFAS release areas and exposure pathways to receptors. The JFHQ is constructed on a parcel of land owned by the South Dakota ARNG (SDARNG) since 1933. 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 10 September 2019 and completed visual site inspections at locations where PFAS-containing materials were suspected of being stored, used, or disposed;
- Interviewed current SDARNG personnel, SDARNG environmental managers, and operations staff
- Completed visual site inspections at known or suspected potential PFAS release locations and documented with photographs

No Areas of Interest (AOIs) related to potential PFAS releases were identified at JFHQ during the PA. The summary of PA findings is shown on **Figure ES-1**.

Based on the documented absence of the use/release of PFAS-containing materials at JFHQ, evidence does not support current or former SDARNG activities having contributed to PFAS contamination in soil, groundwater, surface water, or sediment at the facility or adjacent areas. However, potential off-facility PFAS release areas exist upgradient of the JFHQ and it is unknown whether or not the off-facility sources affect the facility. The facility will not move forward in the Comprehensive Environmental Response, Compensation, and Liability Act process. PFAS analyses performed in 2016 had method detection limits that were higher than currently achievable. Based on the US Environmental Protection Agency (USEPA) Unregulated Contaminant Monitoring Rule 3 data, it was indicated that no PFAS were detected in a public water system above the USEPA Lifetime Health Advisory within 20 miles of the facility. Thus, it is possible that low concentrations of PFAS were not detected during the UCMR3 but might be detected if analyzed today.



1. Introduction

1.1 Authority and Purpose

The Army National Guard (ARNG)-Installations & Environment Division 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 facilities that used per- and poly-fluoroalkyl substances (PFAS), primarily in the form of aqueous film forming foam (AFFF) released as part of firefighting activities, although other PFAS sources 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 regulatory 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 US Environmental Protection Agency (USEPA) issued Drinking Water Health Advisories for PFOA and PFOS in May 2016, but there are currently no promulgated national standards regulating PFAS in drinking water. In the absence of federal maximum contaminant levels, some states have adopted their own drinking water standards for PFAS. The State of South Dakota does not currently have drinking water standards for PFAS.

This report presents the findings of a PA for PFAS-containing materials at the Joint Forces Headquarters (JFHQ; also referred to as the "facility") in Rapid City, South Dakota, 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 [CFR] Part 300), and Army requirements and guidance.

This PA documents locations where PFAS may have been released into the environment at the JFHQ. The term PFAS will be used throughout this report to encompass all PFAS chemicals being evaluated, including PFOS and PFOA, which are key components of AFFF.

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 10 September 2019 and completed visual site inspections (VSIs) at locations where PFAS-containing materials were suspected of being stored, used, or disposed;
- Interviewed current South Dakota ARNG (SDARNG) personnel, SDARNG environmental managers, and operations staff

• Completed visual site inspections at known or suspected potential PFAS release locations and documented with photographs

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: describes the fire training areas (FTAs) at the facility identified during the site visit
- Section 3 Non-Fire Training Areas: describes other locations of potential PFAS releases at the facility identified 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 for the Areas of Interest (AOIs) and the facility
- 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 JFHQ is located in Pennington County, approximately 13 miles southwest of Ellsworth Air Force Base (AFB) and approximately 13 miles northwest of Rapid City Regional Airport (**Figure 1-1**). The JFHQ is located within Camp Rapid National Guard Armory boundaries. The facility is accessible from Corning Avenue from the north and Hazel Avenue from the south.

The AASF was constructed in 1933 on a parcel of land, approximately 84.4-acres, owned by the SDARNG. See **Appendix A** for real estate documents. The current JFHQ facilities include utility buildings, administrative buildings, and classrooms.

1.5 Facility Environmental Setting

The JFHQ lies within the Black Hills region, which is characterized as an isolated eroded mountain region, ancient rock removal by stream erosion produces this mountain setting. From a distance the rounded hilltops, well-forested slopes, and deep valleys present a dark appearance, giving them their name. The Rapid Creek is the main stream channel near the facility.

1.5.1 Geology

JFHQ lies within the eastern side of the Black Hills, on an elliptically shaped crescentic asymmetrical double plunging anticline created by the tectonic movement during the Laramide Orogeny. During the movement, the tectonic plates uplifted crystalline rocks along with exposing the overlying Mesozoic and Paleozoic rock. Beneath the complex lies Precambrian-age crystalline basement rocks that are overlain by Cambrian through Lower Cretaceous deposits of dolomite, limestone, and sandstone (Aerostar, 2019).

The surface geology of the JFHQ and the immediate surrounding area is comprised of quaternary alluvial deposits that range from 20 feet (ft) to 40 ft in depth (South Dakota Geological Survey, 1989). Beneath the alluvium is the Triassic aged Spearfish Formation, which ranges from approximately 250 ft to 400 ft and contains layers of shale and siltstone with large lenses and beds of gypsum scattered throughout. Under the Spearfish Formation is approximately 40 ft of Permian aged, red and purple limestone, which makes up the Minnekahta Limestone (South Dakota Geological Survey, 1965). Next is the Opeche Shale, which consists of 100 ft of red shales and siltstones with discontinuous beds of gypsum at the base of the formation (Fahrenbach, 2001). Underlying the shale is the Minnelusa formation, which is approximately 500 ft thick and Pennsylvanian in age. The Minnelusa formation is made up of sandstone, shales, limestones and dolomites that range in colors from reds to pinks, purples and yellows (South Dakota Geological Survey, 1965), Located below the Minnelusa is the Pahasapa Limestone. This formation was deposited in the Mississippian and is about 300 ft thick. It is comprised of white limestone and dolomite layers with void spaces and fractures throughout (South Dakota Geological Survey, 1989). Beneath the Pahasapa Limestone is the Devonian aged Englewood Limestone followed by the Ordovician aged Deadwood Formation and finally the Precambrian aged basement rocks (Fahrenbach, 2001).

1.5.2 Hydrogeology

The JFHQ is in the Black Hills area, which is an important recharge area for aquifers within the northern Great Plains. JFHQ is within the Williston Basin, which flows into the Madison and Minnelusa aquifers. These aquifers are a part of the Paleozoic group, which occurs in areas that have high altitude and in uplifts like the Laramide Orogeny in the Black Hills. The Madison aquifer, also known as the Mississippian aquifer, has a siltstone, sandstone, limestone, and dolomite base. The water found in this location is typically in outcrop areas and flows to the recharge areas to the northeast. The discharge location occurs as a result of upward leakage to the lower Cretaceous aquifer located in central South Dakota. The Minnelusa aquifer has a limestone and sandstone base, and the aquifer moves from areas of recharge upward by leakage into the lower Cretaceous aquifer. Sandstone composes the lower Cretaceous aquifer and is confined by shale except in areas where uplift can be found. Over one-half of the water found in these areas is moderately saline and can be described as briny in many parts. The salination of this water occurs from upward leakage of mineralized water from the Paleozoic aquifers (US Geological Survey, 2002).

One domestic water well and one irrigation well are located within the boundary of the JFHQ; however, four domestic, one commercial/business, one municipal, five monitoring, and one unknown well exist within 1 mile of the facility (**Figure 1-2**). Drinking water for the facility is supplied by the Rapid City Water Division, which uses the Jackson Springs Gallery and the Girl Scouts Gallery as infiltration galleries along the Rapid Creek alluvium. Water is also drawn from the Minnelusa and Madison aquifers through eight wells. Surface water collects in the Rapid Creek, which collects water from the Deerfield and Pactola Reservoirs. This surface water

supplies water for treatment to the Mountain View and Jackson Springs treatment plants then used for municipal use (Rapid City Water Division, 2018).

Based on the USEPA Unregulated Contaminant Monitoring Rule 3 data, it was indicated that no PFAS were detected in a public water system above the USEPA Health Advisory within 20 miles of the facility. 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

JFHQ has a streamflow that is influenced depending on the climate at the time and the geologic conditions. The base flow in Rapid City comes from the higher altitudes surrounding the city and occurs from events of high precipitation. Many of the surrounding streams have headwater springs that originate from the Paleozoic carbonate rocks. These streams generally flow eastward over the Precambrian rocks of the crystalline core and typically lose flow as the Paleozoic rock dissipates out of the Black Hills (US Geological Survey, 2002).

The surface water flow at the facility is primarily to the southeast towards Rapid Creek (**Figure 1-3**).

1.5.4 Climate

The climate at JFHQ consists of four clearly separated seasons, with warm and clear summers and dry, freezing, cloudy, windy winters. Temperatures vary from average highs of 59.1 degrees Fahrenheit (°F) to average lows of 33.5 °F. The average annual temperature is 46.3 °F. Average precipitation is 18.32 inches of rain (World Climate, 2019).

1.5.5 Current and Future Land Use

JFHQ is a controlled access facility with public roads. The facility consists of utility buildings, administration buildings, and classrooms. Exterior features are vehicle parking areas and roads. Infrastructure improvements, land acquisitions, land use controls, and reasonably anticipated future land use is not expected to change from the current land use.





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2. Fire Training Areas

No FTAs were identified within the facility during the PA through interviews or document review. Fire training exercises for the SDARNG are conducted at Ellsworth AFB.

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 was identified within the JFHQ facility during the PA through interviews or document review. A description of the non-FTA is presented below and shown on **Figure 3-1**. Interview records and photographs are included in **Appendix B** and **Appendix C**, respectively.

3.1 Building 105

Building 105 is located on the west side of the facility and the geographical coordinates are 44°4'49.79"N and 103°16'11.04"W. Building 105 houses two crash rescue firetrucks that are used for fire training exercises off-facility. One firetruck is used as a water tender that only has the capability to hold and dispense water. The other firetruck is a ladder truck with the capability to hold and dispense AFFF or other fire suppressant material; however, the ladder firetruck has never been filled with AFFF. The firetrucks are stored in Building 105 to provide mission support during deployment. If AFFF is required to support the mission, the ladder firetruck would be filled and rinsed at the deployment destination or in "theater." As a result, bulk AFFF has never been stored at the facility.

AFFF fire extinguishers have never been present at JFHQ. The current fire extinguishers are Class B fire extinguishers. There are no hangars, fire stations or other facilities at JFHQ that would have used or stored AFFF.



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4. Emergency Response Areas

No emergency response areas were identified within the JFHQ facility during the PA through interviews or document review. Rapid City Fire Department provides fire emergency services for the JFHQ.

5. Adjacent Sources

Two off-site PFAS sources adjacent to the JFHQ were identified during the PA through interviews (**Appendix B**), online research, and the Environmental Data Resource Report (**Appendix A**). **Figure 5-1** presents the location of potential adjacent source areas.

5.1 Car Washes

During PA interviews, several local interviewees noted two car washes located along the north boundary of JFHQ. There was some conjecture that the wax, and other products typically used at car washes have the potential to contain PFAS. More specifically, the waxes that provide a waterproof layer or barrier. The groundwater flows to the south and the two car washes are upgradient of JFHQ and it is unknown whether or not the off-facility sources affect the facility.



6. Preliminary Conceptual Site Model

Based on the PA findings, no release areas were identified as AOIs at JFHQ. A conceptual site model identifies three components necessary for potentially complete exposure pathways related to a site: (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, there are no PFAS sources that originate at JFHQ or from activities associated with SDARNG activities.

7. Conclusions

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

7.1 Findings

The following area, which was discussed in **Section 3**, were determined to have no suspected release (**Table 7-1**).

Table 7-1: No Suspected Release Areas

No Suspected Release Area	Used by	Rationale for No Suspected Release Determination
Building 105	SDARNG	Building 105 houses two firetrucks. One firetruck is capable of only holding water, and the other firetruck has the capability to hold AFFF; however, has never been filled with AFFF. Also, firetrucks were filled only while deployed and were emptied before returning to Building 105.

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 other non-traditional activities, 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 other sources. Gathered information has a degree of uncertainty due to the absence of written documentation, the limited number of personnel with direct knowledge due to staffing changes, the time passed since PFAS were first used (1989 to 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 potential storage of PFAS were reviewed, retired and current personnel were interviewed, multiple persons were interviewed for the same potential source area, and the facility was visually inspected. **Table 7-2** summarizes the uncertainties associated with the PA.

Table 7-2: Uncertainties

Potential Adjacent Sources	Source of Uncertainty
Car Washes	It is unknown if the products used at car washes contain PFAS.

7.3 Potential Future Actions

Based on the documented absence (2005-present) of the use or release of PFAS-containing materials at JFHQ, no AOIs were identified during the PA. Evidence does not indicate that current or former ARNG activities contributed PFAS contamination to soil, groundwater, surface water, or sediment at the facility or adjacent areas. JFHQ will not move forward in the CERCLA process.



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PFAS Preliminary Assessment Report Joint Forces Headquarters Rapid City, SD

> Appendix A Data Resources

Data Resources will be provided separately on CD. Data Resources for Joint Forces Headquarters.

Joint Forces Headquarters Leases, Licenses, and Permits

• 1933 Warranty Deed

Joint Forces Headquarters Documentation

- 2015 Final Preliminary Assessment Report for Perfluorinated Compounds at Ellsworth Air Force Base South Dakota
- 2019 Final Site Inspection Report of Aqueous Film Forming Foam Areas at Ellsworth Air Force Base Meade and Pennington Counties, South Dakota

EDR Report

• 2019 Joint Forces Headquarters EDR Report

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FINAL PRELIMINARY ASSESSMENT REPORT FOR PERFLUORINATED COMPOUNDS AT ELLSWORTH AIR FORCE BASE SOUTH DAKOTA

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

May 2015

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- Appendix A Photo Documentation
- Appendix B Field Documentation
- Appendix C Records of Communication
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LIST OF ACRONYMS AND ABBREVIATIONS

AFB AFCEC AFFF ANG	Air Force Base Air Force Civil Engineer Center aqueous film-forming foam Air National Guard	
Base bgs	Ellsworth Air Force Base below ground surface	
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980	
EDR	Environmental Data Resources, Inc.	
FTA	Fire Training Area	
HGL	HydroGeoLogic, Inc.	
OU	Operable Unit	
NFRAP	no further remedial action planned	
PA PFC PFOA PFOS	preliminary assessment perfluorinated compound perfluorooctanoic acid perfluorooctane sulfonate	
RI	Remedial Investigation	
SCF SI	SES Construction and Fuel Services, LLC Site Inspection	
USAF USEPA USFWS UST	U.S. Air Force U.S. Environmental Protection Agency U.S. Fish and Wildlife Service underground storage tank	
WWTP	wastewater treatment plant	

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FINAL PRELIMINARY ASSESSMENT REPORT FOR PERFLUORINATED COMPOUNDS ELLSWORTH AIR FORCE BASE SOUTH DAKOTA

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 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 Ellsworth Air Force Base (AFB) (Base) during the week of February 23, 2015. Ellsworth AFB is an active installation near Box Elder, South Dakota. The location of Ellsworth AFB and the locations identified on Ellsworth 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, 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 Ellsworth 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.

This PA Report documents the known FTAs, as well as additional locations where AFFF may have been released into the environment at Ellsworth 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
Ellsworth Air Force Base, South Dakota

Fire Training Areas			
FT001 – Former FTA			
Current FTA			
Non-Fire Training Areas			
Hangars/Buildings			
70, 80, and 90 Rows			
Building 618			
Building 88240			
Fire Stations			
Former Fire Station 2			
Former Fire Storage Area			
Former Fire Station (Building 7506)			
Current Fire Station (Building 7502)			
Emergency Response			
B-52 Crash (1970)			
B-1 Crash (1988)			
Delta Taxiway West Crash (2000)			
Marten Crash (2003)			
Crash 4 (2001)			
Others			
Hazmart			
Wastewater Treatment Plant (WWTP)			
Spray Nozzle Test Area			
Alert Apron			

1.3 BASEWIDE ENVIRONMENTAL SETTING

A description of the Basewide geology, hydrogeology, and hydrology is presented in the Site Investigation Report for Site Investigations of Fire Fighting Foam Usage at Various Air Force Bases in the United States for Ellsworth Air Force Base (SES Construction and Fuel Services, LLC [SCF], 2015) and is summarized in the sections below.

1.3.1 Geology

Ellsworth AFB lies on the extreme eastern flank of the Black Hills uplift, a north-south trending elliptically shaped dome (125 miles long and 45 miles wide), which resulted from tectonic movement during the Laramide Orogeny. During this event, basement crystalline rocks west of Ellsworth AFB were uplifted and exposed while overlying Mesozoic and Paleozoic strata were uplifted, eroded, and deformed. These strata today crop out as hogbacks flanking the Black Hills uplift. Beneath Ellsworth AFB these strata dip moderately to the east-northeast.

The oldest and deepest rocks present in the Ellsworth AFB subsurface are Precambrian age crystalline basement rocks. Overlying the basement crystalline rocks are Cambrian through Lower Cretaceous age deposits of limestone, sandstone, and dolomite. Several of these sedimentary deposits are known aquifers in the region. Overlying the Lower Cretaceous deposits is a sequence of Upper Cretaceous age marine shales with intermittent sandstone and limestone beds. This Upper Cretaceous sequence of fine-grained marine deposits extends to the surface and is more than 1,000 feet thick below Ellsworth AFB. The uppermost of these Cretaceous age deposits is the Pierre Shale, which forms the bedrock surface at Ellsworth AFB.

The Pierre Shale at Ellsworth AFB is a dark gray to light gray, organic-rich, noncalcareous, blocky, fragmented marine shale. Bentonite beds and ironstone concretion layers more than 1 foot thick are common, as are ironstone nodules and selenite crystals on weathered faces. Bentonite beds are typically yellow and are the result of volcanism that occurred during the Laramide Orogeny. The Pierre Shale may be considerably altered by weathering and typically weathers into an orange to brown clay material overlying fractured and iron-stained shale.

The depth to weathered shale or shale bedrock is variable across Ellsworth AFB, occurring anywhere from surface outcrops to depths of approximately 40 feet. The depth to the weathered shale/ bedrock contact (where both are present) is also variable across Ellsworth AFB. Generally, the Pierre Shale decreases in weathering and permeability with depth.

The location geology at Ellsworth AFB typically consists of unconsolidated materials underlain by the Pierre Shale. Unconsolidated materials can be divided into three basic categories based upon depositional history:

- Colluvial Deposits loose, heterogeneous and incoherent sediment and/or rock fragments deposited by rainwash, sheetwash, or slow, continuous downslope creep. Typified by juxtaposition of sedimentary components not normally associated with one another (for example, gravelly clay).
- Alluvial Deposits clay, silt, sand, gravel or similar unconsolidated, detrital ill material deposited during comparatively recent geologic time by running water as a sorted or semisorted deposit. These deposits are generally associated with the past or current drainage system of Boxelder Creek.

• Residual Material – unconsolidated material that has developed in place through the weathering of underlying consolidated rock. These materials may show relict textures associated with the parent rock. Residual deposits resemble weathered shale and the boundary between the two is not well defined.

The thickness of these unconsolidated materials varies widely across the installation but generally ranges from 10 to 30 feet. Toward the northern end of Ellsworth AFB, the Pierre Shale is predominantly covered by a thin veneer of soil, alluvium, or colluvium but is exposed along deeper channels and some steeper side slopes. Toward the southern end of Ellsworth AFB, older, relatively thicker, coarser alluvial deposits associated with Boxelder Creek fill the gentler, wider erosional channels, and exposures of Pierre Shale are less common.

1.3.2 Hydrogeologic Setting

One shallow unconfined aquifer and three confined aquifers (Inyan Kara, Minnelusa, and Madison) could be used for water supplies at Ellsworth AFB. None of the confined aquifers are in hydraulic communication with the overlying unconfined aquifer. The shallow unconfined aquifer at Ellsworth AFB is considered a federal Class II-B (potential source of drinking water) aquifer and possibly a Class II-A (discharge to surface water) aquifer. Groundwater within the shallow aquifer on the northern end of the Base flows southeast. Farther south on Ellsworth AFB, groundwater flows in a more southern direction within the shallow aquifer.

At Ellsworth AFB, the upper shallow aquifer consists of both alluvial and colluvial deposits and fractured Pierre Shale. The shallow aquifer is absent in some areas and extends in depth from only a few feet below the surface to 60 feet or less in depth in other areas. The thickness and yield of the shallow aquifer depend upon the extent of alluvial material and the thickness of water-yielding fractures in the Pierre Shale. In several areas toward the northern end of Ellsworth AFB, no groundwater-bearing zones were found, while in the southern area of the Base, alluvial sand and gravel beds and shallow fracture zones typically produce less than 2 gallons per minute to monitoring wells. The shallow, unconfined aquifer at Ellsworth AFB is present within the fractured shale horizon near the top of the Pierre Shale and the contiguous overlying deposits of unconsolidated material.

The Inyan Kara aquifer is a confined aquifer bounded by confining beds of the Pierre Shale and other relatively impermeable Upper Cretaceous strata above and Permian-Jurassic strata below. The aquifer lies about 1,900 feet beneath Ellsworth AFB and consists of 350 to 500 feet of permeable sandstone belonging to the Fall River and Lakota Formations. Groundwater flow direction is assumed based on published data; west of Ellsworth AFB, it is assumed to be toward the east-northeast based on the direction of dip.

The Minnelusa aquifer is a confined aquifer that lies beneath approximately 1,000 feet of Permian-Jurassic confining beds and above Pennsylvanian confining beds. The aquifer is a limestone unit approximately 600 feet thick and lies 3,460 feet beneath Ellsworth AFB. Groundwater flow direction is assumed to be toward the east-northeast based on the direction of dip.

The deepest aquifer used as a domestic water supply source in this region is the Madison (also known as Pahasapa) aquifer, which is beneath 240 to 450 feet of Lower Pennsylvanian confining strata. The aquifer is a limestone deposit that averages 350 feet thick and lies 4,150 feet beneath

Ellsworth AFB. Groundwater flow direction is assumed to be toward the east-northeast in the direction of dip.

Ellsworth AFB drinking water comes from off Base and is supplied by the Rapid City Municipal Distribution System (Jensen, 2015, personal communication; Appendix C). Sources of water for this system come from three infiltration galleries: Jackson Springs Gallery, Meadowbrook Gallery, and Girl Scout Gallery. Water is also drawn from the Minnelusa and Madison aquifers. In high demand times, the City also uses surface water from Rapid Creek, which originates in the Rapid Creek drainage areas west of Rapid City. This source includes the Deerfield and Pactola Reservoirs (USAF, 2008). This surface water source is upgradient of Ellsworth AFB.

Ellsworth AFB previously had several water supply wells that were used to supply the Base with drinking water. Five public water supply wells were installed in the deep bedrock aquifers of the Base but have all been abandoned/decommissioned (Pavek, 2015, personal communication; Appendix C).

Various private wells screened within the shallow aquifer may be or were historically present at off-Base locations. Two private wells were identified as being located within 1 to 2 miles of the data search location based on the Environmental Data Resources, Inc. (EDR) report; however, these wells were both noted as being inactive (EDR, 2015). Additionally, both of these wells are cross-gradient (east) or upgradient (north-northwest) of the Base, indicating no exposure potential.

1.3.3 Hydrologic Setting

The northern border of Ellsworth AFB is a steep northward-facing escarpment, which is drained by seven unnamed ephemeral drainages that discharge into Elk Creek, approximately 5 miles to the northeast. Surface drainage on the plateau follows the topographic slope, primarily flowing south-southeast via retention ponds, ditches, storm sewers, and ephemeral streams, eventually discharging into Boxelder Creek, 1 mile to the south. Some surface flow in the western and southwestern portions of Ellsworth AFB is southwest toward an unnamed drainage west of the Base that ultimately discharges to Boxelder Creek.

1.3.4 Ecological Receptors

The following endangered species are known to inhabit Meade and Pennington Counties:

- Whooping Crane Bird
- Bald Eagle Bird
- Interior Least Tern Bird
- Black-footed Ferret Mammal

It is possible that these endangered species may be found within the boundaries of Ellsworth AFB.

1.4 PRELIMINARY ASSESSMENT METHODS

This PA Report was prepared in accordance with the following:

- CERCLA Guidance (U.S. Environmental Protection Agency, 1991)
- Interim Air Force Guidance (USAF, 2012a)
- 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 2-day visit to Ellsworth AFB.
- Conducting interviews with government personal in Environmental Management, the Ellsworth AFB Fire Department, and Aircraft Hangar Maintenance and Operations.
- Visiting and photographing locations where AFFF has been used or may have been used.
- Performing an environmental data records search to document nearby populations and recording water supply well information and wetlands information.

1.5 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 visit.
- Section 3.0, Non-Fire Training Areas, describes the non-FTAs identified during the 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

FIGURE

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nty	Figure 1.1 All Identified Locations Ellsworth AFB, South Dakota		
ounty		Legend	
	Apj Gro	proximate Uppermost, Shallow undwater Flow Direction	
	Stre	am/River	
HON	—— Stor	rm Sewer	
100	Was	stewater Line	
2	Wat	er Line	
	—— Roa	d	
	Арј	proximate Site Boundary	
1.1	Bas	e Boundary	
	Bui	lding	
	She	d	
£ 1	Free	shwater Forested/Shrub Wetland	
	Free	shwater Emergent Wetland	
	Free	shwater Pond	
1	Oth	er	
	Notes:		
	FTA = fire trainiWWTP = waster	ng area water treatment plant Proi\&FCFC\Fl\sworth\GI\$\ManFiles\	
Real Property lies	Source: Wetland, Nat 2012, U.S. Fi Conservation	ional Wetlands Inventory - Wetland Polygons, Published September sh and Wildlife Service, Division of Habitat and Resource , Washington, D.C. http://www.fws.gov/wetlands/	
SDA, munity		CH2MHILL.	

2.0 FIRE TRAINING AREAS

2.1 FT001 – FORMER FIRE TRAINING AREA

2.1.1 Description and Operational History

Site FT001, the former FTA, is approximately 8 acres in size and is located in the southwestern segment of Ellsworth AFB (Figures 1.1 and 2.1). It is an Installation Restoration Program site and is included in Operable Unit 1 (OU 1), which includes FT001 as well as a portion of the downgradient drainages including Pond 1. FT001 is bordered to the north by the current FTA, to the south and east by unnamed drainages, and to the west by open grasslands. The geographic coordinates are $44^{\circ}7' 51.83"$ N and $103^{\circ}5' 56.05"$ W.

From 1942 to 1990, Site FT001 was the original FTA on Ellsworth AFB. Fire training activities were moved to the current FTA in 1993. No fire training activities were conducted in the interim time period. The tanks and pipelines associated with FT001 were removed at that time (USAF, 2012b). FT001 contained a shallow, unlined burn pit with a steel aircraft mockup that was set ablaze for fire training exercises. The location of the burn area within the former FTA has changed several times over the years. Aerial photographs of Ellsworth AFB dated May 28, 1952, October 8, 1954, August 25, 1962, and June 19, 1968, show numerous areas of staining presumed to be a result of fire training activities within the former training area. The training exercises conducted at the FTA involved simulation of aircraft fires and spills.

In 1995, a groundwater treatment system (Building 6908) was installed at FT001 to remediate fuels and chlorinated volatile organic compounds in groundwater. The system was located just east of FT001 (Figure 2.1). From 1995 to 2001, treated groundwater was discharged to the unnamed drainage located directly south of the site. As a result of elevated selenium in treated water, discharge to surface water was stopped in 2001 and was reinjected into groundwater via two injection trenches. However, groundwater from the southernmost injection trench was found to be daylighting into the drainages south of the site, and injection into this trench was stopped. Reinjection continued at a second infiltration trench located 1,700 feet north-northwest of Building 6908 until the pump and treatment system were turned off in November 2011 and replaced by passive treatment (in-situ reductive treatment) in accordance with the OU-11 (Basewide Groundwater) Record of Decision Amendment (USAF, 2012c).

A full description of the site and operational history is presented in previous investigation documents. The location of FT001 is shown on Figures 1.1 and 2.1.

2.1.2 Waste Characteristics

Various types of fuels, oils, and chlorinated solvents were dispersed within the burn pit area and subsequently ignited and then extinguished. AFFF was used to extinguish the fires used during these training activities starting in the early 1970s until the location was closed in 1990 (Beck, 2015a, personal communication; Appendix C). Mr. Beck of the Ellsworth AFB Fire Department did not have knowledge or record logs of the quantity of AFFF used/released during fire training activities (Beck, 2015a, personal communication; Appendix C).

In the early 2000s, Pond 1 was dredged, and the dredge materials were land applied west of the current FTA (USAF, 2012b) (Figure 2.1).

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2.1.3 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 one day care facility, six schools, three hospitals, and two colleges within the potential migration area of 4 miles from any given potential release location of PFCs. No elementary schools are located on Base. The closest elementary school is located at least 1.6 miles hydrologically cross-gradient of FT001. The on-Base child development center is located approximately 1.4 miles hydrologically cross-gradient of FT001.

2.1.3.1 Groundwater Pathway and Targets

The Basewide geologic and hydrogeological settings are provided in Section 1.3. Groundwater at this site flows south-southeast.

Ellsworth AFB drinking water sources are all located more than 4 miles cross-gradient or upgradient of Ellsworth AFB and do not support a complete drinking water exposure pathway. The fact that Ellsworth does not use the shallow unconfined aquifer below the Base as a supply of drinking water would render this drinking water exposure pathway incomplete for Ellsworth AFB workers and residents. However, because of the relatively shallow depth to groundwater in some areas (as shallow as 10 feet below ground surface [bgs]), excavation workers could be exposed to groundwater.

One public water supply well, owned by Box Elder, is located approximately 2.3 miles east of FT001 (EDR, 2015). The well serves a population of approximately 7,800 (EDR, 2015). This is a groundwater well; although, the aquifer in which the well is zoned is unknown. However, it is likely to be installed in the deeper confined aquifer that would not be impacted by shallow groundwater migrating off Base. Additionally, this well is hydrologically cross-gradient of the current FTA.

One private groundwater public water supply well is located 1.9 miles southeast of FT001 and serves a population of 90 in Whispering Willows. The aquifer in which the well is zoned is unknown (EDR, 2015). This well is hydrologically cross-gradient of the location.

One known private well is located 1,490 feet downgradient of the site and is used to water cattle (Jensen, 2015, personal communication; Appendix C). Consequently, while ingestion of groundwater by humans is not anticipated, there is a complete ingestion and dermal exposure pathway for cattle and other ecological receptors. A second private well is located approximately 1,985 feet downgradient (south) of FT001 and is owned by a landscape/nursery company. It is not known whether this well is used for potable water (USAF, 2012b). As part of the future RI at FT001, an inventory of all nearby private wells will be conducted and sampling of each well and analysis of groundwater for PFCs will be performed (Jensen, 2015, personal communication; Appendix C).

Sampling was conducted at FT001 as part of a broad agency announcement in 2011. PFCs were detected in groundwater collected at and downgradient of this location. A remedial investigation (RI) to assess the extent of PFCs at this location and downgradient of the location is planned (Jensen, 2015, personal communication; Appendix C).

2.1.3.2 <u>Surface Water Pathway and Targets</u>

The surface water drainage from FT001 flows south from the site to unnamed drainages which discharge to Pond 1, and eventually enters into a private landowner's pond. Ellsworth AFB drinking water does not come from surface water sources located within the watershed of Ellsworth AFB, so there is no exposure pathway for surface water to residents or workers through domestic drinking water. Groundwater beneath FT001 discharges into the unnamed drainages south of the site and could provide a complete exposure pathway for non-ingestion exposures, such as dermal exposure to humans. Ingestion by aquatic or other animals is also a potential pathway for ecological receptors.

The site is not located within a flood zone. The nearest body of water is Pond 1, located approximately 800 feet downgradient of the site. Discharge from Pond 1 leaves the Base via Outfall 1 and travels to a private landowner's pond located approximately 0.5 mile downgradient of FT001.

No surface water intakes, downstream fisheries, or sensitive environments are adjacent to the surface water migration path within 15 miles downstream of the site; however, several wetlands are present (EDR, 2015; USFWS, 2015). Local waterways may be used for recreational fishing by residents of nearby communities while crayfish and fish are known to be consumed from on-Base ponds (Goyer, 2015b, personal communication; Appendix C). Additionally, nearly all of the surface water along the tributaries and Boxelder Creek is available for use for stock watering (Goyer, 2015a, personal communication; Appendix C).

2.1.3.3 Soil and Air Exposure Pathways and Targets

A release of AFFF to the soil surface during fire training activities has likely occurred. Additionally, dredge materials from Pond 1 were land applied to the west of the current FTA. The nearest residents are approximately 1,490 feet downgradient of FT001. Workers are not present at the location and, aside from the fire training activities that occur just north of FT001 at the current FTA, no workers are present within 0.5 mile of FT001. The well-vegetated area would preclude any fugitive dust emissions and potential exposures. Current and planned future land use does not involve any human health exposures, and no intrusive work is anticipated 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 site includes Rapid City and Box Elder residents, with a population of approximately 8,190. No schools or day care facilities are within a 200-foot radius of the site. The nearest school is Vandenberg Elementary School, located approximately 7,780 feet to the east-northeast of FT001 (EDR, 2015). The nearest day care facility is the Ellsworth AFB Child Development Center, located approximately 8,700 feet to the northeast.

The FT001 area is not used for hunting, fishing, or harvesting of wild or farmed foods, and such activities are not anticipated in the future. No sensitive environments have been identified within 200 feet or within 4 miles.

Sampling was conducted at FT001 as part of a broad agency announcement in 2011. PFCs were detected in soils collected at and downgradient of this location. An RI to assess the extent of PFCs at this site is planned (Jensen, 2015, personal communication; Appendix C).

2.2 CURRENT FIRE TRAINING AREA

2.2.1 Description and Operational History

The current FTA, is approximately 7 acres in size and is located in the southwestern segment of Ellsworth AFB (Figures 1.1 and 2.1). The current FTA is bordered to the north by the open fields, to the south by FT001, to the east by unnamed drainages, and to the west by open grasslands. The geographic coordinates are 44°7' 59.56"N and 103°5' 53.96"W.

The current FTA was built in 1992 and began operation in 1993. This location contains a large concrete pad with a steel mockup aircraft in the center that is set ablaze for fire training exercises. The central area of the concrete pad consists of a lined pit in which the training activities are conducted. This pit holds the water and/or AFFF applied during fire training exercises. When the pit reaches capacity, the water is discharged via underground piping to a lined retention pond located just off the concrete pad to the southwest (Beck, 2015a, personal communication; Appendix C). When full, the retention pond is emptied using a 9,500-gallon tanker and a transfer pump and contents are disposed of at the 70 row diversion tank (see Section 3.1.1 for discussion regarding the 70 row diversion tank).

The location of the current FTA is shown on Figures 1.1 and 2.1.

2.2.2 Waste Characteristics

Fire training is typically conducted on a monthly basis using only water; however, AFFF is used up to a few times a year. Historically, 6 percent AFFF was used until the mid-1990s when the Base switched to 3 percent AFFF, which is currently still in use by the fire department (Beck, 2015a, personal communication; Appendix C).

Spray nozzle testing is also conducted annually at the current FTA. While the majority of AFFF discharged during this testing is contained on the concrete pad, it does occasionally run off into the grass surrounding the pad. No logs exist that document the volume of AFFF used during fire training activities; however, approximately 5 to 10 gallons of AFFF are used during each test (Beck, 2015a, personal communication; Appendix C).

After an emergency response call where AFFF is applied, the nozzle is always flushed at the current FTA.

Five-gallon buckets of AFFF are stored inside a conex storage container at the current FTA. As of February 2015, 1,635 gallons were reportedly stored here. No spills or releases have been reported or observed (Beck, 2015a, personal communication; Appendix C).

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Based on the operational history and release of AFFF during these years, the potential for PFCs released to the environment is high. Because the location is currently in use, future impacts to environmental media would need to be investigated once the ongoing use of AFFF is discontinued.

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 one day care facility, six schools, three hospitals, and two colleges within the potential migration area of 4 miles from any given potential release location of PFCs. No elementary schools are located on Base. The closest elementary school is located at least 1.6 miles hydrologically cross-gradient of the current FTA. The on-Base child development center is located approximately 1.4 miles hydrologically cross-gradient of the location.

2.2.3.1 Groundwater Pathway and Targets

The Basewide geologic and hydrogeological settings are provided in Section 1.3. In the southern portion of Ellsworth AFB, groundwater flows in a southerly direction within the shallow aquifer.

Ellsworth AFB drinking water sources are all located more than 4 miles cross-gradient or upgradient of Ellsworth AFB and do not support a complete drinking water exposure pathway. The fact that Ellsworth does not use the shallow unconfined aquifer below the Base as a supply of drinking water would render this drinking water exposure pathway incomplete for Ellsworth AFB workers and residents. However, because of the relatively shallow depth to groundwater in some areas (as shallow as 10 feet bgs), excavation workers could be exposed to groundwater.

One public water supply well, owned by Box Elder, is located approximately 2.3 miles east of the location (EDR, 2015). The well serves a population of approximately 7,800 (EDR, 2015). This is a groundwater well; although, the aquifer in which the well is zoned is unknown. However, it is likely to be installed in the deeper confined aquifer that would not be impacted by shallow groundwater migrating off Base. Additionally, this well is hydrologically cross-gradient of the current FTA.

One private groundwater public water supply well is located 1.9 miles southeast of the current FTA and serves a population of approximately 90 in Whispering Willows. The aquifer in which the well is zoned is unknown (EDR, 2015). This well is hydrologically cross-gradient of the location.

One known private well is located 2,250 feet downgradient (south) of the location and is used to water cattle (Jensen, 2015, personal communication; Appendix C). Consequently, while ingestion of groundwater by humans is not anticipated, there is a complete ingestion and dermal exposure pathway for cattle and other ecological receptors. A second private well is located approximately 2,650 feet downgradient (south) of the location and is owned by a landscape/nursery company. It

is not known whether this well is used for potable water (USAF, 2012b). As part of the RI at FT001, an inventory of all nearby private wells will be conducted and sampling of each well and analysis of the groundwater for PFCs will be performed (Jensen, 2015, personal communication; Appendix C). Because the current FTA is located directly north of FT001, any potential impacts to downgradient groundwater resources will be identified during this RI.

2.2.3.2 <u>Surface Water Pathway and Targets</u>

The surface water drainage from the current FTA either infiltrates into the soils, enters the unnamed drainages to the east, or travels south to FT001 where runoff eventually enters unnamed drainages and discharges to Pond 1 and eventually enters into a private landowners' pond. Ellsworth AFB drinking water does not come from surface water sources located within the watershed of Ellsworth AFB, so there is no exposure pathway for surface water to residents or workers through domestic drinking water. Groundwater beneath the current FTA daylights into the unnamed drainages south of the location and could provide a complete exposure pathway for non-ingestion exposures, such as dermal exposure to humans. Ingestion by aquatic or other animals is also a potential pathway for ecological receptors.

The location is not located within a flood zone. The nearest body of water is Pond 1, located approximately 1,400 feet downgradient of the location. Discharge from Pond 1 leaves the Base via Outfall 1 and travels to a private landowners' pond located approximately 0.5 mile downgradient of FT001 (Goyer, 2015a, personal communication; Appendix C).

No surface water intakes, downstream fisheries, or sensitive environments are adjacent to the surface water migration path within 15 miles downstream of the location; however, several wetlands are present (EDR, 2015; USFWS, 2015). Local waterways may be used for recreational fishing by residents of nearby communities while crayfish and fish are known to be consumed from on-Base ponds (Goyer, 2015b, personal communication; Appendix C). Additionally, nearly all of the surface water along the tributaries and Boxelder Creek is available for use for stock watering (Goyer, 2015a, personal communication; Appendix C).

2.2.3.3 Soil and Air Exposure Pathways and Targets

A release of AFFF to the soil surface during fire training activities has likely occurred. The nearest residents are approximately 2,250 feet south of the location. Workers are present at the location during monthly fire training activities. Aside from fire department staff who conduct fire training activities at the location, workers are not present within 0.5 mile of the current FTA. The well-vegetated area would preclude any fugitive dust emissions and potential exposures. Construction activities or other ground-disturbing activities could result in potential worker exposure. The potential of exposure to burrowing animals, if any, would be present at the perimeter of the location, although the majority of the location is concrete.

The population within 4 miles of the current FTA includes Rapid City and Box Elder residents, with a population of approximately 8,190. No schools or day care facilities are within a 200-foot radius of the current FTA. The nearest school is Vandenberg Elementary School, located approximately 7,750 feet to the east-northeast of the current FTA (EDR, 2015). The nearest day care facility is the Ellsworth AFB Child Development Center, located approximately 8,600 feet to the northeast.

FIGURE

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3.0 NON-FIRE TRAINING AREAS

3.1 HANGARS/BUILDINGS

3.1.1 70, 80, and 90 Rows

3.1.1.1 Description and Operational History

Docks 70, 71, 72, 73, 74, 81, 90, 91, 92, and 93 are aircraft hangars in the 70, 80, and 90 rows of hangars on the northeast side of the Ellsworth AFB runway (Figures 1.1 and 3.1). The area encompasses approximately 83 acres. The geographic coordinates are 44°9' 6.40"N and 103°6' 6.10"W.

Historically, these docks contained AFFF fire suppression systems. These systems were supplied with AFFF via Pumphouse 7263 located at the northeast end of 90 row. Pumphouse 7263 contained a 1,000-gallon AFFF tank that fed the 70, 80, and 90 rows of hangars via underground piping. According to the spills database, 310 gallons of AFFF was released at the pumphouse in September 1994 (Ellsworth, 2015). In 2000, the systems were upgraded and each dock had its own 500-gallon AFFF tank installed inside. AFFF underground piping from the pumphouse to the hangars is still in place but capped at the floor.

Inside each dock is a trench drain system that discharges to the 150,000-gallon 70 row diversion tank (underground storage tank [UST] 7246). The contents of the diversion tank were typically released to the WWTP but could have also been released to Outfall 3 on the southwest side of the runway at Ellsworth AFB through storm drains. In 2000, the systems were upgraded and each dock had its own 500-gallon AFFF tank installed inside. AFFF underground piping from the pumphouse to the hangars is still in place but capped at the floor.

According to Mr. Beck, when an AFFF system would activate, the diversion valve was closed automatically through Monaco system to prevent AFFF from traveling to the WWTP and the diversion tank would be opened. Released AFFF was held inside the facility and entered drain lines and the diversion tank. After the AFFF was drained, the lines were flushed with water and the diversion valves were re-opened. AFFF in the tank would be removed as hazardous waste (Beck, 2015a, personal communication; Appendix C).

In 2014, the WWTP was decommissioned. As of July 2014, the diversion tank now discharges to the off-Base publicly owned treatment works.

Conversion of all AFFF systems to high-expansion foam systems began in 2005 and was completed in 2012. AFFF is no longer used in any of the docks (Beck, 2015a, personal communication; Appendix C).

3.1.1.2 <u>Waste Characteristics</u>

According to the spills database, 310 gallons of AFFF was released at the pumphouse in September 1994 (Ellsworth, 2015). In 1993, the tank contents, approximately 150,000 gallons, were released into the storm drain, which flowed to Outfall 3 and then off-Base through an unnamed tributary of Boxelder Creek. The USEPA issued a Notice of Violation regarding this incident (USAF, 2012b).

Several releases of AFFF have occurred at the docks including the following:

- Dock 70:
 - 700 gallons of AFFF were released due to unknown reasons (November 2000) (Ellsworth, 2015).
 - An unknown amount of AFFF was released in due to a system malfunction (September 2002) (Ellsworth, 2015).
- Dock 71:
 - Inadvertent release/pipe break of 400 gallons of AFFF in foam pump room (September 2006). Contained in diversion tank (Beck, 2015a, personal communication; Appendix C).
 - A 300-foot by 30-foot spill occurred when testing repaired AFFF system (May 1998). Contained in diversion tank (Ellsworth, 2015).
 - An unknown amount of AFFF was released in the mechanical room of Dock 71 when a pipe broke in July 2000 (Ellsworth, 2015).
- Dock 74:
- 100 gallons released when system activated (October 1994). Contained in diversion tank (USAF, 2012b)
- Dock 81:
 - o 30 gallons released from a leaking nozzle (June 1999) (Ellsworth, 2015).
 - 250 gallons released for unknown reasons (June 2000). The spills database also noted this as occurring at AFFF pumphouse; therefore, it is unclear whether this occurred in Dock 81 or at Pumphouse 7263 (Ellsworth, 2015).
 - An unknown amount of AFFF was released due to a leaking gasket (June 2000) (Ellsworth, 2015).
 - An unknown amount of AFFF was released from a deck gun (July 2002) (Ellsworth, 2015).
- Dock 90:
 - 12-gallon release when system activated (March 1995). Contained in diversion tank (USAF, 2012b).
 - Inadvertent release of 450 gallons of AFFF (March 2007). Contained in diversion tank (Beck, 2015a, personal communication; Appendix C).
 - An unknown amount of AFFF was released as a result of cold weather (January 2005) (Ellsworth, 2015).
- Dock 91:
 - Inadvertent release of 315 gallons of AFFF (May 2006). Contained in diversion tank (Beck, 2015a, personal communication; Appendix C).
 - Unknown amount of AFFF released from the pipe next to the monitor gun (December 2000) (Ellsworth, 2015).
- Dock 92:
 - 300 gallons released during system activation and equipment failure (November 1995). Contained in diversion tank (USAF, 2012b).

- 25 to 50 gallons released due to nuisance tripping of fire alarm (June 2000) (Ellsworth, 2015).
- o 400 gallons released from aircraft 5086 (December 2000) (Ellsworth, 2015).
- o 400 gallons released due to a system leak (December 2005) (Ellsworth, 2015).
- Dock 93:
 - 60 to 70 gallons spilled from drums while transferring to tank (February 1994).
 Contained on concrete (USAF, 2012b).
 - o 500 gallons released for unknown reasons (May 2002) (Ellsworth, 2015).

Mr. Beck, who has worked at Ellsworth AFB for 20 years, related that soil surrounding these docks may potentially be contaminated with PFCs because he often saw discharges coming out of the hangars (Beck, 2015a, personal communication; Appendix C).

3.1.1.3 <u>Pathway and Environmental Hazard Assessment</u>

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 one day care facility, six schools, three hospitals, and two colleges within the potential migration area of 4 miles from any given potential release location of PFCs. No elementary schools are located on Base. The closest elementary school is located at least 1.9 miles hydrologically downgradient (southeast) of the hangars. The on-Base child development center is located approximately 1.5 miles hydrologically downgradient (east-southeast) of the location.

3.1.1.3.1 Groundwater Pathway and Targets

The Basewide geologic and hydrogeological settings are provided in Section 1.3. In the northern portion of the Base, groundwater in the shallow groundwater aquifer generally flows southeast.

Ellsworth AFB drinking water sources are all located more than 4 miles cross-gradient or upgradient of Ellsworth AFB and do not support a complete drinking water exposure pathway. The fact that Ellsworth does not use the shallow unconfined aquifer below the Base as a supply of drinking water would render this drinking water exposure pathway incomplete for Ellsworth AFB workers and residents. However, because of the relatively shallow depth to groundwater in some areas (as shallow as 10 feet bgs), excavation workers could be exposed to groundwater.

One public water supply well, owned by Box Elder, is located approximately 3 miles southeast (cross-gradient) of the location (EDR, 2015). The well serves a population of approximately 7,800 (EDR, 2015). This is a groundwater well, although the aquifer in which the well is zoned is unknown. However, it is likely to be installed in the deeper confined aquifer that would not be impacted by shallow groundwater migrating off Base.

One private groundwater public water supply well is located 3.1 miles south-southeast of the location and serves a population of approximately 90 in Whispering Willows. The aquifer in which the well is zoned is unknown (EDR, 2015). This well is hydrologically cross-gradient of the location.

One known private well is located 9,000 feet cross-gradient (south) of the location and is used to water cattle (Jensen, 2015, personal communication; Appendix C). A second private well is located approximately 9,400 feet cross-gradient (south) of the location and is owned by a landscape/nursery company. It is not known whether this well is used for potable water (USAF, 2012b). However, because these wells are cross-gradient of the hangars, a complete exposure pathway does not exist.

Sampling for PFCs was conducted as part of the Site Inspection (SI) (SCF, 2015) at Docks 73 and 93. PFCs were detected in groundwater and confirm that PFCs have been released as a result of the AFFF fire suppression systems in the hangars.

3.1.1.3.2 Surface Water Pathway and Targets

The surface water drainage from the area around the hangars either infiltrates into the soils adjacent to the hangars or enters the storm drain system that flows to the west and discharges to Pond 3, eventually leaving the Base via Outfall 3. In 1993, the tank contents were released to the storm drain system and entered Pond 3, discharged off Base, and eventually discharged to Boxelder Creek. Additionally, while no surface waterbodies are present in the vicinity of the hangars, shallow groundwater beneath the hangar area could be hydrologically connected with downgradient surface waters such as Boxelder Creek. Consequently, complete exposure pathways for dermal exposure to humans and dermal exposure and ingestion by aquatic or other animals are present. Ellsworth AFB drinking water does not come from surface water sources located within the watershed of Ellsworth AFB, so there is no exposure pathway for surface water to residents or workers through domestic drinking water.

The location is not located within a flood zone. No wetlands are located within the immediate vicinity of the hangars or within 0.5 mile of the location. Discharge from the hangars either enters storm drains or infiltrates into grassy areas surrounding the hangars.

No surface water intakes, downstream fisheries, or sensitive environments are adjacent to the surface water migration path within 15 miles downstream of the location; however, several wetlands are present (EDR, 2015; USFWS, 2015). Local waterways may be used for recreational fishing by residents of nearby communities while crayfish and fish are known to be consumed from on-Base ponds (Goyer, 2015b, personal communication; Appendix C). Additionally, nearly all of the surface water along the tributaries and Boxelder Creek is available for use for stock watering (Goyer, 2015a, personal communication; Appendix C).

Sampling for PFCs was conducted as part of the SI (SCF, 2015) at Docks 73 and 93. PFCs were detected in surface water and sediments at Pond 3/Outfall 3 located downgradient of the hangars.

3.1.1.3.3 Soil and Air Exposure Pathways and Targets

A release of AFFF to the soil surface during fire training activities has likely occurred. This area has no residents, but workers are present at the location where staff work inside and around the hangars. The nearest residents are approximately 1 mile east of the location. The location consists

primarily of hard surfaces with grassy areas along the perimeter. The unpaved areas surrounding the location are well-vegetated and would preclude any fugitive dust emissions and potential exposures. Construction activities or other ground-disturbing activities could result in potential worker exposure. The potential of exposure to burrowing animals, if present, would be possible, although the majority of the location is paved.

The population within 4 miles of the location includes Rapid City and Box Elder residents, with a population of approximately 5,660. No schools or day care facilities are within a 200-foot radius of the location. The nearest school is Vandenberg Elementary School, located approximately 8,875 feet to the southeast of the location (EDR, 2015). The nearest day care facility is the Ellsworth AFB Child Development Center, located approximately 1.4 miles to the west-southwest.

The location is not used for hunting, fishing, or harvesting of wild or farmed foods, and such activities are not anticipated in the future. No sensitive environments have been identified within 200 feet or within 4 miles.

Sampling for PFCs was conducted as part of the SI (SCF, 2015) at Docks 73 and 93. PFCs were detected in groundwater and confirm that PFCs have been released as a result of the AFFF fire suppression systems in the hangars.

3.1.2 Building 618

3.1.2.1 <u>Description and Operational History</u>

Building 618, the Logistics Readiness Squadron and refueling maintenance, is located near the southeast end of the runway (Figures 1.1 and 3.2). This building formerly had an AFFF fire suppression system. Discharge from the system was captured in floor drains and discharged to a 50,000-gallon diversion recovery tank (UST 618) via underground pipelines. The tank contents were released to the WWTP. The solids in the tank were periodically cleaned out by contractors. The dewatered sludge was shoveled out and disposed of at a local landfill (Ellefson, 2015, personal communication; Appendix C). The geographic coordinates are 44°8' 11.54"N and 103°5' 9.42"W.

Conversion of all AFFF systems to high-expansion foam systems started in 2005 and was completed in 2012. AFFF is no longer used at Building 618 (Beck, 2015a, personal communication; Appendix C).

3.1.2.2 <u>Waste Characteristics</u>

According to the spills database, 50 gallons of AFFF were inadvertently released inside Building 618 when electricians accidentally pressurized the system in November 2001 (Ellsworth, 2015). Based on data collected during the SI (SCF, 2015), AFFF releases have occurred at this location as discussed in Sections 3.1.2.3.1 and 3.1.2.3.3.

3.1.2.3 <u>Pathway and Environmental Hazard Assessment</u>

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 one day care facility, six schools, three hospitals, and two colleges within the potential migration area of 4 miles from any given potential release location of PFCs. No elementary schools are located on Base. The closest elementary school is located at least 1.1 miles hydrologically cross-gradient (east) of Building 618. The on-Base child development center is located approximately 1 mile hydrologically cross-gradient (northeast) of the location.

3.1.2.3.1 Groundwater Pathway and Targets

The Basewide geologic and hydrogeological settings are provided in Section 1.3. In the northern portion of the Base, groundwater in the shallow groundwater aquifer generally flows southeast.

Ellsworth AFB drinking water sources are all located more than 4 miles cross-gradient or upgradient of Ellsworth AFB and do not support a complete drinking water exposure pathway. The fact that Ellsworth does not use the shallow unconfined aquifer below the Base as a supply of drinking water would render this drinking water exposure pathway incomplete for Ellsworth AFB workers and residents. However, because of the relatively shallow depth to groundwater near Building 618 (12 to 15 feet bgs), excavation workers could be exposed to groundwater.

One public water supply well, owned by Box Elder, is located approximately 1.8 miles southeast (downgradient) of the location (EDR, 2015). The well serves a population of approximately 7,800 (EDR, 2015). This is a groundwater well, although the aquifer in which the well is zoned is unknown. However, it is likely to be installed in the deeper confined aquifer that would not be impacted by shallow groundwater migrating off Base.

One private groundwater public water supply well is located 1.8 miles south-southeast of the location and serves a population of approximately 90 in Whispering Willows. The aquifer in which the well is zoned is unknown (EDR, 2015). This well is hydrologically cross-gradient of the location.

One known private well is located 5,385 feet cross-gradient (southwest) of the location and is used to water cattle (Jensen, 2015, personal communication; Appendix C). A second private well is located approximately 5,600 feet cross-gradient (southwest) of the location and is owned by a landscape/nursery company. It is not known whether this well is used for potable water (USAF, 2012b). However, because these wells are cross-gradient of Building 618, a complete exposure pathway does not exist.

Sampling for PFCs was conducted as part of the SI (SCF, 2015) at Building 618. PFCs were detected in groundwater and confirm that PFCs have been released as a result of the AFFF fire suppression system.

3.1.2.3.2 Surface Water Pathway and Targets

The surface water drainage from the area around Building 618 either infiltrates into the soils adjacent to the location or enters the storm drain system that flows to the south, discharges into Pond 2, and eventually discharges off Base from Outfall 2. Additionally, while no surface waterbodies are present in the vicinity of the building, shallow groundwater beneath the location

could be hydrologically connected with downgradient surface waters such as Boxelder Creek. Consequently, complete exposure pathways for dermal exposure to humans and dermal exposure and ingestion by aquatic or other animals are present. Ellsworth AFB drinking water does not come from surface water sources located within the watershed of Ellsworth AFB, so there is no exposure pathway for surface water to residents or workers through domestic drinking water.

The location is not located within a flood zone. No waterbodies or wetlands are located within the immediate vicinity of Building 618. Unnamed drainages and ponds are located within 1,380 feet east and northeast of the location.

No surface water intakes, downstream fisheries, or sensitive environments are adjacent to the surface water migration path within 15 miles downstream of the location; however, several wetlands are present (EDR, 2015; USFWS, 2015). Local waterways may be used for recreational fishing by residents of nearby communities while crayfish and fish are known to be consumed from on-Base ponds (Goyer, 2015b, personal communication; Appendix C). Additionally, nearly all of the surface water along the tributaries and Boxelder Creek is available for use for stock watering (Goyer, 2015a, personal communication; Appendix C).

3.1.2.3.3 Soil and Air Exposure Pathways and Targets

A release of AFFF to the soil surface has occurred based on recent sampling efforts during the SI. This area has no residents, but workers are present at the location where staff work inside and around the building. The nearest residents are approximately 3,200 feet east of the location. The location consists primarily of hard surfaces with grassy areas along the perimeter and surrounding the tank. The unpaved areas surrounding the location are well-vegetated and would preclude any fugitive dust emissions and potential exposures. Construction activities or other ground-disturbing activities could result in potential worker exposure. The potential of exposure to burrowing animals, if present, would be possible although the majority of the location is paved.

The population within 4 miles of the location includes Rapid City and Box Elder residents, with a population of approximately 7,210. No schools or day care facilities are within a 200-foot radius of the location. The nearest school is Vandenberg Elementary School, located approximately 4,600 feet to the east-northeast (EDR, 2015). The nearest day care facility is the Ellsworth AFB Child Development Center, located approximately 5,450 feet to the northeast.

The location is not used for hunting, fishing, or harvesting of wild or farmed foods, and such activities are not anticipated in the future. No sensitive environments have been identified within 200 feet or within 4 miles.

Sampling for PFCs was conducted as part of the SI (SCF, 2015) at Building 618. PFCs were detected in the soil and confirm that PFCs have been released as a result of the AFFF fire suppression system.

3.1.3 Building 88240

3.1.3.1 <u>Description and Operational History</u>

Building 88240 is located in the munitions storage area on the north side of Ellsworth AFB and formerly contained an AFFF fire suppression system (Figures 1.1 and 3.3). The building contains a trench drain system. Under normal operating conditions, flow from the trench drains goes into

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an oil-water separator prior to being released into the sanitary sewer. However, a valve can be switched to route drainage into the surface impoundment in the event that the AFFF system was activated. Consequently, any AFFF releases in Building 88240 would have drained via underground piping to a surface impoundment located south of Building 88240. There are no records of accidental AFFF releases from Building 88240. The approximate size of the location is 4.7 acres including the surface impoundment. The building currently supports a water-only fire suppression system. The geographic coordinates are $44^{\circ}9'$ 54.73"N and $103^{\circ}6'$ 23.53"W.

Pumphouse 88490, located just southwest of Building 88240, once contained a 500-gallon AFFF tank in the 1980s. This tank provided the AFFF to the fire suppression system located inside Building 88240. The AFFF tank was removed in the early 1990s (Goyer, 2015a, personal communication; Appendix C).

3.1.3.2 <u>Waste Characteristics</u>

No spills or releases are known to have occurred at Building 88240; however, sampling conducted during the SI (SCF, 2015) confirms that PFCs have been released, possibly as a result of the AFFF fire suppression system in the building.

3.1.3.3 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 one day care facility, six schools, three hospitals, and two colleges within the potential migration area of 4 miles from any given potential release location of PFCs. No elementary schools are located on Base. The closest elementary school is located approximately 2.5 miles hydrologically downgradient (southeast) of Building 88240. The on-Base child development center is located approximately 2.3 miles hydrologically downgradient (southeast) of the location.

3.1.3.3.1 Groundwater Pathway and Targets

The Basewide geologic and hydrogeological settings are provided in Section 1.3. In the northern portion of the Base, groundwater in the shallow groundwater aquifer generally flows southeast.

Ellsworth AFB drinking water sources are all located more than 4 miles cross-gradient or upgradient of Ellsworth AFB and do not support a complete drinking water exposure pathway. The fact that Ellsworth does not use the shallow unconfined aquifer below the Base as a supply of drinking water would render this drinking water exposure pathway incomplete for Ellsworth AFB workers and residents. However, because of the relatively shallow depth to groundwater (10 feet bgs), excavation workers could be exposed to groundwater.

One public water supply well, owned by Box Elder, is located approximately 3.7 miles southeast (downgradient) of the location (EDR, 2015). The well serves a population of approximately 7,800 (EDR, 2015). This is a groundwater well, although the aquifer in which the well is zoned is unknown. However, it is likely to be installed in the deeper confined aquifer that would not be impacted by shallow groundwater migrating off Base.

One private groundwater public water supply well is located 4 miles south-southeast of the location and serves a population of approximately 90 in Whispering Willows. This aquifer in which the well is zoned is unknown (EDR, 2015). This well is hydrologically cross-gradient of the location.

One known private well is located 2.7 miles south of the location and is used to water cattle (Jensen, 2015, personal communication; Appendix C). A second private well is located approximately 2.75 miles south of the location and is owned by a landscape/nursery company. It is not known whether this well is used for potable water (USAF, 2012b). Because these wells are not located downgradient (groundwater flow from the location is southeast), a complete exposure pathway for cattle and other ecological receptors or people via drinking water or dermal contact does not exist.

Sampling for PFCs was conducted as part of the SI (SCF, 2015) at the surface impoundment south of Building 88240. PFCs were detected in groundwater collected within and around the surface impoundment south of Building 88240; these samples confirm that PFCs have been released as a result of the AFFF fire suppression system in the building.

3.1.3.3.2 Surface Water Pathway and Targets

The surface water drainage from the area around Building 88240 either infiltrates into the soils adjacent to the location or enters the surface impoundment south of Building 88240. Consequently, complete exposure pathways for dermal exposure to humans and dermal exposure and ingestion by aquatic or other animals are present. Ellsworth AFB drinking water does not come from surface water sources located within the watershed of Ellsworth AFB, so there is no exposure pathway for surface water to residents or workers through domestic drinking water.

The location is not located within a flood zone. In addition to the surface impoundment located 300 feet south of Building 88240, another pond is located 1,000 feet northwest of Building 88240 but is not within the surface drainage pathway.

No surface water intakes, downstream fisheries, or sensitive environments are adjacent to the surface water migration path within 15 miles downstream of the location; however, several wetlands are present (EDR, 2015; USFWS, 2015). Local waterways may be used for recreational fishing by residents of nearby communities while crayfish and fish are known to be consumed from on-Base ponds (Goyer, 2015b, personal communication; Appendix C). Additionally, nearly all of the surface water along the tributaries and Boxelder Creek is available for use for stock watering (Goyer, 2015a, personal communication; Appendix C).

Sampling for PFCs was conducted as part of the SI (SCF, 2015) at the surface impoundment south of Building 88240. PFCs were detected in sediment and surface water collected within and around the surface impoundment south of Building 88240; these samples confirm that PFCs have been released as a result of the AFFF fire suppression system in the building.

3.1.3.3.3 Soil and Air Exposure Pathways and Targets

A release of AFFF to the soil has occurred based on recent sampling efforts during the SI. This area has no residents, but workers are present at the location where staff work inside and around the building. The nearest residents are approximately 7,000 feet southeast of the location. The location consists primarily of grassy areas with hard surfaces surrounding the building. The unpaved areas surrounding the location are well-vegetated and would preclude any fugitive dust emissions and potential exposures. Construction activities or other ground-disturbing activities could result in potential worker exposure. The potential of exposure to burrowing animals, if present, would be possible.

The population within 4 miles of the location includes Rapid City and Box Elder residents, with a population of approximately 4,970. No schools or day care facilities are within a 200-foot radius of the location. The nearest school is Vandenberg Elementary School, located approximately 2.5 miles to the southeast (EDR, 2015). The nearest day care facility is the Ellsworth AFB Child Development Center, located approximately 2.3 miles to the southeast.

The location is not used for hunting, fishing, or harvesting of wild or farmed foods, and such activities are not anticipated in the future. No sensitive environments have been identified within 200 feet or within 4 miles.

Sampling for PFCs was conducted as part of the SI (SCF, 2015) at the surface impoundment south of Building 88240. PFCs were detected in soil collected around the surface impoundment south of Building 88240; these samples confirm that PFCs have been released as a result of the AFFF fire suppression system in the building.

3.2 FIRE STATIONS

3.2.1 Former Fire Station 2 (Building 7506)

3.2.1.1 Description and Operational History

Former Fire Station 2 was located in Building 7506. The building was demolished in 2010. The station was located in the northern portion of the Base (Figures 1.1 and 3.4). This fire station was used to support the munitions storage area until 1994. This station did not have access to and did not service the airfield. It is unknown whether this station had a crash truck, but a fire truck was located here in the late 1980s for structural fires. Foam rarely would have been used on structure fires. No known spills or leaks of AFFF at this location have occurred (Beck, 2015a, personal communication; Appendix C). Based on the information obtained about Fire Station 2, the potential for this location to be a source of AFFF is low and no complete exposure pathways are likely to exist. The geographic coordinates are 44°9' 40.63"N and 103°5' 49.46"W.

3.2.1.2 <u>Waste Characteristics</u>

Not applicable.

3.2.1.3 Pathway and Environmental Hazard Assessment

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 Former Fire Storage Area

3.2.2.1 Description and Operational History

A former storage area used by the fire department was located in the northern portion of the Base (Figures 1.1 and 3.1). No fire trucks were stored here but other miscellaneous equipment was stored here by the department. Additionally, this location may have historically supported an old fire station (Beck, 2015a, personal communication; Appendix C). The dates of this fire station are unknown and it is unknown whether AFFF was used or stored here. However, given that several other fire stations were located on Base by 1970 and were closer to the flightline operations and based on the location of this storage area, it is unlikely that AFFF was used here (Beck, 2015a, personal communication; Appendix C). Based on the information obtained about the Former Fire Storage Area, the potential for this location to be a source of AFFF is low and no complete exposure pathways are believed to exist.

3.2.2.2 <u>Waste Characteristics</u>

Not applicable.

3.2.2.3 Pathway and Environmental Hazard Assessment

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 Former Fire Station (Building 7506)

3.2.3.1 Description and Operational History

The former fire station was located in Building 7506 in the central portion of Ellsworth AFB (Figures 1.1 and 3.4). The building was built in 1952, used until 2000, and demolished in 2007. The geographical coordinates are 44°8'44.06"N and 103°5'40.36"W.

Fire department vehicles were stored, cleaned, and maintained in this building. The building was fitted with trench drains that contained any spills inside the building although discharges of AFFF were often observed outside the building (Beck, 2015a, personal communication; Appendix C). Trench drains discharged to the sanitary sewer system and ultimately to the WWTP (the WWTP is evaluated in Section 3.4.2).

Due to limited space in the fire station, trucks were sometimes stored in Dock 51. No maintenance of fire trucks was conducted in Dock 51 (Beck, 2015a, personal communication; Appendix C). Two minor spills were noted in Dock 51 in the spills database including a 3-gallon spill from a fire truck in May 1998 and a 2-gallon spill from a foam trailer in April 2000 (Ellsworth, 2015). Spills would have entered the trench drains inside the building and been contained in the 20 row diversion tank. Consequently, Dock 51 is not considered a potential release location for AFFF.

3.2.3.2 <u>Waste Characteristics</u>

AFFF was stored in two overhead storage tanks with a piping system that was used to gravity fill into the tops of the crash trucks. The tanks were 300 and 500 gallons. These tanks were not known to have any serious leaks or spills (Beck, 2015a, personal communication; Appendix C). However, the spills database documented a 5-gallon spill when a line broke in November 1994 (Ellsworth, 2015). The spill was contained on concrete (USAF, 2012b).

While the former fire station was in operation, it was not uncommon to see foam solution on the fire station driveways after foam operations had occurred on Base (Beck, 2015a, personal communication; Appendix C) indicating releases outside of the building footprint.

Based on the operational history and use of AFFF during these years, the potential for PFCs released to the environment is high.

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 one day care facility, six schools, three hospitals, and two colleges within the potential migration area of 4 miles from any given potential release location of PFCs. No elementary schools are located on Base. The closest elementary school is located

approximately 6,775 feet hydrologically downgradient (southeast) of the former fire station. The on-Base child development center is located approximately 6,610 feet hydrologically cross-gradient (east) of the location.

3.2.3.3.1 Groundwater Pathway and Targets

The Basewide geologic and hydrogeological settings are provided in Section 1.3. In the northern portion of the Base, groundwater in the shallow groundwater aquifer generally flows southeast.

Ellsworth AFB drinking water sources are all located more than 4 miles cross-gradient or upgradient of Ellsworth AFB and do not support a complete drinking water exposure pathway. The fact that Ellsworth does not use the shallow unconfined aquifer below the Base as a supply of drinking water would render this drinking water exposure pathway incomplete for Ellsworth AFB workers and residents. However, because of the relatively shallow depth to groundwater (10 feet bgs), excavation workers could be exposed to groundwater.

One public water supply well, owned by Box Elder, is located approximately 2.5 miles southeast (downgradient) of the location (EDR, 2015). The well serves a population of approximately 7,800 (EDR, 2015). This is a groundwater well, although the aquifer in which the well is zoned is unknown. However, it is likely to be installed in the deeper confined aquifer that would not be impacted by shallow groundwater migrating off Base.

One private groundwater public water supply well is located 2.6 miles south-southeast of the location and serves a population of approximately 90 in Whispering Willows. The aquifer in which the well is zoned is unknown (EDR, 2015). This well is hydrologically cross-gradient of the location.

One known private well is located 1.4 miles southwest of the former fire station (cross-gradient) and is used to water cattle (Jensen, 2015, personal communication; Appendix C). A second private well is located approximately 1.45 miles southwest of the location and is owned by a landscape/nursery company. It is not known whether this well is used for potable water (USAF, 2012b). Because these wells are not located downgradient (groundwater flow from the location is southeast), a complete exposure pathway for cattle and other ecological receptors or people via drinking water or dermal contact does not exist.

3.2.3.3.2 Surface Water Pathway and Targets

The surface water drainage from the area around the former fire station either infiltrates into the soils adjacent to the location or enters the storm drain system and eventually drains off Base. Consequently, complete exposure pathways for dermal exposure to humans and dermal exposure and ingestion by aquatic or other animals are present. Ellsworth AFB drinking water does not come from surface water sources located within the watershed of Ellsworth AFB, so there is no exposure pathway for surface water to residents or workers through domestic drinking water.

The location is not located within a flood zone. Unnamed drainages and wetlands are located approximately 2,900 feet east of the former fire station but are not within the surface drainage pathway.

No surface water intakes, downstream fisheries, or sensitive environments are adjacent to the surface water migration path within 15 miles downstream of the location; however, several

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wetlands are present (EDR, 2015; USFWS, 2015). Local waterways may be used for recreational fishing by residents of nearby communities while crayfish and fish are known to be consumed from on-Base ponds (Goyer, 2015b, personal communication; Appendix C). Additionally, nearly all of the surface water along the tributaries and Boxelder Creek is available for use for stock watering (Goyer, 2015a, personal communication; Appendix C).

3.2.3.3.3 Soil and Air Exposure Pathways and Targets

Because grassy areas are located around the former fire station, it is possible that AFFF migrated out of the bay and into nearby soils. This area has no residents, but workers are present at the location where staff work inside and around the buildings. The nearest residents are approximately 5,000 feet northeast of the location. The location consists primarily of hard surfaces with some adjacent grassy areas. The unpaved areas surrounding the location are well-vegetated and would preclude any fugitive dust emissions and potential exposures. Construction activities or other ground-disturbing activities could result in potential worker exposure. The potential of exposure to burrowing animals, if present, would be possible.

The population within 4 miles of the location includes Rapid City and Box Elder residents, with a population of approximately 6,210. No schools or day care facilities are within a 200-foot radius of the location. The nearest school is Vandenberg Elementary School, located approximately 6,750 feet to the east-southeast (EDR, 2015). The nearest day care facility is the Ellsworth AFB Child Development Center, located approximately 6,620 feet to the east.

The location is not used for hunting, fishing, or harvesting of wild or farmed foods, and such activities are not anticipated in the future. No sensitive environments have been identified within 200 feet or within 4 miles.

3.2.4 Current Fire Station (Building 7502)

3.2.4.1 <u>Description and Operational History</u>

The current fire station, Building 7502, is located in the central portion of the Base between 50 row and 60 row (Figures 1.1 and 3.4). The building was built in 2000 at which time the fire department moved out of the former location (Building 7506). The building is in good condition with no cracking in floors or driveways. It is surrounded by a paved/concrete area with small grassy areas bordering it to the south.

AFFF is stored in the current fire station in a storage room and in fire trucks and trailers. As of February 2015, 220 gallons of AFFF were stored in the storage room (Beck, 2015a, personal communication; Appendix C). A total of 2,641 gallons of AFFF are stored in trucks at the fire station; this includes 500 gallons on three P-23s, 56 gallons on U-8, 30 gallons on Engine 9, 25 gallons on Engine 7, 30 gallons on Aerial, and 1,000 gallons on the foam trailer. Trucks are refilled with AFFF in the bays from 5-gallon buckets.

As noted in the spills database, only one minor spill has occurred at the current fire station. Five gallons were released from a fire truck in July 2012 in the northwest corner of the fire station. The spill was not washed down the drains and was allowed to evaporate on the floor (Ellsworth, 2015).

Cleaning, maintenance, and refilling of the vehicle is conducted inside the fire station bays where floor drains are present to capture any runoff and feed into the sanitary sewer line that discharged

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to the WWTP until 2014 when it was decommissioned. The sanitary sewer now discharges to an off-Base publicly owned treatment works. The WWTP is evaluated as a separate location in Section 3.4.2.The geographical coordinates of the current fire station are 44°8'47.24"N and 103°5'40.94"W.

3.2.4.2 <u>Waste Characteristics</u>

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.

3.3 EMERGENCY RESPONSE

Only those crashes where AFFF was used are presented below. As documented in the Limited PA (USAF, 2012b) and as confirmed by Mr. Beck (Beck, 2015a, personal communication; Appendix C), a C-21 crashed in the southwest corner of the Base in 2002 but AFFF was not released at this crash location. Therefore, this crash location is not discussed further.

3.3.1 B-52 Crash (1970)

3.3.1.1 Description and Operational History

In April 1970, a B-52 caught fire and crashed during landing, skidding into a brick pumphouse containing six 25,000-gallon USTs. The crash occurred along the northern portion of the runway (Figures 1.1 and 3.1). The Ellsworth AFB Fire Department responded to the crash and extinguished the fire with an unknown quantity of foam (Beck, 2015a, personal communication; Appendix C). It is unlikely that AFFF would have been present in the Ellsworth inventory by early 1970. The geographic coordinates are 44°9' 8.92"N and 103°6' 36.22"W.

3.3.1.2 <u>Waste Characteristics</u>

Not applicable.

3.3.1.3 Pathway and Environmental Hazard Assessment

Not applicable.

3.3.1.3.1 Groundwater Pathway and Targets

Not applicable.

3.3.1.3.2 Surface Water Pathway and Targets

Not applicable.

3.3.1.3.3 Soil and Air Exposure Pathways and Targets

Not applicable.

3.3.2 B-1 Crash (1988)

3.3.2.1 Description and Operational History

In 1988, a B-1 crashed while landing just short of the southern end of the runway (Figures 1.1 and 3.5). The geographic coordinates are 44°7' 43.33"N and 103°5' 58.77"W.

3.3.2.2 <u>Waste Characteristics</u>

The Ellsworth AFB Fire Department responded to the B-1 crash and extinguished the fire with an unknown quantity of AFFF (Beck, 2015a, personal communication; Appendix C). AFFF applied would have infiltrated into the grass at the crash location.

3.3.2.3 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 one day care facility, six schools, three hospitals, and two colleges within the potential migration area of 4 miles from any given potential release location of PFCs. No elementary schools are located on Base. The closest elementary school is located approximately 5,350 feet hydrologically cross-gradient (northeast) of the crash location. The on-Base child development center is located approximately 6,610 miles hydrologically cross-gradient (east) of the location.

3.3.2.3.1 Groundwater Pathway and Targets

The Basewide geologic and hydrogeological settings are provided in Section 1.3. Groundwater in the shallow groundwater aquifer generally flows southeast.

Residual AFFF released to grass or dirt surfaces at the crash location may have infiltrated to groundwater. Ellsworth AFB drinking water sources are all located more than 4 miles cross-gradient or upgradient of Ellsworth AFB and do not support a complete drinking water exposure pathway. The fact that Ellsworth does not use the shallow unconfined aquifer below the Base as a supply of drinking water would render this drinking water exposure pathway incomplete for Ellsworth AFB workers and residents. However, because of the relatively shallow depth to groundwater (10 feet bgs), excavation workers could be exposed to groundwater.

One public water supply well, owned by Box Elder, is located approximately 1.5 miles east (crossgradient) of the location (EDR, 2015). The well serves a population of approximately 7,800 (EDR, 2015). This is a groundwater well, although the aquifer in which the well is zoned is unknown. However, it is likely to be installed in the deeper confined aquifer that would not be impacted by shallow groundwater migrating off Base.

One private groundwater public water supply well is located 1.2 miles south-southeast of the location and serves a population of approximately 90 in Whispering Willows. The aquifer in which the well is zoned is unknown (EDR, 2015). This well is hydrologically downgradient of the location.

One known private well is located approximately 4,700 feet southwest of the crash location (crossgradient) and is used to water cattle (Jensen, 2015, personal communication; Appendix C). A second private well is located approximately 4,730 feet southwest of the location and is owned by a landscape/nursery company. It is not known whether this well is used for potable water (USAF, 2012b). Because these wells are not located downgradient (groundwater flow from the location is southeast), a complete exposure pathway for cattle and other ecological receptors or people via drinking water or dermal contact does not exist.

3.3.2.3.2 Surface Water Pathway and Targets

The surface water drainage from the area around the crash location infiltrates into the soils or enters the unnamed drainages just south of the location. Consequently, complete exposure pathways for dermal exposure to humans and dermal exposure and ingestion by aquatic or other animals are present. Ellsworth AFB drinking water does not come from surface water sources located within the watershed of Ellsworth AFB, so there is no exposure pathway for surface water to residents or workers through domestic drinking water.

The location is not located within a flood zone. No wetlands are located within 200 feet of the location. Unnamed drainages and ponds are located approximately 1,300 feet southwest of the crash location.

No surface water intakes, downstream fisheries, or sensitive environments are adjacent to the surface water migration path within 15 miles downstream of the location; however, several wetlands are present (EDR, 2015; USFWS, 2015). Local waterways may be used for recreational fishing by residents of nearby communities while crayfish and fish are known to be consumed from on-Base ponds (Goyer, 2015b, personal communication; Appendix C). Additionally, nearly

all of the surface water along the tributaries and Boxelder Creek is available for use for stock watering (Goyer, 2015a, personal communication; Appendix C).

3.3.2.3.3 Soil and Air Exposure Pathways and Targets

AFFF was likely released to soils in this area. This area has no residents and no workers are present at the location. The nearest residents are approximately 3,350 feet northeast of the location. The location consists entirely of grass. The area is well-vegetated and would preclude any fugitive dust emissions and potential exposures. Construction activities or other ground-disturbing activities could result in potential worker exposure. The potential of exposure to burrowing animals, if present, would be possible.

The population within 4 miles of the location includes Rapid City and Box Elder residents, with a population of 7,530. No schools or day care facilities are within a 200-foot radius of the location. The nearest school is Vandenberg Elementary School, located approximately 5,350 feet to the northeast. The nearest day care facility is the Ellsworth AFB Child Development Center, located approximately 6,900 feet to the northeast.

The location is not used for hunting, fishing, or harvesting of wild or farmed foods, and such activities are not anticipated in the future. No sensitive environments have been identified within 200 feet or within 4 miles.

3.3.3 Delta Taxiway West Crash (2000)

3.3.3.1 Description and Operational History

In August 2000, a P-15 fire truck rear ended an AFFF foam trailer on Delta Taxiway West (Figures 1.1 and 3.4) (Beck, 2015a, personal communication; Appendix C). The geographic coordinates are $44^{\circ}8' 30.33"$ N and $103^{\circ}6' 8.94"$ W.

3.3.3.2 <u>Waste Characteristics</u>

Approximately 100 gallons of AFFF was spilled at the scene (USAF, 2012b). AFFF released on the taxiway may have run off to the adjacent soils and infiltrated into the grass.

3.3.3.3 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 one day care facility, six schools, three hospitals, and two colleges within the potential migration area of 4 miles from any given potential release location of PFCs. No elementary schools are located on Base. The closest elementary school is located

approximately 8,400 feet hydrologically cross-gradient (east) of the crash location. The on-Base child development center is located approximately 8,750 miles hydrologically cross-gradient (east) of the location.

3.3.3.3.1 Groundwater Pathway and Targets

The Basewide geologic and hydrogeological settings are provided in Section 1.3. Groundwater in the shallow groundwater aquifer generally flows southeast.

Residual AFFF released to grass or dirt surfaces at the crash location may have infiltrated to groundwater. Ellsworth AFB drinking water sources are all located more than 4 miles cross-gradient or upgradient of Ellsworth AFB and do not support a complete drinking water exposure pathway. The fact that Ellsworth does not use the shallow unconfined aquifer below the Base as a supply of drinking water would render this drinking water exposure pathway incomplete for Ellsworth AFB workers and residents. However, because of the relatively shallow depth to groundwater (10 feet bgs), excavation workers could be exposed to groundwater.

One public water supply well, owned by Box Elder, is located approximately 2.7 miles eastsoutheast (downgradient) of the location (EDR, 2015). The well serves a population of approximately 7,800 (EDR, 2015). This is a groundwater well, although the aquifer in which the well is zoned is unknown. However, it is likely to be installed in the deeper confined aquifer that would not be impacted by shallow groundwater migrating off Base.

One private groundwater public water supply well is located 2.6 miles south-southeast of the location and serves a population of 90 in Whispering Willows. The aquifer in which the well is zoned is unknown (EDR, 2015). This well is hydrologically downgradient of the location.

One known private well is located approximately 4,700 feet southwest of the crash location (crossgradient) and is used to water cattle (Jensen, 2015, personal communication; Appendix C). A second private well is located approximately 4,730 feet southwest of the location and is owned by a landscape/nursery company. It is not known whether this well is used for potable water (USAF, 2012b). Because these wells are not located downgradient (groundwater flow from the location is southeast), a complete exposure pathway for cattle and other ecological receptors or people via drinking water or dermal contact does not exist.

3.3.3.3.2 Surface Water Pathway and Targets

The surface water drainage from the area around the crash location infiltrates into the soils or enters the storm drain system that flows to Pond 1 and eventually discharges into a private waterbody. Consequently, complete exposure pathways for dermal exposure to humans and dermal exposure and ingestion by aquatic or other animals are present. Ellsworth AFB drinking water does not come from surface water sources located within the watershed of Ellsworth AFB, so there is no exposure pathway for surface water to residents or workers through domestic drinking water.

The location is not located within a flood zone. No wetlands are located within 200 feet of the location. Unnamed drainages and ponds are located approximately 1,300 feet southwest of the crash location.

No surface water intakes, downstream fisheries, or sensitive environments are adjacent to the surface water migration path within 15 miles downstream of the location; however, several

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wetlands are present (EDR, 2015; USFWS, 2015). Local waterways may be used for recreational fishing by residents of nearby communities while crayfish and fish are known to be consumed from on-Base ponds (Goyer, 2015b, personal communication; Appendix C). Additionally, nearly all of the surface water along the tributaries and Boxelder Creek is available for use for stock watering (Goyer, 2015a, personal communication; Appendix C).

3.3.3.3.3 Soil and Air Exposure Pathways and Targets

AFFF was likely released to soils in this area. This area has no residents and no workers are present at the location. The nearest residents are approximately 3,350 feet northeast of the location. The location consists entirely of grass. The area is well-vegetated and would preclude any fugitive dust emissions and potential exposures. Construction activities or other ground-disturbing activities could result in potential worker exposure. The potential of exposure to burrowing animals, if present, would be possible.

The population within 4 miles of the location includes Rapid City and Box Elder residents, with a population of approximately 7,530. No schools or day care facilities are within a 200-foot radius of the location. The nearest school is Vandenberg Elementary School, located approximately 5,350 feet to the northeast. The nearest day care facility is the Ellsworth AFB Child Development Center, located approximately 6,900 feet to the northeast.

The location is not used for hunting, fishing, or harvesting of wild or farmed foods, and such activities are not anticipated in the future. No sensitive environments have been identified within 200 feet or within 4 miles.

3.3.4 Marten Crash (2003)

3.3.4.1 <u>Description and Operational History</u>

In February 2003, a privately owned semi-truck traveling west crashed off of an overpass on I-90 and landed in a grassy field on Ellsworth AFB property (Figures 1.1 and 3.5). The geographic coordinates are 44°7' 4.79"N and 103°4' 45.47"W.

3.3.4.2 <u>Waste Characteristics</u>

The Ellsworth AFB Fire Department responded to the crash and an unknown amount of AFFF was used at the scene (Beck, 2015a, personal communication; Appendix C).

3.3.4.3 <u>Pathway and Environmental Hazard Assessment</u>

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 one day care facility, six schools, three hospitals, and two colleges within the potential migration area of 4 miles from any given potential release location of PFCs. No elementary schools are located on Base. The closest elementary school is located approximately 7,860 feet hydrologically upgradient (northeast) of the crash location. The on-Base child development center is located approximately 9,950 miles hydrologically upgradient (northeast) of the location.

3.3.4.3.1 Groundwater Pathway and Targets

The Basewide geologic and hydrogeological settings are provided in Section 1.3. Groundwater in the shallow groundwater aquifer generally flows southeast.

Residual AFFF released to grass or dirt surfaces at the crash location may have infiltrated to groundwater. Ellsworth AFB drinking water sources are all located more than 4 miles cross-gradient or upgradient of Ellsworth AFB and do not support a complete drinking water exposure pathway. The fact that Ellsworth does not use the shallow unconfined aquifer below the Base as a supply of drinking water would render this drinking water exposure pathway incomplete for Ellsworth AFB workers and residents. However, because of the relatively shallow depth to groundwater (10 feet bgs), excavation workers could be exposed to groundwater.

One public water supply well, owned by Box Elder, is located approximately 1.5 miles northeast (cross-gradient) of the location (EDR, 2015). The well serves a population of approximately 7,800 (EDR, 2015). This is a groundwater well, although the aquifer in which the well is zoned is unknown. However, it is likely to be installed in the deeper confined aquifer that would not be impacted by shallow groundwater migrating off Base.

One private groundwater public water supply well is located 0.6 mile southeast of the location and serves a population of approximately 90 in Whispering Willows. The aquifer in which the well is zoned is unknown (EDR, 2015). This well is hydrologically cross-gradient of the location.

One known private well is located approximately 6,260 feet northwest of the crash location (upgradient) and is used to water cattle (Jensen, 2015, personal communication; Appendix C). A second private well is located approximately 6,170 feet northwest of the location and is owned by a landscape/nursery company. It is not known whether this well is used for potable water (USAF, 2012b). Because these wells are not located downgradient (groundwater flow from the location is southeast), a complete exposure pathway for cattle and other ecological receptors or people via drinking water or dermal contact does not exist.

3.3.4.3.2 Surface Water Pathway and Targets

The surface water drainage from the area around the crash location infiltrates into the soils or enters nearby unnamed tributaries that eventually discharge to Boxelder Creek. Consequently, complete exposure pathways for dermal exposure to humans and dermal exposure and ingestion by aquatic or other animals are present. Ellsworth AFB drinking water does not come from surface water sources located within the watershed of Ellsworth AFB, so there is no exposure pathway for surface water to residents or workers through domestic drinking water.

The location is not located within a flood zone. No wetlands are located within 200 feet of the location. Unnamed drainages are located approximately 500 feet south of the crash location.

No surface water intakes, downstream fisheries, or sensitive environments are adjacent to the surface water migration path within 15 miles downstream of the location; however, several wetlands are present (EDR, 2015; USFWS, 2015). Local waterways may be used for recreational fishing by residents of nearby communities. Additionally, nearly all of the surface water along the tributaries and Boxelder Creek is available for use for stock watering (Goyer, 2015a, personal communication; Appendix C).

3.3.4.3.3 Soil and Air Exposure Pathways and Targets

AFFF was likely released to soils in this area. This area has no residents and no workers are present at the location. The nearest residents are approximately 3,350 feet northeast of the location. The location consists entirely of grass. The area is well-vegetated and would preclude any fugitive dust emissions and potential exposures. Construction activities or other ground-disturbing activities could result in potential worker exposure. The potential of exposure to burrowing animals, if present, would be possible.

The population within 4 miles of the location includes Rapid City and Box Elder residents, with a population of approximately 7,250. No schools or day care facilities are within a 200-foot radius of the location. The nearest school is Badger Clark Elementary School, located approximately 7,860 feet to the northeast. The nearest day care facility is the Ellsworth AFB Child Development Center, located approximately 10,080 feet to the northeast.

The location is not used for hunting, fishing, or harvesting of wild or farmed foods, and such activities are not anticipated in the future. No sensitive environments have been identified within 200 feet or within 4 miles.

3.3.5 Crash 4 (2001)

3.3.5.1 <u>Description and Operational History</u>

In March 2000, Crash 4, a P-23 fire truck, apparently released 10 gallons of AFFF near the vicinity of Building 7140 (Figures 1.1 and 3.1). The fire department has no records or knowledge of this crash but according to Mr. Beck, it likely happened on the road leading from taxiway alpha to Building 7140, which has since been demolished. Mr. Beck indicated that the area was often used for staging fire trucks during war training exercises (Beck, 2015b, personal communication; Appendix C). The geographic coordinates are 44°9' 23.90"N and 103°6' 33.81"W.

3.3.5.2 <u>Waste Characteristics</u>

The spills database indicates that a spill resulted in the release of 10 gallons of AFFF (Ellsworth, 2015).

3.3.5.3 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 one day care facility, six schools, three hospitals, and two colleges within the potential migration area of 4 miles from any given potential release location of PFCs. No elementary schools are located on Base. The closest elementary school is located approximately 11,750 feet hydrologically downgradient (southeast) of the crash location. The on-Base child development center is located approximately 11,050 miles hydrologically downgradient (southeast) of the location.

3.3.5.3.1 Groundwater Pathway and Targets

The Basewide geologic and hydrogeological settings are provided in Section 1.3. Groundwater in the shallow groundwater aquifer generally flows southeast.

Residual AFFF released to grass or dirt surfaces at the crash location may have infiltrated to groundwater. Ellsworth AFB drinking water sources are all located more than 4 miles cross-gradient or upgradient of Ellsworth AFB and do not support a complete drinking water exposure pathway. The fact that Ellsworth does not use the shallow unconfined aquifer below the Base as a supply of drinking water would render this drinking water exposure pathway incomplete for Ellsworth AFB workers and residents. However, because of the relatively shallow depth to groundwater (10 feet bgs), excavation workers could be exposed to groundwater.

One public water supply well, owned by Box Elder, is located approximately 3.5 miles southeast (downgradient) of the location (EDR, 2015). The well serves a population of approximately 7,800 (EDR, 2015). This is a groundwater well, although the aquifer in which the well is zoned is unknown. However, it is likely to be installed in the deeper confined aquifer that would not be impacted by shallow groundwater migrating off Base.

One private groundwater public water supply well is located 3.6 miles south-southeast of the location and serves a population of approximately 90 in Whispering Willows. The aquifer in which the well is zoned is unknown (EDR, 2015). This well is hydrologically cross-gradient of the location.

One known private well is located approximately 11,500 feet south of the location (cross-gradient) and is used to water cattle (Jensen, 2015, personal communication; Appendix C). A second private well is located approximately 11,900 feet south of the location and is owned by a landscape/nursery company. It is not known whether this well is used for potable water (USAF, 2012b). Because these wells are not located downgradient (groundwater flow from the location is southeast), a complete exposure pathway for cattle and other ecological receptors or people via drinking water or dermal contact does not exist.

3.3.5.3.2 Surface Water Pathway and Targets

The surface water drainage from the area around the crash location infiltrates into the soils or enters nearby drainages. Consequently, complete exposure pathways for dermal exposure to humans and dermal exposure and ingestion by aquatic or other animals are present. Ellsworth AFB drinking water does not come from surface water sources located within the watershed of Ellsworth AFB, so there is no exposure pathway for surface water to residents or workers through domestic drinking water.

The location is not located within a flood zone. No wetlands are located within 200 feet of the location. Unnamed drainages are located approximately 500 feet north of the location.

No surface water intakes, downstream fisheries, or sensitive environments are adjacent to the surface water migration path within 15 miles downstream of the location; however, several wetlands are present (EDR, 2015; USFWS, 2015). Local waterways may be used for recreational fishing by residents of nearby communities. Additionally, nearly all of the surface water along the tributaries and Boxelder Creek is available for use for stock watering (Goyer, 2015a, personal communication; Appendix C).

3.3.5.3.3 Soil and Air Exposure Pathways and Targets

AFFF was potentially released to soils in this area. This area has no residents and no workers are present at the location. The nearest residents are approximately 6,950 feet east of the location. The location consists of paved areas surrounded by grass. The area is well-vegetated and would preclude any fugitive dust emissions and potential exposures. Construction activities or other ground-disturbing activities could result in potential worker exposure. The potential of exposure to burrowing animals, if present, would be possible.

The population within 4 miles of the location includes Rapid City and Box Elder residents, with a population of approximately 7,250. No schools or day care facilities are within a 200-foot radius of the location. The nearest school is Badger Clark Elementary School, located approximately 11,750 feet to the southeast. The nearest day care facility is the Ellsworth AFB Child Development Center, located approximately 11,050 feet to the southeast.

The location is not used for hunting, fishing, or harvesting of wild or farmed foods, and such activities are not anticipated in the future. No sensitive environments have been identified within 200 feet or within 4 miles.

3.4 OTHER

3.4.1 Hazmart (Building 1911)

3.4.1.1 Description and Operational History

Hazmart (Building 1911) is a chemical storage facility located on the southern portion of the Base (Figures 1.1 and 3.2). The Hazmart currently stores about 3,965 gallons of AFFF (Beck, 2015a, personal communication; Appendix C). Based on a visit on February 24, 2015, most containers are shrink-wrapped and stored on pallets. The storage room has floor drains that would contain spills. No known spills or releases are documented (Ellsworth, 2015). The geographic coordinates are 44°8' 9.52"N and 103°4' 58.93"W.

3.4.1.2 <u>Waste Characteristics</u>

Not applicable.

3.4.1.3 Pathway and Environmental Hazard Assessment

3.4.1.3.1 Groundwater Pathway and Targets

Not applicable.

3.4.1.3.2 Surface Water Pathway and Targets

Not applicable.

3.4.1.3.3 Soil and Air Exposure Pathways and Targets

Not applicable.

3.4.2 Wastewater Treatment Plant

3.4.2.1 Description and Operational History

The Base WWTP is located in the southeast portion of the Base (Figures 1.1 and 3.6) and was decommissioned in July 2014. The geographic coordinates are 44°7' 54.49"N and 103°4' 41.05"W.

During operations, all waste in the sanitary sewer and industrial sewer lines went to the WWTP. Treated water was discharged to Outfall 5, which flowed to unnamed drainages then to Golf Course Lake and to Outfall 6 where it went off Base and discharged to Boxelder Creek. When the WWTP was operating, approximately 300,000 to 500,000 gallons per day were discharged from the Golf Course Lake to off Base. Sludge from the WWTP was disposed of at the local landfill in accordance with the permit (Goyer, 2015a, personal communication; Appendix C).

3.4.2.2 <u>Waste Characteristics</u>

The WWTP received discharge from several locations which have had AFFF releases such as the diversion tanks at 70 row and Building 618 and any discharge from fire station floor drains (Goyer, 2015a, personal communication; Appendix C). Sludge and treated water from the WWTP are likely to contain PFCs. While the WWTP was a closed system, AFFF was likely released as a result of treated water discharge and sludge management. Additionally, water from Golf Course Lake was sometimes used for irrigation of the golf course (Goyer, 2015a, personal communication; Appendix C).

3.4.2.3 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 one day care facility, six schools, three hospitals, and two colleges within the potential migration area of 4 miles from any given potential release location of PFCs. No elementary schools are located on Base. The closest elementary school is located approximately 3,780 feet hydrologically cross-gradient (northeast) of the WWTP. The on-Base child development center is located approximately 5,265 feet hydrologically cross-gradient (northeast) of the location.

3.4.2.3.1 Groundwater Pathway and Targets

The Basewide geologic and hydrogeological settings are provided in Section 1.3. Groundwater in the shallow groundwater aquifer generally flows east near the WWTP.

The sludge drying bed at the WWTP is a potential source of AFFF to groundwater. The drying beds do not have an impervious layer beneath them. Ellsworth AFB drinking water sources are all located more than 4 miles cross-gradient or upgradient of Ellsworth AFB and do not support a complete drinking water exposure pathway. The fact that Ellsworth does not use the shallow unconfined aquifer below the Base as a supply of drinking water would render this drinking water exposure pathway incomplete for Ellsworth AFB workers and residents. However, because of the relatively shallow depth to groundwater (as shallow as 10 feet bgs), excavation workers could be exposed to groundwater.

One public water supply well, owned by Box Elder, is located approximately 1.3 miles east (downgradient) of the location (EDR, 2015). The well serves a population of approximately 7,800 (EDR, 2015). This is a groundwater well, although the aquifer in which the well is zoned is unknown. However, it is likely to be installed in the deeper confined aquifer that would not be impacted by shallow groundwater migrating off Base.

One private groundwater public water supply well is located 1.3 miles south-southeast of the location and serves a population of approximately 90 in Whispering Willows. The aquifer in which the well is zoned is unknown (EDR, 2015). This well is hydrologically cross-gradient of the location.

One known private well is located 6,220 feet southwest of the location (cross-gradient) and is used to water cattle (Jensen, 2015, personal communication; Appendix C). A second private well is located approximately 6,350 feet southwest of the location and is owned by a landscape/nursery company. It is not known whether this well is used for potable water (USAF, 2012b). Because these wells are not located downgradient (groundwater flow from the location is southeast), a complete exposure pathway for cattle and other ecological receptors or people via drinking water or dermal contact does not exist.

3.4.2.3.2 Surface Water Pathway and Targets

Surface runoff from the area runs into nearby unnamed drainages that drain to Golf Course Lake which discharges off Base via Outfall 6. Consequently, complete exposure pathways for dermal exposure to humans and dermal exposure and ingestion by aquatic or other animals are present. Ellsworth AFB drinking water does not come from surface water sources located within the watershed of Ellsworth AFB, so there is no exposure pathway for surface water to residents or workers through domestic drinking water.

The location is not located within a flood zone. Wetlands are located 120 feet south of the location and unnamed drainages are located directly east of the location.

No surface water intakes, downstream fisheries, or sensitive environments are adjacent to the surface water migration path within 15 miles downstream of the location; however, several wetlands are present (EDR, 2015; USFWS, 2015). Local waterways may be used for recreational fishing by residents of nearby communities while crayfish and fish are known to be consumed from on-Base ponds (Goyer, 2015b, personal communication; Appendix C). Additionally, nearly all of the surface water along the tributaries and Boxelder Creek is available for use for stock watering (Goyer, 2015a, personal communication; Appendix C).

As part of the SI (SCF, 2015), surface water and sediment samples were collected from the drainage system that leaves the WWTP and discharges to the Golf Course Lake, and these samples contained PFCs.

3.4.2.3.3 Soil and Air Exposure Pathways and Targets

AFFF is likely present in soils of the sludge drying beds, which are still in place. This area has no residents and no workers are present at the location. The nearest residents are approximately 1,500 feet northeast of the location. The majority of the location consists of grass. The area is well-vegetated and would preclude any fugitive dust emissions and potential exposures. Construction activities or other ground-disturbing activities could result in potential worker exposure. The potential of exposure to burrowing animals, if present, would be possible.

The population within 4 miles of the location includes Rapid City and Box Elder residents, with a population of approximately 7,530. No schools or day care facilities are within a 200-foot radius of the location. The nearest school is Vandenberg Elementary School, located approximately 3,650 feet to the northeast. The nearest day care facility is the Ellsworth AFB Child Development Center, located approximately 5,200 feet to the east.

The location is not used for hunting, fishing, or harvesting of wild or farmed foods, and such activities are not anticipated in the future. No sensitive environments have been identified within 200 feet or within 4 miles.

3.4.3 Spray Nozzle Test Area

3.4.3.1 Description and Operational History

In the 1970s and 1980s, equipment testing was conducted near Pumphouses 1, 2, and 3 at the end of the runway using 6 percent AFFF. This routine equipment testing was often conducted when crash trucks were checked out. A truck would be driven to the edge of the ramp and the operator would discharge foam out across the grass (Beck, 2015a, personal communication; Appendix C). Figures 1.1 and 3.4 show the spray nozzle test area location. The geographic coordinates are 44°8' 25.23"N and 103°5' 35.30"W.

3.4.3.2 <u>Waste Characteristics</u>

AFFF was sprayed onto the grassy area of the flightline and likely infiltrated soils.

3.4.3.3 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 one day care facility, six schools, three hospitals, and two colleges within the potential migration area of 4 miles from any given potential release location of PFCs. No elementary schools are located on Base. The closest elementary school is located approximately 6,000 feet hydrologically cross-gradient (east) of the location. The on-Base child development center is located approximately 6,460 feet hydrologically cross-gradient (east-northeast) of the location.

3.4.3.3.1 Groundwater Pathway and Targets

The Basewide geologic and hydrogeological settings are provided in Section 1.3. Groundwater in the shallow groundwater aquifer generally flows southeast.

AFFF applied to soils likely infiltrated to the groundwater. Ellsworth AFB drinking water sources are all located more than 4 miles cross-gradient or upgradient of Ellsworth AFB and do not support a complete drinking water exposure pathway. The fact that Ellsworth does not use the shallow unconfined aquifer below the Base as a supply of drinking water would render this drinking water exposure pathway incomplete for Ellsworth AFB workers and residents. However, because of the relatively shallow depth to groundwater (10 feet bgs), excavation workers could be exposed to groundwater.

One public water supply well, owned by Box Elder, is located approximately 2.5 miles southeast (downgradient) of the location (EDR, 2015). The well serves a population of approximately 7,800 (EDR, 2015). This is a groundwater well, although the aquifer in which the well is zoned is unknown. However, it is likely to be installed in the deeper confined aquifer that would not be impacted by shallow groundwater migrating off Base.

One private groundwater public water supply well is located 2.2 miles south-southeast of the location and serves a population of approximately 90 in Whispering Willows. The aquifer in which the well is zoned is unknown (EDR, 2015). This well is hydrologically cross-gradient of the location.

One known private well is located 5,680 feet southwest of the location (cross-gradient) and is used to water cattle (Jensen, 2015, personal communication; Appendix C). A second private well is located approximately 5,890 feet southwest of the location and is owned by a landscape/nursery company. It is not known whether this well is used for potable water (USAF, 2012b). Because these wells area not located downgradient (groundwater flow from the location is southeast), a complete exposure pathway for cattle and other ecological receptors or people via drinking water or dermal contact does not exist.

3.4.3.3.2 Surface Water Pathway and Targets

Surface runoff from the area either infiltrates into the soil or runs into nearby storm drains that discharge off Base via Outfall 1. Consequently, complete exposure pathways for dermal exposure to humans and dermal exposure and ingestion by aquatic or other animals are present. Ellsworth AFB drinking water does not come from surface water sources located within the watershed of Ellsworth AFB, so there is no exposure pathway for surface water to residents or workers through domestic drinking water.

The location is not located within a flood zone. No wetlands are located within 200 feet of the location. Unnamed drainages are located 1,400 feet west of the location.

No surface water intakes, downstream fisheries, or sensitive environments are adjacent to the surface water migration path within 15 miles downstream of the location; however, several wetlands are present (EDR, 2015; USFWS, 2015). Local waterways may be used for recreational fishing by residents of nearby communities while crayfish and fish are known to be consumed from on-Base ponds (Goyer, 2015b, personal communication; Appendix C). Additionally, nearly all of the surface water along the tributaries and Boxelder Creek is available for use for stock watering (Goyer, 2015a, personal communication; Appendix C).

3.4.3.3.3 Soil and Air Exposure Pathways and Targets

AFFF is likely present in soils of the location. This area has no residents and no workers are present at the location. The nearest residents are approximately 3,870 feet east of the location. The majority of the location consists of grass. The area is well-vegetated and would preclude any fugitive dust emissions and potential exposures. Construction activities or other ground-disturbing activities could result in potential worker exposure. The potential of exposure to burrowing animals, if present, would be possible.

The population within 4 miles of the location includes Rapid City and Box Elder residents, with a population of approximately 7,090. No schools or day care facilities are within a 200-foot radius of the location. The nearest school is Vandenberg Elementary School, located approximately 6,130 feet to the east. The nearest day care facility is the Ellsworth AFB Child Development Center, located approximately 6,450 feet to the east-northeast.

The location is not used for hunting, fishing, or harvesting of wild or farmed foods, and such activities are not anticipated in the future. No sensitive environments have been identified within 200 feet or within 4 miles.

3.4.4 Alert Apron

3.4.4.1 <u>Description and Operational History</u>

The alert apron is located in the southern portion of the Base just west of the southern end of the runway (Figures 1.1 and 2.1). During the Cold War, B-52s were parked down in this location to be on standby for quick takeoff. Crash trucks were also located here in the event of an emergency (Beck, 2015a, personal communication; Appendix C). AFFF may have been stored in some of the crash trucks that were on standby at the alert apron. However, no known emergency response was conducted at the alert apron, and no leaks or spills are known or reported (Beck, 2015a, personal

communication; Appendix C). Therefore, this area likely has not had any AFFF releases. The geographical coordinates are $44^{\circ}7'45.61$ "N and $-103^{\circ}5'37.75$ "W.

3.4.4.2 <u>Waste Characteristics</u>

Not applicable.

3.4.4.3 Pathway and Environmental Hazard Assessment

3.4.4.3.1 Groundwater Pathway and Targets

Not applicable.

3.4.4.3.2 Surface Water Pathway and Targets

Not applicable.

3.4.4.3.3 Soil and Air Exposure Pathways and Targets

Not applicable.

FIGURES













4.0 SUMMARY AND CONCLUSIONS

The sections below summarize the findings of the PA for AFFF on Ellsworth AFB and provide conclusions based on those findings.

4.1 SUMMARY

Based on background research and visits to Ellsworth AFB, a total of 2 FTAs, 3 fire stations, 1 fire station storage area, 10 hangars (evaluated as 1 location), 2 buildings, 5 emergency response locations, 1 area where AFFF spray testing has occurred, and 3 additional miscellaneous locations have been identified as being active during the timeframe when AFFF has been used by the USAF for fire suppression. The sections below summarize the PA findings for these 18 locations.

4.1.1 Fire Training Areas

4.1.1.1 <u>FT001 – Former Fire Training Area</u>

Ellsworth AFB has only one former FTA (FT001) that is currently an Environmental Restoration Program location. FT001 contained a shallow, unlined burn pit with a steel aircraft mockup that was set ablaze for fire training exercises. The location of the burn area within the former FTA has changed several times over the years. This location has known releases of AFFF and soil, groundwater, and downgradient soil and sediment have been sampled as part of an SI. An RI is planned for FT001 in 2017 (Jensen, 2015, personal communication; Appendix C).

4.1.1.2 <u>Current Fire Training Area</u>

The current FTA was built in 1992 and began operation in 1993. This location contains a large concrete pad with a steel mockup aircraft in the center that is set ablaze for fire training exercises. The central area of the concrete pad consists of a lined pit in which the training activities are conducted. This pit holds the water and/or AFFF applied during fire training exercises. When the pit reaches capacity, the water is discharged via underground piping to a lined retention pond located just off the concrete pad to the southwest (Beck, 2015a, personal communication; Appendix C). When full, the retention pond is emptied using a 9,500-gallon tanker and a transfer pump and contents are disposed of at the 70 row diversion tank. Spray nozzle testing and flushing occurs on the concrete pad at the location but runoff is likely to have impacted adjacent soils.

4.1.2 Non-Fire Training Areas

4.1.2.1 <u>Hangars/Buildings</u>

Ten docks located in 70, 80, and 90 rows previously contained AFFF fire suppression systems. One pumphouse (7263) and one underground diversion tank (7246) also contained AFFF. Pumphouse 7263 contained a 1,000-gallon AFFF tank that fed 70, 80, and 90 row hangars via underground piping. Inside each dock is a trench drain system that discharged to the 150,000-gallon 70 row diversion tank (UST 7246). The contents of the diversion tank were typically released to the WWTP but could also be released to Outfall 3 on the southwest side of the runway at Ellsworth AFB through storm drains. In 1993, the entire contents of the diversion

Preliminary Assessment Report

tank were released to the storm drains. In addition, 8 of the 10 docks had known discharges of AFFF inside of them and discharges were often seen coming outside of the hangar doors.

Based on sampling conducted during SI outside two of the docks with known releases (Docks 73 and 93), soil and groundwater around the hangars are contaminated. Based on these data, there is a high likelihood of contamination in soil and groundwater at all docks. Additionally, as a result of releases to the storm drains, PFCs likely impacted downgradient waterbodies.

Two additional buildings (618 and 88240) had AFFF fire suppression systems. Discharges from Building 618 went to an underground diversion tank (UST 618) while Building 88240 released AFFF discharges to a surface impoundment located south of the location. Sampling conducted during the SI at both locations indicated that media (soil, groundwater, sediment, and surface water at the surface impoundment and soil and groundwater near UST 618) have been impacted by PFCs.

4.1.2.2 <u>Fire Stations</u>

Former Fire Station 2 was used to support the munitions storage area until 1994. This fire station did not have access to and did not service the airfield. The likelihood of AFFF being used or released at this fire station is low. Similarly, a former fire storage area was located near the northern portion of the runway. No fire trucks were stored at this location, but the fire department stored other miscellaneous equipment here. Additionally, this location may have historically supported an old fire station (Beck, 2015a, personal communication; Appendix C). The operational dates of this fire station are unknown, and it is unknown whether AFFF was used or stored here. However, given that several other fire stations were located on Base by 1970, and they were closer to the flightline operations, and based on the location of this storage area, it is unlikely that AFFF was used here (Beck, 2015a, personal communication; Appendix C).

AFFF was used and stored at the former fire station (Building 7506). While the former fire station was in operation, it was not uncommon to see AFFF solution on the fire station driveways after AFFF operations had occurred on Base (Beck, 2015a, personal communication; Appendix C). Additionally, the spills database documented a known 5-gallon AFFF spill inside of the station (Ellsworth, 2015). Based on the history, there is potential for AFFF to have been released to adjacent soils and groundwater beneath the location.

While AFFF is used at the current fire station, no known spills have been reported, and trench drains within the building and outside of the building would prevent migration of AFFF to outside soils. Consequently, releases from the current fire station are unlikely.

4.1.2.3 <u>Emergency Response</u>

AFFF was known to have been used or released at five crash locations. All crash locations were located either in grassy fields adjacent to the runways or on the runway adjacent to grassy fields. The AFFF could have infiltrated soils and may have entered nearby waterbodies or storm drains.

4.1.2.4 <u>Other</u>

Other areas include the Hazmart, the WWTP, a spray nozzle test area, and an alert apron. Of these, only the WWTP and the spray nozzle test area location are likely to be potential release areas for AFFF. The Hazmart (Building 1911) is a chemical storage facility located on Base. While the Hazmart stores a large amount of AFFF, it is stored on pallets in shrink-wrap, and spills would be

contained via the floor drain system. While crash trucks may have been present at the alert apron, no emergency response efforts are known to have been needed, and no spills or releases are documented.

The WWTP is likely to have released PFCs to soils through the sludge drying beds as well as to nearby waterbodies via discharges to Outfall 5. As part of the SI (SCF, 2015), surface water and sediment samples were collected from the drainage system that leaves the WWTP and discharges to the Golf Course Lake; these samples contained PFCs.

In the 1970s and 1980s, equipment testing was conducted near Pumphouses 1, 2, and 3 at the end of the runway using 6 percent AFFF. This routine equipment testing was often conducted when crash trucks were checked out. A truck would be driven to the edge of the ramp and the operator would shoot AFFF out across the grass (Beck, 2015a, personal communication; Appendix C). Soil and groundwater beneath this area is likely to be impacted with PFCs.

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 Preliminary Assessment and 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 an 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 (NFRAP) 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).

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Locations	Group	Rationale	Recommendation
FT001 – Former FTA	Group 1	 Used for fire training from 1942 to 1990. Known discharges to downgradient waterbodies. Sampling conducted during broad agency announcement supports elevated PFCs in soil and groundwater. 	Continue with RI that is planned for 2017.
Current FTA	Group 2	 In operation since 1993; still using AFFF. All nozzle spray testing and flushing occurs at this location. Most AFFF is contained within the retention pond. Some AFFF may be released to adjacent soils. 	Initiate SI.
70, 80, 90 Rows	Group 1	 Known releases in 8 of 10 hangars. SI (SCF, 2015) indicated soil and groundwater contamination associated with Docks 73 and 93, and the 70 row diversion tank. 	Initiate SI.
Building 618	Group 1	 SI (SCF, 2015) indicated soil and groundwater contamination. Spills noted in the spills database. 	Initiate SI.
Building 88240	Group 1	• SI (SCF, 2015) indicated soil, sediment, surface water, and groundwater contamination.	Initiate SI.
Former Fire Station 2	Group 4	 No known use of AFFF. Served munitions storage area; no access to flightline. 	Close out with no additional investigation.
Former Fire Storage Area	Group 4	• No known storage of AFFF.	Close out with no additional investigation.
Former Fire Station (Building 7506)	Group 3	 Overhead AFFF tanks. Known spill (5 gallons). Several engines/trailer contained AFFF. AFFF seen on station driveways. 	Initiate SI.

Table 4.1Preliminary Assessment Report Summary and FindingsEllsworth Air Force Base, South Dakota

Locations	Group	Rationale	Recommendation
Current Fire Station (Building 7502)	Group 4	 Activities occur inside fire station. Any releases are contained within the building. Only one spill reported but contained inside building. 	Close out with no additional investigation.
B-52 Crash (1970)	Group 3	• Based on crash date, unknown whether AFFF was applied but possible.	Initiate SI.
B-1 Crash (1988)	Group 3	• Unknown amount of AFFF applied during emergency response.	Initiate SI.
Delta Taxiway West Crash (2000)	Group 3	• 100 gallons of AFFF spilled; likely migrated to adjacent soils.	Initiate SI.
Marten Crash (2003)	Group 3	• Based on crash photos, a moderate amount of AFFF was applied at the crash location.	Initiate SI.
Crash 4 (2001)	Group 3	• 10 gallons released from fire truck.	Initiate SI.
Hazmart	Group 4	• Storage of AFFF but no known spills; all spills would be contained in floor drain system.	Close out with no additional investigation.
WWTP	Group 1	• SI (SCF, 2015) indicates that downgradient sediment and surface water are impacted.	Initiate SI.
Spray Nozzle Test Area	Group 2	• AFFF applied to grassy area for up to 20 years (1970s and 1980s).	Initiate SI.
Alert Apron	Group 4	• No known emergency response or AFFF releases occurred here.	Close out with no additional investigation.

Table 4.1Preliminary Assessment Report Summary and FindingsEllsworth Air Force Base, South Dakota
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APPENDIX A

PHOTO DOCUMENTATION

Team:	ElKivo	TH AFR	Date: 2-24-15	
Project N	umber:		Observation Period: Start: 2-24-15 Stop: 2-25-15	
Weather:	2:24-15	SIMON 505	2:5.15 cold Show	
Photo				
No.	Time	View Direction	Location/Description	
	210	N	Pond #	
2	3:10	2	Cullent' FTA	
	7.11	W	Retention Pond C +TA	
7	2 d	E	LOOKING CETA from retention pond	
3	2:15	C.	ALT STORY & CONEX & FTA'	
· (c.	214	3-	ALT S JULO BUCKOT	
07	digt-	2.1	FTOOL (OID FTA)	
*	2.25	2hr	Munages new FTCU of CON DEVILATED	100.13
1	2:00	3	GOL CROWN & ON A LARAINS TO SUTAL-NOMITA	-030
10	0.70	N	toximizy acita crosh site atom trailer	
11	2.5	N	Laxing delta frash site (toom trailer)	n m
15	2.5	E	Parts Cined but plevicusing unined when	XS
13	0.50	2	Pond 3 Devond ows	Irain
14	3 00	12	READING TO DEALWARD ANALY & DONNER	NOR
12	3.17	N	APT ADD 200 CALANDE - Patiend)	
14	2012	< E	IKE DI COSH SEPALAF MANJAN	
N	2.15	511	The start of the of the of	
12	3:20	- JW	(1400+ Fra Doot Tranch Omins - hultin 11	12
20	2:20	LYBY	En Thick 35 pairs	
21	2:21	_	GOOD TRUCKS ECH ADIKO	
22	3:21		Ime aniko talik	
23	3:22		AFFF STROND	
24	3:23		11 STRADO	
25	3:24		TROCH drain to CIUS to	
			OLA FILE SPATIC	
26	3:26	NE.	TRACE around of tyde ED Lars to stand dear	1
27	3:29	SW	(16) FIRE STATIO MOTHER (751) BISEDA)
28	3:39	-	NYK 51-FD TRUCK FERRID OR-2000	37
29	3:40		DORKSI- FLOOR deals 1901 fe	20-
30	3:16	-	DOCK SI- ADOCTORIAS	Irai
31	3:58	N	THE KOU DIVERSION TONK SIAD	ins
32	3:58	N.	TO BUU DIVERSION TANK	
33	4:08	SW		
34	4:21	No	S3240 retention prind	
35	4:21	NE		
36	4.26	2E	Five station 2 (potential Att scorce)	
5	4.26			beyond
38	12:35	E	Truck crash - off overpass onto base property	- 2nd
39	5.25	- Eg	Truck crash - " pearby drainage ditch "	Fence
40	1018		Blos PUMPMANR	
71	10:18		in inder	
18	10:19		1265 TREACH PIGHAS	
75	10.00		TOP Drains	
77	10.00		1260 ATT STORAGE	
41	10:50		Voce is thench prains	
29	10.31		DOCK IS FILT COOMOS	
11	10:22		LOCK TO HET IN DEM IN INEL	
1-10	110:20		ner cumer parel	

PHOTOGRAPH LOG

HGL

Team:			Date:
Project N	umber:		Observation Period: Start: Stop:
Weather:			
Photo			
No.	Time	View Direction	Location/Description
49	10:35	JW	DOCK 93 - PTCS detected in Soil benoth pay
50	10:36	NE	GASSY area behind DOCK 93 - HCS do teched
51	10:52	W	1972 B52 COSh
52	11:01	NW	1970s to 1980s nozzol clean out / testing afra
53	1:05	~	Hazmart storave (~ 800+ buckets)
54	11:06	-	11 F 0 010
55	11:08	SW	LOIS DIVERSION TRUCK EXCLOSED COUL
56	11:39	N	
51	11:25	SE	WWTP - MICHING FILTER, digesters
58	11:35	E	11 - best filter press
59	1135	N	Five Station 2 (possible had AFFF on trucks)
60	11:36	NE	
[e]	12:00		Blog X240 Trench Drawns
(02	12:03		"J " Trench Drains & havgar dags
63	12:08		MOMEN SSOHO M FIRE SUPPRESSION SUSTEM - WATER
_			

PHOTOGRAPH LOG

HGL



Photo 1



Photo 3





Photo 2







Photo 5



Photo 7









Photo 9



Photo 11





Photo 10



Photo 12



Photo 13



Photo 15





Photo 14



Photo 16



Photo 17



Photo 19







Photo 21



Photo 23







Photo 24



Photo 25



Photo 27











Photo 29









Photo 30







Photo 33



Photo 35



Photo 34



Photo 36

HGL—Preliminary Assessment Report—Ellsworth Air Force Base, South Dakota



Photo 37



Photo 39



Photo 38



Photo 40



Photo 41



Photo 43



Photo 42







Photo 45



Photo 47





Photo 46







Photo 49



Photo 51



Photo 50



Photo 52



Photo 53



Photo 55



Photo 54

HGL—Preliminary Assessment Report—Ellsworth Air Force Base, South Dakota



Photo 56



Photo 57



Photo 59



Photo 58







Photo 61









Photo 62

APPENDIX B

FIELD DOCUMENTATION

POTENTIAL HAZARDOUS WASTE SITE FORMS

_					Identificatio	n
Potential	Hazardous W	aste Site l	Preliminary As	sessment	State: SD	CERCLIS #:
		Form			CERCLIS Disc	overy Date:
		1. Ge	neral Site Informatio	n		
Name: Ellsworth	AFB	Street Addres	s: 1000 N Ellsworth Rd			
City:		State: SD	Zip Code:	County:	Co. Code:	Cong. Dist:
			57769	Meade		
Latitude:	Longitude:	Approximate	Area of Site:	Status of Site:		
14°7° 51.83°	103°5° 56.05″	_10	Acres	Active	Not Specified	
			Square FL	✓ Inactive] NA (GW plume,	etc.)
site Name: F100	1 - Former Fire Traini	ng Area				
		2. Own	er/Operator Information	tion		
Owner: Ellswortl	h AFB		Operator:			
Street Address: 1	1000 N Ellsworth Rd		Street Address:			
City:			City:	City:		
State: SD	Zip Code:	Telephone:	State:	Zip Code:	Telephone:	
Type of Ownersh	nin:		Type of Ownershi	o.		
Federal Agency		al	Federal Agency		I	
Name: _DO	D Not Spe	cified	Name:	Not Spec	ified	
	Other			Other		
		3 Site	Evaluator Informatio	on		
Name of Evaluat	or:	Agency/Orga	nization:		Date Prepare	ed:
Kelly Teplitsky		CH2M HILL			03/03/2015	
Street Address: S	9191 South Jamaica S	treet	City: Englewood		State: CO	
Name of EPA or	State Agency Contact	:	Street Address:			
City		Ctata:		Talanhana		
City.		State.		relephone.		
		4. Site Dis	position (for EPA use	only)		
Emergency Resp	onse/Removal Assess	sment	CERCLIS Recomme	endation:	Signature:	
Recommendatio			Lower Priority	si Sl	Name (typed	l):
				-		,
					Position:	
I	Date:		Date:			
		5. Gen	eral Site Characterist	– ics	I	
Predominant Lar	nd Llse Within 1 Mile	of Site (check all	Site Setting		Vears of One	ration:
redominant Lar	nd Use Within 1 Mile	of Site (check all	Site Setting:		Years of Ope	ration:

that apply):							
□ Industrial □ Agriculture □ DOI			🗌 Urbar	Beginning Year _1942			
	Mining	Other Federal	🗹 Subu	rban	Ending Vear 1990		
Residential			🗹 Rural				
] Other			Unknown		
Type of Site Operation	ons (check all that	apply):			Waste Generated:		
Manufacturing (must cl	heck subcategory)		Retail		✓ Onsite		
Lumber and Woo	od Products		LINK/Salvage Yard		Onsite and Offsite		
Plastic and/or Ru	ibber Products		Municipal Landfill				
Paints, Varnishes	5		Other Landfill		Waste Deposition Authorized		
Industrial Organic Chemicals					By: Present Owner		
Agricultural Chen Missellaneous Chen	nicals				Former Owner		
Primary Metals	iemical Products	i	Other Federal Facilit	У	Unauthorized		
Metal Coating, Pl	lating, Engraving	I					
Metal Forging, St	tamping		Treatment, Sto	rage, or Disposal	Waste Accessible to the Public:		
Fabricated Struct Electronic Equipr	tural Metal Products		Small Ouantity	Generator			
Other Manufactu	ring		Subtitle D		Ves		
	5		🗌 Municipa	I	□ No		
			Industria	I			
			"Converter" "Protective File	r"	Distance to Nearest Dwelling,		
Oil and Gas			□ "Non-or Late Filer"		School, or Workplace:		
Non-metallic Min	erals		Note Specified				
			Other		1,490 Feet		
6. Waste Characteristics Information							
(Refer to PA Table 1 for WC Score)							
с. т.		(Refer to P/	A Table 1 for WC Scc	pre)			
Source Type:	Sour	(Refer to P) ce Waste Quantity:	A Table 1 for WC Sco Tier*:	ore) General Type of	Waste		
Source Type: (check all that apply)	Sour (include	(Refer to P) ce Waste Quantity: unit)	A Table 1 for WC Sco Tier*:	General Type of (check all that app	Waste bly):		
Source Type: (check all that apply)	Sourc (include	(Refer to P) ce Waste Quantity: unit)	A Table 1 for WC Sco Tier*:	General Type of (check all that app Metals	Waste oly):		
Source Type: (check all that apply)	Sour (include	(Refer to P) ce Waste Quantity: unit)	A Table 1 for WC Sco Tier*:	General Type of (check all that app Metals Organics	Waste oly): Pesticides/Herbicides Acids/Bases Oily Waste		
Source Type: (check all that apply) Landfill Surface Impoundment Drums	Sour (include 	(Refer to P) ce Waste Quantity: unit)	A Table 1 for WC Sco Tier*:	General Type of (check all that app Metals Organics Inorganics Solvents	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste		
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Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum	Sourd (include ontainers	(Refer to P)	A Table 1 for WC Scc Tier*:	General Type of (check all that app (check all that app Organics Inorganics Solvents Paints/Pigments Laboratory/Hospi Radioactive Wast Construction/Der	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Explosives te Other _AFFF_ molition Waste Waste as Deposited (check all		
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source)	Sourd (include	(Refer to P)	A Table 1 for WC Sco Tier*:	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Radioactive Wast Construction/Der Physical State of that apply):	Waste oly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Explosives te Other _AFFF_ molition Waste Waste as Deposited (check all		
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Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sediu (unidentified source)	Sourd (include	(Refer to P)	A Table 1 for WC Scc Tier*:	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste Dly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste Ital Waste Vother _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge		
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Cc Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil	Sourd (include	(Refer to P)	A Table 1 for WC Scc Tier*:	General Type of (check all that app Metals Organics Solvents Paints/Pigments Laboratory/Hospi Radioactive Wast Construction/Der Physical State of that apply):	Waste Dly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Nining Waste Ital Waste V Other _AFFF_ molition Waste Waste as Deposited (check all Solid Sludge Powder		
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sediu (unidentified source) Contaminated Soil Other No Sources	Sourd (include	(Refer to P)	A Table 1 for WC Scc Tier*:	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hospi Radioactive Wast Construction/Der Physical State of that apply):	Waste oly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Explosives te Other _AFFF_ molition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Cas		
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sediu (unidentified source) Contaminated Sul Other No Sources *C=Constitue	Sourd (include	(Refer to P)	A Table 1 for WC Scc Tier*:	General Type of (check all that app Organics Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste Dly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste Ital Waste Explosives te Other _AFFF_ molition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas		
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitue	Sourd (include	(Refer to P)	A Table 1 for WC Scc Tier*: 	General Type of (check all that app Organics Organics Solvents Paints/Pigments Laboratory/Hospi Radioactive Wast Construction/Der Physical State of that apply):	Waste Dly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Nining Waste Explosives te Other_AFFF_ molition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas		
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitue	Sourd (include	(Refer to P) ce Waste Quantity: unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Organics Organics Inorganics Solvents Paints/Pigments Laboratory/Hospi Radioactive Wast Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Hining Waste Explosives te Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas arget Population Served by		
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Cc Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Sul Other No Sources *C=Constitue Within 4 Miles:	Sourd (include)ontainers)) ne ment (include)))))))))))))))))))	(Refer to P) ce Waste Quantity: unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Organics Organics Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste oly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste Ital Waste Explosives te Other _AFFF_ molition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas Garget Population Served by Vithdrawn From:		
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Cc Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitue Within 4 Miles: Yes	Sourd (include) ontainers) e me ment (include) (incl	(Refer to P) ce Waste Quantity: unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Organics Organics Solvents Paints/Pigments Construction/Der Physical State of that apply):	Waste Dly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste Ital Waste Explosives Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas Target Population Served by Vithdrawn From:		
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedii (unidentified source) Contaminated Soil Other No Sources *C=Constitute Within 4 Miles: Yes No	Sourd (include	(Refer to P)	A Table 1 for WC Scc Tier*: 	General Type of (check all that app Organics Organics Solvents Paints/Pigments Laboratory/Hosp Construction/Der Physical State of that apply):	Waste Ply): Pesticides/Herbicides Acids/Bases Oily Waste Oily Waste Nunicipal Waste Nunicipal Waste Nuning Waste Oily Wa		
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitue Within 4 Miles: Yes No	Sourd (include	(Refer to P)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Organics Organics Organics Solvents Paints/Pigments Laboratory/Hospi Radioactive Wast Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Ke Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas Gas Garget Population Served by Vithdrawn From:NA		

Drinking Well:	Have Drimany Targo	+ Drinking	< 1/ + - 1/ 2 IVIIIC	INA	
Feet	Water Wells Reen I	dentified:			
Type of Drinking Water Walls Within		actititica.	>1/2 - 1 Mile	NA	
Miles	Yes ✓ No		>1 - 2 Mile	NA	
(Check all that apply):	If Yes, Enter Prima	ary Target	>2 - 3 Mile	NA	
Private None	Fopulation.	People ³	>3 - 4 Mile	NA	
Depth to Shallowest Aquifer:	Nearest Designated	Wellhead	Total Within 4 Miles ⁴	⁴ NA	
~ 10 to 50 Feet	Protection Area ⁶ :				
Karst Terrain/Aquifer Present:	☐ Underlies ☐ >0-4 Mile ☑ None Wit	Underlies Site		able 2	
I No			Note nearest weinfor ins o	n ow ruliway scoresheet	
	8. Surface	Water Pathw	ay		
Type of Surface Water Draining Site an that apply):	nd 15 Miles Downstrea	m (check all	Shortest Overland Dist Surface Water:	ance From Any Source to	
Stream River	Popd		250 Fee	et	
Bay Ocean (Other			Miles	
Is There a Suspected Release to Surfac	e Water ¹ :		Site is Located in:		
· ✓ Yes ☐ No			☐ Annual - 10 yr Fl ☐ >10yr - 100yr Fl ☐ >100yr - 500yr F ☐ >500yr Floodplai	oodplain oodplain Tloodplain in	
Drinking Water Intake Located Along t	he Surface Water Mig	ration Path:	List All Secondary Targ	et Drinking Water Intakes:	
			<u>Name: Water Body: Flo</u>	ow (cfs): Population Served:	
Have Primary Target Drinking Water In	ntakes Been Identified:				
□ Yes If Yes, Dista ☑ No Water Intak	ance to Nearest Drinkin ke : Miles ⁶	ng			
If Yes, Enter Population Served by Targ	get Intake:				
NAPeople ⁴	-		Total within 15 Miles ⁴		
Fisheries Located Along the Surface W	ater Migration Path:		List All Secondary Targ	et Fisheries ¹⁰ :	
□ Yes ☑ No If Yes, Distar	nce to Nearest Fishery: Miles		Water Body/ Fishery Nam	<u>e : Flow (cfs)</u> :	
Have Primary Target Fisheries Been Ide	entified:				
🗌 Yes 🛛 🗹 No					
	8. Surface Wate	r Pathway (co	ntinued)		
Wetlands Located Along the Surface W Path:	Vater Migration C	other Sensitive I Aigration Path:	Environments Located Al	ong the Surface Water	
✓ Yes □ No		☐ Yes ☑ No	If Yes, Distance to Environment:	Nearest Sensitive Miles	
Have Primary Target Wetlands Been I	dentified: H	ave Primary Tai	rget Sensitive Environme	nts Been Identified:	
_ □ Yes ☑ No		☐ Yes ☑ No			
List All Wetlands:		List All Sensitive Environments ¹¹ :			

<u>Water Body</u> : <u>Flow (cfs)</u> : <u>Frontage miles:</u>		Water Body :	<u>Flow (cfs)</u> :	Sensitive Environment Type:		
· · · ·						
	9. Soil E	L xposure Pat	hway			
Are People Occupying Residence or	Number of Worke	ers Onsite ⁴ :	restrial Sensitive Environments Been			
Attending School or Daycare on or			Identified	l on or Within 200 Feet of Areas of		
Within 200 Feet of Area of Known or	✓ None		Known o	Suspected Contamination:		
Suspected Contamination:	□ 1 - 100 □ 101 - 1,	000				
	□ > 1,000)		Yes		
☐ Yes				I No		
⊥ No			If Yes, L	st Each Terrestrial Sensitive		
	Population Withir	n 1 Mile:	Environ	ment⁵:		
If Yes, Enter Total Residential						
Population:	De	onlo ⁷				
	re	copie				
People ²			*Defer to	* Pafar to DA Table 7 for any represent types		
			A Table 7 for environment types			
	10.	Air Pathway				
Is there a Suspected Release to Air ¹ :		Wetlands Located Within 4 Miles of the Site ⁶ :				
∐ Yes	☑ Yes					
		□ No If Yes, How Many Acres:		ow Many Acres Acres		
Enter Total Population on or Within:		Other Sensitive Environments Lessted Within 4 Miles of the S				
Onsite		Other Sensitive Environments Located within 4 Miles of the Site:				
		Yes				
0-1/4 Wille						
>1/4-1/2 Mile		List All Sensitive Environments Within 1/2 Mile of the Site ⁶ :				
>1/2-1 Mile		Distance: Sensitive Environment Type/Wetlands Area (acres):				
>1-2 Miles		Onsite	None			
>2-3 Miles		0-1/4 Mile	_Wetlands			
>3-4 Miles		>1/4-1/2 Mile _Wetlands				
Total Within 4 Miles ³⁻⁵ _8,190_						

¹⁻¹¹ Refers to question number on the PA scoresheet for each particular pathway

					Identification		
Potential H	azardous Wa	ste Site Pre	eliminary As	ssessment	State: SD	CERCLIS #:	
		Form			CERCLIS Discovery Date:		
		1. Gener	al Site Informatio	on			
Name: Ellsworth Al	FB	Street Address: 10	000 N Ellsworth Rd				
City:		State: SD	Zip Code:	County:	Co. Code:	Cong. Dist:	
			57769	Meade			
				Pennington			
Latitude:	Longitude:	Approximate Area	a of Site:	Status of Site:	•		
44°7' 59.93"	103°5' 54.61"	7 A	cres	Active	Not Specified		
		Sc	quare Ft	Inactive	NA (GW plume, et	c.)	
Site Name: Current	Fire Training Area (F	TA)					
		2. Owner/C	Operator Informa	tion			
Owner: Ellsworth A	\FB		Operator: same a	is owner			
Street Address: 100	00 N Ellsworth Rd		Street Address:				
City:			City:				
State: SD	Zip Code: 57769	Telephone:	State:	Zip Code:	Telephone:		
Type of Ownership	:		Type of Ownershi	p:			
Private	County		Private County				
Federal Agency	Municipal		Federal Agency Municipal				
State	_ □ Not Specifi	ed Name: L			t Specified her		
🗆 Indian			Indian				
		3. Site Eva	l aluator Informati	on			
Name of Evaluator:		Agency/Organizat	tion:		Date Prepared	:	
Kelly Teplitsky		CH2M HILL			03/03/2015		
Street Address: 919	91 South Jamaica Stre	et	City: Englewood State: CO				
Name of EPA or Sta	te Agency Contact:		Street Address:				
City:		State:	I	Telephone:			
		4. Site Dispos	ition (for EPA use	e only)			
Emergency Respon	se/Removal Assessm	ent	CERCLIS Recomme	endation:	Signature:		
Recommendation:			Higher Priority	SI	Nama (true - 1)		
	☐ Yes		Lower Priority NFRAP	21	ivarrie (typed):		
	🗋 No				Position:		
Dat	te:		Other:				
		5. General	Site Characterist	 tics	1		

Predominant Land U	se Within 1 Mi	le of Site (check all	Site Setting:		Years of Operation:
Industrial Commercial Residential	 ☐ Agriculture ☐ Mining ☑ DOD 	DOI Other Federal Facility:	□ Urbar □ Subu ☑ Rural	n rban	Beginning Year 1993 Ending Year present
Forest/Fields	DOE	 Other			🗌 Unknown
Type of Site Operation	ons (check all th	nat apply):			Waste Generated:
Manufacturing (must c Lumber and Woo Inorganic Chemi Plastic and/or Ru Paints, Varnishee Industrial Organ Agricultural Cher Miscellaneous Cf Primary Metals Metal Coating, P Metal Forging, S Fabricated Struc Electronic Equipi Other Manufactu Mining Metals	heck subcategory) od Products cals ubber Products s ic Chemicals micals nemical Products lating, Engraving tamping tural Metal Product ment ring	S	Retail Recycling Junk/Salvage Yard Municipal Landfill Other Landfill DOD DOE DOI Other Federal Facilit RCRA Treatment, Sto Large Quantity Small Quantity Small Quantity Industria "Converter"	Y rage, or Disposal Generator Generator I I	✓ Onsite Offsite 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 Dwolling
Coal Oil and Gas Non-metallic Mir	nerals		"Protective File "Non-or Late Fi Note Specified Other	r" er" 	School, or Workplace: _2,250 Feet
		6. Waste Cha	racteristics Infor	mation	•
Source Type:	So	(Refer to P	Tior*	Conoral Type of	Wasta
(check all that apply)	(inclu	ude unit)	ner .	(check all that app	vvaste
Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment	ontainers e			Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hospi Radioactive Wast Construction/Der	Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste ital Waste Explosives te Other _AFFF_ molition Waste
Contaminated GW Plun	ne			Physical State of	f Waste as Deposited (check all
(unidentified source) Contaminated SW/Sediment (unidentified source) Contaminated Soil Other No Sources *C=Constituent, W=Wastestream. V=Volume. A=Area		Ithat apply):		Solid Sludge Powder Liquid Gas	
		7. Grou	nd Water Pathwa	ау	
Is Ground Water Use Within 4 Miles:	ed for Drinking	Is There a Suspec Ground Water ¹ : Ves	cted Release to	List Secondary T Ground Water V	arget Population Served by Vithdrawn From:
LI NO	earest	LI No		0 - 1/4 Mile	NA
	curcsi			>1/4 - 1/2 Mili	ρ ΝΔ

Feet Water Type of Drinking Water Wells Within 4 Water Miles (check all that apply): ☑ Municipal Private □ None Private □ None Private ○ 10 to 50 Feet Provent:	Yes Yes Ves Ves Vo Yes, Enter Primary Target opulation: People ³ arest Designated Wellhead	 >1/2 - 1 MileNA >1 - 2 MileNA >2 - 3 MileNA >3 - 4 MileNA 		
Type of Drinking Water Wells Within 4 Miles (check all that apply): Municipal Private None Depth to Shallowest Aquifer: ~ 10 to 50 Feet Karet Torrain (Aquifor Procent:	☐ Yes ☑ No Yes, Enter Primary Target opulation: People ³ arest Designated Wellhead	>1/2 - 1 MileNA >1 - 2 MileNA >2 - 3 MileNA >3 - 4 MileNA		
Miles (check all that apply): Municipal Private None Depth to Shallowest Aquifer: ~ 10 to 50 Feet Karet Torrain (Aquifor Procent:	☐ Yes ☑ No ¹ Yes, Enter Primary Target opulation: People ³ arest Designated Wellhead	>1 - 2 Mile		
Image: Check all that apply): If Image: Municipal P Private None Depth to Shallowest Aquifer: Ne ~ 10 to 50 Feet Procent:	Yes, Enter Primary Target opulation: People ³ arest Designated Wellhead	>2 - 3 Mile		
□ Private □ None Depth to Shallowest Aquifer: Ne ~ 10 to 50 Feet Pro- Karet Torrain (Aquifor Procent:	People ³	>3 - 4 Mile NA		
Depth to Shallowest Aquifer: Ne ~ 10 to 50 Feet Pro	arest Designated Wellhead			
~ 10 to 50 Feet Pro		Total Within 4 Miles ⁴ NA		
Karst Torrain (Aquifor Brocont:	otection Area ⁶ :			
	 ☐ Underlies Site ☐ >0-4 Miles ☑ None Within 4 Miles 	*Use population #s for PA Table 2 *Note pearest well for #5 on GW Pathway Scoresheet		
I No				
	8. Surface Water Pathv	vay		
Type of Surface Water Draining Site and 15 that apply):	Miles Downstream (check all	Shortest Overland Distance From Any Source to Surface Water:		
Stream River Doord		1.400 Feet		
Bay Ocean Other_	Lake	Miles		
Is There a Suspected Release to Surface Wa	ter ¹ :	Site is Located in:		
☑ Yes ☑ No		 ☐ Annual - 10 yr Floodplain ☐ >10yr - 100yr Floodplain ☐ >100yr - 500yr Floodplain ☐ >500yr Floodplain 		
Drinking Water Intake Located Along the Su	rface Water Migration Path:	List All Secondary Target Drinking Water Intakes:		
□ Yes ☑ No				
		Name: Water Body: Flow (cts): Population Served:		
Have Primary Target Drinking Water Intakes	Been Identified:			
□ Yes If Yes, Distance to ☑ No Water Intake :	o Nearest Drinking Miles ⁶			
If Yes, Enter Population Served by Target Int	ake:			
NAPeople ⁴		Total within 15 Miles ⁴		
Fisheries Located Along the Surface Water N	Aigration Path:	List All Secondary Target Fisheries ¹⁰ :		
□ Yes ☑ No If Yes, Distance to	Nearest Fishery: Miles	Water Body/ Fishery Name : Flow (cfs):		
Have Primary Target Fisheries Been Identifie	ed:	☐		
Yes INO				
	. Surface Water Pathway (co	ontinued)		
Wetlands Located Along the Surface Water Path:	Migration Other Sensitive Migration Path:	Environments Located Along the Surface Water		
	□ Yes	If Yes, Distance to Nearest Sensitive		
✓ Yes □ No	✓ No	Environment: Miles		
 ✓ Yes □ No Have Primary Target Wetlands Been Identi 	⊡ No fied: Have Primary Ta	arget Sensitive Environments Been Identified:		
 ✓ Yes No Have Primary Target Wetlands Been Identi □ Yes ☑ No 	☑ № fied: Have Primary Ta	arget Sensitive Environments Been Identified:		

Water Body : Flow (cfs): Frontage miles:		<u>Water Body</u> :	Flow (cfs):	Sensitive Environment Type:		
	9. Soil E	xposure Pat	hway			
Are People Occupying Residence or	Number of Worke	ers Onsite ⁴ :	strial Sensitive Environments Been			
Attending School or Daycare on or	_		Identified o	on or Within 200 Feet of Areas of		
Within 200 Feet of Area of Known or	□ None		Known or S	Suspected Contamination:		
Suspected Contamination:	□ 101 - 1,	000				
	□ > 1,000)		☐ Yes I No		
Yes						
☑ No			If Yes, List	t Each Terrestrial Sensitive		
	Population Within	n 1 Mile:	Environm	ient ³ :		
If Yes, Enter Total Residential	People ⁷					
Population.						
People ²						
				*Refer to PA Table 7 for environment types		
	10.	Air Pathwa	y			
Is there a Suspected Release to Air ¹ :		Wetlands Located Within 4 Miles of the Site ⁶ :				
Yes	✓ Yes		If Voc. How			
		🗌 No	п тез, по	w Many Acres.		
Enter Total Population on or within:		Other Sensitive Environments Located Within 4 Miles of the Site:				
Onsite						
		⊥ Yes I No				
0-1/4 Mile						
>1/4-1/2 Mile		List All Sensitive Environments Within 1/2 Mile of the Site ⁶ :				
>1/2-1 Mile		Distance: Sensitive Environment Type/Wetlands Area (acres):				
>1-2 Miles		Onsite	None			
>2-3 Miles		0-1/4 Mile	_Wetlands			
>3-4 Miles		>1/4-1/2 Mile	e _Wetlands			
Total Within 4 Miles ³⁻⁵ _8,190_		*Refer to PA Tab	le 10 for calculations or	n air pathway exposures		

¹⁻¹¹ Refers to question number on the PA scoresheet for each particular pathway

					Identificatio	n
Potential	Hazardous W	aste Site P	reliminary	Assessment	State: SD	CERCLIS #:
		Form			CERCLIS Disc	covery Date:
		1. Gen	eral Site Inform	ation		
Name: Ellsworth	n AFB	Street Address:	1000 N Ellsworth	Rd		
City:		State: SD	Zip Code: 57769	County: Meade	Co. Code:	Cong. Dist:
Latitude: 44°9' 6.40"	Longitude: 103°6' 6.10"	Approximate A _83 Ac	rea of Site: res Square Ft	Status of Site:] Not Specified] NA (GW plume,	etc.)
Site Name: 70, 8	30, 90 Row Hangars	-		•		
93). These syste contained a 1,00 upgraded and e	ms were supplied with 00 gallon AFFF tank th ach dock had its own s	n AFFF via Pumpho at fed hangars 70, 500-gallon AFFF ta	buse 7263 located 80, and 90 via un nk installed inside	at the northeast enderground piping. In	d of 90 row. F 2000, the sy	Pumphouse 7263 stems were
		2. Owner	<pre>/Operator Infor</pre>	mation		
Owner: Ellswort	h AFB		Operator: sam	e as owner		
Street Address: 1000 N Ellsworth Rd			Street Address	::		
City:			City:			
State: SD	Zip Code:	Telephone:	State:	Zip Code:	Telephone:	
Type of Ownership: Private County Federal Agency Municipal Name: _DOD Not Specified State Other Indian Indian			Type of Owne Type of Owne Frivate Federal Agence Name: State Indian	rship: County y Dunicipa Not Spec Other_	l ified	
		3. Site E	Evaluator Inform	ation		
Name of Evalua Kelly Teplitsky	tor:	Agency/Organi: CH2M HILL	zation:		Date Prepar 03/03/2015	ed:
Street Address:	9191 South Jamaica St	reet	City: Englewoo	od	State: CO	
Name of EPA or	State Agency Contact		Street Address	:		
City:		State:	I	Telephone:		
		4. Site Disp	osition (for EPA	use only)		
Emergency Resp	oonse/Removal Assess	ment	CERCLIS Recor	nmendation:	Signature:	
Recommendation:		Higher Priority SI Lower Priority SI NFRAP RCRA Other:		:		
			Date:			
		5. Gene	ral Site Characte	eristics	-	
Predominant La	nd Use Within 1 Mile	of Site (check all	Site Setting:		Years of Ope	eration:
	that apply):					
---	--	-----------------------------	-----------------------------	---	----------------------------	---------------------------------
□ commercial Mining Other Federal □ Suburban Ending Year present □ result □ Rural □ Unknown □ Unknown Type of Site Operations (check all that apply): □ Anside □ Onside □ Onside □ Intrapin (Chemicals □ Junk/Savage Yard □ Onside □ Onside □ Intrapin (Chemicals □ Junk/Savage Yard □ Onside □ Onside □ Pastic and/or Rubber Products □ One I Landfill Waste Deposition Authorized By: □ Present (Chemicals □ One I Indiffill Waste Deposition Authorized By: □ Present (Chemicals □ One I Indiffill Waste Deposition Authorized By: □ Present (Chemicals) □ One I Indiffill Waste Deposition Authorized By: □ Present (Chemicals) □ One I Indiffill Waste Accessible to the Public: □ Primery Media Structural Media Products □ Diffic Generate □ One I Indiffill Waste Accessible to the Public: □ Primery Media Structural Media Products □ Diffic Generate □ Structural Media Products □ Structural Media □ Onder Municipal I Chemicals □ One I Indiffill □ One I Indiffill □ One I Indiffill □ Mining<	Industrial	Agriculture		🗌 Urbar	ı	Beginning Year _?_
Rotational 000 Paciny: Rural Channel each present. Type of Site Operations (check all that apply): Industriating (must check subcategory) Retail Industriating (must check subcategory) Retail Image: Interpret and Wood Poolucis Recycling Industriating (must check subcategory) Retail Industriating (must check subcategory) Industriating (must check check check subcategory) Industriating (Commercial	Mining	Other Federal	🗌 Subur	ban	Ending Voor procont
Image: construction of the construc	Residential	DOD DOF	☐ Facility:	🗹 Rural		Ending rear present
Type of Site Operations (check all that apply): Waste Generated: Manufacturing (must check subclegory) Rescall Lumbor and Wood Products Dank/Salvaga pardi Points. Address Subclegory) Rescall Points. darkets subclegory) Rescall Points. darkets Dank/Salvaga pardi Points. darkets Other Landfill Points. darkets Other Landfill Parints. Varnishes Other Landfill Metal Forging. Stamping CRCRA Rescription of Structure Metal Products Distance To Neare Primary Metals Other Haarment, Storage, or Disposal Refered Structure Metal Products Stabilito D Metal Forging. Stamping Creatment, Storage, or Disposal Refered Structure Metal Products Stabilito D Waste Characteristics Information Vest Metal Scale Crowerter* Other Stabilito D Mining Indicabilita Manufacturing Stabilito D Metal Scale Crowerter* Statustic D Statustic D Other Manufacturing Statustic D In Interament, Starage on Disposal	L Forest/Fields	DOF	Other			🗌 Unknown
I ype of Site Operations (check all that apply):		())))				
■ manufacturing (must check subcategory) ■ cstall □ orsite ■ Industrial Chemicals □ Junk/Salvage Yard □ orsite □ Plastic and/or Rubber Products □ Junk/Salvage Yard □ orsite □ Plastic and/or Rubber Products □ Junk/Salvage Yard □ orsite □ Plastic and/or Rubber Products □ Other Landfill □ Other Landfill □ Agricultard Chemicals □ Oto □ orsite □ Miscellaneous Chemical Products □ Other Landfill □ Other Landfill □ Matel Casting, Plaing, Engraving □ CREA □ Other Landfill □ Waste Accessible to the Public: □ Other Manufacturing □ Distance to Nearest Dwelling, □ Subtille D □ Waste Accessible to the Public: □ Other Manufacturing □ Industrial □ Non-metallic Minerals □ Distance to Nearest Dwelling, □ Other Manufacturing □ Other Landfill □ No □ Subtile D □ Other Manufacturing □ Industrial □ Distance to Nearest Dwelling, □ Other Manufacturing □ Other Landfill □ No □ Other Manufacturing □ Other Landfill □ No □ Other Manufacturing □ Industrial □ Other Maste □ Other Manufacturing □ C	Type of Site Operatio	ns (check all i	that apply):			Waste Generated:
□ Lumber and Wood Products □ @cycling □ Indixial Chemicals □ UnivSalvage Yard □ Plastic and/or Rubber Products □ UnivSalvage Yard □ Indixial Organic Chemicals □ DOL □ Agricultural Chemicals □ DOL □ Agricultural Chemicals □ DOL □ Agricultural Chemicals □ DOL □ Metal Congine Chaine, Patry Metals □ DOL □ Agricultural Chemicals □ DOL □ Metal Congine, Engraving □ Creating Reating, Engraving □ Fabrical Structural Metal Products □ Data Coantity Generator □ Backing Matrix □ Dote □ Mation Coanting, Patry Metals □ Dote Manufacturing □ Attribution □ Subtite D □ Coantity Generator □ Waste Accessible to the Public: □ Backing □ Treatment, Strange, or Disposal □ Maning □ Industrial □ Industrial □ Industrial □ Matrix □ Dote Manufacturing □ Industrial □ Industrial □ Matrix □ Patrix □ Industrial □ Conservetfar' □ Diard Gas □ Treatment □ Other Manufacturing □ Industrial	Manufacturing (must ch	eck subcategory)	Retail		⊡ Onsite
□ Inorganic Chemicals □ Junk/Salvage Yard □ Unsite and Offsite □ Paints, Varnishes □ Other Landfill Waste Deposition Authorized □ Industrial Organic Chemicals □ Otol □ Present & Former Owner □ Miscelianeous Chemicals Organic Stammary □ Otol □ Present & Former Owner □ Miscelianeous Chemicals Organic Stammary □ Otol □ Present & Former Owner □ Miscelianeous Chemicals Organic Stammary □ Otol □ Present & Former Owner □ Miscelianeous Chemicals Organic Stammary □ Otol □ Present & Former Owner □ Miscelianeous Chemicals □ Otol □ Present & Former Owner □ Anauthorized □ Distance to Nearest Dwelling, □ Otol □ Other Manufacturing □ Subtrite O □ Distance to Nearest Dwelling, □ Other Manufacturing □ Other □ Distance to Nearest Dwelling, □ Other □ Other □ Source Waste Quantity: □ Certer Coal □ Present & Filer* School, or Workplace: □ Other □ Other □ Other	Lumber and Woo	d Products		Recycling		
 Plastic and/or Nubber Products Industrial Organic Chemicals ODD Agricultural Chemicals ODD Metal Coating, Plating, Engraving Brain Metals Other Landfill Metal Coating, Plating, Engraving Brain Metals Chemicals Structural Metal Products Brain Quantity Generator Small Quantity Generator School, or Workplace: Distance to Nearest Dwelling, School, or Workplace: School, or Waste Check all that apply): (include unit) General Type of Waste (check all that apply): (include unit)	Inorganic Chemic	als		Junk/Salvage Yard		
□ rains, variables □ Dote □ rains, variables □ Dote □ Agricultural Chemicals □ Dote □ Agricultural Chemicals □ Dote □ Agricultural Chemicals □ Dote □ Metal Forging, Stamping □ Catament, Storage, or Disposal □ Activated Structural Metal Products □ Dote □ Cotter Manufacturing □ Statilite 0 □ Metals □ Cotter Teament, Storage, or Disposal □ Metals □ Containing Contrainers □ Other Manufacturing □ Statilite 0 □ Metals □ Containing Converter* □ Coal □ Present & Former Comer □ Non-metalic Minerals □ Non-retainer □ Other Manufacturing □ Statilite 0 □ Reals □ Other □ Coal □ Present & Former Comer □ Non-metalic Minerals □ Non-retainer □ Other □ Non-retainer □ Other □ Non-retainer □ Other □ Present & Former Comer □ Statilite 0 □ Industriat □ Industriat □ Industriat □ Coal □ Present & Former □ Coal □ Present & Former	Plastic and/or Ru	ober Products		Municipal Landill Other Landfill		Maste Deve esitien Authorized
Agricultural Chemicals DOE Agricultural Chemical Products DOE Primary Metals Other Federal Facility Metal Coating, Plating, Engraving RCRA Metal Coating, Plating, Engraving RCRA Hetal Coating, Plating, Engraving RCRA Hetal Coating, Plating, Engraving RCRA Getterion Equipment Stability Generator Other Manufacturing Stability Generator Other Manufacturing Industrial Metals "Converter" Other Specified Distance to Nearest Dwelling, School, or Workplace: Non-metallic Minerals Other Vectore Filer" Non-metallic Minerals No Waste Characteristics Information (Refer to PA Table 1 for WC Score) School, or Workplace: Source Type: Source Waste Quantity: Ter*: (check all that apply) (include unit) Motical Specified Drums Organics Othy Waste Drums Outy Waste Outy Waste Drums Outy Waste Outy Waste Drums Outy Waste Outy Waste Drand Kas and Non-Dum Containers Distance of Waste as	Industrial Organic	: Chemicals		☑ DOD		Waste Deposition Authorized
Miscellaneous Chemical Products DOI Primary Metals Other Federal Facility Dither Federal Facility Metal Coating, Plating, Engraving Treatment, Storage, or Disposal Ditanuom Primary Metals Treatment, Storage, or Disposal Ditanuom Paintary Metals Dither Federal Facility Waste Accessible to the Public: Paintary Metals Ditanuom Waste Accessible to the Public: Ditanuom Subtitue D Waste Accessible to the Public: Mining Ditanuctorized Non- Mong Municipal Non- Motals Converter Distance to Nearest Dwelling, School, or Workplace: School, or Workplace: School, or Workplace: Source Type: Source Waste Quantity: Tier*: General Type of Waste Check all that apply) (include unit) Distance to Nearest Dwelling, Oither Adds/Bases Surface Impoundment Distance to Nearest Dwelling Distance to Nearest Dwelling, Surface Impoundment Distance to Nearest Dwelling, Distance to Nearest Dwelling, Contaminated SWSediment Distance to Nearest Dwelling, Distance to Nearest Dwelling, Contaminated	Agricultural Chem	nicals		🗌 DOE		By: Former Owner
□ Primary Metals □ Other Federal Facility □ Unauthorized □ Metal Forging, Stamping □ Creatment, Storage, or Disposal □ Unknown □ Fabricated Structural Metal Products □ Small Quantity Generator □ Waste Accessible to the Public: □ Other Manufacturing □ Statitity Generator □ Waste Accessible to the Public: □ Mining □ Industrial □ Yes □ Mining □ Industrial □ Statitity Generator □ Other Manufacturing □ Statitity O □ Yes □ Mining □ Industrial □ Vorecrive Filer* □ Other Manufacturing □ Statitity O □ Stance to Nearest Dwelling, School, or Workplace: □ Non-metallic Minerals □ Note Specified □ School, or Workplace: □ Other Type: Source Waste Quantity: Tier**: General Type of Waste □ Check all that apply) (include unit) □ Metals □ Pesticides/Herbicides □ Druns □ Contaminated SWSediment □ Laboratory/Hospital Waste □ Schoid Waste □ Contaminated SW Plume □ Laboratory/Hospital Waste □ Construction/Demolition Waste □ Contaminated SW Plume □ Industriad □ Solid □ Sudge □ Powader □ Powader	Miscellaneous Ch	emical Products		DOI		Present & Former Owner
Metal Coating, Plating, Engraving IRCMA Metal Coating, Plating, Engraving Intreatment, Storage, or Disposal Fabricated Structural Metal Products Subilite D Other Manufacturing Industrial Mining Municipal Metals Industrial Coal Industrial Other Manufacturing Industrial Municipal Industrial Other Manufacturing Subilite D Metals Industrial Other Manufacturing Industrial Metals Industrial Other Subilite D Image: Subilite D Yes Distance to Nearest Dwelling, School, or Workplace: School, or Workplace: School, or Workplace School, or Workplace: Source Type: Source Waste Quantity: Tre*: (check all that apply) (include unit) (check all that apply): Image: Impoundment Image: Impoundment Image: Impoundment Subriae Impoundment Image: Impoundment Image: Impoundment Image: Impoundment Image: Impoundment Image: Impoundment Image: Impoundment Image: I	Primary Metals			Other Federal Facility	У	Unauthorized
Metal reging, Stamping Image: or subject Waste Accessible to the Public: Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or subject Image: or	Metal Coating, Pla	ating, Engraving		CRCRA	rade or Disposal	
Contaminated SWUSediment Contaminate	Metal Forging, St Eabricated Struct	amping ural Metal Produc	rts	Large Quantity	Generator	Waste Accessible to the Public:
□ Other Manufacturing □ Subtitle D □ Yes □ Municipal □ Municipal □ No □ Coal □ 'Oroverter' □ Distance to Nearest Dwelling, □ Oli and Gas □ 'Non-or-teleFiler' □ Distance to Nearest Dwelling, □ Oli and Gas □ 'Non-or-teleFiler' □ Distance to Nearest Dwelling, □ Oli and Gas □ 'Non-or-teleFiler' □ School, or Workplace: □ Non-metallic Minerals □ Other	Electronic Equipm	ient		Small Quantity	Generator	
Mining Municipal No Matais ''Converter" Distance to Nearest Dwelling, Oil and Gas ''Non-or Late Filer" School, or Workplace: Non-metallic Minerals Other	Other Manufactur	ing		Subtitle D		Yes
□ □	Mining			Municipal		☑ No
□ Coll and Gas □ 'onverter' □ bistance to Nearest Dwelling, □ Oil and Gas □ 'Non-or Late Filer' □ School, or Workplace: □ Non-metallic Minerals □ Other	Metals					
☐ Oil and Gas ☐ "Non-or Late Filer" School, or Workplace: ☐ Non-metallic Minerals ☐ Other	Coal			"Converter" "Protective Filer	-"	Distance to Nearest Dwelling,
□ Non-metallic Minerals □ Note Specified □ Other	Oil and Gas			Interest in the second seco	ler"	School, or Workplace:
□ Other	Non-metallic Mine	erals		Note Specified		
6. Waste Characteristics Information (Refer to PA Table 1 for WC Score) Source Type: Source Waste Quantity: Tier*: General Type of Waste (check all that apply) (include unit) Landfill Unorganics Uno				Other		5.660 Feet
6. Waste Characteristics Information (Refer to PA Table 1 for WC Score) Source Type: Source Waste Quantity: Tier*: General Type of Waste (check all that apply) (include unit) (include unit) (check all that apply): Landfill						
(Refer to PA Table 1 for WC Score) Source Type: Source Waste Quantity: Tier*: General Type of Waste (check all that apply) (include unit) (check all that apply): (check all that apply): Landfill			6. Waste Cha	racteristics Infor	mation	
Source Type: Source Waste Quantity: Tier*: General Type of Waste (check all that apply) (include unit) (check all that apply): □ Landfill			(Refer to P	A Table 1 for WC Sco	ore)	
(check all that apply) (include unit) (check all that apply): Landfill	Source Type:	So	ource Waste Quantity:	Tier*:	General Type of	Waste
Landfill	(check all that apply)	(ind	clude unit)		(check all that app	ly):
Surface Impoundment					Metals	Pesticides/Herbicides
□ Drums □ Inorganics □ Oily Waste □ Tanks and Non-Dum Containers □ Inorganics □ Oily Waste □ Chemical Waste Pile □ Oily Waste □ Solvents □ Municipal Waste □ Scrap Metal or Junk Pile □ Other □ Display □ Laboratory/Hospital Waste □ Explosives □ Trash Pile (open drum) □ OtherAFFF_ □ Construction/Demolition Waste □ OtherAFFF_ □ Contaminated GW Plume □ Other □ Physical State of Waste as Deposited (check all that apply): □ Contaminated Soil □ Solid □ Solid □ Other □ Powder □ Powder □ No Sources □ Liquid □ Gas	Surface Impoundment	_			Organics	
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	Drums	_			□ Inorganics □ Solvents	Ully Waste
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	Tanks and Non-Dum Co	ntainers			Paints/Pigments	Mining Waste
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 AFFF_ Radioactive Waste Radioactive Waste Construction/Demolition Waste Physical State of Waste as Deposited (check all that apply): Solid Solid Solid Solid Gas 7. Ground Water Pathway	Chemical Waste Pile				Laboratory/Hospi	ital Waste 🗌 Explosives
Contaminated GW Plume (unidentified source) Contaminated SW/Sediment (unidentified source) Contaminated Soli Other No Sources *C=Constituent, W=Wastestream, V=Volume, A=Area	Scrap Metal or Junk Pile Tailings Pile				Radioactive Wast	e I Other _AFFF_
Land Treatment	Trash Pile (open drum)				Construction/Den	nolition Waste
□ Contaminated GW Plume (unidentified source) □ Contaminated SW/Sediment (unidentified source) □ Contaminated Soil □ Other □ No Sources *C=Constituent, W=Wastestream, V=Volume, A=Area 7. Ground Water Pathway	Land Treatment					
(unidentified source) that apply): (unidentified source) Solid (unidentified source) Solid Contaminated Soil Sludge Other Powder No Sources I Liquid *C=Constituent, W=Wastestream, V=Volume, A=Area Gas	Contaminated GW Plum	e _			Physical State of	Waste as Deposited (check all
Containinated SW/Seuffient (unidentified source) Contaminated Soil Other No Sources *C=Constituent, W=Wastestream, V=Volume, A=Area	(unidentified source)	aant			that apply):	
Contaminated Solicy Sludge Contaminated Soli Powder Other Liquid No Sources Sludge *C=Constituent, W=Wastestream, V=Volume, A=Area Gas	(unidentified source)					Solid
□ Other □ Powder □ No Sources □ □ Liquid *C=Constituent, W=Wastestream, V=Volume, A=Area □ Gas *C=Constituent, W=Wastestream, V=Volume, A=Area	Contaminated Soil					Sludge
No Sources C=Constituent, W=Wastestream, V=Volume, A=Area 7. Ground Water Pathway	Other					Powder
*C=Constituent, W=Wastestream, V=Volume, A=Area 7. Ground Water Pathway	No Sources					Liquid Gas
7. Ground Water Pathway	*C=Constitue	nt, W=Wastestrea	ım, V=Volume, A=Area			
· ·			7. Grou	nd Water Pathwa	ау	
Is Ground Water Used for Drinking Is There a Suspected Release to List Secondary Target Population Served by	Is Ground Water Use	d for Drinking	g Is There a Suspec	ted Release to	List Secondary T	arget Population Served by
Within 4 Miles: Ground Water ¹ : Ground Water Withdrawn From:	Within 4 Miles:		Ground Water ¹ :		Ground Water W	Vithdrawn From:
✓ Yes ✓ Yes	7 Yes		J Yes			
	□ No					
0 - 1/4 MileNA					0 - 1/4 Mile	NA
If Yes, Distance to nearest	If Yes, Distance to ne	earest			>1/4 - 1/2 Mila	ς ΝΔ

Feet	Have Drimany Target	rinking	>1/4 1/2 WINC	NA
	Water Wells Been Ide	ninking ntified:		
Type of Drinking Water Walls Within			>1/2 - 1 Mile	NA
Miles	4 ☐ Yes ☑ No	:	>1 - 2 Mile	NA
(cneck all that apply):	If Yes, Enter Primar	Target	>2 - 3 Mile	NA
Private None	Pe	pple ³	>3 - 4 Mile	NA
Depth to Shallowest Aquifer:	Nearest Designated \	ellhead .	Total Within 4 Miles	ιNΔ
~ 10 to 50 Feet	Protection Area ⁶ :			
Karst Terrain/Aquifer Present:	☐ Underlies S ☐ >0-4 Miles ☑ None With	ie A Miles	*Use population #s for PA T	able 2 n GW Pathway Scoresheet
✓ No				
	8. Surface V	ater Pathway		
Type of Surface Water Draining Site an that apply):	nd 15 Miles Downstream	(check all Sh Su	ortest Overland Dist urface Water:	ance From Any Source to
Stream River I	Pond Diaka		3,685 F	eet
Bay Ocean 0	Other			Miles
Is There a Suspected Release to Surfac	e Water ¹ :	Sit	te is Located in:	
· ✓ Yes ☐ No			 ☐ Annual - 10 yr Fl ☐ >10yr - 100yr Fl ☐ >100yr - 500yr F ☐ >500yr Floodplai 	oodplain oodplain loodplain n
Drinking Water Intake Located Along t	he Surface Water Migra	ion Path: Lis	st All Secondary Targ	et Drinking Water Intakes:
U No		<u> </u>	Name: Water Body: Flo	ow (cfs): Population Served:
Have Primary Target Drinking Water In	ntakes Been Identified:			
□ Yes If Yes, Dista ☑ No Water Intak	nce to Nearest Drinking ke : Miles ⁶	-		
If Yes, Enter Population Served by Targ	get Intake:			
NAPeople ⁴			Total within	n 15 Miles ⁴
Fisheries Located Along the Surface W	ater Migration Path:	Lis	st All Secondary Targ	et Fisheries ¹⁰ :
□ Yes ☑ No If Yes, Distar	nce to Nearest Fishery: Miles		Water Body/ Fishery Nam	<u>e</u> : <u>Flow (cfs)</u> :
Have Primary Target Fisheries Been Ide	entified:			
🗌 Yes 🛛 🗹 No				
	8. Surface Water	athway (contin	ued)	
Wetlands Located Along the Surface W Path:	Vater Migration Ot Mi	er Sensitive Envir ration Path:	ronments Located Al	ong the Surface Water
] Yes] No	If Yes, Distance to Environment: _	Nearest Sensitive Miles
✓ Yes No				
⊻ Yes □ No Have Primary Target Wetlands Been I	dentified: Ha	e Primary Target	Sensitive Environme	nts Been Identified:
 ✓ Yes No Have Primary Target Wetlands Been I □ Yes ☑ No 	dentified: Ha	e Primary Target	Sensitive Environme	nts Been Identified:

<u>Water Body</u> : <u>Flow (cfs)</u> : <u>Frontage miles:</u>		Water Body :	<u>Flow (cfs)</u> :	Sensitive Environment Type:			
· · ·							
	9. Soil E	xposure Pat	hway				
Are People Occupying Residence or	Number of Worke	ers Onsite ⁴ :	Have Terre	estrial Sensitive Environments Been			
Attending School or Daycare on or			Identified	on or Within 200 Feet of Areas of			
Within 200 Feet of Area of Known or	□ None		Known or	Suspected Contamination:			
Suspected Contamination:	□ 101 - 1.	000					
	□ > 1,000)		Voc			
				☑ Tes			
Yes							
⊡ No			If Yes, Lis	t Each Terrestrial Sensitive			
	Population Withir	n 1 Mile:	Environm	nent ^s :			
If Yes, Enter Total Residential							
Population:	Pe	eople ⁷					
People ²		1					
			*Refer to PA	Table 7 for environment types			
	10.	Air Pathwa	y	6			
Is there a Suspected Release to Air ¹ :		Wetlands Lo	cated Within 4 N	Ailes of the Site [°] :			
L Yes IZ No		🗹 Yes	If Vec. Ho	W Many Acros			
Enter Tatal Danulation on an Mithing		🗌 No	11 163, 110	it res, now wany Acres Acres			
Enter rotal Population on or within:		Othor Concit	ivo Environmont	c Located Within 4 Miles of the Sites			
Onsite		Other Sensit		s Located Within 4 Miles of the Site.			
0-1/4 Mile							
>1/4-1/2 Mile		List All Sensi	tive Environmen	ts Within 1/2 Mile of the Site ⁶ :			
>1/2-1 Mile		Distance:	Sensitive Environ	ment Type/Wetlands Area (acres):			
>1-2 Miles		Onsite	None				
>2-3 Miles		0-1/4 Mile	_Wetlands				
>3-4 Miles		>1/4-1/2 Mile	e _Wetlands				
Total Within 4 Miles ³⁻⁵ _5,660							

					Identification	
Potential I	Hazardous W	aste Site Pi	reliminary As	ssessment	State: SD	CERCLIS #:
		Form			CERCLIS Disco	very Date:
		1. Gene	eral Site Informatio	n	<u> </u>	
Name: Ellsworth	AFB	Street Address:	1000 N Ellsworth Rd			
City:		State: SD	Zip Code:	County:	Co. Code:	Cong. Dist:
			57769	Meade		
Latitude:	Longitude:	Approximate Ar	rea of Site:	Status of Site:	•	-
44°8' 11.54"	103°5' 9.42"	_0.9	Acres	Active	Not Specified	
			Square Ft	Inactive	NA (GW plume, e	tc.)
Site Name: Buildi	ng 618	•				
he tank were rel:	eased to the WWTP.	The system was co	onverted to HEF syste	em between 2005	5 and 2012.	
		2. Owner	/Operator Informa	tion		
Owner: Ellsworth	AFB		Operator: same as	sowner		
Street Address: 1	000 N Ellsworth Rd		Street Address:			
City:			City:			
State: SD	Zip Code:	Telephone:	State:	Zip Code:	Telephone:	
Tupe of Ownersh	in:		Type of Ownershi	<u>.</u>		
	ip.			µ. □ County		
Federal Agency	County Municipa	al	Private Federal Agency	County Municipal		
Name: _DOD	Not Spe	cified	Name:	Not Spec	ified	
☐ State	Other		☐ State	Other		
		3. Site E	valuator Information	on	Data Daaraa	1.
Name of Evaluato	Dr:	Agency/Organiz	zation:		Date Prepare	1:
Ctroot Address O	101 Courth Israelas C		City Englasses		03/03/2013	
Street Address: 9	TAT SOULD Jamaica St	reet	City: Englewood		state: CO	
Name of EPA or S	State Agency Contact:		Street Address:			
Name of EPA or S	State Agency Contact:	State:	Street Address:	Telephone:		
Name of EPA or S City:	State Agency Contact:	State:	Street Address:	Telephone:		
Name of EPA or S City:	State Agency Contact:	State: 4. Site Dispo	Street Address:	Telephone: • only)		
Name of EPA or S City: Emergency Respo	State Agency Contact:	State: 4. Site Dispo ment	Street Address: Disition (for EPA use CERCLIS Recomme	Telephone: e only) endation:	Signature:	
Name of EPA or S City: Emergency Respo Recommendatior	State Agency Contact: Donse/Removal Assess	State: 4. Site Dispo ment	Street Address: Disition (for EPA use CERCLIS Recomme Higher Priority U ower Priority	Telephone: e only) endation: SI	Signature:	
Name of EPA or S City: Emergency Respo Recommendatior	State Agency Contact:	State: 4. Site Dispo ment	Street Address: Disition (for EPA use CERCLIS Recomme Higher Priority Lower Priority S NFRAP	Telephone: e only) endation: SI SI	Signature: Name (typed)	:
Name of EPA or S City: Emergency Respo Recommendatior	State Agency Contact: Donse/Removal Assess n: Yes No	State: 4. Site Dispo ment	Street Address: Disition (for EPA use CERCLIS Recomme Higher Priority Lower Priority S NFRAP RCRA	Telephone: e only) endation: si si	Signature: Name (typed) Position:	:
Name of EPA or S City: Emergency Respo Recommendatior	State Agency Contact: Donse/Removal Assess n: Yes No Date:	State: 4. Site Dispo ment	Street Address: Disition (for EPA use CERCLIS Recomme Higher Priority Lower Priority S NFRAP RCRA Other: Date:	Telephone: conly) endation: SI SI	Signature: Name (typed) Position:	:
Name of EPA or S City: Emergency Respo Recommendatior	State Agency Contact: Donse/Removal Assess n: Yes No Date:	State: 4. Site Dispo ment	Street Address: Distion (for EPA use CERCLIS Recomme Higher Priority Lower Priority S NFRAP RCRA Other: Date: Tal Site Characterist	Telephone: e only) endation: si si	Signature: Name (typed) Position:	:

that apply):					
Industrial	Agriculture		🗌 Urbai	n	Beginning Year _?_
	Mining	Other Federal	🗌 Subu	rban	Ending Year 2012
Residential Forest/Fields			Rural	l	
		Other			Unknown
Type of Site Operation	ons (check all t	hat apply):			Waste Generated:
	, 		_		
	neck subcategory)		Retail Recycling		☐ Offsite
Inorganic Chemi	cals		Junk/Salvage Yard		Onsite and Offsite
Plastic and/or Ru	bber Products		Municipal Landfill		
Paints, Varnishes	;		Other Landfill		Waste Deposition Authorized
Industrial Organi Agricultural Chor	c Chemicals				By: Present Owner
	nicals nemical Products				Former Owner Present & Former Owner
Primary Metals			Other Federal Facilit	ty	
Metal Coating, Pl	ating, Engraving				Unknown
Metal Forging, St Eabricated Struct	tamping	to	Large Quantity	rage, or Disposai Generator	Waste Accessible to the Public:
Electronic Equipr	nent	15	Small Quantity	Generator	
Other Manufactu	ring		Subtitle D		□ Yes
Mining			Municipa	l	☑ No
Metals			Industria	1	
🗆 Coal			"Protective File	r"	Distance to Nearest Dwelling,
Oil and Gas			"Non-or Late Fi	iler"	School, or Workplace:
☐ Non-metallic Min	erals		Note Specified		
			Other		_3,200 Feet
		6. Waste Cha (Refer to P	racteristics Infor A Table 1 for WC Sco	mation ore)	
Source Type:	So	urce Waste Quantity:	Tier*:	General Type of	Waste
(check all that apply)	(incl	ude unit)		(check all that app	ly):
				Metals	Pesticides/Herbicides
				Organics	Acids/Bases
				Inorganics	Oily Waste
Tanks and Non-Dum Co	ontainers			Solvents Paints/Pigments	Municipal Waste
Chemical Waste Pile				Laboratory/Hospi	tal Waste Explosives
Scrap Metal or Junk Pile	e			Radioactive Wast	e Other _AFFF_
Trash Pile (open drum)				Construction/Den	nolition Waste
Land Treatment	_				
Contaminated GW Plum	ne			Physical State of	Waste as Deposited (check all
(unidentified source) □ Contaminated SW/Sedia	ment			that apply):	
(unidentified source)					Solid
Contaminated Soil					Sludge
Other					Liquid
					Gas
*C=Constitue	ent, w=wastestrear	n, v=voiume, A=Area	nd Water Dath		
Is Ground Water Har		7. Grou		ay	
Ins Ground Water Use	d for Drinking	Ic Thora a Success	tod Dologoo to	Lict Cocondom / L	<u> </u>
Within A Milas	d for Drinking	Is There a Suspec	ted Release to	List Secondary 1	lithdrawn Fram:
Within 4 Miles:	d for Drinking	Is There a Suspec Ground Water ¹ :	ted Release to	Ground Water W	arget Population Served by Vithdrawn From:
Within 4 Miles:	d for Drinking	Is There a Suspec Ground Water ¹ : Ves	ted Release to	List Secondary I Ground Water W	arget Population Served by /ithdrawn From:
Within 4 Miles: Ves No	d for Drinking	Is There a Suspec Ground Water ¹ : ☑ Yes ☐ No	ted Release to	List Secondary F Ground Water W 0 - 1/4 Mile	Vithdrawn From: NA
Within 4 Miles: Ves No If Yes, Distance to n	d for Drinking earest	Is There a Suspec Ground Water ¹ : ☑ Yes ☐ No	ted Release to	List Secondary I Ground Water W 0 - 1/4 Mile	/ithdrawn From: NA

Feet Type of Drinking Water Wells Within	nave Primary Target			
Type of Drinking Water Wells Within	Water Wells Reen Id	entified:		
i ype of or miking water wells within			>1/2 - 1 Mile	NA
Miles	I 4 ☐ Yes ☑ No		>1 - 2 Mile	NA
(cneck all that apply):	If Yes, Enter Prima	y Target	>2 - 3 Mile	NA
Private None	Population.	ople ³	>3 - 4 Mile	NA
Depth to Shallowest Aquifer:	Nearest Designated	Nellhead	Total Within 4 Miles	⁴ ΝΔ
~ 10 to 50 Feet	Protection Area ⁶ :			
Karst Terrain/Aquifer Present:	☐ Underlies ☐ >0-4 Mile ☑ None Witt	Site in 4 Miles	*Use population #s for PA T *Note pearest well for #5 o	able 2 In GW Pathway Scoresheet
☑ No				,
	8. Surface	Vater Pathwa	у	
Type of Surface Water Draining Site an that apply):	nd 15 Miles Downstrear	າ (check all	Shortest Overland Dist Surface Water:	ance From Any Source to
Stream River I	Pond Diske		1,380 F	eet
Bay Ocean	Other			Miles
Is There a Suspected Release to Surfac	ce Water ¹ :		Site is Located in:	
∵ Yes □ No			☐ Annual - 10 yr Fl ☐ >10yr - 100yr Fl ☐ >100yr - 500yr F ☐ >500yr Floodpla	oodplain oodplain Tloodplain in
Drinking Water Intake Located Along t	the Surface Water Migr	tion Path:	List All Secondary Targ	et Drinking Water Intakes:
			<u>Name: Water Body: Flo</u>	ow (cfs): Population Served:
Have Primary Target Drinking Water I	ntakes Been Identified:			
□ Yes If Yes, Dista ☑ No Water Inta	ance to Nearest Drinkin ke : Miles ⁶			
If Yes, Enter Population Served by Tar	get Intake:			
NA People ⁴			Total withi	n 15 Miles ⁴
Fisheries Located Along the Surface W	/ater Migration Path:		List All Secondary Targ	et Fisheries ¹⁰ :
□ Yes ☑ No If Yes, Dista	nce to Nearest Fishery: Miles		Water Body/ Fishery Nam	<u>ie</u> : <u>Flow (cfs)</u> :
Have Primary Target Fisheries Been Id	entified:			
🗌 Yes 🛛 🗹 No				
	8. Surface Water	Pathway (con	tinued)	
Wetlands Located Along the Surface V Path:	Vater Migration O	her Sensitive Er gration Path:	nvironments Located Al	ong the Surface Water
		☐ Yes ☑ No	If Yes, Distance to Environment:	Nearest Sensitive Miles
✓ Yes □ No				
	Identified: Ha	ve Primary Targ	get Sensitive Environme	nts Been Identified:
 ✓ Yes No Have Primary Target Wetlands Been □ Yes ☑ No 	ldentified: Ha	ve Primary Targ	get Sensitive Environme □ Yes ☑ No	nts Been Identified:

<u>Water Body</u> : <u>Flow (cfs)</u> : <u>Frontage miles:</u>		Water Body :	Flow (cfs):	Sensitive Environment Type:			
· · ·							
	9. Soil E	xposure Pat	hway				
Are People Occupying Residence or	Number of Worke	ers Onsite ⁴ :	Have Terre	estrial Sensitive Environments Been			
Attending School or Daycare on or			Identified	on or Within 200 Feet of Areas of			
Within 200 Feet of Area of Known or	✓ None		Known or	Suspected Contamination:			
Suspected Contamination:	□ 1° 100 □ 101 - 1,	\Box 101 - 1.000					
	□ > 1,000)		Yes			
☐ Yes				I No			
⊡ No			If Yes, Lis	t Each Terrestrial Sensitive			
	Population Withir	n 1 Mile:	Environn	nent⁵:			
If Yes, Enter Total Residential							
Population:	De	anla ⁷					
P		eopie.					
People ²			*				
			Refer to P	A Table 7 for environment types			
	10.	Air Pathwa	у				
Is there a Suspected Release to Air ¹ :		Wetlands Lo	cated Within 4 N	٨iles of the Site ⁶ :			
Yes		✓ Yes	If Vec. 11e				
		🗌 No	li fes, no	II Tes, How Many Acres: Acres			
Enter Total Population on or Within:		Other Consit	ivo Environmont	a Located Within 4 Miles of the Site.			
Onsite		Other Sensit		s located within 4 Miles of the Site:			
			∐ Yes ☑ No				
U-1/4 IVIIIe							
>1/4-1/2 Mile		List All Sensi	tive Environmen	ts Within 1/2 Mile of the Site ⁶ :			
>1/2-1 Mile		Distance:	Sensitive Environ	ment Type/Wetlands Area (acres):			
>1-2 Miles		Onsite	None				
>2-3 Miles		0-1/4 Mile	_Wetlands				
>3-4 Miles		>1/4-1/2 Mile	e _Wetlands				
Total Within 4 Miles ³⁻⁵ _7,210_							

	_				Identification	า
Potential H	lazardous Wa	iste Site Pr	eliminary A	ssessment	State: SD	CERCLIS #:
		Form			CERCLIS Disc	overy Date:
		1. Gene	ral Site Informati	on		
Name: Ellsworth A	AFB	Street Address: 1	1000 N Ellsworth Ro	d		
City:		State: SD	Zip Code: 57769	County: Meade	Co. Code:	Cong. Dist:
Latitudo:	Longitudo:	Approvimate Ar	a of Sito:	Status of Sito:		
	102°6' 22 52"	Approximate Are				
44 5 54.75	105 0 25.55	_4.7 Aci	cuare Et		Not Specified	-+- \
Cita Nama Duildin	00240	5	quarent		INA (GW plume,	elc.)
Site Name: Buildin	1g 88240			hha wawth sida af r		
contained an AFFI a surface impound	F fire suppression syst dment located south c	em. Any AFFF rele of Building 88240.	ases in Building 88	240 would have d	rained via und	derground piping to
		2. Owner/	Operator Inform	ation		
Owner: Ellsworth	AFB		Operator: same a	as owner		
Street Address: 10	000 N Ellsworth Rd		Street Address:			
City:			City:			
State: SD	Zip Code:	Telephone:	State:	Zip Code:	Telephone:	
Type of Ownershi	p:		Type of Ownersh	ip:		
☐ Private						
☑ Federal Agency	Municipal		Federal Agency	Municipa	I	
Name: _DOD_	Not Specif	ied	Name:	_ 🗌 Not Spec	ified	
	Other			Other		
		3. Site Ev	l valuator Informat	ion		
Name of Evaluato Kelly Teplitsky	r:	Agency/Organiza CH2M HILL	ation:		Date Prepare 03/03/2015	ed:
Street Address: 91	191 South Jamaica Stre	eet	City: Englewood		State: CO	
Name of EPA or St	tate Agency Contact:		Street Address:			
City		Ctata		Tolonhono		
City:		State:		relephone:		
		4. Site Dispo	sition (for EPA us	e only)		
Emergency Respo	nse/Removal Assessm	ent	CERCLIS Recomm	endation:	Signature:	
Recommendation	:		Higher Priority	y SI		-
	☐ Yes		Lower Priority	SI	Name (typed):
	🗌 No		\square NFRAP \square RCRA		Position	
D	ate:		Other:			
			Date:			
		5. Genera	al Site Characteris	stics		
Predominant Land	d Use Within 1 Mile of	Site (check all	Site Setting:		Years of Ope	ration:

that apply):					
Industrial	Agriculture		🗌 Urba	n	Beginning Year _?_
	Mining	Other Federal	🗌 Subu	rban	Ending Year procent
Residential	DOD DOF	☐ Facility:	🗹 Rural		Ending rear present
L Forest/Fields	DOE	Other			Unknown
	())))))				
Type of Site Operation	ons (check all th	at apply):			Waste Generated:
Manufacturing (must cl	heck subcategory)		🗌 Retail		⊡ Onsite
Lumber and Woo	od Products		Recycling		
Inorganic Chemic	cals		Junk/Salvage Yard		
Plastic and/or Ru Deinte Vernishes	bber Products		Other Landfill		Maste Dependentier Authorized
Industrial Organi	ic Chemicals		☑ DOD		
Agricultural Chen	nicals		DOE		By: Former Owner
Miscellaneous Ch	nemical Products		DOI	h.	Present & Former Owner
Primary Metals	lation Francian			.y	Unauthorized
Metal Coating, Pl Metal Forging, St	tamping, Engraving		Treatment, Sto	rage, or Disposal	
Fabricated Struct	tural Metal Products		Large Quantity	Generator	Waste Accessible to the Public:
Electronic Equipr	ment		Small Quantity	Generator	
Other Manufactu	iring			1	Yes
Mining				l	I No
Metals			Converter"		
			"Protective File	r"	Distance to Nearest Dweiling,
□ On and Gas	erals		□ "Non-or Late F	iler"	School, of Workplace:
					_7,000Feet
		6 Waste Cha	ractoristics Infor		
				mation	
		(Refer to P	A Table 1 for WC Sco	mation pre)	
Source Type:	Sou	(Refer to P. irce Waste Quantity:	A Table 1 for WC Sco Tier*:	ore) General Type of	Waste
Source Type: (check all that apply)	Sou (inclu	(Refer to P. Irce Waste Quantity: de unit)	A Table 1 for WC Sco Tier*:	General Type of (check all that app	Waste oly):
Source Type: (check all that apply)	Sou (inclu	(Refer to P. Irce Waste Quantity: de unit)	A Table 1 for WC Sco Tier*:	General Type of (check all that app (chetals	Waste oly):
Source Type: (check all that apply)	Sou (inclu	(Refer to P. Irce Waste Quantity: de unit)	A Table 1 for WC Sco Tier*:	General Type of (check all that app Metals	Waste bly): Pesticides/Herbicides Acids/Bases
Source Type: (check all that apply)	(inclu	(Refer to P. Irce Waste Quantity: de unit)	A Table 1 for WC Sco Tier*:	General Type of (check all that app (check all that app) (check all that app (check all that app) (check all	Waste Dly): Acids/Bases Oly Waste
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co	Sou (inclu —— —— ontainers ——	(Refer to P. Irce Waste Quantity: de unit)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app (check all that app) (check all that	Waste oly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile	Sou (inclu —— ontainers —— ——	(Refer to P. Irce Waste Quantity: de unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp	Waste oly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste Explosives
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile	Sou (inclu 	(Refer to P. Irce Waste Quantity: de unit)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste Explosives te Other _AFFF_
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum)	Sou (inclu 	(Refer to P. Irce Waste Quantity: de unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wasi Construction/Der	Waste Dly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste ital Waste Explosives te Other _AFFF_ molition Waste
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment	Sou (inclu ontainers	(Refer to P. Irce Waste Quantity: de unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der	Waste oly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Kining Waste ital Waste Explosives te Other _AFFF_ molition Waste
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum	Sou (inclu ontainers e e ne	(Refer to P. Irce Waste Quantity: de unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der	Waste oly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Explosives te Other _AFFF_ nolition Waste Waste as Deposited (check all
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedit	Sou (inclu ontainers e ne ment	(Refer to P. Irce Waste Quantity: de unit)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Kining Waste Explosives te Other _AFFF_ nolition Waste Waste as Deposited (check all
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source)	Sou (inclu ontainers e ne ment	(Refer to P.	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Construction/Der Physical State of that apply):	Waste Oly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste Explosives te Other_AFFF_ molition Waste Waste as Deposited (check all Solid
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sediu (unidentified source)	Sou (inclu ontainers e ne ment	(Refer to P. Irce Waste Quantity: de unit)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste ital Waste Explosives te Other _AFFF_ molition Waste Waste as Deposited (check all Solid Sludge Payudes
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other	Sou (inclu ontainers e ne ment	(Refer to P. Irce Waste Quantity: de unit)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Construction/Der Physical State of that apply):	Waste oly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Ke Other _AFFF_ nolition Waste Waste as Deposited (check all Sludge Powder Liquid
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Cc Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedit (unidentified source) Contaminated Soil Other No Sources	Sou (inclu ontainers e ne ment	(Refer to P. Irce Waste Quantity: de unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste Ital Waste Vother _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sediu (unidentified source) Contaminated Soil Other No Sources *C=Constitue	Sou (inclu ontainers e ne ment ment ent, W=Wastestream	(Refer to P. Irce Waste Quantity: de unit) 	A Table 1 for WC Sco Tier*:	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Construction/Der Physical State of that apply):	Waste oly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Explosives te Other _AFFF_ molition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitue	Sou (inclu ontainers e ne ment ent, W=Wastestream	(Refer to P. Irce Waste Quantity: de unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Construction/Der Physical State of that apply):	Waste oly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Ke Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated Sw/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitue	Sou (inclu ontainers	(Refer to P. Irce Waste Quantity: de unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste Ital Waste Vother _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas Garget Population Served by
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitute Within 4 Miles:	Sou (inclu ontainers	(Refer to P. Irce Waste Quantity: de unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste oly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste Ital Waste Explosives te Other _AFFF_ nolition Waste F Waste as Deposited (check all Solid Sludge Powder Liquid Gas Garget Population Served by Vithdrawn From:
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitue Within 4 Miles: Yes	Sou (inclu ontainers e ne ment ent, W=Wastestream	(Refer to P. Irce Waste Quantity: de unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Construction/Der Physical State of that apply):	Waste oly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Explosives AF Waste as Deposited (check all Solid Sludge Powder Liquid Gas Garget Population Served by Vithdrawn From:
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedit (unidentified source) Contaminated Soil Other No Sources *C=Constitue Within 4 Miles: Yes No	Sou (inclu ontainers	(Refer to P. Irce Waste Quantity: de unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste oly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Explosives te Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas Gas AA
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitue Within 4 Miles: Yes No	Sou (inclu ontainers	(Refer to P. Irce Waste Quantity: de unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Nining Waste Explosives te Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas Gas Garget Population Served by Vithdrawn From:NA

Drinking Well:	Have Drimany Targe	+ Drinking	~1/4 - 1/2 IVIIIC	INA
Feet	Water Wells Been I	t Drinking Tentified:		
Type of Drinking Water Wells Within /			>1/2 - 1 Mile	NA
Miles	+ ∐ Yes ☑ No		>1 - 2 Mile	NA
	If Yes, Enter Prima Population:	iry Target	>2 - 3 Mile	NA
Private None		People ³	>3 - 4 Mile	NA
Depth to Shallowest Aquifer:	Nearest Designated	Wellhead	Total Within 4 Miles ⁴	ι NA
~ 10 to 50 Feet	Protection Area ⁶ :			_!!!!
Karst Terrain/Aquifer Present:	☐ Underlies ☐ >0-4 Mile ☑ None Wit	s Site es :hin 4 Miles	*Use population #s for PA T *Note nearest well for #5 o	able 2 n GW Pathway Scoresheet
√ No				
	8. Surface	Water Pathwa	ly	
Type of Surface Water Draining Site and that apply):	d 15 Miles Downstrea	m (check all	Shortest Overland Dist Surface Water:	ance From Any Source to
Stream River Po	ond 🗌 Lake		_300_ Fee	et
Bay Ocean O	ther			Miles
Is There a Suspected Release to Surface	water ¹ .		Site is Located in:	
✓ Yes			□ Annual - 10 yr Fl □ >10yr - 100yr Fle	oodplain oodplain
□ No			□ >100yr - 500yr F □ >500yr Floodplai	loodplain n
Drinking Water Intake Located Along th	e Surface Water Mig	ration Path:	List All Secondary Targ	et Drinking Water Intakes:
☐ Yes ☑ No			<u>Name: Water Body: Flo</u>	ow (cfs): Population Served:
Have Primary Target Drinking Water Int	takes Been Identified:			
☐ Yes If Yes, Distan ☑ No Water Intake	nce to Nearest Drinkir e : Miles ⁶	g		
If Voc. Enter Deputation Served by Targe				
if fes, Enter Population Served by Targe				
NA People ⁴			Total within	n 15 Miles ⁴
Fisheries Located Along the Surface Wa	ter Migration Path:		List All Secondary Targ	et Fisheries ¹⁰ :
□ Yes ☑ No If Yes, Distance	ce to Nearest Fishery: Miles		Water Body/ Fishery Nam	<u>e</u> : <u>Flow (cfs)</u> :
Have Primary Target Fisheries Been Ide	ntified:		1	
☐ Yes ☑ No				
Yes Vo				
Yes INO	8. Surface Wate	r Pathway (con	tinued)	
☐ Yes ☑ No Wetlands Located Along the Surface Wa Path:	8. Surface Wate	r Pathway (con other Sensitive E digration Path:	tinued) nvironments Located Al	ong the Surface Water
☐ Yes ☑ No Wetlands Located Along the Surface Wa Path: ☑ Yes ☐ No	8. Surface Wate ater Migration C N	r Pathway (con Ither Sensitive E Aigration Path: Yes Vo	tinued) nvironments Located Al If Yes, Distance to Environment:	ong the Surface Water Nearest Sensitive Miles
☐ Yes ☑ No Wetlands Located Along the Surface Wa Path: ☑ Yes ☐ No Have Primary Target Wetlands Been Id	8. Surface Wate ater Migration C N lentified: H	r Pathway (con other Sensitive E figration Path: ☐ Yes ☑ No ave Primary Targ	tinued) nvironments Located Al If Yes, Distance to Environment: get Sensitive Environme	ong the Surface Water Nearest Sensitive Miles nts Been Identified:
☐ Yes ☑ No Wetlands Located Along the Surface Wa Path: ☑ Yes ☐ No Have Primary Target Wetlands Been Id ☐ Yes ☑ No	8. Surface Water ater Migration C N lentified: H	r Pathway (con hther Sensitive E fligration Path: □ Yes ☑ No ave Primary Targ	tinued) nvironments Located Al If Yes, Distance to Environment: get Sensitive Environme □ Yes ☑ No	ong the Surface Water Nearest Sensitive Miles nts Been Identified:

Water Body : Flow (cfs): Frontage miles:		Water Body :	<u>Flow (c</u>	s): <u>Sensitive Envi</u>	ronment Type:	
	9. Soil E	xposure Pat	hway			
Are People Occupying Residence or	Number of Worke	ers Onsite ⁴ :	Have T	errestrial Sensitiv	ve Environments Been	
Attending School or Daycare on or			Identif	ed on or Within	200 Feet of Areas of	
Within 200 Feet of Area of Known or	□ None		Known	or Suspected Co	ontamination:	
Suspected Contamination:	□ 101 - 1,	000				
	□ > 1,000)		□ Yes		
				⊡ res ☑ No		
⊡ Yes ☑ No			If Yes	List Fach Terres	trial Sensitive	
	Population Withir	n 1 Mile:	Envir	Environment ⁵ :		
If Yes, Enter Total Residential		T I Wine.				
Population:		- 7				
Pe		eopie,				
People ²			*			
			Refer	to PA Table 7 for enviro	onment types	
	10.	Air Pathwa	У			
Is there a Suspected Release to Air ¹ :		Wetlands Lo	cated Within	4 Miles of the Si	ite ⁶ :	
∐ Yes ☑ No		✓ Yes	If Voc			
Enter Total Population on or Within:		🗌 No	11 103,		Acres	
		Other Sensit	ive Environm	ents Located Wi	thin 4 Miles of the Site [.]	
Onsite		o the oction				
				es Io		
0-1/4 Mile						
>1/4-1/2 Mile		List All Sensi	tive Environr	ents Within 1/2	! Mile of the Site ⁶ :	
>1/2-1 Mile		Distance:	Sensitive Env	ronment Type/We	etlands Area (acres):	
>1-2 Miles		Onsite	None			
>2-3 Miles		0-1/4 Mile	_Wetlands			
>3-4 Miles		>1/4-1/2 Mile	e _Wetlands_			
Total Within 4 Miles ³⁻⁵ _4,970_						

					Identificatio	n
Potential H	lazardous Wa	aste Site P	reliminary A	ssessment	State: SD	CERCLIS #:
		Form			CERCLIS Disc	overy Date:
		1. Ger	eral Site Informati	on		
Name: Ellsworth	AFB	Street Address	: 1000 N Ellsworth R	d		
City:		State: SD	Zip Code: 57769	County: Meade	Co. Code:	Cong. Dist:
Latitude:	Longitude:	Annroximate A	Area of Site	Status of Site		
44°9' 40 63"	103°5' 49 46"	less than 1				
44 5 40.05	105 5 45.40		Square Ft		Not Specified	
			Squarent		INA (GW plume,	etc.)
Site Name: Forme	er Fire Station 2					
Site Description: I	Former Fire Station 2,	located in build	ng 88538, was under	r air mobility comi	mand starting	in 1957 and was
transferred to Ells	sworth in 1962. This fi	re station was us	sed to support the m	unitions storage a	irea until 199	4. This station did
not have access to	o and did not service t	he airfield. It is u	unknown if this statio	on had a crash tru	ck but a fire t	ruck was located
here in the late 19	980s for structural fire	s. Foam rarely w	vould have been used	d on structure fire	s.	
		-				
		2. Owne	r/Operator Inform	ation		
Owner: Ellsworth	AFB		Operator: same a	as owner		
Street Address: 10	000 N Ellsworth Rd		Street Address:			
City:			City:			
State: SD	Zip Code:	Telephone:	State:	Zip Code:	Telephone:	
Type of Ownershi	in:		Type of Ownersh	vin:		
			-	пр. П.а		
	County		Private	County	I.	
Federal Agency		C - J	Federal Agency		ified	
State	Not Speci	lied	State	_ Other	ineu	
Indian			Indian			
		3. Site	Evaluator Informat	tion		
Name of Evaluato	nr.	Agency/Organ	ization.		Date Prenar	-d-
Kolly Toplitsky	//.				02/02/2015	cu.
					03/03/2013	
Street Address: 9	191 South Jamaica Str	eet	City: Englewood		State: CO	
Name of EPA or S	tate Agency Contact:		Street Address:			
City:		State:		Telephone:		
		A Site Dier	osition (for EDA us	e only)		
	noo/Domenial Arra	אנום אוב ייי		ondot:	Cignet	
Emergency Respo	mse/ kemoval Assessn	ient	CERCLIS Recomm	iendation:	signature:	
Recommendation	1:		Higher Priorit	y SI	Nieuro (trus e	IV.
	Yes			/ 51	Name (type)	ı):
	🗌 No				Dealth	
_					Position:	
D	ate:		Date:			
		5. Gene	ral Site Characterio	stics	1	
Predominant Lan	d Llse Within 1 Mile o	Site (check all	Site Setting		Years of One	eration:
		Site (LIECK all	Site Setting.		Licais of Obe	

that apply):					
Industrial	Agriculture		🗌 Urba	n	Beginning Year 1957
	Mining	Other Federal	🗌 Subu	ırban	Ending Year 1994
Residential Forest/Fields	DOD DOF		Rural	I	
	0000	Other			Unknown
Type of Site Operation	ons (check al	l that apply):			Waste Generated:
	neck subcatego	ry)	Retail Recycling		
Inorganic Chemic	cals		Junk/Salvage Yard		Onsite and Offsite
Plastic and/or Ru	bber Products		Municipal Landfill		
Paints, Varnishes	5		Other Landfill		Waste Deposition Authorized
Industrial Organi	c Chemicals				By: Present Owner
	nicais iemical Product	s			Former Owner Present & Former Owner
Primary Metals		3	Other Federal Facilit	ty	
Metal Coating, Pl	ating, Engravin	g	🗆 RCRA		
Metal Forging, St	tamping		Treatment, Sto	orage, or Disposal	Waste Accessible to the Public:
Fabricated Struct	ural Metal Prod	ucts	Large Quantity	Generator	
Electronic Equipr Other Manufactur	rina		Subtitle D	Concrator	
	illig		□ Municipa	al	
☐ Mining			Industria	al	
Metals			Converter"		Distance to Nearest Dwelling
			"Protective File	er"	School, or Workplace:
Non-metallic Min	erals			iler"	School, of Workplace.
	oraio				
					_4,550 Feet
		6 Waste Ch	aracteristics Infor	mation	
		(Refer to)	PA Table 1 for WC Sco	ore)	
Source Type:		Source Waste Quantity:	Tier*:	General Type of	Waste
(check all that apply)	(i	nclude unit)		(check all that app	oly):
				Metals	Pesticides/Herbicides
				Organics	Acids/Bases
				Inorganics Solvents	
Tanks and Non-Dum Co	ontainers			Paints/Pigments	
Chemical Waste Pile					
Scrap Metal or Junk Pile				Laboratory/Hosp	ital Waste 🛛 Explosives
Trash Pile (open drum)				Laboratory/Hosp Radioactive Wast	ital Waste Explosives C Other _AFFF_
				Construction/Der	ital Waste
Land Treatment				Laboratory/Hosp Radioactive Wasi Construction/Der	ital Waste Explosives Explosives Explosive Explosive Explosi
Land Treatment	ne			Laboratory/Hosp Radioactive Wasi Construction/Der Physical State of	ital Waste Explosives Explosives Tother _AFFF_ nolition Waste Waste as Deposited (check all
Land Treatment Contaminated GW Plum (unidentified source)	ne			Construction/Der Physical State of that apply):	ital Waste Explosives Explosives Tother _AFFF_ nolition Waste Waste as Deposited (check all
Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin	ne			Caboratory/Hosp Radioactive Wasi Construction/Der Physical State of that apply):	ital Waste Explosives Explosives Explosives Conter _AFFF_ molition Waste EXPLOSITE As Deposited (check all Solid
Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil	ne			Construction/Der Physical State of that apply):	ital Waste Explosives Te Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge
Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other	ne			Construction/Der Physical State of that apply):	ital Waste Explosives ital Waste Waste Waste as Deposited (check all Solid Sludge Powder
Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources	ne			Construction/Der	ital Waste Explosives Te Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid
Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitute	ne ment ent, W=Wastestri	eam, V=Volume, A=Area		Laboratory/Hosp Radioactive Wasi Construction/Der Physical State of that apply):	ital Waste Explosives Te Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas
Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitute	ne ment ent, W=Wastestr	eam, V=Volume, A=Area	 und Water Pathwa	Construction/Der Physical State of that apply):	ital Waste Explosives Explosives Explosives Other _AFFF_ nolition Waste EWaste as Deposited (check all Solid Sludge Powder Liquid Gas
Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitue Is Ground Water Use	ne ment ent, W=Wastestr d for Drinkir	eam, V=Volume, A=Area 7. Grou Is There a Suspe	Ind Water Pathwa	Laboratory/Hosp Radioactive Wasi Construction/Der Physical State of that apply):	ital Waste Explosives Te Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas arget Population Served by
Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedit (unidentified source) Contaminated Soil Other No Sources *C=Constitute Is Ground Water Use Within 4 Miles:	ne ment ent, W=Wastestr d for Drinkir	eam, V=Volume, A=Area 7. Grou Is There a Suspe Ground Water ¹ :	Ind Water Pathwa cted Release to	List Secondary T Ground Water V	ital Waste Explosives ital Waste ital Waste ital Waste ital Waste ital Waste ital Waste ital Other _AFFF_ nolition Waste ital Other _AFFF_ Waste as Deposited (check all Solid Sludge Powder Liquid Gas arget Population Served by Vithdrawn From:
Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitute Is Ground Water Use Within 4 Miles:	ne ment ent, W=Wastestr d for Drinkir	eam, V=Volume, A=Area r. Ground Ground Water ¹ :	Ind Water Pathwa	List Secondary T Ground Water V	ital Waste Explosives The Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas arget Population Served by Vithdrawn From:
□ Land Treatment □ Contaminated GW Plum (unidentified source) □ Contaminated SW/Sedin (unidentified source) □ Contaminated Soil □ Other □ No Sources *C=Constitue Is Ground Water Use Within 4 Miles: □ Yes □ No	ne ment ent, W=Wastestr d for Drinkir	eam, V=Volume, A=Area r. Ground Ground Water ¹ : Yes No	Ind Water Pathwa	Laboratory/Hosp Radioactive Wasi Construction/Der Physical State of that apply):	ital Waste Explosives The Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas arget Population Served by Vithdrawn From:
□ Land Treatment □ Contaminated GW Plum (unidentified source) □ Contaminated SW/Sedin (unidentified source) □ Contaminated Soil □ Other □ No Sources *C=Constitute Within 4 Miles: □ Yes □ No	ne ment ent, W=Wastestri d for Drinkir	eam, V=Volume, A=Area 7. Grou ng Is There a Suspe Ground Water ¹ : Yes No	Ind Water Pathwa	Laboratory/Hosp Radioactive Wasi Construction/Der Physical State of that apply):	ital Waste Explosives The Other _AFFF_ The onlition Waste The Other _AFFF_ The online of the onlin

Drinking Well:	Have Drimary Targ	ot Drinking	~1/4 - 1/2 IVIIIC	INA	
Feet					
Type of Drinking Water Walls Within /	>1/2 - 1 Mile	NA			
Miles	t ☐ Yes ☑ No		>1 - 2 Mile	NA	
(Check all that apply):	If Yes, Enter Prim	ary Target	>2 - 3 Mile	NA	
PrivateNone		People ³	>3 - 4 Mile	NA	
Depth to Shallowest Aquifer:	Nearest Designate	d Wellhead	Total Within 4 Miles	⁴ NA	
~ 10 to 50 Feet	Protection Area ⁶ :				
Karst Terrain/Aquifer Present:	□ Underlie □ >0-4 M ☑ None W	es Site iles /ithin 4 Miles	*Use population #s for PA T	able 2	
⊡ No				n Gw Fallway Scolesneet	
	8. Surface	e Water Pathwa	ay		
Type of Surface Water Draining Site and	d 15 Miles Downstre	am (check all	Shortest Overland Dist	ance From Any Source to	
that apply):			Surface Water:		
Stream River Pc	ond 🗌 Lake		_2,100_ F	eet	
Bay Ocean O	ther			Miles	
Is There a Suspected Release to Surface	Water ¹ :		Site is Located in:		
			Annual - 10 vr Fl	oodplain	
Yes			□ >10yr - 100yr Floodplain		
☑ No			☐ >100yr - 500yr F ☐ >500yr Floodpla	Toodplain in	
Drinking Water Intake Located Along th	e Surface Water Mig	gration Path:	List All Secondary Targ	et Drinking Water Intakes:	
☐ Yes ☑ No			<u>Name: Water Body: Flo</u>	ow (cfs): Population Served:	
Have Primary Target Drinking Water Int	akes Been Identified	1:			
☐ Yes If Yes, Distan	nce to Nearest Drinki	ing			
☑ No Water Intake	e : Miles	6			
If Yes, Enter Population Served by Targe	et Intake:				
			Total within 15 Miles ⁴		
NA People ⁴					
Fisheries Located Along the Surface Wa	ter Migration Path:		List All Secondary Targ	et Fisheries ¹⁰ :	
□ Yes ☑ No If Yes, Distanc	دe to Nearest Fishery Miles	/:	Water Body/Fishery Nam	<u>e: Flow (cfs)</u> :	
Have Primary Target Fisheries Been Ider	ntified:		1		
☐ Yes ☑ No	☐ Yes ☑ No				
	8. Surface Wate	er Pathway (cor	ntinued)		
Wetlands Located Along the Surface Wa Path:	8. Surface Wate	er Pathway (cor Other Sensitive E Migration Path:	ntinued) Invironments Located Al	ong the Surface Water	
Wetlands Located Along the Surface Wa Path: ☑ Yes ☐ No	8. Surface Wate	er Pathway (cor Other Sensitive E Migration Path: Yes Vo	nvironments Located Al If Yes, Distance to Environment:	ong the Surface Water Nearest Sensitive Miles	
Wetlands Located Along the Surface Wa Path: ☑ Yes □ No Have Primary Target Wetlands Been Id	8. Surface Wate	er Pathway (cor Other Sensitive E Migration Path: Yes No Have Primary Tar	nvironments Located Al If Yes, Distance to Environment: get Sensitive Environme	ong the Surface Water Nearest Sensitive Miles nts Been Identified:	
Wetlands Located Along the Surface Wa Path: Ves No Have Primary Target Wetlands Been Id Yes No	8. Surface Wate	er Pathway (cor Other Sensitive E Migration Path: Yes No Have Primary Tar	ntinued) nvironments Located Al If Yes, Distance to Environment: get Sensitive Environme ☐ Yes ☑ No	ong the Surface Water Nearest Sensitive Miles nts Been Identified:	

<u>Water Body</u> : <u>Flow (cfs)</u> : <u>Frontage miles:</u>		Water Body :	Flow (cfs):	Sensitive Environment Type:		
· · · ·						
				·		
	9. Soil E	xposure Pat	hway			
Are People Occupying Residence or	Number of Worke	ers Onsite ⁴ :	Have Terres	strial Sensitive Environments Been		
Attending School or Daycare on or			Identified o	on or Within 200 Feet of Areas of		
Within 200 Feet of Area of Known or	☑ None		Known or S	Suspected Contamination:		
Suspected Contamination:	□ 1 - 100 □ 101 - 1	000				
	□ > 1,000					
				⊡ res ☑ No		
□ Yes						
☑ No			If Yes, List	Each Terrestrial Sensitive		
	Population Withir	n 1 Mile:	Environm	ent ^s :		
If Yes, Enter Total Residential						
Population:	0 Peopl	e ⁷		· · · · · · · · · · · · · · · · · · ·		
Decente ²		-				
People-			*Refer to PA	Table 7 for environment types		
4	10.	Air Pathwa	У	<u>,</u>		
Is there a Suspected Release to Air ¹ :		Wetlands Lo	cated Within 4 M	liles of the Site [°] :		
		🗹 Yes	lf Vee Her			
		🗌 No	If Yes, Hov	w Many Acres: Acres		
Enter Total Population on or Within:		Other Constitute Fourier ments Located Within 4 Miles of the City				
Onsite		Other Sensitive Environments Located Within 4 Miles of the Site:				
			∐ Yes			
0-1/4 Mile						
>1/4-1/2 Mile		List All Sensi	tive Environment	s Within 1/2 Mile of the Site ⁶ :		
>1/2-1 Mile		Distance:	Sensitive Environn	nent Type/Wetlands Area (acres):		
>1-2 Miles		Onsite	None			
>2-3 Miles		0-1/4 Mile	_Wetlands			
>3-4 Miles		>1/4-1/2 Mile	e _Wetlands			
Total Within 4 Miles ³⁻⁵ _5,010_						

				Identification		
Potential	Hazardous W	aste Site P	reliminary A	ssessment	State: SD	CERCLIS #:
		Form			CERCLIS Disc	covery Date:
		1. Gen	eral Site Informati	on		
Name: Ellsworth	AFB	Street Address	: 1000 N Ellsworth R	d		
City:		State: SD	Zip Code: 57769	County: Meade	Co. Code:	Cong. Dist:
Latitude:	Longitude:	Approximate A	rea of Site: Less	Status of Site:		
44°9' 26.51"	103°6' 40.85"	than 1 #	Acres Square Ft	Active] Not Specified] NA (GW plume,	etc.)
Site Name: Form	ner Fire Storage Area			_		
trucks were stor have historically	ed here but other miso supported an old fire	sellaneous equipi station but dates	nent was stored her are unknown.	e by the departme	ent. Additiona	ally, this site may
		2. Owne	r/Operator Inform	ation		
Owner: Ellswort	h AFB		Operator: same a	as owner		
Street Address:	1000 N Ellsworth Rd		Street Address:			
City:			City:			
State: SD	Zip Code:	Telephone:	State:	Zip Code:	Telephone:	
Type of OwnersI □ Private ☑ Federal Agency	hip: County Municipa D Not Spec Other	ified	Type of Ownersh Type of Ownersh Frivate Federal Agency Name: State Indian	hip: County Municipa Not Spec Other	l ified	
		3. Site	Evaluator Informat	tion		
Name of Evaluat Kelly Teplitsky	tor:	Agency/Organi CH2M HILL	ization:		Date Prepar 03/03/2015	ed:
Street Address: 9	9191 South Jamaica St	reet	City: Englewood		State: CO	
Name of EPA or	State Agency Contact:		Street Address:			
City:		State:	1	Telephone:		
		4. Site Disp	osition (for EPA us	e only)		
Emergency Resp	onse/Removal Assessi	nent	CERCLIS Recomm	nendation:	Signature:	
Recommendatio	Dn: Yes No		Higher Priorit Lower Priority NFRAP	y SI y SI	Name (typed	d):
	Date:		Other: Date:			
		5. Gene	ral Site Characteri	stics		
Predominant La	nd Use Within 1 Mile c	f Site (check all	Site Setting:		Years of Ope	eration:

				Identification		
Potential	Hazardous W	aste Site P	reliminary A	ssessment	State: SD	CERCLIS #:
		Form			CERCLIS Disc	overy Date:
		1. Gen	eral Site Informati	on		
Name: Ellsworth	AFB	Street Address	: 1000 N Ellsworth Ro	d		
City:		State: SD	Zip Code: 57769	County: Meade	Co. Code:	Cong. Dist:
Latitude:	Longitude:	Approximate A	rea of Site: Less	Status of Site:		
44°8' 44.06"	103°5' 30.36"	than 1 A	- Acres	□ Active □	Not Specified	
			Square Ft	□ Inactive] NA (GW plume,	etc.)
Site Name: Form	ner Fire Station Buildin	g 7506		_	• • •	
Site Description:	The building was buil	t in 1952, used ur	ntil 2000, and demoli	shed in 2007. Fire	department	vehicles were
stored, cleaned, the building. Tre	and maintained in thi nch drains discharged	s building. The bu to the sanitary se	ilding was fitted with ewer system and ulting was fitted with ever system and ulting the system and ulting the system and ulting the system and t	h trench drains wl mately the WWTF	nich containeo 9.	d any spills inside
		2. Owner	r/Operator Informa	ation		
Owner: Ellswort	h AFB		Operator: same a	as owner		
Street Address: 2	1000 N Ellsworth Rd		Street Address:			
City:			City:			
State: SD	Zip Code:	Telephone:	State:	Zip Code:	Telephone:	
Type of Ownersh	nip:		Type of Ownersh	ip:		
Private			□ Private			
Federal Agency	Municipa	I	Federal Agency	Municipa	I	
Name: _DOI	D Not Spec	cified	Name:	_ Not Spec	ified	
	Other			U Other		
		3. Site l	Evaluator Informat	ion		
Name of Evaluat Kelly Teplitsky	or:	Agency/Organi CH2M HILL	zation:		Date Prepare 03/03/2015	ed:
Street Address: 9	9191 South Jamaica St	reet	City: Englewood		State: CO	
News - CDA						
Name of EPA or	State Agency Contact:		Street Address:			
City:		State:		Telephone:		
		4 Site Diam	osition /for EDA us			
Emorgonou/ Doon	ance /Demoval Access	4. Site Disp		e only	Cignoturo	
Recommendation	ionse/ Removal Assess	ment			Signature:	
necommenuatio				y SI	Name (typed	l):
			□ NFRAP		(-71	
					Position:	
	Date:		Date:			
		5. Gene	ral Site Characteris	 stics	<u>I</u>	
Predominant Lar	nd Use Within 1 Mile o	of Site (check all	Site Setting:		Years of Ope	ration:

that apply):					
Industrial	Agriculture		🗌 Urba	n	Beginning Year 1956
	Mining	Other Federal	🗌 Subu	ırban	Ending Year 2000
Residential Forest/Fields	I DOD □ DOF		🗹 Rura	I	
		Other			Unknown
Type of Site Operation	ons (check all	that apply):			Waste Generated:
	, 		_		
	heck subcategor	'y)	Retail Recycling		☐ Offsite
Inorganic Chemi	cals		Junk/Salvage Yard		Onsite and Offsite
Plastic and/or Ru	ubber Products		Municipal Landfill		
Paints, Varnishes	S		Other Landfill		Waste Deposition Authorized
Industrial Organi Agricultural Cher	nc Unemicals				By: Present Owner
Miscellaneous Ch	nemical Products	5	DOI		Present & Former Owner
Primary Metals			Other Federal Facili	ty	Unauthorized
Metal Coating, P	lating, Engraving	9	□ RCRA	orage or Disposal	Unknown
Fabricated Struct	tural Metal Prod	ucts	Large Quantity	Generator	Waste Accessible to the Public:
Electronic Equipr	ment		Small Quantity	Generator	
Other Manufacture	iring		Subtitle D		☐ Yes
Mining				al	✓ No
Metals			Converter"		
			"Protective File	er"	Distance to Nearest Dweiling,
Non-metallic Min	ierals		Non-or Late F	iler"	School, of Workplace.
			Other		20 Fast
		6. Waste Ch	aracteristics Infor	rmation	L
		(Refer to	PA Table 1 for WC Sc	ore)	
Source Type:	9	Source Waste Quantity:	Tier*:	General Type of	Waste
(check all that apply)	(i	nclude unit)		(check all that app	bly):
	-			Metals	Pesticides/Herbicides
Surface Impoundment	-			Organics Inorganics	
	-				
Chemical Waste Pile	ontainers _			Solvents	Oily Waste Municipal Waste
Scrap Metal or Junk Pile				Solvents	Oily Waste Municipal Waste Mining Waste
	- e _			Solvents Paints/Pigments Laboratory/Hosp Badiaactive Wass	Olly Waste Municipal Waste Mining Waste Explosives
Tailings Pile	- e _			Solvents Paints/Pigments Laboratory/Hosp Radioactive Was Construction/Der	Olly Waste Municipal Waste Mining Waste Explosives te Other _AFFF_ molition Waste
Tailings Pile Trash Pile (open drum)	- - -			Solvents Paints/Pigments Laboratory/Hosp Radioactive Was Construction/Der	Olly Waste Municipal Waste Mining Waste Explosives te Other _AFFF_ nolition Waste
Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum	e _ - - - -			Solvents Solvents Aatoratory/Hosp Radioactive Was Construction/Der Physical State of	Olly Waste Municipal Waste Mining Waste Explosives te ✓ Other _AFFF_ molition Waste
 Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) 	e			Solvents Solvents Caboratory/Hosp Radioactive Was Construction/Der Physical State of that apply):	☐ Oily Waste ☐ Municipal Waste ☐ Mining Waste ital Waste ☐ Explosives te ☑ Other _AFFF_ nolition Waste Waste as Deposited (check all
Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedi	e - - ne - ment -			Solvents Solvents Paints/Pigments Laboratory/Hosp Radioactive Wass Construction/Der Physical State of that apply):	Olly Waste Municipal Waste Mining Waste Explosives te Other _AFFF_ nolition Waste Waste as Deposited (check all Solid
Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedi (unidentified source) Contaminated Soil	e			Solvents Solvents Paints/Pigments Laboratory/Hosp Radioactive Was Construction/Der Physical State of that apply):	Ully Waste ☐ Municipal Waste ☐ Mining Waste ital Waste ☐ Explosives te ☑ Other _AFFF_ molition Waste Waste as Deposited (check all Solid Sludge
 Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedi (unidentified source) Contaminated Soil Other 	e			Solvents Solvents Caboratory/Hosp Radioactive Was Construction/Der Physical State of that apply):	☐ Oily Waste
 Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedi (unidentified source) Contaminated Soil Other No Sources 	e			Solvents Solvents Caboratory/Hosp Radioactive Wass Construction/Der Physical State of that apply):	Olly Waste Municipal Waste Mining Waste Mining Waste Explosives te Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas
Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedi (unidentified source) Contaminated Soil Other No Sources *C=Constitute	e	eam, V=Volume, A=Area		Solvents Solvents Solvents Laboratory/Hosp Radioactive Was Construction/Der Physical State of that apply):	☐ Oily Waste
Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedi (unidentified source) Contaminated Soil Other No Sources *C=Constitut	e	eam, V=Volume, A=Area	Ind Water Pathw	Solvents Solvents Solvents Caboratory/Hosp Radioactive Was Construction/Der Physical State of that apply):	Ully Waste Municipal Waste Mining Waste ital Waste Explosives te Ø Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas
Tailings Pile Trash Pile (open drum) Contaminated GW Plum (unidentified source) Contaminated SW/Sedi (unidentified source) Contaminated Soil Other No Sources *C=Constitute Is Ground Water Use	e	eam, V=Volume, A=Area	Ind Water Pathw cted Release to	Solvents Solvents Solvents Solvents Radioactive Was Construction/Der Physical State of that apply):	Olly Waste Municipal Waste Mining Waste Mining Waste Other _AFFF_ molition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas Gas Garget Population Served by
Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedi (unidentified source) Contaminated Soil Other No Sources *C=Constitute Is Ground Water Use Within 4 Miles:	e	eam, V=Volume, A=Area T. Grou Is There a Suspe Ground Water ¹ :	Ind Water Pathw cted Release to	Solvents Solvents Solvents Laboratory/Hosp Radioactive Was Construction/Der Physical State of that apply): ay List Secondary T Ground Water V	Olly Waste Municipal Waste Mining Waste Mining Waste Explosives te ✓ Other _AFFF_ molition Waste
Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedi (unidentified source) Contaminated Soil Other No Sources *C=Constitute Is Ground Water Use Within 4 Miles: Ves	e	eam, V=Volume, A=Area	Ind Water Pathw cted Release to	Solvents Solvents Solvents Caboratory/Hosp Radioactive Was Construction/Der Physical State of that apply):	☐ Oily Waste
 ☐ Tailings Pile ☐ Trash Pile (open drum) ☐ Land Treatment ☐ Contaminated GW Plum (unidentified source) ☐ Contaminated SW/Sedi (unidentified source) ☐ Contaminated Soil ☐ Other ☐ No Sources *C=Constitute Is Ground Water Use Within 4 Miles: Yes No	e	eam, V=Volume, A=Area	Ind Water Pathw cted Release to	Solvents Solvents Aatioactive Was Construction/Der Physical State of that apply):	□ Oily Waste □ Municipal Waste □ Mining Waste ital Waste □ Explosives te □ Other _AFFF_ molition Waste F Waste as Deposited (check all Solid Sludge Powder Liquid Gas Farget Population Served by Vithdrawn From: NA
 ☐ Tailings Pile ☐ Trash Pile (open drum) ☐ Land Treatment ☐ Contaminated GW Plum (unidentified source) ☐ Contaminated SW/Sedi	e	eam, V=Volume, A=Area	und Water Pathw cted Release to	Solvents Solvents Aatioactive Was Construction/Der Physical State of that apply): ay List Secondary T Ground Water V 0 - 1/4 Mile	Olly Waste Municipal Waste Mining Waste Mining Waste Explosives te Other _AFFF_ molition Waste

	Have Drimany Target Drink	/1/4 - 1/2 WINCNA
Feet		
Type of Drinking Water Wells Within	>1/2 - 1 MileNA	
Miles	→ UYes ✓ No	>1 - 2 MileNA
Municipal	If Yes, Enter Primary Tar	get >2 - 3 MileNA
PrivateNone	People	³ >3 - 4 MileNA
Depth to Shallowest Aquifer:	Nearest Designated Wellh	read Total Within 4 Miles ⁴ NA
~ 10 to 50 Feet	Protection Area ⁶ :	
Karst Terrain/Aquifer Present:	☐ Underlies Site ☐ >0-4 Miles ☑ None Within 4 Mi	*Use population #s for PA Table 2 iles *Note nearest well for #5 on GW Pathway Scoresheet
I No		
	8. Surface Wate	r Pathway
Type of Surface Water Draining Site and that apply):	d 15 Miles Downstream (che	eck all Shortest Overland Distance From Any Source to Surface Water:
 ✓ Stream □ River ✓ P □ Bay □ Ocean □ C 	ond Lake Dther	_2,930_ Feet Miles
	1	Site is located in:
is There a Suspected Release to Surface	e water :	
☐ Yes ☑ No	 Annual - 10 yr Floodplain >10 yr - 100 yr Floodplain >100 yr - 500 yr Floodplain >500 yr Floodplain 	
Drinking Water Intake Located Along th	ne Surface Water Migration	Path: List All Secondary Target Drinking Water Intakes:
☐ Yes ☑ No		Name: Water Body: Flow (cfs): Population Served:
Have Primary Target Drinking Water In	takes Been Identified:	
☐ Yes If Yes, Distar ☑ No Water Intak	nce to Nearest Drinking e : Miles ⁶	
If Yes, Enter Population Served by Targ	et Intake:	
in res, Enter i opulation served by raig		
NA People ⁴		
Fisheries Located Along the Surface Wa	ater Migration Path:	List All Secondary Target Fisheries ¹⁰ :
□ Yes ☑ No If Yes, Distan	ce to Nearest Fishery: Miles	Water Body/ Fishery Name : Flow (cfs):
Have Primary Target Fisheries Been Ide	entified:	
	8. Surface Water Path	way (continued)
Wetlands Located Along the Surface W Path:	8. Surface Water Path Tater Migration Other S Migratio	way (continued) ensitive Environments Located Along the Surface Water on Path:
Wetlands Located Along the Surface W Path:	8. Surface Water Path 'ater Migration Other S Migration ☐ Yes ☑ No	way (continued) ensitive Environments Located Along the Surface Water on Path: If Yes, Distance to Nearest Sensitive Environment: Miles
Wetlands Located Along the Surface W Path: Ves No Have Primary Target Wetlands Been Ic	8. Surface Water Path 'ater Migration Other S Migratio □ Yes ☑ No dentified: Have Pri	way (continued) ensitive Environments Located Along the Surface Water on Path: If Yes, Distance to Nearest Sensitive Environment: Miles imary Target Sensitive Environments Been Identified:
Wetlands Located Along the Surface W Path: Yes No Have Primary Target Wetlands Been Ic Yes No	8. Surface Water Path 'ater Migration Other S Migration Image: Second secon	ensitive Environments Located Along the Surface Water on Path: If Yes, Distance to Nearest Sensitive Environment: Miles imary Target Sensitive Environments Been Identified: Yes Vo

<u>Water Body</u> : <u>Flow (cfs)</u> : <u>Frontage miles:</u>		Water Body :	Flow (cfs):	Sensitive Environment Type:		
· · · ·						
	9. Soil E	L xposure Pat	hway			
Are People Occupying Residence or	Number of Worke	ers Onsite ⁴ :	Have Terre	strial Sensitive Environments Been		
Attending School or Daycare on or	_		Identified o	on or Within 200 Feet of Areas of		
Within 200 Feet of Area of Known or	✓ None		Known or S	Suspected Contamination:		
Suspected Contamination:	□ 1 - 100 □ 101 - 1.	000				
	□ > 1,000					
				✓ No		
☐ Yes						
⊡ No			If Yes, List	Each Terrestrial Sensitive		
	Population Withir	n 1 Mile:	Environm	ent ³ :		
If Yes, Enter Total Residential						
Population:	Population: 0 Peopl					
People ²						
People-			*Refer to PA	Table 7 for environment types		
	10.	Air Pathwa	v			
Is there a Suspected Release to Air ¹ :		Wetlands Lo	, ocated Within 4 M	liles of the Site ⁶ :		
☐ Yes		Voc				
I No			If Yes, How	w Many Acres: Acres		
Enter Total Population on or Within:						
Onsite		Other Sensitive Environments Located Within 4 Miles of the Site:				
U-1/4 Mile						
>1/4-1/2 Mile		List All Sensi	tive Environment	s Within 1/2 Mile of the Site ⁶ :		
>1/2-1 Mile		Distance: Sensitive Environment Type/Wetlands Area (acres):				
>1-2 Miles		Onsite	None			
>2-3 Miles		0-1/4 Mile	_Wetlands			
>3-4 Miles		>1/4-1/2 Mile	e _Wetlands			
Total Within 4 Miles ³⁻⁵ _6,210_						

				Identification		
Potential	Hazardous Wa	aste Site Pr	eliminary A	ssessment	State: SD	CERCLIS #:
		Form			CERCLIS Disc	overy Date:
		1. Gene	ral Site Informati	on		
Name: Ellsworth	AFB	Street Address: 2	1000 N Ellsworth Ro	d		
City:		State: SD	Zip Code: 57769	County: Meade	Co. Code:	Cong. Dist:
Latitude:	Longitude:	Approximate Ar	an of Site: Less	Status of Site:		
AA°8' A7 2A"	103°5' 40 94"	than 1 Ac				
	105 5 40.54		Square Ft		Not Specified	otc)
Sita Nama: Curra	nt Fire Station (Buildin	¯ α 7502)			INA (GW plume,	eic.)
Site Description:	The current fire station	g 7502) D Building 7502 is	s located in the cen	tral portion of the	hasa hatwaa	n 50 row and 60
row. The building is stored in the fi	g was built in 2000 at w re department in a sto	which time the fire rage room and in	department moved fire trucks/trailers.	d out of the forme	er location (Bu	iilding 7506). AFFF
		2. Owner/	Operator Information	ation		
Owner: Ellsworth	n AFB		Operator: same a	as owner		
Street Address: 1	1000 N Ellsworth Rd		Street Address:			
City:			City:			
State: SD	Zip Code:	Telephone:	State:	Zip Code:	Telephone:	
Type of Ownersh	nip:		Type of Ownersh	ip:		
Private						
—	☐ Municipal		Federal Agency	🗌 Municipa	I	
Name: _DOD	D Not Specif	ïed	Name:	_ Not Spec	ified	
	Other			Uther		
		3. Site Ev	valuator Informat	ion		
Name of Evaluat	or:	Agency/Organiza	ation:		Date Prepare	ed:
Kelly Teplitsky		CH2M HILL			03/03/2015	
Street Address: 9	9191 South Jamaica Str	eet	City: Englewood		State: CO	
Name of EPA or S	State Agency Contact:		Street Address:		I	
City:		State:		Telephone:		
		4. Site Dispo	sition <i>(for EPA us</i>	e onlv)		
Emergency Resp	onse/Removal Assessm	nent	CERCLIS Recomm	endation:	Signature:	
Recommendatio	n:		Higher Priority	y SI		
	□ Yes		Lower Priority	SI	Name (typed):
	□ No				.	
.			Other:		Position:	
	Jaie		Date:			
		5. Genera	al Site Characteris	stics		
Predominant Lar	nd Use Within 1 Mile of	Site (check all	Site Setting:		Years of Ope	ration:

that apply):					
Industrial	Agriculture		🗌 Urba	n	Beginning Year 2000
Commercial	Mining	Other Federal	🗌 Subu	rban	Ending Vear present
Residential			Rural	l	
		Other			Unknown
Tupo of Site Operatio	nc (chock all t	hat apply):			Wasta Canaratad:
Type of Site Operation		nat appiy).			waste Generated.
Manufacturing (must cl	heck subcategory)		Retail		Onsite Official
Lumber and Woo	d Products		Recycling		\Box Onsite and Offsite
Inorganic Chemic Plastic and/or Ru	ibber Products		Municipal Landfill		
Paints, Varnishes	5		Other Landfill		Waste Deposition Authorized
Industrial Organi	c Chemicals				By: Present Owner
Agricultural Cher	nicals nemical Products				Former Owner
Primary Metals			Other Federal Facilit	ty	
Metal Coating, Pl	ating, Engraving				Unknown
Metal Forging, Si Eabricated Struct	tamping tural Metal Product	ts	Large Quantity	Generator	Waste Accessible to the Public:
Electronic Equipr	nent		Small Quantity	Generator	
Other Manufactu	ring		Subtitle D		Yes
Mining			☐ Municipa	1	☑ No
Metals			Converter"	•	
			"Protective File	r"	Distance to Nearest Dwelling,
□ OII and Gas	erals		□ "Non-or Late F	iler"	School, or workplace:
	oraio		Note Specified Other		0.5.1
					_0Feet
		6. Waste Cha	racteristics Infor	mation	
		(Refer to P	A Table 1 for WC Sco	ore)	
Source Type:	So	urce Waste Quantity:	Tier*:	General Type of	Waste
(check all that apply)	(incl	ude unit)		(check all that app	oly):
				Metals	Pesticides/Herbicides
Surface Impoundment				Organics	
Drums				Solvents	Oily Waste Municipal Waste
Tanks and Non-Dum Co Comical Waste Pile	ontainers			Paints/Pigments	Mining Waste
Scrap Metal or Junk Pile	e				ital Waste Explosives
Tailings Pile					nolition Waste
Trash Pile (open drum)					
Contaminated GW Plum	ne —			Physical State of	Waste as Deposited (check all
(unidentified source)	_			that apply):	
Contaminated SW/Sedi	ment				Solid
Contaminated Soil					Sludge
Other					Powder
No Sources					Gas
*C=Constitue	ent, W=Wastestrear	n, V=Volume, A=Area			
		7. Grou	nd Water Pathwa	ay	
• · · · · · · · · · · · · · · · · · · ·					
Is Ground Water Use	d for Drinking	Is There a Suspec	ted Release to	List Secondary T	arget Population Served by
ls Ground Water Use Within 4 Miles:	d for Drinking	Is There a Suspec Ground Water ¹ :	ted Release to	List Secondary T Ground Water V	arget Population Served by Vithdrawn From:
Is Ground Water Use Within 4 Miles:	d for Drinking	Is There a Suspec Ground Water ¹ :	ted Release to	List Secondary T Ground Water V	arget Population Served by Vithdrawn From:
Is Ground Water Use Within 4 Miles: Ves No	d for Drinking	Is There a Suspec Ground Water ¹ : □ Yes ☑ No	ted Release to	List Secondary T Ground Water V 0 - 1/4 Mile	arget Population Served by Vithdrawn From: NA
Is Ground Water Use Within 4 Miles: Yes No If Yes, Distance to n	d for Drinking earest	Is There a Suspec Ground Water ¹ : □ Yes ☑ No	ted Release to	List Secondary T Ground Water V 0 - 1/4 Mile	arget Population Served by Vithdrawn From: NA

	Have Drimany Target	rinking	>1/4 - 1/2 WINC	INA	
Feet	ntified.		N 4		
Type of Drinking Mater Malle Mithin	>1/2 - 1 Mile	NA			
Miles	4 ☐ Yes ☑ No		>1 - 2 Mile	NA	
(Check all that apply):	If Yes, Enter Primar	Target	>2 - 3 Mile	NA	
Private None	Pe	ople ³	>3 - 4 Mile	NA	
Depth to Shallowest Aquifer:	Nearest Designated V	/ellhead	Total Within 4 Miles	4 NA	
~ 10 to 50 Feet	Protection Area ⁶ :				
Karst Terrain/Aquifer Present:	☐ Underlies S ☐ >0-4 Miles ☑ None With	te n 4 Miles	*Use population #s for PA T	Table 2	
I No			Note field est weil for #5 t	shew rutiway scoresheet	
	8. Surface V	/ater Pathway			
Type of Surface Water Draining Site an that apply):	nd 15 Miles Downstream	(check all SI	hortest Overland Dist urface Water:	tance From Any Source to	
Stream River D	Pond Lake		2.950 F	eet	
Bay Ocean (Other			_Miles	
Is There a Suspected Release to Surfac	e Water ¹ :	Si	te is Located in:		
☐ Yes ☑ No			 ☐ Annual - 10 yr Floodplain □ >10yr - 100yr Floodplain □ >100yr - 500yr Floodplain □ >500yr Floodplain 		
Drinking Water Intake Located Along t	he Surface Water Migra	ion Path: Li	st All Secondary Tare	et Drinking Water Intakes:	
⊡ No			Name: Water Body: FI	ow (cfs): Population Served:	
Have Primary Target Drinking Water In	ntakes Been Identified:				
□ Yes If Yes, Dista ☑ No Water Intak	nce to Nearest Drinking <e :="" miles<sup="">6</e>				
If Yes, Enter Population Served by Targ	get Intake:				
NAPeople ⁴	-		Total with	in 15 Miles ⁴	
Fisheries Located Along the Surface W	ater Migration Path:	Li	List All Secondary Target Fisheries ¹⁰ :		
□ Yes ☑ No If Yes, Distan	nce to Nearest Fishery: Miles		Water Body/ Fishery Nan	ne : <u>Flow (cfs)</u> :	
Have Primary Target Fisheries Been Ide	entified:				
☐ Yes ☑ No					
	8. Surface Water	athway (contir	nued)		
Wetlands Located Along the Surface W Path:	Vater Migration Ot Mi	er Sensitive Envi ration Path:	ronments Located A	long the Surface Water	
☑ Yes		☐ Yes ☑ No	If Yes, Distance to Environment:	o Nearest Sensitive Miles	
		- Duine		nte Deen Identified.	
Have Primary Target Wetlands Been I	dentified: Hav	e Primary Target	Sensitive Environme	ents Been Identified:	
Have Primary Target Wetlands Been I	dentified: Ha	e Primary Target	Yes No	nts Been Identified:	

<u>Water Body</u> : <u>Flow (cfs)</u> : <u>Frontage miles:</u>		Water Body :	Flow (cfs):	Sensitive Environment Type:		
	9. Soil E	xposure Pat	hway			
Are People Occupying Residence or	Number of Worke	ers Onsite ⁴ :	Have Terre	estrial Sensitive Environments Been		
Attending School or Daycare on or			Identified of	on or Within 200 Feet of Areas of		
Within 200 Feet of Area of Known or	None		Known or S	Suspected Contamination:		
Suspected Contamination:	□ 1 - 100 □ 101 - 1.	000				
	□ > 1,000					
				☑ No		
Ves						
1 NO			If Yes, Lis	t Each Terrestrial Sensitive		
If Vac Enter Tatal Desidential	Population Within	n 1 Mile:	Environin	ient ⁻ .		
Population:						
	_0 Peopl					
People ²						
		*Refer to PA Table 7 for environment types		Table 7 for environment types		
	10.	Air Pathwa	У			
Is there a Suspected Release to Air ¹ :		Wetlands Lo	ocated Within 4 N	1iles of the Site ⁶ :		
Yes		✓ Yes	If Voc. Ho			
		🗌 No	li res, no	w Many Acres: Acres		
Enter Total Population on or Within:		Other Consitive Environments Lesated Within 4 Miles of the Site				
Onsite		Other Sensitive Environments Located Within 4 Miles of the Site:				
0.1/4.04:10			∐ Yes ☑ No			
0-1/4 Wille						
>1/4-1/2 Mile		List All Sensitive Environments Within 1/2 Mile of the Site ⁶ :				
>1/2-1 Mile		Distance: Sensitive Environment Type/Wetlands Area (acres):				
>1-2 Miles		Onsite	None			
>2-3 Miles		0-1/4 Mile	_Wetlands			
>3-4 Miles		>1/4-1/2 Mile	e _Wetlands			
Total Within 4 Miles ³⁻⁵ _6,210_						

	_				Identificatio	n
Potential	Hazardous Wa	aste Site Pr	eliminary A	ssessment	State: SD	CERCLIS #:
		Form			CERCLIS Disc	covery Date:
		1. Gene	eral Site Informati	on	•	
Name: Ellsworth	n AFB	Street Address:	1000 N Ellsworth Ro	d		
City:		State: SD	Zip Code: 57769	County: Meade	Co. Code:	Cong. Dist:
Latitude:	Longitude [.]	Annroximate Ar	ea of Site Less	Status of Site		
44°9' 8.92"	103°6' 36.22"	than 1 A	cres		Not Specified	
		:	Square Ft	☑ Inactive] NA (GW plume,	etc.)
Site Name: B-52	Crash (1970)			_	· · ·	
Site Description:	: In 1970, a B-52 caught	fire and crashed	during landing, skid	ding into brick pu	mphouse cor	ntaining six 25,000
was put into use	e, it is unknown if the tr	uck was carrying <i>i</i>	AFFF or not.	ecause this occur	rea in 1970, t	ne same year AFFF
		2. Owner	Operator Information	ation		
Owner: Ellswort	h AFB		Operator: same a	as owner		
Street Address:	1000 N Ellsworth Rd		Street Address:			
City:			City:			
State: SD	Zip Code:	Telephone:	State:	Zip Code:	Telephone:	
Type of Owners	nip:		Type of Ownersh	ip:		
Private	County		Private	County		
Federal Agency	Municipal		Federal Agency	🗌 Municipa	I	
Name: _DOI	D Not Speci	fied	Name: State	_ L Not Spec	ified	
Indian	□ Other		Indian			
		3. Site E	valuator Informat	ion		
Name of Evaluat Kelly Teplitsky	tor:	Agency/Organiz CH2M HILL	ation:		Date Prepare 03/03/2015	ed:
Street Address: 9	9191 South Jamaica Str	eet	City: Englewood		State: CO	
Name of EPA or	State Agency Contact:		Street Address:			
City:		State:	1	Telephone:		
		4. Site Dispo	osition (for EPA us	e only)		
Emergency Resp	onse/Removal Assessn	nent	CERCLIS Recomm	nendation:	Signature:	
Recommendatio	on:		Higher Priority	y SI	Ŭ	
	Yes		Lower Priority	SI	Name (typed	:(b
	□ No		\square NFRAP \square RCRA		Position	
	Date:		Other:			
			Date:			
	111 140.11 1 1 11	5. Gener	al Site Characteris	STICS		
Predominant La	nd Use Within 1 Mile o	Site (check all	Site Setting:		Years of Ope	eration:

that apply):					
Industrial	Agriculture		🗌 Urba	n	Beginning Year NA
Commercial	Mining	Other Federal	🗌 Subu	ırban	
Residential	DOD	Facility:	🗹 Rura	I	Ending Year NA
L Forest/Fields	DOF	Other			🗌 Unknown
Type of Site Operation	ons (check all	that apply):			Waste Generated:
Manufacturing (must ch	heck subcategory)	🗌 Retail		Onsite
Lumber and Woo	od Products		Recycling		Offsite
Inorganic Chemic	cals		Junk/Salvage Yard		Onsite and Offsite
Plastic and/or Ru	bber Products		Municipal Landfill Other Landfill		
Paints, Varnishes	c Chemicals				Waste Deposition Authorized
Agricultural Chen	nicals		DOE		By: Former Owner
Miscellaneous Ch	emical Products		DOI		Present & Former Owner
Primary Metals			U Other Federal Facili	ty	Unauthorized
Metal Coating, PI	ating, Engraving			orage or Disposal	Unknown
Eabricated Struct	tamping tural Metal Produ	rts	Large Quantity	Generator	Waste Accessible to the Public:
Electronic Equipr	nent		Small Quantity	Generator	
Other Manufactu	ring		Subtitle D		☐ Yes
Mining			Municipa	al	✓ No
Metals				al	
Coal				۲ "	Distance to Nearest Dwelling,
Oil and Gas			Son-or Late F	iler"	School, or Workplace:
Non-metallic Min	erals		Note Specified		
			Other		1,100 Feet
					· <u> </u>
		6. Waste Cha	aracteristics Info	rmation	
		(Refer to F	PA Table 1 for WC Sc	ore)	
Source Type:	So	ource Waste Quantity:	Tier*:	General Type of	Waste
(check all that apply)	(in	clude unit)		(check all that app	oly):
	_			Metals	Pesticides/Herbicides
Surface Impoundment	_			Organics	Acide/Passes
Drums	_				Acius/ Bases
Tanks and Non-Dum Co	ntainers			☐ Inorganics	Oily Waste
Chemical Waste Pile				 Inorganics Solvents Paints/Pigments 	 Actus/Bases Oily Waste Municipal Waste Mining Waste
				 Inorganics Solvents Paints/Pigments Laboratory/Hosp 	Actor Bases Oily Waste Municipal Waste Mining Waste Explosives
Scrap Metal or Junk Pile				Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast	ital Waste Qily Waste Municipal Waste Kining Waste Explosives C Other _AFFF_
 Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) 				Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der	☐ Actory Bases ☐ Oily Waste ☐ Municipal Waste ☐ Mining Waste ital Waste ☐ Explosives te ☑ Other _AFFF_ nolition Waste
Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment				Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der	 ☐ Actory Bases ☐ Oily Waste ☐ Municipal Waste ☐ Mining Waste ☐ Explosives te ☑ Other _AFFF_ nolition Waste
Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum				Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wasi Construction/Der Physical State of	Actor Bases Oily Waste Municipal Waste Mining Waste Explosives Other _AFFF_ nolition Waste
Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sofie				 Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Actory Bases Oily Waste Municipal Waste Mining Waste Explosives Other _AFFF_ molition Waste Waste as Deposited (check all
Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedir (unidentified source)				Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	☐ Actus Bases ☐ Oily Waste ☐ Municipal Waste ☐ Mining Waste ital Waste ☐ Explosives te ☑ Other _AFFF_ nolition Waste Waste as Deposited (check all Solid
Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedir (unidentified source) Contaminated S0il	ne			Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	☐ Actus Bases ☐ Oily Waste ☐ Municipal Waste ☐ Mining Waste ital Waste ☐ Explosives te ☑ Other _AFFF_ molition Waste Waste as Deposited (check all Solid Sludge
Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedir (unidentified source) Contaminated Soil Other	ne			Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Actory Bases Oily Waste Municipal Waste Mining Waste Explosives te Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid
Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedir (unidentified source) Contaminated Soil Other No Sources	ment			Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wasi Construction/Der Physical State of that apply):	Oily Waste Oily Waste Mining Waste Mining Waste Other _AFFF_ molition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas
Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedir (unidentified source) Contaminated Soil Other No Sources *C=Constitute	ment	m, V=Volume, A=Area		Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	☐ Actus Bases ☐ Oily Waste ☐ Municipal Waste ☐ Mining Waste ital Waste ☐ Explosives te ☑ Other _AFFF_ molition Waste
Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedir (unidentified source) Contaminated Soil Other No Sources *C=Constitue	ne me ment ent, W=Wastestrea	m, V=Volume, A=Area	nd Water Pathw	 Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wasi Construction/Der Physical State of that apply): ay 	City Waste City City City City City City City City
Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedir (unidentified source) Contaminated Soil Other No Sources *C=Constitue Is Ground Water Use	ment	m, V=Volume, A=Area 7. Grou Is There a Suspe	nd Water Pathw cted Release to	Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wasi Construction/Der Physical State of that apply):	☐ Actus Bases ☐ Oily Waste ☐ Municipal Waste ☐ Mining Waste ital Waste ☐ Explosives te ☑ Other _AFFF_ molition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas arget Population Served by
 □ Scrap Metal or Junk Pile □ Tailings Pile □ Trash Pile (open drum) □ Land Treatment □ Contaminated GW Plum (unidentified source) □ Contaminated SW/Sedir (unidentified source) □ Contaminated Soil □ Other □ No Sources *C=Constitute 	ment ent, W=Wastestrea	m, V=Volume, A=Area	nd Water Pathw	 Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wasi Construction/Der Physical State of that apply): Image: Construction of the problem of th	Gild Sludge Powder Liquid Gas
 Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedir (unidentified source) Contaminated Soil Other No Sources *C=Constitute Is Ground Water Use Within 4 Miles: Yes 	ment ent, W=Wastestrea	m, V=Volume, A=Area T. Ground Ground Water ¹ :	nd Water Pathw mted Release to	Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply): ay List Secondary T Ground Water V	Gild Solid
 Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedir (unidentified source) Contaminated Soil Other No Sources *C=Constitute Is Ground Water Use Within 4 Miles: Yes No 	ment	m, V=Volume, A=Area 7. Grou Ground Water ¹ : Yes No	nd Water Pathw cted Release to	Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wasi Construction/Der Physical State of that apply):	☐ Actus Bases ☐ Oily Waste ☐ Municipal Waste ☐ Mining Waste ☐ Explosives te
 Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedir (unidentified source) Contaminated Soil Other No Sources *C=Constitute Is Ground Water Use Within 4 Miles: Yes No 	ment	m, V=Volume, A=Area 7. Grou g Is There a Suspe Ground Water ¹ : ¥ Yes No	 	 Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wasi Construction/Der Physical State of that apply): ay List Secondary T Ground Water V 0 - 1/4 Mile 	□ Actus Bases □ Oily Waste □ Municipal Waste □ Mining Waste ital Waste □ Explosives te □ ② Other _AFFF_ molition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas arget Population Served by Vithdrawn From: NA

Drinking Well:	Have Drimany Target Drinking	<pre>/1/+-1/2 WINCWA</pre>	
Feet Have Primary Target Drinking			
Type of Drinking Water Malle Within 4	>1/2 - 1 MIIENA		
Miles	>1 - 2 MileNA		
(Check all that apply):	If Yes, Enter Primary Target	>2 - 3 MileNA	
Private None	People ³	>3 - 4 MileNA	
Depth to Shallowest Aquifer:	Nearest Designated Wellhead	Total Within 4 Miles ⁴ NA	
~ 10 to 50 Feet	Protection Area ⁶ :		
Karst Terrain/Aquifer Present:	*Use population #s for PA Table 2		
⊡ No		Note hearest well for #5 of GW Pathway Scoresheet	
	8. Surface Water Pai	thway	
Type of Surface Water Draining Site and	15 Miles Downstream (check al	II Shortest Overland Distance From Any Source to	
that apply):		Surface Water:	
Stream River Pc	nd 🗆 Lake	_1,875 Feet	
Bay Ocean Ot	her	Miles	
	M/-t-r ¹ .	Site is Located in:	
is there a suspected Release to surface	water:		
Yes		\square >10yr - 100yr Floodplain	
I No	☐ >100yr - 500yr Floodplain☐ >500yr Floodplain		
Drinking Water Intake Located Along the	e Surface Water Migration Path:	List All Secondary Target Drinking Water Intakes:	
☐ Yes ☑ No	<u>Name: Water Body</u> : <u>Flow (cfs)</u> : Population Served:		
Have Primary Target Drinking Water Int	akes Been Identified:		
	co to Noarost Drinking		
 ✓ No ✓ Water Intake 	: Miles ⁶		
If Yes, Enter Population Served by Targe	t Intake:		
NA People ⁴		Total within 15 Miles ⁴	
Fisheries Located Along the Surface Wat	er Migration Path:	List All Secondary Target Fisheries ¹⁰ :	
□ Yes ☑ No If Yes, Distanc	e to Nearest Fishery: Miles	Water Body/ Fishery Name : Flow (cfs):	
Have Primary Target Fisheries Been Ider	ntified:		
☐ Yes ☑ No			
	8. Surface Water Pathway	(continued)	
Wetlands Located Along the Surface Wa Path:	ter Migration Other Sensit Migration Pa	ive Environments Located Along the Surface Water ath:	
✓ Yes □ No	☐ Yes ☑ No	If Yes, Distance to Nearest Sensitive Environment: Miles	
Have Primary Target Wetlands Been Id	entified: Have Primary	y Target Sensitive Environments Been Identified:	
☐ Yes	☐ Yes ☑ No		

Water Body : Flow (cfs): Frontage miles:		Water Body :	Flow (cfs):	Sensitive Environment Type:	
· · · ·					
				·	
	9. Soil E	xposure Pat	hway		
Are People Occupying Residence or	Number of Worke	ers Onsite ⁴ :	Have Terres	strial Sensitive Environments Been	
Attending School or Daycare on or			Identified o	on or Within 200 Feet of Areas of	
Within 200 Feet of Area of Known or	☑ None		Known or S	suspected Contamination:	
Suspected Contamination:	□ 1 - 100 □ 101 - 1	000			
	□ > 1,000				
				⊡ res ☑ No	
Yes				_	
⊡ No			If Yes, List	Each Terrestrial Sensitive	
	Population Withir	n 1 Mile:	Environm	ent ^s :	
If Yes, Enter Total Residential					
Population:	0 Peopl	e ⁷			
People ²					
People				*Refer to PA Table 7 for environment types	
	10	Air Dathwa			
	10.		y	en en f	
Is there a Suspected Release to Air :		Wetlands Lo	cated Within 4 M	lies of the Site :	
✓ No		✓ Yes	If Yes, Hov	v Many Acres: Acres	
Enter Total Population on or Within:		∐ No			
		Other Sensit	ive Environments	Located Within 4 Miles of the Site:	
Onsite					
			∐ Yes ☑ No		
0-1/4 WIIE					
>1/4-1/2 Mile		List All Sensitive Environments Within 1/2 Mile of the Site ⁶ :			
>1/2-1 Mile		<u>Distance:</u>	Sensitive Environn	nent Type/Wetlands Area (acres):	
>1-2 Miles		Onsite	None		
>2-3 Miles		0-1/4 Mile	_Wetlands		
>3-4 Miles		>1/4-1/2 Mile	e _Wetlands		
Total Within 4 Miles ³⁻⁵ _6,250_					

					Identificatio	on
Potential	Hazardous W	aste Site P	reliminary	Assessment	State: SD	CERCLIS #:
		Form			CERCLIS Disc	covery Date:
		1. Ger	neral Site Informa	ation	•	
Name: Ellsworth	AFB	Street Address	: 1000 N Ellsworth	Rd		
City:		State: SD	Zip Code: 57769	County: Meade	Co. Code:	Cong. Dist:
Latitude:	Longitude:	Approximate A	Area of Site: Less	s Status of Site:		
44°7' 43.33"	103°5' 58.77"	than 1 /	Acres	Active	Not Specified	
			Square Ft	✓ Inactive	NA (GW plume	, etc.)
Site Name: B-1 C	Crash (1988)					
Site Description:	In 1988, a B-1 crashed	l while landing ju	ist short of the sou	thern end of the rur	iway.	
		2. Owne	r/Operator Infor	mation		
Owner: Ellswort	h AFB		Operator: sam	e as owner		
Street Address: 1	1000 N Ellsworth Rd		Street Address	:		
City:			City:			
State: SD	Zip Code:	Telephone:	State:	Zip Code:	Telephone:	
Type of Ownersh	nip:		Type of Owner	rship:		
Private	County			County		
Federal Agency	Municipa	I	Federal Agency	y 🗌 Municipa	I	
Name: _DOE	D Not Spec	ified	Name:	Not Spec	ified	
	Other			U Other		
		3. Site	Evaluator Inform	ation		
Name of Evaluat	or:	Agency/Organ	ization:		Date Prepar	ed:
Kelly Teplitsky		CH2M HILL			03/03/2015	
Street Address: 9	9191 South Jamaica St	reet	City: Englewoo	City: Englewood State: CO		
Name of EPA or :	State Agency Contact:		Street Address	:	I	
City:		State:	I	Telephone:		
		4. Site Disp	position (for EPA	use only)		
Emergency Resp	onse/Removal Assess	ment	CERCLIS Recon	nmendation:	Signature:	
Recommendatio	in:			ority SI	Name (tuno	d).
	Yes			111. 19	ivanie (type	uj.
	🗌 No				Position:	
	Date:		Other:		-	
		F O -	Date:			
	1	5. Gene	eral Site Characte	ristics		
Predominant Lar	nd Use Within 1 Mile c	of Site (check all	Site Setting:		Years of Ope	eration:

that apply).					
Industrial	Agriculture [🗌 Urbai	n	Beginning Year NA
	Mining	Other Federal	🗌 Subu	rban	
Residential			🗹 Rural		
		Other			🗌 Unknown
Type of Site Operation	ons (check all tha	t apply):			Waste Generated:
	neck subcategory)		Retail		
Inorganic Chemic	cals		Junk/Salvage Yard		Onsite and Offsite
Plastic and/or Ru	bber Products		Municipal Landfill		
Paints, Varnishes			Other Landfill		Waste Deposition Authorized
Industrial Organi Agricultural Chen	ic Chemicals				By: Present Owner
Miscellaneous Ch	nemical Products				Present & Former Owner
Primary Metals			Other Federal Facilit	ty	Unauthorized
Metal Coating, Pl	lating, Engraving		RCRA	rado, or Disposal	Unknown
Metal Forging, St Fabricated Struct	tamping tural Metal Products		Large Quantity	Generator	Waste Accessible to the Public:
Electronic Equipr	ment		Small Quantity	Generator	
Other Manufactu	ring		Subtitle D		🗆 Yes
Mining			☐ Municipa	ll M	⊡ No
Metals			Converter"	11	
Coal			"Protective File	r"	Distance to Nearest Dwelling,
Oil and Gas Non motallic Min	orals		"Non-or Late Fi	iler"	School, or Workplace:
			Note Specified		
			Uther		1,550 Feet
		6 Wasta Cha	ractoristics Infor	mation	
		(Refer to P		ination	
			A Table 1 for WC Sco	ore)	
Source Type:	Sour	ce Waste Quantity:	Tier*:	ore) General Type of	Waste
Source Type: (check all that apply)	Sour (includ	ce Waste Quantity: e unit)	Tier*:	General Type of (check all that app	Waste oly):
Source Type: (check all that apply)	Sour (includ	ce Waste Quantity:	Tier*:	General Type of (check all that app Metals	Waste bly):
Source Type: (check all that apply)	Sour (includ	e unit)	Tier*:	General Type of (check all that app (check all that app	Waste oly): Carterio Pesticides/Herbicides Carterio Acids/Bases
Source Type: (check all that apply)	Sour (includ 	ce Waste Quantity: e unit)	Tier*:	General Type of (check all that app Metals Organics Inorganics Solvents	Waste oly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co	Sour (includ ontainers	ce Waste Quantity: e unit)	Tier*:	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile	Sour (includ ontainers	ce Waste Quantity: e unit)	Tier*:	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp	Waste Dly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste Explosives
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile	Sour (includ ontainers e	ce Waste Quantity: e unit)	Tier*:	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wasi	Waste oly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste ital Waste Explosives te Other _AFFF_ polition Waste
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum)	Sour (includ ontainers e	ce Waste Quantity: e unit)	Tier*:	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wasi Construction/Der	Waste oly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Kining Waste Explosives te Other _AFFF_ molition Waste
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW/ Plum	Sour (includ ontainers	ce Waste Quantity: e unit)	Tier*:	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste tal Waste Explosives te Other _AFFF_ nolition Waste
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source)	Sour (includ	ce Waste Quantity: e unit)	Tier*:	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der	Waste Dly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Kining Waste Explosives te Other _AFFF_ molition Waste Waste as Deposited (check all
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedii	Sour (includ ontainers e ne ment	ce Waste Quantity: e unit)	Tier*:	General Type of (check all that app Metals Organics Solvents Paints/Pigments Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Explosives te Other _AFFF_ molition Waste Waste as Deposited (check all
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source)	Sour (includ	ce Waste Quantity: e unit)	Tier*:	General Type of (check all that app Metals Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Hining Waste Explosives te Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sediu (unidentified source) Contaminated Source) Contaminated Source)	Sour (includ	ce Waste Quantity: e unit)	Tier*:	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste Dly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Hining Waste Ital Waste Vother _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sediu (unidentified source) Contaminated Soil Other No Sources	Sour (includ	ce Waste Quantity: e unit)	Tier*:	General Type of (check all that app Metals Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wasi Construction/Der Physical State of that apply):	Waste Dly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste Ital Waste Vother _AFFF_ molition Waste Waste as Deposited (check all Solid Sludge Powder Liquid
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitue	Sour (includ 	<pre>ce Waste Quantity: e unit) </pre>	A lable 1 for we set Tier*:	General Type of (check all that app Metals Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste oly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Hining Waste te Other _AFFF_ nolition Waste Waste as Deposited (check all Sludge Powder Liquid Gas
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Contaminated GW Plum (unidentified source) Contaminated SW/Sedit (unidentified source) Contaminated Soil Other No Sources *C=Constitue	Sour (includ	<pre>(refer to r) ce Waste Quantity: e unit)</pre>	A Table 1 for we set Tier*:	General Type of (check all that app Metals Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste Dly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Nining Waste Ital Waste Vother _AFFF_ molition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Cc Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitue Is Ground Water Use	Sour (includ 	/=Volume, A=Area	Tier*: Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste Ply): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Hining Waste Ital Waste Vother _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas arget Population Served by
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sediu (unidentified source) Contaminated Soil Other No Sources *C=Constitue Within 4 Miles:	Sour (includ	/=Volume, A=Area	Tier*: Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Construction/Der Physical State of that apply):	Waste oly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Nining Waste Explosives te Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas Gas Garget Population Served by Vithdrawn From:
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitue Vithin 4 Miles: Ves	Sour (includ	/=Volume, A=Area	Tier*: Tier*: 	General Type of (check all that app detais organics solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste ital Waste Vother _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas Gas Garget Population Served by Vithdrawn From:
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Contaninated or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated Soil Other No Sources *C=Constitue Within 4 Miles: Yes No	Sour (includ	/=Volume, A=Area /=Volu	Tier*: Tier*: 	General Type of (check all that app Metals Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wasi Construction/Der Physical State of that apply): List Secondary T Ground Water V	Waste Ply): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste Ital Waste Other _AFFF_ molition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas Gas Garget Population Served by Vithdrawn From:
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Traish Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitue Within 4 Miles: Ves No	Sour (includ	/=Volume, A=Area /=Volu	Tier*: Tier*: 	General Type of (check all that app Metals Organics Solvents Paints/Pigments Construction/Der Physical State of that apply):	Waste oly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Explosives te Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas Gas Garget Population Served by Vithdrawn From:NA

Feet	Have Brimany Target Drinking	<1/4 - 1/2 WINCWA		
1001	Water Wells Been Identified			
Type of Drinking Mater Malle Mithin	>1/2 - 1 MileNA			
Miles	>1 - 2 MileNA			
(Check all that apply):	If Yes, Enter Primary Target	>2 - 3 MileNA		
Private None	People ³	>3 - 4 MileNA		
Depth to Shallowest Aquifer:	Nearest Designated Wellhead	Total Within 4 Miles ⁴ NA		
~ 10 to 50 Feet	Protection Area ⁶ :			
Karst Terrain/Aquifer Present:	Underlies Site	*Use population #s for PA Table 2		
⊡ No		Note hearest well for #5 of GW Pathway Scoresheet		
	8. Surface Water Path	way		
Type of Surface Water Draining Site an	d 15 Miles Downstream (check all	Shortest Overland Distance From Any Source to		
that apply):		Surface Water:		
Stream River P	ond 🗌 Lake	_1,300 Feet		
Bay Ocean C	Other	Miles		
	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	Site is Located in:		
is there a Suspected Release to Surface	e water :			
🗆 Yes		\square Annual - 10 yr Floodplain \square >10yr - 100yr Floodplain		
☑ No	☐ >100yr - 500yr Floodplain ☐ >500yr Floodplain			
Drinking Water Intake Located Along th	ne Surface Water Migration Path:	List All Secondary Target Drinking Water Intakes:		
☐ Yes ☑ No	Name: Water Body: Flow (cfs): Population Served:			
Have Primary Target Drinking Water In	takes Been Identified:			
☑ No Water Intak	e : Miles ⁶			
If Yes, Enter Population Served by Targ	et Intake:			
NAPeople ⁴		Total within 15 Miles ⁴		
Ficharias Located Along the Surface W:	ater Migration Path:	List All Secondom Torget Fisherias ¹⁰		
□ Yes ☑ No If Yes, Distan	ce to Nearest Fishery:	<u>Water Body/ Fishery Name</u> : Flow (cfs):		
	Have Primary Target Fisheries Been Identified:			
Have Primary Target Fisheries Been Ide	entified:			
Have Primary Target Fisheries Been Ide	ntified:			
Have Primary Target Fisheries Been Ide	8. Surface Water Pathway (o	continued)		
Have Primary Target Fisheries Been Ide	8. Surface Water Pathway (o Vater Migration Other Sensitive Migration Path	continued) e Environments Located Along the Surface Water n:		
Have Primary Target Fisheries Been Ide	8. Surface Water Pathway (or line of the sensitive of the sensite of the sensitive of the sensitive of the sensitive of the sen	e Environments Located Along the Surface Water If Yes, Distance to Nearest Sensitive Environment:Miles		
Have Primary Target Fisheries Been Ide	8. Surface Water Pathway (or sensitive distance) Vater Migration Other Sensitive distance) Ves Ves No No dentified: Have Primary T	continued) e Environments Located Along the Surface Water the Surface Water If Yes, Distance to Nearest Sensitive Environment:Miles Target Sensitive Environments Been Identified:		
Have Primary Target Fisheries Been Ide	8. Surface Water Pathway (c /ater Migration Other Sensitive // Yes ✓ No // dentified: Have Primary T	e Environments Located Along the Surface Water If Yes, Distance to Nearest Sensitive Environment:Miles Target Sensitive Environments Been Identified: Yes No		

<u>Water Body</u> : <u>Flow (cfs)</u> : <u>Frontage miles:</u>		Water Body :	Flow (cfs):	Sensitive Environment Type:	
	9. Soil E	xposure Pat	hway		
Are People Occupying Residence or	Number of Worke	ers Onsite ⁴ :	Have Terres	strial Sensitive Environments Been	
Attending School or Daycare on or			Identified o	on or Within 200 Feet of Areas of	
Within 200 Feet of Area of Known or	□ 1 - 100		Known or S	Suspected Contamination:	
Suspected Contamination:	□ 101 - 1,	000			
	□ > 1,000	1		☐ Yes ☑ No	
☐ Yes					
∠ No			If Yes, List	Each Terrestrial Sensitive	
	Population Withir	n 1 Mile:	Environm	ent ² :	
Population:	People	7			
People ²					
People-			*Refer to PA	*Refer to PA Table 7 for environment types	
	10.	Air Pathwa	y		
Is there a Suspected Release to Air^1 :		Wetlands Lo	cated Within 4 M	liles of the Site ⁶ :	
☐ Yes ☑ No		✓ Yes	If Yes, Hov	w Many Acres: Acres	
Enter Total Population on or Within:					
Onsite		Other Sensit	ive Environments	S Located Within 4 Miles of the Site:	
0-1/4 Mile		☐ Yes ☑ No			
>1/4-1/2 Mile		List All Sensitive Environments Within 1/2 Mile of the Site ⁶ :			
>1/2-1 Mile		Distance:	Sensitive Environn	nent Type/Wetlands Area (acres):	
>1-2 Miles		Onsite	None		
>2-3 Miles		0-1/4 Mile	_Wetlands		
>3-4 Miles		>1/4-1/2 Mile	e _Wetlands		
Total Within 4 Miles ³⁻⁵ _7,530_					

.					Identification	n	
Potential	Hazardous W	aste Site Pr	reliminary A	ssessment	State: SD	CERCLIS #:	
		Form			CERCLIS Discovery Date:		
		1. Gene	eral Site Information	on	1		
Name: Ellsworth	AFB	Street Address:	1000 N Ellsworth Ro	ł			
City:		State: SD	Zip Code:	County:	Co. Code:	Cong. Dist:	
			57769	Meade			
Latitude:	Longitude:	Approximate Ar	rea of Site: _Less	Status of Site:			
44°8' 30.33"	103°6' 8.94"	than 1 A	cres	Active	Not Specified		
			Square Ft	☑ Inactive	NA (GW plume,	etc.)	
Site Name: Delta	a Taxiway West Crash	(2000)					
		2. Owner	Operator Informa	ation			
Owner: Ellswort	h AFB		Operator: same a	is owner			
Street Address: 2	1000 N Ellsworth Rd		Street Address:				
City:			City:				
State: SD	Zip Code:	Telephone:	State:	Zip Code:	Telephone:		
Type of Ownersh	nip:		Type of Ownersh	ip:			
Private	County		Private	County			
Federal Agency	Municip	al	Federal Agency	Federal Agency Municipal			
State	□ Not Spe	ecified	State	_ Not spec			
Indian			🗌 Indian				
		3. Site E	valuator Informat	ion			
Name of Evaluat	or:	Agency/Organiz	ation:		Date Prepare	ed:	
Kelly Teplitsky		CH2M HILL				03/03/2015	
Street Address: S	9191 South Jamaica S	treet	City: Englewood		State: CO		
Name of EPA or	State Agency Contact	:	Street Address:		I		
City:		State:		Telephone:			
		4. Site Dispo	osition (for EPA use	e only)	1		
Emergency Resp	onse/Removal Assess	sment	CERCLIS Recomm	endation:	Signature:		
Recommendatio	in:		Higher Priority	r SI SI	Name (typed).	
	Yes				i tunic (typeu		
	LI No				Position:		
	Date:		Other:				
	Date:	5 Ganor	Date:				

Industrial	Agriculture		🗌 Urba	n	Beginning Year NA
	Mining	Other Federal	🗌 Subu	ırban	Ending Year NA
Residential Forest/Fields	DOD DOF		🗹 Rura	I	
		Other			Unknown
Type of Site Operation	ons (check all t	hat apply):			Waste Generated:
Manufacturing (must cl	heck subcategory)		🗌 Retail		☑ Onsite
Lumber and Woo	od Products		Recycling		
Inorganic Chemi	cals		Junk/Salvage Yard		
Plastic and/or Ru Paints Varnishes	abber Products		Other Landfill		Wasta Daposition Authorized
Industrial Organi	, ic Chemicals		☑ DOD		Present Owner
Agricultural Cher	nicals		DOE		Dy. Former Owner
Miscellaneous Ch	nemical Products		DOI	ty	Present & Former Owner
Primary Metals Motal Coating Pl	lating Engraving			ty	
Metal Coating, 1	tamping		Treatment, Sto	orage, or Disposal	Masta Accessible to the Public:
Fabricated Struct	tural Metal Produc	ts	Large Quantity	Generator	Waste Accessible to the Public.
Electronic Equipr	ment		Small Quantity	Generator	
U Other Manufactu	iring			al	
Mining				al	I NO
Metals			Converter"		Distance to Nearest Dwelling
			"Protective File	er"	School, or Workplace:
Non-metallic Min	ierals		Note Specified	lier	School, of Workplace.
			□ Other		2.500 Fast
					2,500Feet
		6. Waste Cha	aracteristics Info	mation	
		(Refer to P	A Table 1 for WC Sc	ore)	
Source Type:	-				
Source Type:	So	urce Waste Quantity:	Tier*:	General Type of	Waste
(check all that apply)	So (incl	urce Waste Quantity: ude unit)	Tier*:	General Type of (check all that app	Waste oly):
(check all that apply)	So (incl	urce Waste Quantity: ude unit)	Tier*:	General Type of (check all that app O Metals	Waste oly):
(check all that apply)	So (incl 	urce Waste Quantity: ude unit)	Tier*: 	General Type of (check all that app Metals Organics	Waste Dly): Pesticides/Herbicides Acids/Bases
(check all that apply) Landfill Surface Impoundment Drums	So (incl	urce Waste Quantity: ude unit)	Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents	Waste oly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste
(check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co	So (incl — ontainers —	urce Waste Quantity: ude unit)	Tier*: 	General Type of (check all that app Organics Inorganics Solvents Paints/Pigments	Waste oly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste
 (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile 	So (incl — ontainers — e	urce Waste Quantity: ude unit)	Tier*:	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp	Waste Dly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste Explosives
 (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile 	So (incl 	urce Waste Quantity: ude unit)	Tier*:	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste ital Waste Explosives te Other_AFFF_ Multion Waste
(check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum)	So (incl 	urce Waste Quantity: ude unit)	Tier*:	General Type of (check all that app Metals Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Explosives te I Other _AFFF_ molition Waste
(check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminatod CW Plum	So (incl 	urce Waste Quantity: ude unit)	Tier*:	General Type of (check all that app Metals Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Explosives te Other _AFFF_ nolition Waste
 (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) 	So (incl pontainers e ne	urce Waste Quantity: ude unit)	Tier*:	General Type of (check all that app Metals Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der	Waste Oly): Pesticides/Herbicides Acids/Bases Oly Waste Municipal Waste Minig Waste Explosives te Other_AFFF_ nolition Waste f Waste as Deposited (check all
(check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedii	So (incl pontainers e ne me ment	urce Waste Quantity: ude unit)	Tier*:	General Type of (check all that app Metals Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste Explosives te Other_AFFF_ molition Waste Waste as Deposited (check all
(check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedit (unidentified source)	So (incl pontainers e ne ment	urce Waste Quantity: ude unit)	Tier*:	General Type of (check all that app Metals Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Kate Strees Wining Waste te Waste Other _AFFF_ molition Waste Waste as Deposited (check all Solid Sludge
(check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedii (unidentified source) Contaminated Soil Other	So (incl pontainers e ne ment	urce Waste Quantity: ude unit)	Tier*:	General Type of (check all that app Metals Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste Oly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste ital Waste Explosives te Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder
 (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedii (unidentified source) Contaminated Soil Other No Sources 	So (incl 	urce Waste Quantity: ude unit)	Tier*:	General Type of (check all that app Metals Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste Oly): Pesticides/Herbicides Acids/Bases Oly Waste Municipal Waste Mining Waste Explosives te Vother _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid
(check all that apply) Landfill Surface Impoundment Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedii (unidentified source) Contaminated Soil Other No Sources *C=Constitue	So (incl pontainers e ne ment eent. W=Wastestrear	urce Waste Quantity: ude unit)	Tier*:	General Type of (check all that app Metals Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste Explosives te Vother_AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas
(check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedii (unidentified source) Contaminated Soil Other No Sources *C=Constitute	So (incl 	urce Waste Quantity: ude unit)	Tier*: 	General Type of (check all that app Metals Organics Solvents Paints/Pigments Construction/Der Physical State of that apply):	Waste Oly): Pesticides/Herbicides Acids/Bases Oly Waste Municipal Waste Mining Waste Explosives te Vother _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas
Icheck all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedii (unidentified source) Contaminated Soil Other No Sources *C=Constitue	So (incl pontainers e ne ment ent, W=Wastestrear	urce Waste Quantity: ude unit)	Tier*:	General Type of (check all that app Metals Organics Solvents Aadioactive Wast Construction/Der Physical State of that apply):	Waste Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste Explosives te Vother _AFFF_ molition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas Gas
(check all that apply) Landfill Surface Impoundment Tanks and Non-Dum Cc Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedit (unidentified source) Contaminated Soil Other No Sources *C=Constitue Is Ground Water Use Within 4 Miles:	So (incl pontainers e ne ment ent, W=Wastestrear	urce Waste Quantity: ude unit) 	Tier*:	General Type of (check all that app Metals Organics Solvents Paints/Pigments Construction/Der Physical State of that apply):	Waste Ply): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste ital Waste Explosives To Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas Target Population Served by Vithdrawn From:
(check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedit (unidentified source) Contaminated Soil Other No Sources *C=Constitue Within 4 Miles:	So (incl pontainers e ne ment ent, W=Wastestrear ed for Drinking	urce Waste Quantity: ude unit) 	Tier*:	General Type of (check all that app Metals Organics Solvents Paints/Pigments Construction/Der Physical State of that apply):	Waste Oly): Pesticides/Herbicides Acids/Bases Oly Waste Municipal Waste Explosives Conter_AFFF_ Molition Waste F Waste as Deposited (check all Solid Sludge Powder Liquid Gas Farget Population Served by Vithdrawn From:
(check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Cc Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedii (unidentified source) Contaminated Soil Other No Sources *C=Constitue Vithin 4 Miles: Yes No	So (incl ontainers	urce Waste Quantity: ude unit) 	Tier*:	General Type of (check all that app Metals Organics Solvents Paints/Pigments Construction/Der Physical State of that apply):	Waste oly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Explosives Constant Other _AFFF_ Molition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas Carget Population Served by Vithdrawn From:
(check all that apply) Landfill Surface Impoundment Tanks and Non-Dum Cc Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedia (unidentified source) Contaminated Soil Other No Sources *C=Constitute Within 4 Miles: Yes No	So (incl pontainers e ne ment ent, W=Wastestrear ent, W=Wastestrear	urce Waste Quantity: ude unit) 	Tier*:	General Type of (check all that app Metals Organics Solvents Aadioactive Wast Construction/Der Physical State of that apply):	Waste Ply): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste Explosives te Other_AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas Gas Garget Population Served by Vithdrawn From:NA

Feet	Have Brimany Target Drinking	<1/4 - 1/2 WINCWA		
1001	Water Wells Been Identified			
Type of Drinking Mater Malle Mithin	>1/2 - 1 MileNA			
Miles	>1 - 2 MileNA			
(Check all that apply):	If Yes, Enter Primary Target	>2 - 3 MileNA		
Private None	People ³	>3 - 4 MileNA		
Depth to Shallowest Aquifer:	Nearest Designated Wellhead	Total Within 4 Miles ⁴ NA		
~ 10 to 50 Feet	Protection Area ⁶ :			
Karst Terrain/Aquifer Present:	Underlies Site	*Use population #s for PA Table 2		
⊡ No		Note hearest well for #5 of GW Pathway Scoresheet		
	8. Surface Water Path	way		
Type of Surface Water Draining Site an	d 15 Miles Downstream (check all	Shortest Overland Distance From Any Source to		
that apply):		Surface Water:		
Stream River P	ond 🗌 Lake	_1,300 Feet		
Bay Ocean C	Other	Miles		
	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	Site is Located in:		
is there a Suspected Release to Surface	e water :			
🗆 Yes		\square Annual - 10 yr Floodplain \square >10yr - 100yr Floodplain		
☑ No	☐ >100yr - 500yr Floodplain ☐ >500yr Floodplain			
Drinking Water Intake Located Along th	ne Surface Water Migration Path:	List All Secondary Target Drinking Water Intakes:		
☐ Yes ☑ No	Name: Water Body: Flow (cfs): Population Served:			
Have Primary Target Drinking Water In	takes Been Identified:			
☑ No Water Intak	e : Miles ⁶			
If Yes, Enter Population Served by Targ	et Intake:			
NAPeople ⁴		Total within 15 Miles ⁴		
Ficharias Located Along the Surface W:	ater Migration Path:	List All Secondom Torget Fisherias ¹⁰		
□ Yes ☑ No If Yes, Distan	ce to Nearest Fishery:	<u>Water Body/ Fishery Name</u> : Flow (cfs):		
	Have Primary Target Fisheries Been Identified:			
Have Primary Target Fisheries Been Ide	entified:			
Have Primary Target Fisheries Been Ide	ntified:			
Have Primary Target Fisheries Been Ide	8. Surface Water Pathway (o	continued)		
Have Primary Target Fisheries Been Ide	8. Surface Water Pathway (o Vater Migration Other Sensitive Migration Path	continued) e Environments Located Along the Surface Water n:		
Have Primary Target Fisheries Been Ide	8. Surface Water Pathway (or line of the sensitive of the sensite of the sensitive of the sensitive of the sensitive of the sen	e Environments Located Along the Surface Water If Yes, Distance to Nearest Sensitive Environment:Miles		
Have Primary Target Fisheries Been Ide	8. Surface Water Pathway (or sensitive distance) Vater Migration Other Sensitive distance) Ves Ves No No dentified: Have Primary T	continued) e Environments Located Along the Surface Water the Surface Water If Yes, Distance to Nearest Sensitive Environment:Miles Target Sensitive Environments Been Identified:		
Have Primary Target Fisheries Been Ide	8. Surface Water Pathway (c /ater Migration Other Sensitive // Yes ✓ No // dentified: Have Primary T	e Environments Located Along the Surface Water If Yes, Distance to Nearest Sensitive Environment:Miles Target Sensitive Environments Been Identified: Yes No		

<u>Water Body</u> : <u>Flow (cfs)</u> : <u>Frontage miles:</u>		<u>Water Body</u> :	Flow (cfs):	Sensitive Environment Type:		
	9. Soil E	xposure Pat	hway			
Are People Occupying Residence or	Number of Worke	ers Onsite ⁴ :	Have Terre	strial Sensitive Environments Been		
Attending School or Daycare on or			Identified o	on or Within 200 Feet of Areas of		
Within 200 Feet of Area of Known or	☑ None		Known or S	Suspected Contamination:		
Suspected Contamination:	□ 1 - 100 □ 101 - 1	000				
	$\Box > 1,000$	000				
				⊡ Yes ☑ No		
□ Yes						
☑ No			If Yes, List	Each Terrestrial Sensitive		
	Population Withir	n 1 Mile:	Environm	ent ^s :		
If Yes, Enter Total Residential						
Population:	People	7				
Pooplo ²	'					
People-				*Refer to PA Table 7 for environment types		
	10	Air Dathura		<i>"</i>		
	10.	Air Pathwa	y			
Is there a Suspected Release to Air ¹ :		Wetlands Lo	ocated Within 4 M	liles of the Site [°] :		
⊡ res ✓ No		✓ Yes	If Yes, Hou	w Many Acres: Acres		
Enter Total Regulation on or Within:		🗌 No	11 103, 1101			
		Other Sensit	ive Environments	s Located Within 4 Miles of the Site:		
Onsite		Other Sensit		blocated within 4 whes of the site.		
0.1/4.04:1-			∐ Yes ☑ No			
0-1/4 IVIIIe						
>1/4-1/2 Mile		List All Sensitive Environments Within 1/2 Mile of the Site ⁶ :				
>1/2-1 Mile		Distance:	Sensitive Environr	nent Type/Wetlands Area (acres):		
>1-2 Miles		Onsite	None			
>2-3 Miles		0-1/4 Mile	_Wetlands			
>3-4 Miles		>1/4-1/2 Mile	e _Wetlands			
Total Within 4 Miles ³⁻⁵ _7,090_						
	_				Identification	1
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Potential	Hazardous Wa	aste Site Pro	eliminary A	ssessment	State: SD	CERCLIS #:
		Form			CERCLIS Disco	overy Date:
		1. Gene	ral Site Informati	on	-	
Name: Ellsworth	AFB	Street Address: 1	LOOO N Ellsworth R	d		
City:		State: SD	Zip Code: 57769	County: Meade	Co. Code:	Cong. Dist:
Latitudo:	Longitude:	Approvimate Are	a of Site: Less	Status of Site:		
Latitude. ΛΛ°7' Λ 79"	103°/' /5 77"	than 1 Ac	ros			
44 7 4.75	105 4 45.77		auare Et		Not Specified	
<u>.</u>		3	quarent		INA (GW plume, e	eic.)
Site Name: Mart	en Crash (2003)					
landed in a grass	sy field on Ellsworth AF	B property. The Ell	sworth AFB Fire De	epartment respon	ded to the cra	sh and applied
		2. Owner/	Operator Inform	ation		
Owner: Ellswort	h AFB		Operator: same a	as owner		
Street Address: 2	1000 N Ellsworth Rd		Street Address:			
City:			City:			
State: SD	Zip Code:	Telephone:	State:	Zip Code:	Telephone:	
Type of Owners	nip:		Type of Ownersh	nip:		
Federal Agency	Municipal		Federal Agency	Municipa	I	
Name: _DOI	D Not Speci	fied	Name:	Not Spec	ified	
☐ State	Other		☐ State	Other		
		3. Site Ev	aluator Informat	tion		
Name of Evaluat	or:	Agency/Organiza	ation:		Date Prepare	d:
Kelly Teplitsky		CH2M HILL			03/03/2015	
Street Address: 9	9191 South Jamaica Str	eet	City: Englewood		State: CO	
Name of EPA or	State Agency Contact:		Street Address:		1	
City:		State:		Telephone:		
		4. Site Dispo	sition <i>(for FPA us</i>	e only)		
Emergency Resp	onse/Removal Assess	nent	CERCLIS Recomm	nendation:	Signature [.]	
Recommendation	n:		Higher Priority	y SI		
			Lower Priority	, / SI	Name (typed):
			□ NFRAP			
					Position:	
	Date:		Date:			
		5 Genera	I Site Characterie	 stics		
Predominant La	nd Use Within 1 Mile o	Site (check all	Site Setting		Years of One	ration:
		ence (encer un	Site Setting.		1. cu. s or oper	

that apply):					
Industrial	Agriculture		🗌 Urba	in	Beginning Year NA
Commercial	Mining	Other Federal	🗌 Subu	urban	Ending Year NA
Residential			🗹 Rura	al	
	DOL	Other			🗌 Unknown
Type of Site Operatio	ns (check al	that apply):			Waste Generated:
			_		
	ieck subcatego	y)	Retail Recycling		Offsite
	a products		Junk/Salvage Yard		Onsite and Offsite
Plastic and/or Ru	bber Products		Municipal Landfill		
Paints, Varnishes			Other Landfill		Waste Deposition Authorized
Industrial Organic	c Chemicals				By: Present Owner
	ncais emical Product				Former Owner Present & Former Owner
Primary Metals		,	Other Federal Facili	ity	
Metal Coating, Pla	ating, Engravin	9			Unknown
Metal Forging, St	amping		Large Quantity	orage, or Disposal	Waste Accessible to the Public:
	urai Metai Prod Dent	ucts	Small Quantity	Generator	
Other Manufactur	ring		Subtitle D		
	0		🗌 Municipa	al	⊡ No
Metals				al	
Coal			"Converter" "Protective File	or"	Distance to Nearest Dwelling,
Oil and Gas			Son-or Late F	Filer"	School, or Workplace:
Non-metallic Mine	erals		Note Specified		
			Other		850 Feet
		6. Waste	Characteristics Info	rmation	
		(Refer	to PA Table 1 for WC Sc	ore)	
Source Type:		Source Waste Quant	ty: Tier*:	General Type of	Waste
(check all that apply)	(i	nclude unit)		(check all that app	ily):
				Metals	Pesticides/Herbicides
Surface Impoundment					
Drums				Solvents	Municipal Waste
Tanks and Non-Dum Co Comical Waste Pile	ntainers .			Paints/Pigments	Mining Waste
Scrap Metal or Junk Pile				Laboratory/Hospi	ital Waste Explosives
Tailings Pile				Radioactive Wast Construction/Den	e I Other _AFFF_ nolition Waste
Trash Pile (open drum)					
Land Treatment Contaminated CW Plum				Dhusical State of	Masta as Dapasitad (shash all
(unidentified source)				Physical State Of	waste as Deposited (check an
Contaminated SW/Sedir				that apply ly	
	nent			that apply):	
(unidentified source)	nent			that apply):	Solid
(unidentified source)	nent			that apply):	Solid Sludge Powder
(unidentified source) Contaminated Soil Other No Sources	nent .			that apply):	Solid Sludge Powder Liquid
(unidentified source) Contaminated Soil Other No Sources *C=Constitue	nent		 	that apply):	Solid Sludge Powder Liquid Gas
(unidentified source) Contaminated Soil Other No Sources *C=Constitue	nent nt, W=Wastestro		round Water Pathw	that apply):	Solid Sludge Powder Liquid Gas
(unidentified source) Contaminated Soil Other No Sources *C=Constitue	nent nt, W=Wastestru d for Drinkir	eam, V=Volume, A=Area 7. G	round Water Pathw	that apply):	Solid Sludge Powder Liquid Gas arget Population Served by
(unidentified source) Contaminated Soil Other No Sources *C=Constitue Is Ground Water Use Within 4 Miles:	nent nt, W=Wastestro d for Drinkir	eam, V=Volume, A=Area 7. G Is There a Su Ground Wat	round Water Pathw spected Release to	that apply):	Solid Sludge Powder Liquid Gas arget Population Served by Vithdrawn From:
(unidentified source) Contaminated Soil Other No Sources *C=Constitue Is Ground Water Use Within 4 Miles:	nent nt, W=Wastestro d for Drinkir	eam, V=Volume, A=Area 7. G ng Is There a Su Ground Wate	round Water Pathw spected Release to er ¹ :	that apply):	Solid Sludge Powder Liquid Gas arget Population Served by Vithdrawn From:
(unidentified source) Contaminated Soil Other No Sources *C=Constitue Is Ground Water Use Within 4 Miles: Ves No	nent nt, W=Wastestri d for Drinkir	eam, V=Volume, A=Area 7. G ng Is There a Su Ground Wate V	round Water Pathw spected Release to er ¹ :	that apply):	Solid Sludge Powder Liquid Gas arget Population Served by Vithdrawn From:
(unidentified source) Contaminated Soil Other No Sources *C=Constitue Is Ground Water Use Within 4 Miles: Ves No	nent nt, W=Wastestro d for Drinkir	eam, V=Volume, A=Area 7. G ng Is There a Su Ground Wat Va Na	round Water Pathw spected Release to er ¹ :	that apply): that apply): that apply): that apply): that apply	Solid Sludge Powder Liquid Gas arget Population Served by Vithdrawn From: NA

Feet Type of Drinking Water Wells Within 4 Miles (check all that apply): Municipal Private None Depth to Shallowest Aquifer: ~ 10 to 50 Feet	Water Wells Been Identified: ↓ ↓ Yes ↓ No If Yes, Enter Primary Target Population: People ³ Nearest Designated Wellhead	>1/2 - 1 MileNA >1 - 2 MileNA >2 - 3 MileNA >3 - 4 MileNA
Type of Drinking Water Wells Within 4 Miles (check all that apply): Municipal Private None Depth to Shallowest Aquifer: ~ 10 to 50 Feet	If Yes, Enter Primary Target Population: People ³	>1/2 - 1 MILENA >1 - 2 MileNA >2 - 3 MileNA >3 - 4 MileNA
Miles (check all that apply): Municipal Private None Depth to Shallowest Aquifer: ~ 10 to 50 Feet	If Yes, Enter Primary Target Population: People ³	 >1 - 2 MileNA >2 - 3 MileNA >3 - 4 MileNA
Municipal Private None Depth to Shallowest Aquifer: ~ 10 to 50 Feet	If Yes, Enter Primary Target Population: People ³ Nearest Designated Wellhead	>2 - 3 MileNA >3 - 4 MileNA
Depth to Shallowest Aquifer: ~ 10 to 50 Feet	Nearest Designated Wellhead	>3 - 4 MileNA
Depth to Shallowest Aquifer: ~ 10 to 50 Feet	Nearest Designated Wellhead	
~ 10 to 50 Feet		Total Within 4 Miles ⁴ NA
	Protection Area ⁶ :	
Karst Terrain/Aquifer Present:	Underlies Site	*Use population #s for PA Table 2 *Note pearest well for #5 on GW Pathway Scoresheet
⊡ No		Note hearest wention #5 on ow ratinway scoresheet
	8. Surface Water Pa	athway
Type of Surface Water Draining Site and	d 15 Miles Downstream (check	all Shortest Overland Distance From Any Source to
that apply):		Surface Water:
Stream River Po	ond 🗌 Lake	_500 Feet
Bay Ocean O		Miles
Is There a Suspected Palaase to Surface	Water ¹ :	Site is Located in:
is mere a suspected neigase to sufface	ייימוכו .	Annual - 10 vr Floodplain
☑ Yes		\square >10yr - 100yr Floodplain
🗌 No		□ >100yr - 500yr Floodplain □ >500yr Floodplain
Drinking Water Intake Located Along th	e Surface Water Migration Pat	h: List All Secondary Target Drinking Water Intakes:
☐ Yes ☑ No	Name: Water Body: Flow (cfs): Population Served:	
Have Primary Target Drinking Water Int	akes Been Identified:	
	ice to Nearest Drinking	
No Water Intake	e : Miles ⁶	
If Yes, Enter Population Served by Targe	et Intake:	
		Total within 15 Miles ⁴
NA People ⁴		
Fisheries Located Along the Surface Wa	ter Migration Path:	List All Secondary Target Fisheries ¹⁰ :
□ Yes ☑ No If Yes, Distance	ce to Nearest Fishery: Miles	<u>Water Body/ Fishery Name</u> : <u>Flow (cfs)</u> :
Have Primary Target Fisheries Been Ide	ntified:	
🗌 Yes 🛛 🗹 No		
	8. Surface Water Pathwa	y (continued)
	ater Migration Other Sons	itive Environments Located Along the Surface Water
Wetlands Located Along the Surface Wa Path:	Migration 4	Path:
Wetlands Located Along the Surface Wa Path: ☑ Yes ☐ No	Migration F	Path: If Yes, Distance to Nearest Sensitive Environment: Miles
Wetlands Located Along the Surface Wa Path:	lentified:	Path: If Yes, Distance to Nearest Sensitive Environment: Miles ry Target Sensitive Environments Been Identified:
Wetlands Located Along the Surface Wa Path:	lentified:	Path: If Yes, Distance to Nearest Sensitive Environment: Miles ry Target Sensitive Environments Been Identified: Yes Vo

<u>Water Body</u> : <u>Flow (cfs)</u> : <u>Frontage miles:</u>		<u>Water Body</u> :	Flow (cfs):	Sensitive Environment Type:		
· · · ·						
				·		
	9. Soil E	xposure Pat	hway			
Are People Occupying Residence or	Number of Worke	ers Onsite ⁴ :	Have Terre	strial Sensitive Environments Been		
Attending School or Daycare on or			Identified o	on or Within 200 Feet of Areas of		
Within 200 Feet of Area of Known or	☑ None		Known or S	Suspected Contamination:		
Suspected Contamination:		000				
	$\Box > 1,000$	000				
				□ Yes ☑ No		
□ Yes						
☑ No			If Yes, List	Each Terrestrial Sensitive		
	Population Withir	n 1 Mile:	Environm	ent ^s :		
If Yes, Enter Total Residential						
Population:	People	7				
Pooplo ²	'					
People			*Refer to PA	Table 7 for environment types		
	10	Air Dathura				
	10.	Air Pathwa	y			
Is there a Suspected Release to Air ¹ :		Wetlands Lo	ocated Within 4 M	liles of the Site [°] :		
⊡ res ☑ No		✓ Yes	If Yes, How	w Many Acres: Acres		
Enter Total Regulation on or Within:		🗌 No	11 1 23, 110	in res, now wany Acres Acres		
		Other Sensitive Environments Located Within 4 Miles of the Site:				
Onsite						
0.1/4.04:1-						
0-1/4 IVIIIe						
>1/4-1/2 Mile		List All Sensitive Environments Within 1/2 Mile of the Site ⁶ :				
>1/2-1 Mile		Distance:	Sensitive Environn	nent Type/Wetlands Area (acres):		
>1-2 Miles		Onsite	None			
>2-3 Miles		0-1/4 Mile	_Wetlands			
>3-4 Miles		>1/4-1/2 Mile	e _Wetlands			
Total Within 4 Miles ³⁻⁵ _7,250_						

					Identification	n
Potential	Hazardous Wa	aste Site Pre	eliminary A	ssessment	State: SD	CERCLIS #:
		Form			CERCLIS Disco	overy Date:
		1. Gener	al Site Information	on	•	
Name: Ellsworth	AFB	Street Address: 1	000 N Ellsworth Ro	t		
City:		State: SD	Zip Code: 57769	County: Meade	Co. Code:	Cong. Dist:
Latitude:	Longitude:	Annroximate Are	a of Site: Less	Status of Site		
44°9' 23.90"	103°6' 33.81"	than 1 Acr	res		Not Specified	
		Sc	quare Ft		NA (GW plume.)	etc.)
Site Name: Crash	4 (2001)		•			
Site Description:	In March 2000 Crash 4	L a P-23 fire truck	annarently release	ed 10 gallons of A	FFF near they	vicinity of Building
7140.						
		2. Owner/0	Operator Informa	ation		
Owner: Ellsworth	n AFB		Operator: same a	as owner		
Street Address: 1	LOOO N Ellsworth Rd		Street Address:			
City:			City:			
State: SD	Zip Code:	Telephone:	State:	Zip Code:	Telephone:	
Type of Ownersh	nip:	l	Type of Ownersh	ip:		
Private	County					
Federal Agency	Municipal		Federal Agency	Municipa	I	
Name: _DOD	D Not Specif	ïed	Name:	_ 🗌 Not Spec	ified	
	Cther			Other		
		3. Site Eva	aluator Informat	ion		
Name of Evaluat Kelly Teplitsky	or:	Agency/Organiza CH2M HILL	tion:		Date Prepare 03/03/2015	ed:
Street Address: 9	9191 South Jamaica Str	eet	City: Englewood		State: CO	
Name of EPA or S	State Agency Contact:		Street Address:			
Citv:		State:	<u> </u>	Telephone [.]		
City:		otate.		relephone.		
		4. Site Dispos	ition (for EPA us	e only)		
Emergency Resp	onse/Removal Assessm	ient	CERCLIS Recomm	endation:	Signature:	
Recommendatio	n:		Higher Priority	i SI		
	Ves		Lower Priority	SI	Name (typed):
	 □ No				Docition	
r	Date [.]		Other:		Position:	
'			Date:			
		5. Genera	Site Characteris	stics		
Predominant Lar	nd Use Within 1 Mile of	Site (check all	Site Setting:		Years of Ope	ration:

that apply):					
Industrial	Agriculture		🗌 Urba	in	Beginning Year NA
Commercial	Mining	Other Federal	🗌 Subu	urban	
Residential	DOD	Facility:	🗹 Rura	al	Ending Year NA
L Forest/Fields	DOF	Other			🗌 Unknown
Type of Site Operation	ons (check all	that apply):			Waste Generated:
Manufacturing (must cl	heck subcategor	y)	🗌 Retail		☑ Onsite
Lumber and Woo	od Products		Recycling		Offsite
Inorganic Chemic	cals		Junk/Salvage Yard		Onsite and Offsite
Plastic and/or Ru	Ibber Products		Municipal Landfill Other Landfill		
Paints, Varnishes	s ic Chemicals				Waste Deposition Authorized
Agricultural Chen	nicals		DOE DOE		By: Former Owner
Miscellaneous Ch	nemical Products	i	DOI		Present & Former Owner
Primary Metals			Other Federal Facili	ity	Unauthorized
Metal Coating, Pl	lating, Engraving	J		orago, or Disposal	Unknown
Metal Forging, St Eabricated Struct	tamping tural Metal Produ	ucts	Large Quantity	Generator	Waste Accessible to the Public:
Electronic Equipr	ment	1013	Small Quantity	Generator	
Other Manufactu	ring		Subtitle D		□ Yes
Mining			🗌 Municipa	al	⊡ No
Metals			🗌 Industria	al	
			"Converter" "	or"	Distance to Nearest Dwelling,
Oil and Gas			□ Protective File □ "Non-or Late F	ei Filer"	School, or Workplace:
Non-metallic Min	erals		Note Specified		
					1 210 Feet
					1,2101001
		6. Waste Ch	aracteristics Info	rmation	•
		(Refer to	PA Table 1 for WC Sc	ore)	
Source Type:	9	Source Waste Quantity:	Tier*:	General Type of	Waste
(check all that apply)	(ii	nclude unit)		(check all that app	oly):
					Destisides / Lerbisides
	-				Pesticides/Hel Dicides
					Acids/Bases
Tanks and Non-Dum Co	-			Organics Inorganics Calculate	Acids/Bases
Chamical Wasta Dila	- 			Organics Inorganics Solvents Paints/Pigments	Acids/Bases
	- - ontainers -				Acids/Bases Oily Waste Municipal Waste Mining Waste Explosives
Scrap Metal or Junk Pile	- ontainers - - e -			Organics Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wasi	Acids/Bases Oily Waste Municipal Waste Mining Waste Explosives te Other _AFFF_
Cremical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trach Pile (open drum)	- ontainers - - e -				Acids/Bases Oily Waste Municipal Waste Mining Waste Explosives Other _AFFF_ nolition Waste
Crieffical waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment	ontainers _ - e _ -			 Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wasi Construction/Der 	Acids/Bases Oily Waste Municipal Waste Mining Waste ital Waste Explosives te Oither _AFFF_ nolition Waste
Crieffical waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum	- ontainers - - e - - - ne			Organics Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of	
Crieffical waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source)	e			Organics Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that applv):	Acids/Bases Oily Waste Municipal Waste Kining Waste Explosives te Other _AFFF_ nolition Waste
Contaminated Waste Pile Crash Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin	ntainers - 			Organics Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Pesitides/Rebicides Acids/Bases Oily Waste Municipal Waste Mining Waste Explosives Other _AFFF_ nolition Waste
Crieffical waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source)	ntainers - 			Organics Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Acids/Bases Acids/Bases Oily Waste Municipal Waste Mining Waste Explosives te Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge
Contaminated Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other	ntainers - 			Organics Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wasi Construction/Der Physical State of that apply):	Acids/Bases Acids/Bases Acids/Bases Oily Waste Municipal Waste Mining Waste Explosives te Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder
Contentical waste Pile Crash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources	ntainers - 			Organics Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	
Chemical waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitute	ntainers - 			Organics Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Acids/Bases Acids/Bases Acids/Bases Acids/Bases Aunicipal Waste Anining
Contentical waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitute	ent, W=Wastestre			Organics Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wasi Construction/Der Physical State of that apply):	
Crieffical Waste Pile Crash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitue Is Ground Water Use	ontainers - 	am, V=Volume, A=Area	und Water Pathw reted Release to	Organics Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	
Chemical waste Pile Crash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitue Is Ground Water Use Within 4 Miles:	ntainers - 	am, V=Volume, A=Area	und Water Pathw acted Release to	Organics Organics Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	
Crieffical waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitue Is Ground Water Use Within 4 Miles:	ent, W=Wastestre	am, V=Volume, A=Area	und Water Pathw cted Release to	Metals Organics Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Acids/Bases Acids/Bases Acids/Bases Acids/Bases Aunicipal Waste Mining Waste Mining Waste AFFF_ Nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas Acids/Bases Ac
Crieffical waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitue Is Ground Water Use Within 4 Miles: Ves No	ent, W=Wastestre	am, V=Volume, A=Area 7. Grou g Is There a Suspe Ground Water ¹ : ☐ Yes	und Water Pathw 	Organics Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wasi Construction/Der Physical State of that apply):	Acids/Bases Acids/Bases Acids/Bases Acids/Bases Anining Waste Mining Waste Mining Waste AFFF_ Nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas Acids/Bases AFFF_ AFFF
Crieffical waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedii (unidentified source) Contaminated Soil Other No Sources *C=Constitute Is Ground Water Use Within 4 Miles: Ves No	ontainers - 	am, V=Volume, A=Area	und Water Pathw	Organics Organics Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wasi Construction/Der Physical State of that apply):	
Crieffical waste Pile Crieffical waste Pile Crash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitue Is Ground Water Use Within 4 Miles: Yes No If Yes, Distance to no	earest	am, V=Volume, A=Area 7. Grou Ig Is There a Suspe Ground Water ¹ : ☑ Yes □ No	und Water Pathw	Organics Organics Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply): apply): Carter of that apply Construction (Construction) Co	Acids/Bases Acids/Bases Acids/Bases Oily Waste Mining Waste Mining Waste Anining Waste Table Conter_AFFF_ Molition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas Acids/Bases Acid

Drinking Well:	Have Drimany Targe	+ Drinking	~1/4 - 1/2 IVIIIC	INA		
Feet	Water Wells Been I	dentified:				
Type of Drinking Water Walls, Within		dentineu.	>1/2 - 1 Mile	NA		
Miles	4 ☐ Yes ☑ No		>1 - 2 Mile	NA		
(cneck all that apply):	If Yes, Enter Prima Population:	ary Target	>2 - 3 Mile	NA		
Private None		People ³	>3 - 4 Mile	NA		
Depth to Shallowest Aquifer:	Nearest Designated	d Wellhead	Total Within 4 Miles	⁴ ΝΔ		
~ 10 to 50 Feet	Protection Area ⁶ :					
Karst Terrain/Aquifer Present:	☐ Underlie ☐ >0-4 Mil ☑ None Wi	s Site les ithin 4 Miles	*Use population #s for PA T *Note nearest well for #5 c	able 2 n GW Pathway Scoresheet		
✓ No				•		
	8. Surface	Water Pathw	/ay			
Type of Surface Water Draining Site ar that apply):	nd 15 Miles Downstrea	am (check all	Shortest Overland Dist Surface Water:	ance From Any Source to		
Stream River	Pond Diaka		890 Feet			
Bay Ocean	Other			Miles		
Is There a Suspected Release to Surfac	ce Water ¹ :		Site is Located in:			
□ Yes ☑ No			 ☐ Annual - 10 yr Floodplain ☐ >10yr - 100yr Floodplain ☐ >100yr - 500yr Floodplain ☐ >500yr Floodplain 			
Drinking Water Intake Located Along t	he Surface Water Mig	ration Path:	List All Secondary Targ	et Drinking Water Intakes:		
			Namer Water Body El	Name: Water Body: Flow (cfs): Population Served:		
	talian Daar Idaatifiad	_	Name. Water bouy. Fit	<u>Jw (cis)</u> . <u>Population Serveu</u> .		
Have Primary Target Drinking water in	itakes Been Identified	:				
 Yes If Yes, Distance No Water Intal 	ance to Nearest Drinkin ke : Miles ⁶	ng				
If Yes, Enter Population Served by Tar	get Intake:					
NA People ⁴	-		Total within 15 Miles ⁴			
Fisheries Located Along the Surface W	ater Migration Path:		List All Secondary Targ	et Fisheries ¹⁰ :		
□ Yes ☑ No If Yes, Distan	nce to Nearest Fishery Miles	:	Water Body/ Fishery Nam	<u>e : Flow (cfs)</u> :		
Have Primary Target Fisheries Been Id	entified:					
🗌 Yes 🛛 🗹 No						
	8. Surface Wate	r Pathway (co	ontinued)			
Wetlands Located Along the Surface V Path:	Vater Migration C	Other Sensitive Migration Path:	Environments Located Al	ong the Surface Water		
✓ Yes □ No		☐ Yes ✓ No	If Yes, Distance to Environment:	Nearest Sensitive Miles		
Have Primary Target Wetlands Been I	ldentified:	lave Primary Ta	rget Sensitive Environme	nts Been Identified:		
☐ Yes ☑ No		, -	☐ Yes ☑ No			
List All Wetlands:		List All Sensitiv	e Environments ¹¹ :			

<u>Water Body</u> : <u>Flow (cfs)</u> : <u>Frontage miles:</u>		Water Body :	Flow (cfs):	Sensitive Environment Type:		
	9. Soil Ex	xposure Pat	hway			
Are People Occupying Residence or Attending School or Daycare on or Within 200 Feet of Area of Known or Suspected Contamination:	Number of Worke ☐ None ☐ 1 - 100 ☐ 101 - 1,0 ☐ > 1,000	mber of Workers Onsite ⁴ : ☑ None ☐ 1 - 100 ☐ 101 - 1,000 ☐ > 1,000		strial Sensitive Environments Been on or Within 200 Feet of Areas of uspected Contamination: ☐ Yes ☑ No		
⊡ Yes ☑ No			If Yes, List	Each Terrestrial Sensitive		
If Yes, Enter Total Residential Population:	Population Within People ⁷	1 Mile:	Environmo 	ent ⁵ : 		
People ²			*Refer to PA	Table 7 for environment types		
	10.	Air Pathway	/			
Is there a Suspected Release to Air ¹ : Ves No Enter Total Population on or Within:		Wetlands Lo	cated Within 4 M If Yes, Hov	iles of the Site°: v Many Acres: Acres		
Onsite		Other Sensitive Environments Located Within 4 Miles of the Site:				
0-1/4 Mile		☐ Yes ☑ No				
>1/4-1/2 Mile		List All Sensitive Environments Within 1/2 Mile of the Site ⁶ :				
>1/2-1 Mile		Distance: Sensitive Environment Type/Wetlands Area (acres):				
>1-2 Miles		Onsite	None			
>2-3 Miles		0-1/4 Mile	_Wetlands			
>3-4 Miles		>1/4-1/2 Mile	_Wetlands			
Total Within 4 Miles ³⁻⁵ _5,010_		*Refer to PA Tab	le 10 for calculations on	air pathway exposures		

					Identification	n
Potential H	azardous Wa	aste Site Pro	eliminary A	ssessment	State: SD	CERCLIS #:
		Form			CERCLIS Disc	overy Date:
		1. Gener	ral Site Informatio	on		
Name: Ellsworth A	FB	Street Address: 1	LOOO N Ellsworth Ro	ł		
City:		State: SD	Zip Code: 57769	County: Meade	Co. Code:	Cong. Dist:
Latitude:	Longitude:	Approximate Are	ea of Site:	Status of Site:		
44°8' 9.52"	103°4' 58.93"	0.2 Acres	S	Active	Not Specified	
		s	quare Ft		NA (GW plume.	etc.)
Site Name: Hazma	rt					,
Site Description: H	azmart (Building 191	1) is a chemical sto	orage facility locate	d on base. It is lo	cated in the so	outhern portion of
the base . The hazi are shrink wrapped	mart currently stores d and on pallets. The	about 3,965 galloı storage room has	ns of AFFF (Beck, 20 floor drains that w	015, personal com ould contain any :	nmunication). spills.	Most containers
		2. Owner/	Operator Informa	ation		
Owner: Ellsworth A	AFB		Operator: same a	is owner		
Street Address: 10	00 N Ellsworth Rd		Street Address:			
City:			City:			
State: SD	Zip Code:	Telephone:	State:	Zip Code:	Telephone:	
Type of Ownership):		Type of Ownersh	ip:		
□ Private	County					
✓ Federal Agency	Municipal		Federal Agency	🗌 Municipa	I	
Name: _DOD_	_ Not Specif	ied	Name:	_ Not Spec	ified	
	Other			Other		
		3. Site Ev	l valuator Informat	ion		
Name of Evaluator		Agency/Organiza	ation:		Date Prepare	ed:
Kelly Teplitsky		CH2M HILL			03/03/2015	
Street Address: 91	91 South Jamaica Stre	eet	City: Englewood		State: CO	
Name of EPA or Sta	ate Agency Contact:		Street Address:			
City:		State:		Telephone:		
		4. Site Dispo	sition <i>(for EPA use</i>	e onlv)		
Emergency Respor	se/Removal Assessm	ient	CERCLIS Recomm	endation:	Signature:	
Recommendation:	,,,	-	Higher Priority	/ SI	0	
			Lower Priority	SI	Name (typed):
_			CRA		Position:	
Da	te:		Date:			
		5. Genera	I Site Characteris	tics	-	
Predominant Land	Use Within 1 Mile of	Site (check all	Site Setting:		Years of Ope	ration:

that apply):					
Industrial	Agriculture		🗌 Urba	n	Beginning Year ?
	Mining	Other Federal	🗌 Subu	rban	Ending Vear present
Residential		□ Facility:	Rural		
		Other			Unknown
Type of Site Operation	ons (check all th	at apply):			Waste Generated:
			_		
	neck subcategory)				☐ Offsite
	cals		Junk/Salvage Yard		Onsite and Offsite
Plastic and/or Ru	ubber Products		Municipal Landfill		
Paints, Varnishes	5		Other Landfill		Waste Deposition Authorized
Industrial Organi	ic Chemicals				By: Present Owner
	nicais nemical Products				Former Owner Present & Former Owner
Primary Metals			Other Federal Facilit	y	
Metal Coating, Pl	lating, Engraving				Unknown
Metal Forging, St	tamping		Large Quantity	rage, or Disposal Generator	Waste Accessible to the Public:
	nent		Small Quantity	Generator	
Other Manufacture	iring		Subtitle D		□ Yes
	-		🗌 Municipa	I	⊡ No
Metals			Industria	I	
			"Converter" "Protective File	r"	Distance to Nearest Dwelling,
Oil and Gas			Son-or Late F	iler"	School, or Workplace:
Non-metallic Min	erals		Note Specified		
			Other		0 Feet
		6. Waste Cha	racteristics Infor	mation	
		(Defer to D	A Table 1 for MC Se		
	- Sour	(Refer to P	A Table 1 for WC Sco	pre)	Wasta
Source Type:	Sou	(Refer to P rce Waste Quantity:	A Table 1 for WC Sco Tier*:	General Type of	Waste
Source Type: (check all that apply)	Sou (inclue	(Refer to P rce Waste Quantity: le unit)	PA Table 1 for WC Sco Tier*:	General Type of (check all that app	Waste bly):
Source Type: (check all that apply)	Sou (inclue	(Refer to P rce Waste Quantity: le unit)	A Table 1 for WC Sco Tier*:	General Type of (check all that app Metals	Waste oly):
Source Type: (check all that apply)	Sou (inclue 	(Refer to P rce Waste Quantity: le unit)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co	Sou (inclui 	(Refer to P rce Waste Quantity: de unit)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile	Sou (inclue 	(Refer to P rce Waste Quantity: de unit)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app (check all that app Metals Organics Inorganics Solvents Paints/Pigments	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile	Sou (inclue ontainers	(Refer to P rce Waste Quantity: de unit)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste Explosives te
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile	Sou (inclur ontainers	(Refer to P rce Waste Quantity: le unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wasi Construction/Der	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Kining Waste Explosives te Other _AFFF_ molition Waste
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment	Sou (inclur ontainers	(Refer to P rce Waste Quantity: de unit)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste ital Waste Explosives te Other _AFFF_ nolition Waste
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum	Sou (inclue ontainers e e ne	(Refer to P rce Waste Quantity: de unit)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app (check all that app Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste ital Waste Explosives te Other _AFFF_ molition Waste
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source)	Sou (inclue ontainers e ne	(Refer to P rce Waste Quantity: de unit)	A Table 1 for WC Sco Tier*:	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Radioactive Wasi Construction/Der Physical State of that applv):	Waste Dly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Explosives te Other _AFFF_ molition Waste Waste as Deposited (check all
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedia	Sou (inclue ontainers e ne ment	(Refer to P rce Waste Quantity: de unit)	A Table 1 for WC Sco Tier*:	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste Dly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste tal Waste Explosives te Other _AFFF_ nolition Waste Waste as Deposited (check all Solid
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sediu (unidentified source)	Sou (inclue ontainers e ne ment	(Refer to P rce Waste Quantity: de unit)	PA Table 1 for WC Sco Tier*:	General Type of (check all that app Organics Organics Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste ital Waste Explosives te Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Composition of Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedit (unidentified source) Contaminated Soil Other	Sou (inclue ontainers e ne ment	(Refer to P rce Waste Quantity: de unit)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wasi Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Explosives te INDER Of ther _AFFF_ molition Waste Waste as Deposited (check all Solid Sludge Powder
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedii (unidentified source) Contaminated Soil Other No Sources	Sou (inclue ontainers e ne ment	(Refer to P rce Waste Quantity: de unit)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste ital Waste V Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Core
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedit (unidentified source) Contaminated Soil Other No Sources *C=Constitute	Sou (inclue ontainers e ne ment ent, W=Wastestream,	(Refer to P rce Waste Quantity: de unit)	PA Table 1 for WC Sco Tier*:	General Type of (check all that app Organics Organics Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste oly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste Ital Waste Explosives te Other _AFFF_ molition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedii (unidentified source) Contaminated Soil Other No Sources *C=Constitue	Sou (inclui ontainers e ne ment ent, W=Wastestream,	(Refer to P rce Waste Quantity: de unit) 	'A Table 1 for WC Sco Tier*:	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wasi Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste ital Waste Explosives te Other_AFFF_ molition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitue	Sou (inclue ontainers e ne ment ent, W=Wastestream,	(Refer to P rce Waste Quantity: de unit) 	A Table 1 for WC Sco Tier*:	General Type of (check all that app Organics Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste Ply): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Nining Waste Explosives te Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas arget Population Served by
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedit (unidentified source) Contaminated Soil Other No Sources *C=Constitue Within 4 Miles:	Sou (inclue ontainers	(Refer to P rce Waste Quantity: de unit) 	Tier*: Tier*: 	General Type of (check all that app Organics Organics Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste ital Waste Explosives te Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas Garget Population Served by Vithdrawn From:
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Chemical Waste Pile Chemical Waste Pile Contaminated GW Plum (unidentified source) Contaminated SW/Sedit (unidentified source) Contaminated Soil Other No Sources *C=Constitute Within 4 Miles: Ves	Sou (inclue ontainers	(Refer to P rce Waste Quantity: le unit)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Organics Organics Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Huning Waste Explosives te Other_AFFF_ molition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedii (unidentified source) Contaminated Soil Other No Sources *C=Constitue Within 4 Miles: Yes No	Sou (inclue ontainers e ne ment ent, W=Wastestream, ed for Drinking	(Refer to P rce Waste Quantity: de unit)	Tier*: Tier*: 	General Type of (check all that app Organics Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wasi Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste te Vother _AFFF_ molition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas Garget Population Served by Vithdrawn From:
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedit (unidentified source) Contaminated Soil Other No Sources *C=Constitue Within 4 Miles: Yes No	Sou (inclue ontainers	(Refer to P rce Waste Quantity: de unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Organics Organics Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste Ply): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste Ital Waste Vother _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas Gas Garget Population Served by Vithdrawn From:NA

Feet Type of Drinking Water Wells Within Miles (check all that apply): Municipal Private	Water Wells Been In 4 Yes Vo	dentified:	>1/2 - 1 Mile	NA	
Type of Drinking Water Wells Within Miles (check all that apply):	4 □ Yes ☑ No		>1/2 - 1 Mile	NA	
Miles (check all that apply):	→ Li Yes ✓ No				
Municipal	les Ves			NA	
Private	If Yes, Enter Prima Population	ry Target	>2 - 3 Mile	NA	
□ None	[eople ³	>3 - 4 Mile	NA	
Depth to Shallowest Aquifer:	Nearest Designated	Wellhead	Total Within 4 Miles ⁴ NA		
~ 10 to 50 Feet	Protection Area ⁶ :		Total Within 4 Miles	_177	
Karst Terrain/Aquifer Present:	☐ Underlie: ☐ >0-4 Mil ☑ None Wi	Site es hin 4 Miles	*Use population #s for PA Table 2 *Note pagest well for #5 on GW Pathway Scoresheet		
✓ No					
	8. Surface	Water Pathwa	ay		
Type of Surface Water Draining Site an that apply):	d 15 Miles Downstrea	m (check all	Shortest Overland Dista Surface Water:	ance From Any Source to	
Stream River F	Pond 🗌 Lake		_790_ Feet		
🗌 Bay 🗌 Ocean 🔲 C	Dther			Miles	
Is There a Suspected Release to Surfac	e Water ¹ .		Site is Located in:		
is more a suspected herease to sullate			Annual - 10 yr Flo	odplain	
☐ Yes ☑ No			 ☐ >10yr - 100yr Floodplain ☐ >100yr - 500yr Floodplain ☐ >500yr Floodplain 		
Drinking Water Intake Located Along t	he Surface Water Mig	ation Path:	List All Secondary Targe	et Drinking Water Intakes:	
□ Yes			, ,	J. J	
V NO			<u>Name: Water Body: Flo</u>	w (cfs): Population Served:	
Have Primary Target Drinking Water In	takes Been Identified				
☐ Yes If Yes, Dista ☑ No Water Intak	nce to Nearest Drinkir e : Miles ⁶	g			
If Yes, Enter Population Served by Targ	et Intake:				
			Total within 15 Miles ⁴		
NAPeople ⁴			Total within	13 Miles -	
Fisheries Located Along the Surface Wa	ater Migration Path:		List All Secondary Targe	et Fisheries ¹⁰ :	
□ Yes ☑ No If Yes, Distan	ice to Nearest Fishery: Miles		Water Body/ Fishery Name	<u>e: Flow (cfs)</u> :	
Have Primary Target Fisheries Been Ide	entified:		1		
🗌 Yes 🛛 🗹 No					
	8. Surface Wate	r Pathway (con	ntinued)		
Wetlands Located Along the Surface W	/ater Migration C	ther Sensitive E ligration Path:	nvironments Located Alc	ong the Surface Water	
Path:	✓ Yes □ Yes □ Yes			Nearest Sensitive	
Path: ☑ Yes □ No		⊡ Yes ☑ No	Environment:	Miles	
Path: ☑ Yes □ No Have Primary Target Wetlands Been Io	dentified: H	□ res ☑ No ave Primary Targ	Environment:	Miles	
Path: Yes No Have Primary Target Wetlands Been Id Yes No	dentified: H	☐ Yes ☑ No ave Primary Tarş	Environment: get Sensitive Environmer	Miles hts Been Identified:	

<u>Water Body</u> : <u>Flow (cfs)</u> : <u>Frontage miles:</u>		Water Body :	Flow (cfs):	Sensitive Environment Type:		
	9. Soil E	xposure Pat	hway			
Are People Occupying Residence or	Number of Worke	ers Onsite ⁴ :	Have Terre	estrial Sensitive Environments Been		
Attending School or Daycare on or			Identified	on or Within 200 Feet of Areas of		
Within 200 Feet of Area of Known or	☑ None ☑ 1 - 100		Known or a	Suspected Contamination:		
Suspected Contamination:	🗌 101 - 1,	000				
	□ > 1,000			Yes INO		
□ Yes						
I No			If Yes, Lis	t Each Terrestrial Sensitive		
	Population Within	n 1 Mile:	Environm	nent ⁵ :		
If Yes, Enter Total Residential						
Population:	People	7				
People ²			*Refer to P/	Table 7 for environment types		
1	10.	Air Pathwa	У	c		
Is there a Suspected Release to Air ¹ :		Wetlands Lo	cated Within 4 N	/iles of the Site°:		
⊥ Yes ✓ No		✓ Yes	If Vec. Ho	W Many Acros		
Enter Total Deputation on an Within		🗌 No	11 163, 110	If fes, how Maily Acres Acres		
Enter Total Population on or Within:		Other Sensitive Environments Located Within 4 Miles of the Site				
Onsite		Other Sensitive Environments Located Within 4 Miles of the Site:				
		☐ Yes ☑ No				
0-1/4 WINE						
>1/4-1/2 Mile		List All Sensitive Environments Within 1/2 Mile of the Site ⁶ :				
>1/2-1 Mile		<u>Distance:</u>	Sensitive Environ	ment Type/Wetlands Area (acres):		
>1-2 Miles		Onsite	None			
>2-3 Miles		0-1/4 Mile	_Wetlands			
>3-4 Miles		>1/4-1/2 Mile	e _Wetlands			
Total Within 4 Miles ³⁻⁵						

	- ·				Identificatio	n
Potential H	lazardous Wa	aste Site F –	Preliminary	Assessment	State: SD	CERCLIS #:
		Form			CERCLIS Disc	covery Date:
		1. Gei	neral Site Inform	ation		
Name: Ellsworth	AFB	Street Address	s: 1000 N Ellsworth	n Rd		
City:		State: SD	Zip Code: 57769	County: Meade	Co. Code:	Cong. Dist:
Latitude:	Longitude:	Approximate	Area of Site:	Status of Site:		
44°7' 54.49"	103°4' 41.05"	4.3	Acres		Not Specified	
			Square Ft		NA (GW nlume	etc)
Site Name: Waste	Water Treatment Pla		•		fuir (our plaine,	
Site Description	The base W/WTP is loc	ated in the sout	heast nortion of th	hase The W/W/TP w	vas decommi	ssioned in July of
2014 During one	rations all waste with	in the canitary of	sewer and the indu	istrial sower lines we	nt to the W/M	/TP Treated water
2014. During oper	autfall E which flow	ad to upported	drainages then to			where it want
was uischargeu tu	outidii 5, wilicii ilow		urainages then to	Goll Course Lake and		where it went
offbase and disch	arged to Boxelder Cre	eĸ.				
		2. Owne	er/Operator Infor	mation		
Owner: Ellsworth	AFB		Operator: sam	ne as owner		
Street Address: 10	000 N Ellsworth Rd		Street Address	5:		
City:			City:			
State: SD	Zip Code:	Telephone:	State:	Zip Code:	Telephone:	
Type of Ownershi	n.		Type of Owne	rshin [.]		
	p.		-	rsnip.		
					I	
Name: DOD		fied	Name:	Not Spec	' ified	
State	Other_		State	Other		
Indian			Indian			
		3. Site	Evaluator Inform	nation		
Name of Evaluato	or:	Agency/Organ	ization:		Date Prepar	ed:
Kelly Teplitsky		CH2M HILL			03/03/2015	
Street Address: 92	191 South Jamaica Str	eet	City: Englewoo	bd	State: CO	
Name of EPA or S	tate Agency Contact:		Street Address	s:		
City:		State:	<u> </u>	Telephone		
City.		State.		relephone.		
			nocition /for FDA			
		4. Site Dis		use only	<u>c</u> ; ,	
Emergency Respo	onse/Removal Assessr	nent	CERCLIS Recor	nmendation:	Signature:	
Recommendation	1:		Higher Pri	ority SI	Name (tune	47.
	Ves			nity SI	ivanie (type)	<i></i>
	🗌 No				Position	
ח	ate:		Other:			
			Date:			
		5. Gene	eral Site Characte	eristics		
Predominant Lan	d Use Within 1 Mile o	f Site (check all	Site Setting:		Years of Ope	eration:

that apply):						
Industrial	Agriculture		🗌 Urbai	Beginning Year ?		
	Mining	Other Federal	🗌 Subu	rban	Ending Vear 2014	
Residential			🗹 Rural			
		Other			Unknown	
Type of Site Operation	ons (check all th	at apply):			Waste Generated:	
Manufacturing (must cl	heck subcategory)		Retail		✓ Onsite	
Lumber and Woo	od Products		Recycling Iunk/Salvage Yard		Onsite and Offsite	
Plastic and/or Ru	ibber Products		Municipal Landfill			
Paints, Varnishes	5		Other Landfill		Waste Deposition Authorized	
Industrial Organi	c Chemicals				By: Present Owner	
Agricultural Chen Missellaneous Chen	nicals				Former Owner	
Primary Metals	iemical Products		Other Federal Facilit	У	Unauthorized	
Metal Coating, Pl	lating, Engraving		CRA RCRA			
Metal Forging, St	tamping		Treatment, Sto	rage, or Disposal	Waste Accessible to the Public:	
Fabricated Struct Electronic Equipr	tural Metal Products		Small Quantity	Generator		
Other Manufactu	ring		Subtitle D			
	5		🗌 Municipa	I	✓ No	
			🗌 Industria	I		
			"Converter" "Protective File	r"	Distance to Nearest Dwelling,	
Oil and Gas			"Non-or Late Fi	ler"	School, or Workplace:	
Non-metallic Min	erals		Note Specified			
			Other		1,500 Feet	
6. Waste Characteristics Information						
		(2, (), 2		········		
с. т		(Refer to P	A Table 1 for WC Sco	pre)		
Source Type:	Sou	(Refer to P. rce Waste Quantity:	A Table 1 for WC Sco Tier*:	ore) General Type of	Waste	
Source Type: (check all that apply)	Sou (inclue	(Refer to P. rce Waste Quantity: de unit)	A Table 1 for WC Sco Tier*:	General Type of (check all that app	Waste bly):	
Source Type: (check all that apply)	Sou (inclue	(Refer to P. rce Waste Quantity: de unit)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app	Waste bly):	
Source Type: (check all that apply)	Sou (inclue	(Refer to P. rce Waste Quantity: de unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste	
Source Type: (check all that apply)	Sou (inclue 	(Refer to P. rce Waste Quantity: de unit)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co	Sou (inclue pontainers	(Refer to P. rce Waste Quantity: de unit)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile	Sou (inclue 	(Refer to Parce Waste Quantity: de unit)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hospi	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste Explosives to Other AFEE	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile	Sou (inclue ontainers	(Refer to P. rce Waste Quantity: de unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hospi Radioactive Wast Construction/Der	Waste Dly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste ital Waste Explosives te Other _AFFF_ molition Waste	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Tractment	Sou (inclue ontainers	(Refer to P. rce Waste Quantity: de unit)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hospi Radioactive Wast Construction/Der	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste tal Waste Explosives te Other _AFFF_ nolition Waste	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum	Sou (inclue ontainers e e e ne	(Refer to P. rce Waste Quantity: de unit)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app (check all that app Organics Inorganics Solvents Paints/Pigments Laboratory/Hospi Radioactive Wast Construction/Der	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Explosives te Other_AFFF_ molition Waste	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source)	Sou (inclue ontainers	(Refer to P. rce Waste Quantity: de unit)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hospi Radioactive Wast Construction/Der	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Kaste Explosives te I other _AFFF_ molition Waste Maste as Deposited (check all	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedit	Sou (inclue ontainers e ne ment	(Refer to P. rce Waste Quantity: de unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Organics Organics Inorganics Solvents Paints/Pigments Laboratory/Hospi Radioactive Wast Construction/Der Physical State of that apply):	Waste Dly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Nining Waste Explosives te Other _AFFF_ nolition Waste Waste as Deposited (check all Solid	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sediu (unidentified source)	Sou (inclue ontainers	(Refer to P. rce Waste Quantity: de unit)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste ital Waste Explosives te Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other	Sou (inclue ontainers e ne ment	(Refer to P. rce Waste Quantity: de unit)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hospi Radioactive Wast Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Explosives te INDER Other _AFFF_ molition Waste Waste as Deposited (check all Solid Sludge Powder	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sediu (unidentified source) Contaminated Soil Other No Sources	Sou (inclue ontainers e ne ment	(Refer to P. rce Waste Quantity: de unit)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Solvents Paints/Pigments Laboratory/Hospi Radioactive Wast Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste ital Waste V Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Core	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Cc Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sediu (unidentified source) Contaminated Sul Other No Sources *C=Constitute	Sou (inclue ontainers e ne ment ent, W=Wastestream,	(Refer to P. rce Waste Quantity: de unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste oly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste Ital Waste Explosives te Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sediu (unidentified source) Contaminated Soil Other No Sources *C=Constitue	Sou (includ ontainers e ne ment ent, W=Wastestream,	(Refer to P. rce Waste Quantity: de unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Solvents Paints/Pigments Laboratory/Hospi Construction/Der Physical State of that apply):	Waste oly): □ Pesticides/Herbicides □ Acids/Bases □ Oily Waste □ Municipal Waste □ Mining Waste □ Kaplosives te ☑ Other _AFFF_ molition Waste F Waste as Deposited (check all Solid Sludge Powder Liquid Gas	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Cc Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitue	Sou (inclue ontainers	(Refer to P. rce Waste Quantity: de unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Organics Organics Organics Solvents Paints/Pigments Laboratory/Hospi Radioactive Wast Construction/Der Physical State of that apply):	Waste Ply): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Nining Waste Explosives te Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas arget Population Served by	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Cc Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitue Within 4 Miles:	Sou (inclue ontainers	(Refer to P. rce Waste Quantity: de unit) 	A Table 1 for WC Sco Tier*: —— —— —— —— —— —— —— —— —— —— —— —— ——	General Type of (check all that app Organics Organics Solvents Paints/Pigments Laboratory/Hospi Radioactive Wast Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste ital Waste Explosives te Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas Garget Population Served by Vithdrawn From:	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Cc Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitue Within 4 Miles: Ves	Sou (inclue ontainers	(Refer to P. rce Waste Quantity: de unit) de unit)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Organics Organics Solvents Paints/Pigments Laboratory/Hospi Radioactive Wast Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Huning Waste Explosives te Other_AFFF_ molition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitue Within 4 Miles: Yes No	Sou (inclue ontainers	(Refer to P. rce Waste Quantity: de unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Solvents Paints/Pigments Laboratory/Hospi Radioactive Wast Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste te Vother _AFFF_ molition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas Garget Population Served by Vithdrawn From:	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Cc Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitue Within 4 Miles: Yes No	Sou (inclue ontainers	(Refer to P. rce Waste Quantity: de unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Organics Organics Organics Solvents Paints/Pigments Laboratory/Hospi Radioactive Wast Construction/Der Physical State of that apply):	Waste Ply): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste Ital Waste Vother _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas Gas Garget Population Served by Vithdrawn From:NA	

Drinking Well:	Have Drimany Targe	+ Drinking	~1/4 - 1/2 IVIIIC	IVA	
Feet	Have Primary Target Drinking				
Type of Drinking Water Wells Within 4	Anno of Drinking Water Wells Within 4			NA	
Miles	Miles Vitra			NA	
Municipal	If Yes, Enter Prima Population	ary Target	>2 - 3 Mile	NA	
PrivateNone	l	People ³	>3 - 4 Mile	NA	
Depth to Shallowest Aquifer:	Nearest Designated	l Wellhead	Total Within 4 Miles ⁴	NΔ	
~ 10 to 50 Feet	Protection Area ⁶ :			_1174	
Karst Terrain/Aquifer Present:	☐ Underlie: ☐ >0-4 Mil ☑ None Wi	s Site es thin 4 Miles	*Use population #s for PA Ta *Note nearest well for #5 or	able 2 n GW Pathway Scoresheet	
✓ No					
	8. Surface	Water Pathwa	iy		
Type of Surface Water Draining Site and that apply):	15 Miles Downstrea	ım (check all	Shortest Overland Dista Surface Water:	ance From Any Source to	
 ✓ Stream ☐ River ✓ Pc ☐ Bay ☐ Ocean ☐ Otean 	ond 🗌 Lake		_120_Fee	t Miles	
is There a Suspected Release to Surface	water :			odolain	
✓ Yes □ No			 ☐ >10yr - 100yr Floodplain ☐ >100yr - 500yr Floodplain ☐ >500yr Floodplain 		
Drinking Water Intake Located Along th	e Surface Water Mig	ration Path:	List All Secondary Targe	et Drinking Water Intakes:	
☐ Yes ☑ No			Name: Water Body: Flo	w (cfs): Population Served:	
Have Primary Target Drinking Water Int	akes Been Identified	:			
□ Yes If Yes, Distan ☑ No Water Intake	ice to Nearest Drinkir e : Miles ⁶	ng			
If Voc. Enter Deputation Served by Targe					
in res, enter Population Served by Targe					
NA People ⁴			Total within	15 Miles ⁴	
Fisheries Located Along the Surface Wa	ter Migration Path:		List All Secondary Targe	et Fisheries ¹⁰ :	
□ Yes ☑ No If Yes, Distance	ce to Nearest Fishery: Miles	:	Water Body/ Fishery Name	<u>e</u> : <u>Flow (cfs)</u> :	
Have Primary Target Fisheries Been Ider	ntified:				
Yes Vo					
	8 Surface Wate	r Dathway (cor	tinued)		
	8. Juliace wate	i Fatilway (Col	lillacaj		
Wetlands Located Along the Surface Wa Path:	ater Migration	Dther Sensitive E Aigration Path:	nvironments Located Ald	ong the Surface Water	
Wetlands Located Along the Surface Wa Path: ☑ Yes □ No	ater Migration C	Dther Sensitive E Aigration Path: ☐ Yes ☑ No	nvironments Located Ald If Yes, Distance to Environment:	ong the Surface Water Nearest Sensitive Miles	
Wetlands Located Along the Surface Wa Path:	entified:	Dther Sensitive E Aigration Path: ☐ Yes ☑ No lave Primary Tar	nvironments Located Alo If Yes, Distance to Environment: get Sensitive Environmer	ong the Surface Water Nearest Sensitive Miles nts Been Identified:	
Wetlands Located Along the Surface Wa Path:	entified:	Dther Sensitive E Aigration Path: □ Yes ☑ No lave Primary Tar	nvironments Located Alo If Yes, Distance to Environment: get Sensitive Environmer ☐ Yes ☑ No	ong the Surface Water Nearest Sensitive Miles hts Been Identified:	

<u>Water Body</u> : <u>Flow (cfs)</u> : <u>Frontage miles:</u>		Water Body :	Flow (cfs):	Sensitive Environment Type:		
	9. Soil E	xposure Pat	hway			
Are People Occupying Residence or	Number of Worke	ers Onsite ⁴ :	Have Terres	strial Sensitive Environments Been		
Attending School or Daycare on or			Identified o	on or Within 200 Feet of Areas of		
Within 200 Feet of Area of Known or	□ 1 - 100		Known or S	Suspected Contamination:		
Suspected Contamination:	□ 101 - 1,	000				
	□ > 1,000	1		☐ Yes ☑ No		
☐ Yes						
∠ No			If Yes, List	Each Terrestrial Sensitive		
	Population Withir	n 1 Mile:	Environm	ent ² :		
Population:	People	7				
People ²		*Refer to PA Table 7 for environment types		Table 7 for environment types		
	10.	Air Pathwa	y			
Is there a Suspected Release to Air^1 :		Wetlands Lo	cated Within 4 M	liles of the Site ⁶ :		
☐ Yes ☑ No		✓ Yes	If Yes, Hov	w Many Acres: Acres		
Enter Total Population on or Within:						
Onsite		Other Sensitive Environments Located Within 4 Miles of the Site:				
0-1/4 Mile		☐ Yes ☑ No				
>1/4-1/2 Mile		List All Sensitive Environments Within 1/2 Mile of the Site ⁶ :				
>1/2-1 Mile		Distance: Sensitive Environment Type/Wetlands Area (acres):				
>1-2 Miles		Onsite	None			
>2-3 Miles		0-1/4 Mile	_Wetlands			
>3-4 Miles		>1/4-1/2 Mile	e _Wetlands			
Total Within 4 Miles ³⁻⁵ _7,530_						

	_				Identification	า
Potential H	lazardous Wa	ste Site Pro	eliminary A	ssessment	State: SD	CERCLIS #:
		Form			CERCLIS Disco	overy Date:
		1. Genei	ral Site Information	on		
Name: Ellsworth A	\FB	Street Address: 1	LOOO N Ellsworth Ro	ł		
City:		State: SD	Zip Code:	County: Meade	Co. Code:	Cong. Dist:
Latitude:	Longitude:	Approximate Are	of Site:	Status of Site:		
AA°8' 25 23"	103°5' 35 30"	6.8 A				
44 0 23.23	105 5 55.50	_0.0 /	guare Ft		Not Specified	ote)
Sita Nama: Sprav	Nozzlo Tost Aroz		4		INA (Gw pluttle, i	
Site Description: I	n the 1970s and 1980s	equinment testi	ng was conducted	near numphouses	: 1_3 at the en	d of the runway
using 6% AFFF. Th driven to the edge	is routine equipment e of the ramp and the	testing was often operator would sh	conducted when cr noot foam out acro	ash trucks were c ss the grass.	hecked out. T	he truck would be
		2. Owner/	Operator Informa	ation		
Owner: Ellsworth	AFB		Operator: same a	is owner		
Street Address: 10	000 N Ellsworth Rd		Street Address:			
City:			City:			
State: SD	Zip Code:	Telephone:	State:	Zip Code:	Telephone:	
Type of Ownershi	p:		Type of Ownersh	ip:		
Private	County		☐ Private			
Federal Agency	☐ Municipal		Federal Agency	🗌 Municipa	I	
Name: _DOD_	_ Dot Specif	ied	Name:	_ Not Spec	ified	
	Other			U Other		
		3. Site Ev	aluator Informat	ion		
Name of Evaluato	r:	Agency/Organiza	ation:		Date Prepare	d:
Kelly Teplitsky		CH2M HILL			03/03/2015	
Street Address: 91	.91 South Jamaica Stre	et	City: Englewood		State: CO	
Name of EPA or St	ate Agency Contact:		Street Address:		1	
City:		State:		Telephone:		
		4. Site Dispos	sition <i>(for EPA us</i>	e onlv)		
Emergency Respo	nse/Removal Assessm	ent	CERCLIS Recomm	endation:	Signature:	
Recommendation	:	-	Higher Priority	/ SI	0	
	□ Yes		Lower Priority	SI	Name (typed):
	□ No					
			Other:		Position:	
Da	ale		Date:			
		5. Genera	I Site Characteris	tics		
Predominant Land	Use Within 1 Mile of	Site (check all	Site Setting:		Years of Ope	ration:

that apply):						
Industrial	Agriculture [🗌 Urbai	n	Beginning Year 1970s	
	Mining	Other Federal	🗌 Subu	rban	Ending Year 1980s	
Residential Forest/Fields			Rural			
	[]]]]]] Other			Unknown	
Type of Site Operation	ons (check all tha	t apply):			Waste Generated:	
	, 		_			
	heck subcategory)		Retail Recycling		☐ Offsite	
Lumber and woo Inorganic Chemie	cals		Junk/Salvage Yard		Onsite and Offsite	
Plastic and/or Ru	ubber Products		Municipal Landfill			
Paints, Varnishes	5		Other Landfill		Waste Deposition Authorized	
Industrial Organi	ic Chemicals				By: Present Owner	
	nicals nemical Products				Former Owner Present & Former Owner	
Primary Metals			Other Federal Facilit	y		
Metal Coating, Pl	lating, Engraving				Unknown	
Metal Forging, St	tamping		Large Quantity	rage, or Disposal Generator	Waste Accessible to the Public:	
	nent		Small Quantity	Generator		
Other Manufactu	iring		Subtitle D		□ Yes	
	-		🗌 Municipa	I	⊡ No	
Metals			Industria	I		
			"Converter" "Protective File	r"	Distance to Nearest Dwelling,	
Oil and Gas			Son-or Late Fi	iler"	School, or Workplace:	
Non-metallic Min	erals		□ Note Specified			
			Other		_1,050 Feet	
6. Waste Characteristics Information						
		(Defente D	A Table 1 fem MC Car			
Courses Turney	(aut	(Refer to P	A Table 1 for WC Sco	pre)	Mosto	
Source Type:	Sour	(Refer to P ce Waste Quantity:	A Table 1 for WC Sco Tier*:	General Type of	Waste	
Source Type: (check all that apply)	Sour (includ	(Refer to P ce Waste Quantity: e unit)	A Table 1 for WC Sco Tier*:	General Type of (check all that app	Waste bly):	
Source Type: (check all that apply)	Sour (includ	(Refer to P ce Waste Quantity: e unit)	A Table 1 for WC Sco Tier*:	General Type of (check all that app Metals	Waste oly):	
Source Type: (check all that apply)	Sour (includ	(Refer to P ce Waste Quantity: e unit)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste	
Source Type: (check all that apply) Landfill Surface Impoundment Drums	Sour (includ 	(Refer to P ce Waste Quantity: e unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents	Waste bly): Acids/Bases Oily Waste Municipal Waste	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile	Sour (includ pontainers	(Refer to P ce Waste Quantity: e unit)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile	Sour (includ ontainers e	(Refer to P ce Waste Quantity: e unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app (check all that app)) (check all that app) (check a	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste Explosives te	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pike Tailings Pile	Sour (includ ontainers e	(Refer to P ce Waste Quantity: e unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wasi	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Kital Waste Explosives te Other _AFFF_ molition Waste	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum)	Sour (includ ontainers e	(Refer to P ce Waste Quantity: e unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app details organics lorganics solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste tal Waste Explosives te Other _AFFF_ nolition Waste	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum	Sour (includ ontainers	(Refer to P ce Waste Quantity: e unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app (check all that app Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wasi Construction/Der	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Explosives te Other _AFFF_ molition Waste Waste as Deposited (check all	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source)	Sour (includ ontainers	(Refer to P ce Waste Quantity: e unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app (check all that app Organics Inorganics Solvents Paints/Pigments Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste tal Waste Explosives te Other _AFFF_ molition Waste	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedia	Sour (includ	(Refer to P ce Waste Quantity: e unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste Dly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Kate Scheme Vother _AFFF_ nolition Waste Waste as Deposited (check all Solid	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Tailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedii (unidentified source)	Sour (includ ontainers e ne ment	(Refer to P ce Waste Quantity: e unit)	A Table 1 for WC Sco Tier*:	General Type of (check all that app Organics Organics Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste ital Waste Explosives te Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Composition of Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedit (unidentified source) Contaminated Soil	Sour (includ ontainers	(Refer to P ce Waste Quantity: e unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Hining Waste ital Waste V Other _AFFF_ molition Waste Waste as Deposited (check all Solid Sludge Powder	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedii (unidentified source) Contaminated Soil Other No Sources	Sour (includ	(Refer to P ce Waste Quantity: e unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste ital Waste V Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedit (unidentified source) Contaminated Soil Other No Sources *C=Constitute	Sour (includ	(Refer to P ce Waste Quantity: e unit) 	A Table 1 for WC Sco Tier*:	General Type of (check all that app Organics Organics Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste oly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste Ital Waste Explosives te Other _AFFF_ molition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trailings Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedii (unidentified source) Contaminated Soil Other No Sources *C=Constitue	Sour (includ	(Refer to P ce Waste Quantity: e unit) 	A Table 1 for WC Sco Tier*: —— —— —— —— —— —— —— —— —— —— —— —— ——	General Type of (check all that app Metals Organics Inorganics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wasi Construction/Der Physical State of that apply):	Waste oly): □ Pesticides/Herbicides □ Acids/Bases □ Oily Waste □ Municipal Waste □ Mining Waste □ Kaplosives te ☑ Other _AFFF_ molition Waste F Waste as Deposited (check all Solid Sludge Powder Liquid Gas	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedin (unidentified source) Contaminated Soil Other No Sources *C=Constitue	Sour (includ	(Refer to P ce Waste Quantity: e unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Organics Organics Organics Solvents Paints/Pigments Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste ital Waste V Other _AFFF_ molition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas Garget Population Served by	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedit (unidentified source) Contaminated Soil Other No Sources *C=Constitue Within 4 Miles:	Sour (includ	(Refer to P ce Waste Quantity: e unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Organics Organics Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste ital Waste Explosives te Other _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas Garget Population Served by Vithdrawn From:	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Comtaminated of Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedii (unidentified source) Contaminated Soil Other No Sources *C=Constitue Within 4 Miles: Ves	Sour (includ	(Refer to P ce Waste Quantity: e unit)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Organics Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Huning Waste Explosives te Other_AFFF_ molition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Chemical Waste Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedii (unidentified source) Contaminated Soil Other No Sources *C=Constitue Within 4 Miles: Yes No	Sour (includ	(Refer to P ce Waste Quantity: e unit) 	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Organics Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wasi Construction/Der Physical State of that apply):	Waste bly): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Hining Waste Explosives te Other_AFFF_ molition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas Garget Population Served by Vithdrawn From:	
Source Type: (check all that apply) Landfill Surface Impoundment Drums Tanks and Non-Dum Co Chemical Waste Pile Scrap Metal or Junk Pile Trash Pile (open drum) Land Treatment Contaminated GW Plum (unidentified source) Contaminated SW/Sedit (unidentified source) Contaminated Soil Other No Sources *C=Constitue Within 4 Miles: Yes No	Sour (includ	(Refer to P ce Waste Quantity: e unit)	A Table 1 for WC Sco Tier*: 	General Type of (check all that app Organics Organics Organics Solvents Paints/Pigments Laboratory/Hosp Radioactive Wast Construction/Der Physical State of that apply):	Waste Ply): Pesticides/Herbicides Acids/Bases Oily Waste Municipal Waste Mining Waste Ital Waste Vother _AFFF_ nolition Waste Waste as Deposited (check all Solid Sludge Powder Liquid Gas Gas Garget Population Served by Vithdrawn From:NA	

Feet Nave Primary Parget Diffixing Water Wells Been Identified: >1/2 - 1 Mile Miles No (check all that apply): If Yes, Enter Primary Target Private No Private Population: Private No Private Population: Private Population: Private Population: Private Population: Private Population: Private Population: Private Name: Ves None Within 4 Miles* NA			
Type of Drinking Water Wells Within 4 □ Yes >1/2 - 1 Mile _NA			
Type of Drinking water wears wears wears (check all that apply): (check all that apply): (f Yes, Enter Primary Target Population: Protection Area ⁶ : Monce Prose Prose <td< td=""><td></td></td<>			
If Yes, Enter Primary Target Private Private <t< td=""><td></td></t<>			
Private			
Depth to Shallowest Aquifer: Nearest Designated Wellhead ~ 10 to 50 Feet Protection Area ⁶ : Karst Terrain/Aquifer Present: Underlies Site Pres None Within 4 Miles Yes None Within 4 Miles Yos None Within 4 Miles Yos Shortest Overland Distance From Any S Stream River Bay Ocean Other Lake Yes Miles Yes Miles No Site is Located in: Pres No In No Site is Located in: Yes No No No No Site is Located in: Pres No No Site is Located in: Yes No No Sofyr Floodplain >Stogr Floodplain Sofyr Floodplain Pres If Yes, Distance to Nearest Drinking No Water Intakes Been Identified: No Miles ⁶ No Water Intake: No Water Intake: No Water Int			
~ 10 to 50 Feet Protection Area ⁶ : International and the second s			
Karst Terrain/Aquifer Present: Underlies Site >0-4 Miles *Use population #s for PA Table 2 No *None Within 4 Miles *Use population #s for PA Table 2 Type of Surface Water Draining Site and 15 Miles Downstream (check all that apply): Shortest Overland Distance From Any S Surface Water: Stream River Pond Lake _1,400_Feet Bay Ocean Other Miles Surface Water: Is There a Suspected Release to Surface Water ¹ : Site is Located in: Annual - 10 yr Floodplain > 10yr Floodplain Yes No >100 reloodplain > 500 reloodplain > 100 reloodplain Yes No No Site is Located in: Annual - 10 yr Floodplain Yes No Site is Located in: Annual - 10 yr Floodplain Yes No Site is Located in: Annual - 10 yr Floodplain Pres No No Site is Located in: Annual - 10 yr Floodplain Pres No No Name: Water Body: Floodplain Story Floodplain In Fiber No Water Intakes Been Identified:			
Image: Note of Surface Water Draining Site and 15 Miles Downstream (check all shortest Overland Distance From Any S Surface Water Draining Site and 15 Miles Downstream (check all shortest Overland Distance From Any S Surface Water: Image: Stream River Pond Lake Miles Image: Stream River Pond Lake Miles Image: Stream River Pond Lake Miles Is There a Suspected Release to Surface Water ¹ : Site is Located in: Miles Is There a Suspected Release to Surface Water ¹ : Site is Located in: Miles Is There a Suspected Release to Surface Water ¹ : Site is Located in: Miles Is There a Suspected Release to Surface Water ¹ : Site is Located in: Miles Is There a Suspected Release to Surface Water ¹ : Site is Located in: Miles Is There a Suspected Release to Surface Water Migration Path: List All Secondary Target Drinking Water Intakes Been Identified:	heet		
8. Surface Water Pathway Type of Surface Water Draining Site and 15 Miles Downstream (check all that apply): Shortest Overland Distance From Any S Surface Water: Stream River Pond Lake			
Type of Surface Water Draining Site and 15 Miles Downstream (check all that apply): Shortest Overland Distance From Any S Stream River Bay Ocean Other Is There a Suspected Release to Surface Water ¹ : Yes No Drinking Water Intake Located Along the Surface Water Migration Path: Yes Yes No Have Primary Target Drinking Water Intakes Been Identified: Yes Yes No Water Rody: Fisheries Located Along the Surface Water Migration Path: Fisheries Located Along the Surface Water Migration Path: List All Secondary Target Drinking Water Intakes Been Identified: Yes No Fisheries Located Along the Surface Water Migration Path: List All Secondary Target Drinking Water Intakes Been Identified: Total within 15 Miles ⁴ Total within 15 Miles ⁴			
Stream River Bay Ocean Other Is There a Suspected Release to Surface Water ¹ : Yes No Site is Located in: Yes No Drinking Water Intake Located Along the Surface Water Migration Path: Yes Yes No Have Primary Target Drinking Water Intakes Been Identified: Yes Yes No Water Intake : Miles Site is Located Along the Surface to Nearest Drinking Water Intake : Miles ⁶ If Yes, Enter Population Served by Target Intake: NA_ People ⁴ Fisheries Located Along the Surface Water Migration Path: List All Secondary Target Fisheries ¹⁰ ;	Source to		
Is There a Suspected Release to Surface Water ¹ : Yes No Drinking Water Intake Located Along the Surface Water Migration Path: Yes No Have Primary Target Drinking Water Intakes Been Identified: Yes Yes Yes Yes Yes If Yes, Distance to Nearest Drinking Water Intake : NA_People ⁴ Site is Located in: Annual - 10 yr Floodplain Site is Located in	_1,400_ Feet Miles		
Image: Second and the second and t	Site is Located in:		
Drinking Water Intake Located Along the Surface Water Migration Path: List All Secondary Target Drinking Water ☐ Yes No Have Primary Target Drinking Water Intakes Been Identified:	 ☐ Annual - 10 yr Floodplain ☐ >10yr - 100yr Floodplain ☐ >100yr - 500yr Floodplain ☐ >500yr Floodplain 		
□ Yes No Have Primary Target Drinking Water Intakes Been Identified:	er Intakes:		
Have Primary Target Drinking Water Intakes Been Identified:	Served:		
□ Yes If Yes, Distance to Nearest Drinking □ No Water Intake : Miles ⁶ If Yes, Enter Population Served by Target Intake:			
If Yes, Enter Population Served by Target Intake:			
NA People4			
Fisheries Located Along the Surface Water Migration Path: List All Secondary Target Fisheries ¹⁰ :	Total within 15 Miles ⁴		
□ Yes ☑ No If Yes, Distance to Nearest Fishery: <u>Water Body/ Fishery Name</u> : <u>Flow (cfs)</u> : Miles			
Have Primary Target Fisheries Been Identified:			
□ Yes	-		
8. Surface Water Pathway (continued)			
Wetlands Located Along the Surface Water MigrationOther Sensitive Environments Located Along the Surface VPath:Migration Path:	Water		
☑ Yes □ Yes If Yes, Distance to Nearest Sensitive □ No ☑ No Environment:Miles	ve		
Have Primary Target Wetlands Been Identified: Have Primary Target Sensitive Environments Been Identified	1		
□ Yes ☑ No	; ied:		
List All Westlander	ied:		

<u>Water Body</u> : <u>Flow (cfs)</u> : <u>Frontage miles:</u>		<u>Water Body</u> :	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:	Number of Worke ☐ None ☐ 1 - 100 ☐ 101 - 1, ☐ > 1,000	ers Onsite ⁴ :	Have Terres Identified o Known or S	strial Sensitive Environments Been on or Within 200 Feet of Areas of Suspected Contamination:			
☐ Yes ☑ No			If Yes, List	Each Terrestrial Sensitive			
If Yes, Enter Total Residential Population:	Population Within	n 1 Mile: 7	Environmo	ent':			
People ²		*Refer to PA Table 7 for environment types		Table 7 for environment types			
1	10.	Air Pathwa	y	<u>(</u>			
Is there a Suspected Release to Air ¹ : Yes No		Wetlands Lo Yes No	cated Within 4 M If Yes, Hov	liles of the Site [°] : v Many Acres: Acres			
Enter Total Population on or Within:		Other Sensitive Environments Located Within 4 Miles of the Site:					
0-1/4 Mile	0-1/4 Mile			☐ Yes ☑ No			
>1/4-1/2 Mile		List All Sensitive Environments Within 1/2 Mile of the Site ⁶ :					
>1/2-1 Mile		Distance: Sensitive Environment Type/Wetlands Area (acres):					
>1-2 Miles		Onsite	None				
>2-3 Miles		0-1/4 Mile	_Wetlands				
>3-4 Miles		>1/4-1/2 Mile	e _Wetlands				
Total Within 4 Miles ³⁻⁵ _7,090_		*Refer to PA Tab	le 10 for calculations on	air pathway exposures			

	_		_		Identificatio	n
Potential	Hazardous W	aste Site P	reliminary	Assessment	State: SD	CERCLIS #:
		Form			CERCLIS Disc	overy Date:
		1. Gen	eral Site Inform	ation		
Name: Ellsworth	AFB	Street Address:	: 1000 N Ellsworth	n Rd		
City:		State: SD	Zip Code: 57769	County: Meade	Co. Code:	Cong. Dist:
Latitude:	Longitude:	Approximate A	rea of Site:	Status of Site:		
44°7' 46.17"	103°5' 37.53"	43 Acre	es	□ Active □	Not Specified	
			Square Ft	Inactive □] NA (GW plume,	etc.)
Site Name: Alert	Apron			_	• •	
Site Description:	The alert apron is loca	ated in the southe	ern portion of the	base just west of the	e southern en	d of the runway.
During the cold v event of an emer	var, B-52s were parke rgency.	d down here on s	tand-by for quick	take off. Crash truck	s were also lo	cated here in the
		2. Owner	/Operator Info	mation		
Owner: Ellsworth	n AFB		Operator: sam	ne as owner		
Street Address: 1	1000 N Ellsworth Rd		Street Addres	5:		
City:			City:			
State: SD	Zip Code:	Telephone:	State:	Zip Code:	Telephone:	
Type of Ownersh	nip:		Type of Owne	rship:		
Private	County			County		
Federal Agency	Municipa	I	Federal Agence	y 🗌 Municipa	I	
Name: _DOD	D Not Spec	ified	Name:	Not Spec	ified	
	Other			U Other		
		3. Site E	Evaluator Inform	nation		
Name of Evaluat Kelly Teplitsky	or:	Agency/Organi CH2M HILL	zation:		Date Prepare	ed:
Street Address: 9	9191 South Jamaica St	reet	City: Englewoo	bd	State: CO	
Name of EPA or S	State Agency Contact:		Street Addres	5:		
City:		State:		Telephone:		
-						
		4. Site Disp	osition (for EPA	use only)	1	
Emergency Resp	onse/Removal Assess	ment	CERCLIS Recor	nmendation:	Signature:	
Recommendatio	n:		Higher Pri	ority SI	Name (turce	4).
	Yes			лцу 51	ivanie (typet	
	🗌 No				Position:	
C C	Date:		Other:		-	
		E Coro	ral Sito Charact			
Drodominant Lar	d lico Mithin 1 Mila a	5. Gene			Voars of Oas	vration
Preuominant Lar	iu use within 1 Mile C	n Site (check all	site setting:		rears of Ope	ration:

that apply):					
Industrial	Agriculture		🗌 Urba	n	Beginning Year 1947
	Mining	Other Federal	🗌 Subu	rban	Ending Vear 1991
Residential Forest/Fields	I DOD □ DOF		Rural	I	
		Other			Unknown
Type of Site Operation	ons (check all t	hat apply):			Waste Generated:
	, 		_		
	neck subcategory))	Retail Recycling		☐ Offsite
Inorganic Chemi	cals		Junk/Salvage Yard		Onsite and Offsite
Plastic and/or Ru	bber Products		Municipal Landfill		
Paints, Varnishes			Other Landfill		Waste Deposition Authorized
Agricultural Cher	c chemicais nicals				By: Present Owner
Miscellaneous Ch	emical Products		🗆 DOI		Present & Former Owner
Primary Metals			Other Federal Facilit	ty	Unauthorized
Metal Coating, Pl	ating, Engraving		Treatment, Sto	orage, or Disposal	
Fabricated Struct	ural Metal Produc	ts	Large Quantity	Generator	Waste Accessible to the Public:
Electronic Equipr	nent		Small Quantity	Generator	
Other Manufactu	ring				Ves
Mining				al	1 No
Metals			Converter"		Distance to Nearest Dwelling
			"Protective File "Nop or Late File	f" ilor"	School or Workplace
Non-metallic Min	erals		Note Specified	lici	
			 Other		2 075 Eeet
					_2,0731000
		6. Waste Cha	racteristics Infor	mation	·
		(Refer to P	A Table 1 for WC Sco	ore)	
Source Type:	Sc	ource Waste Quantity:	Tier*:	General Type of	Waste
(check all that apply)	(inc	lude unit)		(check all that app	oly):
	_			Metals	Pesticides/Herbicides
Surface Impoundment	_			Organics	
Drums				Solvents	Municipal Waste
Chemical Waste Pile				Paints/Pigments	Mining Waste
Scrap Metal or Junk Pile	e			Laboratory/Hospi Radioactive Wast	ital Waste 🔄 Explosives
Tailings Pile				Construction/Der	nolition Waste
□ I rash Pile (open drum)					
Contaminated GW Plum	ne —			Physical State of	Waste as Deposited (check all
(unidentified source)				that apply):	
Contaminated SW/Sedi	ment				Solid
Contaminated Soil					Sludge
Other					Powder
☐ No Sources					Gas
*C=Constitue	ent, W=Wastestrea	m, V=Volume, A=Area			
		7 Grou	nd Water Pathwa	ay	
		7.000			
Is Ground Water Use	d for Drinking	Is There a Suspec	cted Release to	List Secondary T	arget Population Served by
ls Ground Water Use Within 4 Miles:	d for Drinking	Is There a Suspec Ground Water ¹ :	cted Release to	List Secondary T Ground Water V	arget Population Served by Vithdrawn From:
Is Ground Water Use Within 4 Miles:	d for Drinking	Is There a Suspec Ground Water ¹ :	cted Release to	List Secondary T Ground Water V	arget Population Served by Vithdrawn From:
Is Ground Water Use Within 4 Miles: Ves No	d for Drinking	Is There a Suspec Ground Water ¹ : □ Yes ☑ No	cted Release to	List Secondary T Ground Water V 0 - 1/4 Mile	arget Population Served by Vithdrawn From: NA
Is Ground Water Use Within 4 Miles: Ves No If Yes, Distance to n	d for Drinking earest	Is There a Suspec Ground Water ¹ : □ Yes ☑ No	cted Release to	List Secondary T Ground Water V 0 - 1/4 Mile	arget Population Served by Vithdrawn From: NA

Feet	Have Drimany Target	Drinking	~1/4 - 1/2 WINC	NA
	Have Primary Target Drinking			N1.4
Type of Drinking Mator Malle Mithin	Tune of Drinking Water Walls Within 4			NA
Miles	Yes Vo		>1 - 2 Mile	NA
(Check all that apply):	If Yes, Enter Primary	r Target	>2 - 3 Mile	NA
Private None	Pe	ople ³	>3 - 4 Mile	NA
Depth to Shallowest Aquifer:	Nearest Designated W	Vellhead	Total Within 4 Miles ⁴	NA
~ 10 to 50 Feet	Protection Area ⁶ :			
Karst Terrain/Aquifer Present:	Underlies S >0-4 Miles	ite n 4 Miles	*Use population #s for PA Tal	ole 2 GW Pathway Scorecheat
⊡ No				Gw Fathway Scoresheet
	8. Surface W	/ater Pathway	,	
Type of Surface Water Draining Site an	d 15 Miles Downstream	(check all	Shortest Overland Dista	nce From Any Source to
that apply):		9	Surface Water:	
Stream River F	Pond 🗌 Lake		_1,250_ Fe	et
Bay Ocean C	Other		٢	Viles
	- 1.		Site is Located in:	
is There a Suspected Release to Surface	e water :			odolain
□ Yes			\square >10yr - 100yr Floo	odplain
☑ No			□ >100yr - 500yr Flo □ >500yr Floodplain	podplain
Drinking Water Intake Located Along t	he Surface Water Migrat	tion Path:	List All Secondary Targe	t Drinking Water Intakes:
☐ Yes ☑ No			<u>Name</u> : <u>Water B</u> ody: Flov	v (cfs): Population Served:
Have Primary Target Drinking Water In	takes Been Identified:			
	nco to Noarost Drinking			
☑ No Water Intak	ke : Miles ⁶			
If Yes, Enter Population Served by Targ	get Intake:			
NA People ⁴			Total within 15 Miles ⁴	
Fisheries Located Along the Surface W	ater Migration Path:	I	ist All Secondary Targe	t Fisheries ¹⁰
□ Yes ☑ No If Yes, Distance to Nearest Fishery:			Water Body/ Fishery Name	: <u>Flow (cfs)</u> :
Have Primary Target Fisheries Been Ide	entified:			
☐ Yes ☑ No				
🗌 Yes 🛛 🗹 No			inued)	
Yes No	8. Surface Water F	<u>Pathway (</u> conti	inued)	
☐ Yes ☑ No Wetlands Located Along the Surface W Path:	8. Surface Water F Vater Migration Oth Mig	Pathway (continue ner Sensitive Env gration Path:	vironments Located Alo	ng the Surface Water
☐ Yes ☑ No Wetlands Located Along the Surface W Path: ☑ Yes ☐ No	8. Surface Water F Vater Migration Oth Mig	Pathway (contr ner Sensitive Env gration Path:] Yes ⊇ No	vironments Located Alo If Yes, Distance to Environment:	ng the Surface Water Nearest Sensitive Miles
☐ Yes ☑ No Wetlands Located Along the Surface W Path: ☑ Yes ☐ No Have Primary Target Wetlands Been Io	8. Surface Water F Vater Migration Oth Mig E dentified: Hav	Pathway (contr ner Sensitive Env gration Path:] Yes ☑ No re Primary Targe	vironments Located Alo If Yes, Distance to Environment: et Sensitive Environmen	ng the Surface Water Nearest Sensitive Miles ts Been Identified:
☐ Yes ☑ No Wetlands Located Along the Surface W Path: ☑ Yes ☐ No Have Primary Target Wetlands Been Io ☐ Yes ☑ No	8. Surface Water F Vater Migration Oth Mig dentified: Hav	Pathway (contr ner Sensitive Env gration Path: ☐ Yes ☑ No re Primary Targe	vironments Located Alo If Yes, Distance to Environment: et Sensitive Environmen Yes Vo	ng the Surface Water Nearest Sensitive Miles ts Been Identified:

Water Body : Flow (cfs): Frontage miles:		Water Body :	Flow (cfs):	Sensitive Environment Type:	
	9. Soil E	xposure Pat	hway		
Are People Occupying Residence or	Number of Worke	ers Onsite ⁴ :	Have Terr	estrial Sensitive Environments Been	
Attending School or Daycare on or			Identified	on or Within 200 Feet of Areas of	
Within 200 Feet of Area of Known or	☑ None		Known or	Suspected Contamination:	
Suspected Contamination:	□ 1 - 100 □ 101 - 1.	000			
	□ > 1,000)			
				☑ No	
☐ Yes					
⊡ No			If Yes, Lis	st Each Terrestrial Sensitive	
If Man Frates Tatal Desidential	Population Withir	n 1 Mile:	Environi	nent ² :	
If Yes, Enter Total Residential					
Fopulation.	7				
People ²					
			*Refer to P	A Table 7 for environment types	
	10.	Air Pathwa	y		
Is there a Suspected Release to Air ¹ :		Wetlands Lo	cated Within 4 I	Viles of the Site ⁶ :	
Yes		✓ Yes			
		🗌 No	If Yes, Ho	ow Many Acres: Acres	
Enter Total Population on or Within:		Other Consitive Environments Lesated Within 4 Miles of the Site			
Onsite		Other Sensit		ts Located within 4 Miles of the Site:	
0 1/4 Mile			∐ Yes ☑ No		
0-1/4 Wille					
>1/4-1/2 Mile		List All Sensitive Environments Within 1/2 Mile of the Site ⁶ :			
>1/2-1 Mile		Distance:	Sensitive Enviror	ment Type/Wetlands Area (acres):	
>1-2 Miles		Onsite	None		
>2-3 Miles		0-1/4 Mile	_Wetlands		
>3-4 Miles		>1/4-1/2 Mile	e_Wetlands		
Total Within 4 Miles ³⁻⁵					

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APPENDIX C

RECORDS OF COMMUNICATION

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	1	Sign In Sheet				
Meeting Attendee Name DANIE (ElleSon Phone	Organization 28CES Utilities Shop	Job Title Fire System Specielist	How Long in Current Position? 154R5.	How Long at this Base in Current and Previous Positions?	Have you held similar positions at other bases? Which Bases? Yes Malmstrom AFB.	How Long? 5mths
Name Merril (Phone Emai	28 J WFSM Shop	NCOIC, WFSM Shop	1.5 years	21 yrs.	Ses, Ellsworth AFB, Ramsteino AB, CANTOND AFB, Elmenn AFB, & Spangdalhem AB	17 yrs Sire dorf Sys MX
Name OEUCOBWALTERS Phone Ema	AFCEC/CZO WRISHT-PATTARS OH	RESTORATION BRANCH Chilf	J	O.	Air Force Plants 3,4,59,	2035.
Name <u>/Sill Beck</u> Phone Email	SECES/CEF Fire Dept	Fire Inspector	Hyrs	20 705	Vandanberg AFFB Machellan AFB	7 45
Name Lis LeBlanc Phone Email	28 CES WFSM	Assit. NCOIC WFSM	21/2415	18405	Eielson AFB, AK	6415
Name_Kevin Goyer- Phone_ Email_	28 CES/ CEIEC mil	Water Qual PM	Syr	104-	NO	x) / 14
Name Metody Jensen Phone	AFCEC/CEO	Elisworth RPM	3415	Murs	No	NA

Ellsworth AFB AFFF Preliminary Assessment Meeting

Feburary 23, 2015 10am-noon

Ellsworth AFB AFFF Preliminary Assessment Meeting Feburary 23, 2015 10am-noon

.

Sign In Sheet

Meeting Attendee	Organization	Job Title	How Long in Current Position?	How Long at this Base in Current and	Have you held similar positions at other bases?	
NamePAVEL	APLEZ/CZON	RPin	10-15-00	Bous	Which Bases?	How Long?
Email_					Nº V.	V/A
Name						
Phone						0
Email						
Name						
Phone						
Email						
Name						
Phone						
Email						
Name						
Phone						
Email						

Subject: Meeting Minutes for Preliminary Assessment Kickoff Meeting at Ellsworth Air Force Base

Date: February 24, 2015

Time: 10:00 a.m. to 12:00 p.m.

Attendees: See attached sign in sheet

FT001 – Former Fire Training Area (OU 1)

Operated from 1942 to 1990.

Surface runoff discharges to Pond 1, which discharges offbase at outfall 001 (a regulated outfall) and goes off base. Enters into a private landowner's waterbody. (Mr. Goyer) Sampling was conducted at OU 1 during Broad Agency Announcement at the boundary and results exceeded EPA PAL (Ms. Jensen).

Outfall 001 also drains 60 and 70 row hangars (70 row contained AFFF systems) and south operational apron and center section of runway (Mr. Goyer).

RI being conducted at FT001. (Ms. Jensen).

Depth to groundwater is roughly 15 feet bgs. Possible groundwater contact because the groundwater daylights just south of FT001 into a drainage north of Pond 1. (Mr. Pavik and Ms. Jensen).

Outfall 003 -

Drains the north portion of the runway, taxiway, and hangars 80, 90, and 100 row and live ordnance loading area (Mr. Goyer). Surface water at pond 3 has AFFF in it based on recent sampling. This pond was lined sometime between 1997 and 2001 (Ms. Jensen).

Outfall 002 -

Stormwater discharge point serves south flightline. Potential for discharges to storm drain (Mr. Goyer).

Current FTA (6909) -

Fire training activities occur w/in a lined pit. Edge of the pad beyond pit has likely been impacted by surface water runoff (Mr. Beck).

Foam testing occurs here and a lot of AFFF runs off edge of pad (Mr. Beck).

Water from the FTA is piped via underground piping to a lined retention pond. The retention pond is emptied by utilities using 9,500-gallon tanker and transfer pump when full and disposed of at the 70 row diversion tank which eventually discharges to the WWTP (Mr. Ellefson). As of

July 2014, the diversion tank now discharges to the state-owned POTW. POTW also discharges to Box Elder Creek.

Three spills reported to SDDENR based on spills database per limited PA.

Still using 3% AFFF at FTA. 5-gallon buckets currently stored at conex at FTA (Mr. Beck).

Estimate that 2641 gallons in trucks and trailers. Use it most frequently on foam testing of equipment. May use 5-10 gallons per test. May use another 10-15 gallons for training. Less than a few hundred gallons a year (Mr. Beck).

Fire training is typically conducted monthly using only water. AFFF is used maybe a few times a year (Mr. Beck).

WWTP-

Shutdown in July 2014. Formerly discharged to outfall 005 to unnamed drainage to golf course lake to outfall 006 and goes off base. Year-round discharge from golf course lake to off base (300,000 to 500,000 gallons per day). Sludge from the WWTP was disposed of at landfill in accordance with permit. When WWTP was recently decommissioned, the biosolids were not land applied as suggested in the Limited PA. Dewatering water would go back through the clarifier. All biosolids will be disposed of at landfill (Mr. Goyer).

One time, the solids from WWTP were land applied on nearby private property (Ms. Jensen, Mr. Goyer).

Sampled from WWTP to tributary and at lake and found in surface water at both sampling points (Ms. Jensen).

New AFI says that Ellsworth will not discharge any PFCs. Will need to discuss future releases with the state. Will need to get approval from receiving POTW (Mr. Goyer).

Spray Nozzle Testing -

Yearly spray nozzle testing conducted to ensure correct % . Testing was typically conducted at the FTAs and runoff likely went into the nearby grass because they have to do spray pattern testing (Mr. Beck).

Mr. Beck indicated that equipment testing was conducted near pumphouses 1-3 at the end of the runway in 1980s using 6% AFFF. Routine equipment testing (refractometer test) when they would check out crash trucks. Drive to edge of ramp, shoot foam out. Across from Fire Station. This occurred using 6% AFFF and occurred in 1970s and 1980s.

Fire Truck Maintenance -

Conducted at fire stations in bays (Mr. Beck). Bays drain to OWS. OWS' go to sanitary sewer (Mr. Goyer). No pre-treatment beyond OWS. Eventually combines with effluent from industrial waste water line (Mr. Goyer).

Spill Logs -

Access database contains records of spills reported to SDDENR. Goyer to provide on CD.

Mr. Beck is not aware of any AFFF usage logs or emergency response logs that document AFFF usage.

618 Waste Diversion Tank -

Logistics Readiness Squadron and refueling maintenance. Outside 50,000 gallon underground tank. Tank cleaned by contractor. Dewatered sludge shoveled out and disposed of at landfill (Mr. Goyer).

Building 618 formerly had an AFFF system (Mr. Goyer, Mr. Beck).

Sampled and PFCs in groundwater (Ms. Jensen).

Building 88240 -

AFFF system. Now only water fire suppression system.

Drainage in building to trench drains which go via sanitary sewer and discharges to surface impoundment. There is a valve which can route drainage into the OWS. Under normal operations flow goes into OWS to sanitary sewer. PFCs detected in sediments of surface impoundment (Mr. Goyer).

MSA pumphouse (88490) used to contain 500 gallon AFFF tank in 1980s. Now supports water pressure/hydrants. Used to contain AFFF tank. Removed in early 1990s.

Hangars -

70 row diversion tank is 150,000 gallon. Limited PA indicated that entire tank released into the storm drain in 1993. Violation issues.

All AFFF systems were converted to HEF systems. Started in 2005 and completed in 2012. AFFF piping is still in place but capped at the floor. Could still be sitting inside old piping coming from pumphouses to docks (Mr. Ellefson).

Because old design in 80s did not have appropriate check valves so it got pushed back through systems and back to the storage tanks. Groundwater storage tanks for firefighting capabilities may be contaminated (Mr. Ellefson).

Pumphouse 7246 had 1,000 gallon AFFF tank and fed hangars 70, 80, and 90. In 2000, systems were upgraded and each dock had own 500 gallon AFFF tank installed.

Assume all soil around hangars has potential to be contaminated. Mr. Beck indicated he saw discharges coming out of hangars.

Old Fire Station (Bldg. 7506)-

Vehicles stored here, maintenance etc. Old fire station tore down. Currently Building 7501 Base Ops is present (Mr. Beck).

Fire trucks with AFFF were stored in Dock 51 when old fire house was in operation due to space limitations. No other action done with AFFF here. Trench drains in Dock 51 drain to 20 Row diversion tank (20,000 gallon tank) which drains to industrial wastewater line (Mr. Beck).

The old fire station (where bldg. 7501 now sits) had two overhead storage tanks with a piping system we could use to gravity fill into the tops of the crash trucks. I think one was 500 gallons and a second 300 gal. Never had any significant spills that we're aware of (Mr. Beck).

Pre-2000 it wasn't uncommon to see foam solution on the fire station driveways after foam ops (Mr. Beck).

Current Fire Station (Bldg. 7502)-

2,641 gallons in vehicles. 5 gallon bucket storage (Mr. Beck).

Station 2 –

Very old fire station. Was under air mobility command in 1952. Was transferred to Ellsworth in 1962 (Mr. Pavik). Mr. Beck noted that it may have had a structural engine that may have held 50 gallons of AFFF here in early 1990s. Unsure if this had a crash truck. Fire truck was there for housing in late 80s but all gone by early 90s. Foam rarely would have been used on structure fires (Mr. Beck).

Fire Storage Area -

Storage facility with no fire trucks but historically was an old fire station. May have had AFFF (Mr. Beck).

Alert Aprons -

Crash trucks would stand by when B-52s were sitting here on alert. No known spills but possible (Mr. Beck).

Hazmart –

Building 1911. Stores 5-gallon buckets of foam. Beck provided an inventory of AFFF on base – Hazmart contained 3,965 gallons as of Feb 2015 (Mr. Beck).

Facility Number 12835 -

Fire protection water mns. Noted as having AFFF. Ask Patience to look at history.

Building 6908 Groundwater Treatment System -

Injections trenches released contaminated groundwater via daylighting to unnamed ephemeral drainage which flows to Pond 1 (Ms. Jensen and Mr. Pavik).

Crash Sites –

Delta Taxiway West – foam trailer rear ended and released 100 gallons as noted in limited PA.

1970 B-52 Crash – Limited PA had year wrong. Crash occurred in 1970, not 1972.

1988 B-1 Crash – south of runway.

2002 Learjet crash – crashed after taking off from runway 31. OU 4. No AFFF used as only a small grass fire that was put out with water.

2003 Semitrailer crash – Truck went off overpass on north side. Referred to as Marten Crash Site. Used AFFF. Goyer provided photos.

AFFF –

6% until mid-90s and then converted to 3% (Mr. Beck).

2005 HEF Test Spill -

Included in Limited PA but was high expansion foam, not AFFF.

Systems were very sensitive when set up to UVIR detectors sometimes reflections would set them off. Should be captured in spills database. All drainage to same trench drains, diversion tanks etc. (Mr. Ellefson).

No chrome plating shops on base. Rivet mile did some chromium plating done by the missile sites. There was a corrosion control shop for missiles. But likely down out at missile sites. Sodium chromate solution that was part of the guidance control set. Had hex chrom but not associated with plate. Operated in mid-80s (Mr. Pavik).

Water supply is from Rapid City. No water supply wells on base currently. Any former water supply wells were decommissioned. All drinking water was from deep water wells (confined aquifers). Stopped using them when? Check admin record, original RI (Mr. Pavik).

Private wells located 250 feet south of base. In shallow aquifer. Used to water cattle. They may connect him now to base waterline anyway. Almost all of surface water and groundwater is available for use for stock watering (Mr. Goyer), all along the tributaries and Box Elder Creek.

Historically Sanders had private well, was connected to base supply in late 90s (Mr. Pavik).

RI being conducted at FT001 will include inventory of private wells and will require sampling of the wells (Ms. Jensen).

CDC located on base. No schools (Ms. Jensen).

Other tenants: 432nd Squadron. National Guard Civil Support (Bldg. 1012). Federal Credit Union, Air Force Financial Services Center (Bldg. 2010 and 4040). Pre-1960 – bombing was host wing. 1960 to 1990, missile wing was host wing. After 1990, bombing was host wing again. This page was intentionally left blank.



Final Site Inspection Report of Aqueous Film Forming Foam Areas at Ellsworth Air Force Base Meade and Pennington Counties, South Dakota

March 2019

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 1616 Capitol Avenue Omaha, Nebraska 68102-4901

Prepared by: Aerostar SES LLC 1006 Floyd Culler Court Oak Ridge, Tennessee 37830-8022 under Contract No. W9128F-15-D-0051 Delivery Order No. 0003



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Acronyms and Abbreviations

μg/L	micrograms per liter
µg/kg	microgram per kilogram
AFB	Air Force Base
AFFF	aqueous film forming foam
AOC	area of concern
ARSD	Administrative Rules of South Dakota
ASL	Aerostar SES LLC
bgs	below ground surface
btoc	below top of casing
CAS	Chemical Abstracts Service
CSM	conceptual site model
dup	duplicate
EĂ	EA Engineering, Science, and Technology, Inc.
EPA	Environmental Protection Agency
ERPIMS	Environmental Restoration Program Information Management System
EZ	exclusion zone
ft	foot/feet
FTA	fire training area
HA	health advisory
HO	hazard quotient
ID	identification
IDW	investigation-derived waste
IRP	Installation Restoration Program
LDPE	low-density polyethylene
N/A	not applicable
NAD83	North American Datum 1983
NAVD 88	North American Vertical Datum 1988
NFRAP	no further response action planned
ND	not detected
NL	not listed
OU-1	Operable Unit-1
PA	preliminary assessment
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutane sulfonate
PFC	perfluorinated compound
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
pН	potential of hydrogen
PID	photoionization detector
PPE	personal protective equipment
PVC	polyvinyl chloride
QAPP	quality assurance project plan
RSL	regional screening level
RI	remedial investigation
SCF	SES Construction and Fuel Services LLC
SD DENR	South Dakota Department of Environment and Natural Resources
SI	site inspection
TCLP	Toxicity Characteristic Leaching Procedure
TOC	total organic carbon

USACE	U.S. Army Corps of Engineers
USAF	United States Air Force
USCS	Unified Soil Classification System
UST	underground storage tank
WWTP	wastewater treatment plant

1.0 INTRODUCTION

Aerostar SES LLC (ASL) under contract to the U.S. Army Corps of Engineers (USACE) Omaha District (Contract No. W9128F-15-D-0051, Delivery Order No. 0003) conducted screening-level site inspections (SIs) at 12 known or suspected aqueous film forming foam (AFFF) release areas at Ellsworth Air Force Base (AFB) (Figure 1 in Appendix A). The purpose of the inspections was to determine the presence or absence of perfluorooctanoic acid (PFOA), perfluorooctane sulfonate (PFOS), and perfluorobutane sulfonate (PFBS) in the environment at these areas. PFOA, PFOS, and PFBS are included 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 polyfluoroalkyl substances (PFAS).

In 1970, the United States Air Force (USAF) began using AFFF, firefighting agents containing PFOS and PFOA, to extinguish petroleum fires. Releases of AFFF to the environment routinely occur during fire training, equipment maintenance, storage, and use. Although manufacturers have reformulated AFFF to eliminate PFOS, 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. This was accomplished at Ellsworth AFB on November 23, 2016.

SIs were conducted at Ellsworth AFB from April 19 to July 31, 2018, in accordance with contract requirements (USACE, July 2015), a quality assurance project plan (QAPP) (ASL, March 2016), and a site-specific addendum to the QAPP (ASL, November 2017). The QAPP and QAPP addendum were prepared in accordance with Environmental Protection Agency (EPA) guidance (EPA, March 2012) and Air Force Civil Engineer Center requirements.

The objectives of the SIs are to

- determine if a confirmed release of PFAS has occurred at sites selected for SI;
- determine if PFAS are present in soil, groundwater, surface water, or sediment at the site in concentrations exceeding the EPA lifetime HAs or tap water RSLs, residential soil screening levels, or a state standard;
- identify potential receptor pathways with immediate impacts to human health; and
- provide recommendations for follow-on investigations if detected concentrations of PFAS equal or exceed project action levels (PALs).

This report identifies any releases of AFFF that resulted in PFOS, PFOA, or PFBS contamination in the environment above the project screening levels and 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.

The screening level for PFOS and PFOA in soil and sediment was calculated using EPA's RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search) based on a hazard quotient (HQ) of 0.1 (Appendix B). The toxicity value input for the calculator was the Tier 3 value reference dose of 0.00002 milligrams per kilogram per day derived by the EPA in its drinking water HAs for PFOS (EPA, May 2016a) and PFOA (EPA, May 2016b). Screening levels for PFOS and PFOA in groundwater and surface water are based on EPA lifetime drinking water HAs for PFOS (EPA, May 2016b). A PFAS release was considered confirmed when exceedances of the following concentrations were identified.

PFOS:

0.07 micrograms per liter (μ g/L) in groundwater or surface water (combined with PFOA value). 126 micrograms per kilogram (μ g/kg) in soil or sediment.

PFOA:

 $0.07 \ \mu g/L$ in groundwater or surface water (combined with PFOS value). 126 $\mu g/kg$ in soil or sediment.

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 considered a release to be confirmed if exceedances of the RSL concentrations (HQ=0.1) were identified.

PFBS:

40 μ g/L in groundwater or surface water. 130,000 μ g/kg in soil or sediment (residential soil RSL).

A summary of all PFAS compounds detected in groundwater at all AFFF Areas is also included in Appendix H as additional information.

Published generic regional and calculated screening levels presented in the QAPP and QAPP addendum were based on an HQ of 1.0. The screening levels have subsequently been revised to reflect an HQ of 0.1. This change affects PFBS screening levels for all media and calculated PFOS and PFOA screening levels for soil and sediment. Screening levels for PFOA and PFOS in groundwater and surface water remain at 0.07 μ g/L and are based on the EPA lifetime HA for drinking water. Table 1 presents the screening values for comparing the analytical results for each of the PFAS compounds.

			EPA Regional Screening Level Table (November 2018) ^a			EPA Health Advisory for
Parameter	CAS Number	Residential Soil (µg/kg)	Protection of Ground- water (μg/kg)	Tap Water (µg/L)	Calculated Screening Level for Soil and Sediment ^b (µg/kg)	Drinking Water (Surface Water or Groundwater) ^c (μg/L)
Perfluorobutane sulfonate (PFBS)	29420-43-3	130,000	13	40	N/A	NL
Perfluorooctanoic acid (PFOA)	335-67-1	NL	NL	NL	126	0.07 ^d
Perfluorooctane sulfonate (PFOS)	1763-23-1	NL	NL	NL	126	0.07

Table 1 Regulatory Screening Values

^a EPA Regional Screening Levels (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^b Residential screening levels calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search). ^c EPA, May 2016a. Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS) and EPA, May 2016b. Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA).

^d The EPA health advisory value for drinking water of $0.07 \ \mu g/L$ applies to the combined detected concentrations of PFOS and PFOA.

 $\mu g/kg = micrograms per kilogram$

EPA = Environmental Protection Agency

 $\mu g/L =$ micrograms per liter N/A = not applicable CAS = Chemical Abstracts Service NL = not listed

RSL = regional screening level

Previous and On-Going PFAS-Related Activities at Ellsworth AFB

In 2012, Ellsworth AFB conducted a limited preliminary assessment (PA) summarizing AFFF use, releases, and disposal at the Base. This assessment documented AFFF releases at several areas including the former fire training area (FTA) designated as Operable Unit-1 (OU-1). Sampling conducted during a limited investigation at OU-1 indicated PFOS and PFOA in groundwater and soil were above screening levels (Ellsworth AFB, November 2012).

A screening-level site investigation was conducted at Ellsworth AFB in June 2014 (SES Construction and Fuel Services LLC [SCF], January 2015) to determine the presence or absence of PFAS in soil, groundwater, surface water, and sediment at four areas (identified in the 2012 limited PA) where PFAS releases were known or suspected to have occurred. Areas investigated in 2014 included Docks 73 and 93, Underground Storage Tank (UST) 7246 and Outfall #3, UST 88240 Retention Lagoon, and UST 618 and the Base wastewater treatment plant (WWTP). Analytical results for samples collected during this effort indicated the presence of PFAS above screening levels and are discussed further in Section 2.

A second PA conducted in February 2015 (CH2M Hill, May 2015) recommended SIs for 12 areas at Ellsworth AFB (in addition to the former FTA) because of known or suspected releases of AFFF. These 12 areas (now identified as AFFF Areas 1 through 12) are listed in Table 2 and shown on Figure 2 in Appendix A.

A remedial investigation (RI) of the former FTA and three additional potential source areas (shown on Figure 2 in Appendix A) is currently being conducted by others. These four potential source areas and the area south of the Ellsworth AFB boundary are designated Area of Concern (AOC) PFC-1 (Ayuda Partners Joint Venture, December 2015). In March 2016, a residential well survey was conducted by others as part of the delineation of PFAS at AOC PFC-1 (Ayuda Partners Joint Venture, June 2017). This survey identified three private wells to be sampled for PFAS. Owners of these three wells were identified as Newman, Sanders, and Farrar (note the Farrar well is currently owned by Thunderbird Properties, LLC).

Sampling and analysis of the Newman and Sanders wells indicated the wells to be impacted by PFAS; however, pre-existing water use restrictions precluded their use and no response action was needed. Sampling and analysis of the Thunderbird Realty, LLC, well also indicated PFAS impacts. This well (south of AOC PFC-1) was also used by the adjacent Walter property. In January 2017, an alternate source of potable water was provided to both the Thunderbird Realty and Walter properties and the private well was decommissioned (CB&I, August 2017). Note that the pump was removed but the well is still present.

Stage 1 RI sampling conducted in March 2016 at AOC PFC-1 indicated concentrations of PFOS and PFOA in soil, groundwater, and surface water above current screening levels; PFOS in sediment above the screening level, and PFBS in groundwater above the current screening level (Ayuda Partners Joint Venture, November 2017). Stage 2 RI sampling was conducted in 2017–2018. The lateral extent of PFOS and PFOA in groundwater was not determined and a Stage 3 field effort is currently in the planning stages. A door-to-door well survey effort to locate and sample possible off-Base drinking water wells has been completed by others subsequent to field activities conducted for this ESI. Preliminary results from this effort indicate the presence of previously unknown drinking water wells, some of which have been impacted by PFAS.

Between May and September 2017, field sampling was conducted on the Thunderbird Realty, LLC, and Walter properties to determine if PFAS have migrated from the Base. Surface soil, groundwater, sediment, and surface water were sampled. PFOS was detected in surface soil and sediment above the current screening level and PFOS and PFOA were detected in groundwater and surface water above the

screening level (Aptim Federal Services, LLC, July 2018). It should be noted that the field sampling conducted by Aptim was not conducted under a regulator-approved QAPP, so the results should be treated as "screening level" data.

AFFF Area	Location	Associated Existing IRP ID	Rationale	Media of Concern
1	Current FTA	Not an existing site	 In operation since 1993. All nozzle spray testing and flushing occurred at the FTA. Most AFFF was contained within the retention pond, but some AFFF may have been released to adjacent soils. 	Surface soil Subsurface soil Groundwater
2	70, 80, 90 Rows and Outfall #3	Not an existing site	 Known AFFF releases in eight of 10 hangars. 2014 SI indicated the presence of PFOS and PFOA above current screening levels in shallow groundwater at Dock 73 (on 70 Row), the 70 Row diversion tank (UST 7246), Dock 93 (on 90 Row), and Outfall #3/Pond #3 (SCF, January 2015). 	Surface soil Subsurface soil Groundwater Sediment Surface Water
3	Building 618	Not an existing site	 2014 SI indicated the presence of PFOS and PFOA above current screening levels in shallow groundwater at Building 618 (SCF, January 2015). AFFF spills noted in the Ellsworth spills database (Ellsworth AFB, February 2015). 	Subsurface soil Groundwater
4	Former Fire Station (Building 7506)	Not an existing site	 Overhead AFFF tanks. Known AFFF spill (five gallons). Several engines/trailer contained AFFF. AFFF has been observed on fire station driveways in the past. 	Surface soil Subsurface soil Groundwater
5	B-52 Crash (1972)	Not an existing site	• AFFF use is unknown, but possible.	Surface soil Subsurface soil Groundwater
6	B-1 Crash (1988)	Not an existing site	• Unknown amount of AFFF used during emergency response.	Surface soil Subsurface soil Groundwater
7	Delta Taxiway West Crash (2000)	Not an existing site	• 100 gallons of AFFF spilled; likely migrated to adjacent soils.	Surface soil Subsurface soil Groundwater
8	Marten Crash (2006)	Not an existing site	• Based on crash photos, AFFF was applied at the crash location.	Surface soil Subsurface soil Groundwater
9	Crash 4 (2001)	Not an existing site	• 10 gallons of AFFF released from fire truck.	Surface soil Subsurface soil Groundwater

 Table 2 AFFF Areas and Selection Rationale for Site Inspections at Ellsworth Air Force Base

AFFF Area	Location	Associated Existing IRP ID	Rationale	Media of Concern
10	Wastewater Treatment Plant	Not an existing site	 WWTP received discharge from several locations which had AFFF releases such as the diversion tank at 70 row, Building 618, and fire station floor drains. During operation, the WWTP discharged approximately 300,000 to 500,000 gallons of treated water per day off-Base and to Golf Course Lake. The WWTP ceased operations in 2014. AFFF was likely released as result of treated water discharge and sludge management. Water from Golf Course Lake was sometimes used for irrigation of the golf course. 2014 SI indicated the presence of PFOS and PFOA above current screening levels in sediment and surface water downstream from the WWTP (SCF, January 2015). 	Surface soil Subsurface soil Groundwater Sediment Surface Water
11	Spray Nozzle Test Area	Not an existing site	• During nozzle testing, AFFF was sprayed on a grassed area for up to 20 years in the 1970s and 1980s.	Surface soil Subsurface soil Groundwater Sediment Surface Water
12	Building 88240	Not an existing site	 Formerly contained an AFFF fire suppression system. 2014 SI indicated the presence of PFBS, PFOS, and PFOA above current screening levels in sediment and surface water and the presence of PFOS and PFOA above screening levels in groundwater near a retention pond south of the building (SCF, January 2015). 	Surface soil Subsurface soil Groundwater Sediment Surface Water

Modified from Table 4.1 Preliminary Assessment Report Summary and Findings Ellsworth Air Force Base (CH2M Hill, May 2015)

AFB = Air Force Base	AFFF = aqueous f	film forming foam	0	bgs = below ground surface	ID = identification
FTA = fire training area	IRP = Installation	Restoration Program		PFOA = perfluorooctanoic acid	PFOS = perfluorooctane sulfonate
SCF = SES Construction and Fuel Se	ervices LLC	SI = site inspection		UST = underground storage tank	WWTP = wastewater treatment plant

2.0 AREA DESCRIPTIONS

2.1 ELLSWORTH AIR FORCE BASE

Ellsworth AFB is approximately 10 miles northeast of Rapid City, South Dakota, and adjacent to the City of Box Elder (Figure 1, Appendix A). The Base covers approximately 4,858 acres within Meade and Pennington counties and includes runways, airfield operations, industrial areas, housing, and recreational facilities. Ranches lie to the north and west of Ellsworth AFB and residences, ranches, and commercial areas lie to the east and south.

Topography

The Base lies within the Missouri Plateau subdivision of the Great Plains Physiographic Province. The topography in this region is typified by nearly level upland plateaus interspersed among rolling hills. Erosional dissection of the landscape is often pronounced, especially along upland margins and adjacent to stream valleys. The Base is situated on a gently sloping north-south upland plateau between Elk Creek to the north and Box Elder Creek to the south. Mean elevation is 3,250 feet above mean sea level, and relief across the Base ranges from 40 to 210 feet (EA Engineering, Science, and Technology, Inc. [EA], May 1994).

Surface Water Hydrology

Surface drainage at the Base follows topography primarily flowing south-southeast via retention ponds, ditches, storm sewers, and ephemeral streams with eventual discharge into Box Elder Creek one mile to the south. Box Elder Creek is considered an ephemeral stream containing water only when sufficient runoff is available to support flow, typically during or immediately following precipitation events. Floodplains occur along the main Base drainage, as well as along several of the creek drainages on the northern and southern portion of the Base. The northern limit of the Box Elder Creek floodplain is approximately 50 feet south of the southern Base boundary.

Geology

Ellsworth AFB lies on the extreme eastern flank of the Black Hills uplift, a north-south trending, elliptically shaped dome that resulted from tectonic movement during the Laramide Orogeny. During this event, basement crystalline rocks west of the Base were uplifted and exposed while overlying Mesozoic and Paleozoic strata were uplifted, eroded, and deformed. These strata now crop out as the hogbacks flanking the Black Hills uplift. Beneath the Base, the strata dip moderately to the east-northeast. Figure 3 (Appendix A) presents a generalized stratigraphic column of the strata beneath Ellsworth AFB. A geologic map of the area is included as Figure 4 (Appendix A).

The oldest and deepest rocks beneath the Base are Precambrian-age crystalline basement rocks. The basement rocks are overlain by Cambrian through Lower Cretaceous deposits of limestone, sandstone, and dolomite. Several sedimentary deposits are known aquifers in the region. Overlying the Jurassic deposits is a sequence of Upper Cretaceous age marine shales with intermittent sandstone and limestone beds. This Upper Cretaceous sequence of fine-grained marine deposits extends to the surface and is greater than 1,000 feet thick below the Base. The uppermost of these Cretaceous-age deposits is the Pierre Shale, which forms the bedrock surface at the Base.

The Pierre Shale is a dark gray to light gray, organic-rich, noncalcareous, blocky, fragmented marine shale. Bentonite beds and ironstone concretion layers greater than 1 foot thick are common, as are ironstone nodules and selenite crystals on weathered faces. Bentonite beds are typically yellow and are the result of volcanism that occurred during the Laramide Orogeny. The Pierre Shale may be considerably

altered by weathering and typically weathers into an orange to brown clay material overlying fractured and iron-stained shale.

Previous investigations indicate that the depth to the Pierre Shale is variable, ranging from surface outcrops to depths of approximately 40 feet. Weathering and permeability within the shale generally decrease with depth.

Overburden at the Base typically consists of unconsolidated Tertiary through Quaternary-age strata overlying the Pierre Shale. These unconsolidated materials can be divided into three basic categories based upon depositional history:

- Colluvial deposits loose, heterogeneous sediment and/or rock fragments deposited on slopes and the toe of slopes primarily by gravity rainwash, sheetwash, or slow, continuous downslope creep, typified by juxtaposition of sedimentary components not normally associated with one another (gravelly clay).
- Alluvial deposits clay, silt, sand, gravel, or similar unconsolidated, detrital material deposited during comparatively recent geologic time by running water as sorted or semi-sorted deposit. These deposits are generally associated with the past or current drainage system of Box Elder Creek.
- Residuum –unconsolidated soils that developed in-place through the weathering of underlying consolidated rock. These soils may show relic textures associated with the parent rock (also known as saprolite or saprolitic soil). The boundaries between residual soils, weathered shale, and competent bedrock are often gradual and not well-defined.

Overburden thicknesses vary widely across the Base, but in general, range from 10 feet to 40 feet. Toward the northern end of Ellsworth AFB, the Pierre Shale is predominately covered by a thin veneer of alluvial or colluvial soil but is exposed along deeper channels and some steeper side slopes. Toward the southern end of Ellsworth AFB, older, relatively thicker, coarser alluvial deposits associated with Box Elder Creek fill the gentler, wider erosional channels, and exposures of Pierre Shale are less common (EA, May 1995).

<u>Climate</u>

The climate at Ellsworth AFB is characterized as semi-arid continental with the Black Hills to the west affecting the climate in this area. The average summer temperature is 68 degrees Fahrenheit, and the daily high average is 81 degrees Fahrenheit. Winters are relatively mild due to protection from the Black Hills and the frequent occurrence of Chinook winds. The average winter temperature is 26 degrees Fahrenheit, with an average daily minimum of 14.9 degrees Fahrenheit. Average annual precipitation is 16.3 inches with most precipitation falling during the spring and early summer months. Prevailing winds are from the north and northwest (EA, May 1995).

2.2 CURRENT FIRE TRAINING AREA (FTA) – AFFF AREA 1

The current FTA occupies approximately seven acres in the southwestern portion of Ellsworth AFB as shown on Figures 2 and 5 in Appendix A. The FTA has been in use since 1993 and is still used for fire training activities. All current nozzle spray testing and flushing performed by the Ellsworth AFB Fire Department occurs at the FTA. Although most AFFF was contained by the lined fire training pit and adjacent retention pond, some AFFF may have been released to surrounding grassed areas.

Media potentially impacted by PFAS at the current FTA include surface soil, subsurface soil, and groundwater. Surface water and sediment were not identified as media of concern because there are no surface water bodies near the current FTA.

2.3 70, 80, 90 ROWS AND OUTFALL #3 – AFFF AREA 2

The 70, 80, and 90 Rows of aircraft hangars (also known as docks) are on the northeast side of the Ellsworth AFB runway and encompass approximately 83 acres as shown on Figures 2 and 6a in Appendix A. Of the 13 docks on these three rows, ten docks (Docks 70, 71, 72, 73, 74, 81, 90, 91, 92, and 93) previously contained AFFF fire suppression systems and AFFF releases have been documented for at least eight of the docks. Releases have not been confirmed at Docks 72 and 73.

Pumphouse 7263, at the northeast end of 90 Row, contained a 1,000-gallon AFFF tank that fed the hangars on 70, 80, and 90 Rows via underground piping. According to the Ellsworth spills database, 310 gallons of AFFF were released at the pumphouse in September 1994 and the material went through cracks in the floor and into the soil under the building. In 2000, the AFFF systems were upgraded and each dock had its own 500-gallon AFFF tank installed inside. AFFF underground piping from the pumphouse to the hangars is still in place but capped at the floor (CH2M Hill, May 2015).

Trench drains inside each dock discharge to a 150,000-gallon diversion tank (underground storage tank [UST] 7246) at the southwest end of 70 Row. The contents of the diversion tank were typically released to the WWTP but could have also been released to Outfall #3 on the southwest side of the runway through storm drains (CH2M Hill, May 2015).

SCF investigated possible PFAS impacts at Docks 73 and 93, UST 7246, and Outfall #3 in 2014 (SCF, January 2015). Groundwater, surface soil, and subsurface soil were sampled at Docks 73 and 93. Groundwater and subsurface soil were sampled at UST 7246. Subsurface soil, groundwater, sediment, and surface water were sampled at Outfall #3 (and adjacent Pond #3). Both individual and combined PFOS and PFOA concentrations exceeded the current screening level in groundwater at each of these areas and in surface water at Pond #3 and Outfall #3. PFOS was also detected in the sediment sample from Pond #3 above the current screening level. PFOS and PFOA concentrations were below screening levels in all surface and subsurface soil samples. PFBS was not detected above screening levels in any of the media sampled. PFBS, PFOS, and PFOA analytical results from the 2014 investigation (at Outfall #3) are shown on Figure 6b.

Media known to be, or are potentially, impacted by PFAS include surface soil, subsurface soil, and groundwater at 70, 80, and 90 Rows, and subsurface soil, groundwater, sediment, and surface water at Outfall #3. Surface soil was not identified as media of concern at Outfall #3. Because AFFF impacts were assumed to be from surface water discharge to the outfall, the presence of PFAS impacts would be most likely identified in sediment rather than surface soil.

2.4 BUILDING 618 – AFFF AREA 3

Building 618, 28th Logistics Readiness Squadron and refueling maintenance, is near the southeast end of the runway as shown on Figures 2 and 7. Building 618 formerly had an AFFF fire suppression system; discharge from the system was captured in floor drains and discharged to a 50,000-gallon diversion recovery tank (UST 618) via underground pipelines. The Ellsworth spills database documented the inadvertent release of 50 gallons of AFFF inside Building 618 when electricians accidentally pressurized the system in November 2001 (CH2M Hill, May 2015).

Although no AFFF releases to the environment were reported prior to this investigation, a limited SI was conducted in 2014. To confirm the presence or absence of PFAS at Building 618, subsurface soil and groundwater samples were collected near UST 618. Both individual and combined PFOS and PFOA concentrations exceeded the current screening level in groundwater. PFOS and PFOA concentrations were below the screening level in subsurface soil. PFBS was not detected above screening levels in either groundwater or subsurface soil (SCF, January 2015).

Media known to be, or are potentially, impacted by PFAS at Building 618 include subsurface soil and groundwater. Surface soil was not identified as media of concern because potential releases were assumed to be from the UST (i.e., below ground and not on the ground surface). Surface water and sediment were not identified as media of concern because there are no surface water bodies near Building 618.

2.5 FORMER FIRE STATION (BUILDING 7506) – AFFF AREA 4

The site of the former Fire Station (Building 7506) is near the center of the Base as shown on Figures 2 and 8. The station was constructed in 1952, remained in operation until 2000, and was subsequently demolished in 2007. The building had a trench drain system that contained any spills inside the building; although, discharges of AFFF were often observed outside the building. Trench drains discharged to the sanitary sewer system and ultimately to the WWTP. AFFF was stored in two overhead storage tanks with a piping system that was used to gravity fill into the tops of the crash trucks. The Ellsworth spills database documented a 5-gallon spill (contained on concrete) when a line broke in November 1994. During interviews for the 2015 PA, Base personnel indicated it was not uncommon to see foam solution on the fire station driveways after foam operations indicating AFFF releases outside of the building footprint (CH2M Hill, May 2015).

Media potentially impacted by PFAS at Building 7506 include surface soil, subsurface soil, and groundwater. Surface water and sediment were not identified as media of concern because there are no surface water bodies near the former fire station.

2.6 B-52 CRASH (1972) – AFFF AREA 5

The 2015 PA indicated a B-52 caught fire and crashed during landing, skidding into Pumphouse 7 on the north side of the runway and west of 70 Row as shown on Figures 2 and 9. It should be noted that Figure 3.1 in the 2015 PA incorrectly shows the location of the crash to be further northwest, but available documentation indicates the crash occurred at Pumphouse 7. The Ellsworth AFB Fire Department responded to the crash and extinguished the fire with an unknown quantity of foam (CH2M Hill, May 2015). The 2015 PA also indicated the crash occurred in 1970; however, additional review of the Air Force Administrative Record found an Installation Restoration Program (IRP) records search (Engineering-Science, September 1985) that indicated the crash occurred in 1972 and also confirmed the crash occurred at Pumphouse 7. Although the 2015 PA could not verify that the type of foam used, based on the revised date of the crash (1972), use of AFFF is likely since the Air Force began using AFFF in 1970.

Media potentially impacted by PFAS at the B-52 crash site include surface soil, subsurface soil, and groundwater. Surface water and sediment were not identified as media of concern because there are no surface water bodies near the B-52 crash site

2.7 B-1 CRASH (1988) – AFFF AREA 6

The B-1 crash occurred in 1988 on the southeastern end of the runway as shown on Figures 2 and 10. During the emergency response, an unknown amount of AFFF was used at the crash site (CH2M Hill, May 2015).

Media potentially impacted by PFAS at the B-1 crash site include surface soil, subsurface soil, and groundwater. Surface water and sediment were not identified as media of concern because there are no surface water bodies near the B-1 crash site.

2.8 DELTA TAXIWAY WEST CRASH (2000) – AFFF AREA 7

A vehicle crash in 2000 involving a fire truck and an AFFF trailer occurred on Taxiway West as shown on Figures 2 and 11. The crash resulted in the release of 1000 gallons of AFFF. According to South Dakota Department of Environment and Natural Resources (SD DENR) spill records, approximately 900 gallons were recovered and 100 gallons infiltrated soil in adjacent grassed areas. The spill report indicates the contaminated soil was excavated and disposed of at the Rapid City Landfill (SD DENR, 2000).

Media potentially impacted by PFAS at the Delta Taxiway West crash site include surface soil, subsurface soil, and groundwater. Surface water and sediment were not identified as media of concern because there are no surface water bodies near the crash site.

2.9 MARTEN CRASH (2006) – AFFF AREA 8

In 2006, a tractor trailer owned by Marten Transport Ltd crashed off of the Interstate 90 overpass onto Ellsworth AFB property below as shown on Figures 2 and 12 (SD DENR, 2006). Photographs of the crash scene show that AFFF was applied to the wreckage and collected in low-lying areas on either side of the abandoned railroad tracks in the area. Note that the 2015 PA incorrectly indicated the crash occurred in 2003 (CH2M Hill, May 2015).

Media potentially impacted by PFAS at the Marten crash site include surface soil, subsurface soil, and groundwater. Surface water and sediment were not identified as media of concern because there are no surface water bodies near the crash site.

2.10 CRASH 4 (2001) – AFFF AREA 9

In 2001, 10 gallons of AFFF were spilled from a Base fire department crash truck designated as "Crash 4." The spill occurred near former Building 7140 as shown on Figures 2 and 13. The 2015 PA indicated the spill likely occurred along Menoher Road that led to Building 7140. Building 7140 has been demolished and a live ordnance loading area was constructed over the likely release area.

Media potentially impacted by PFAS at the Crash 4 spill site include surface soil, subsurface soil, and groundwater. Surface water and sediment were not identified as media of concern because there are no surface water bodies near the spill site.

2.11 WASTEWATER TREATMENT PLANT – AFFF AREA 10

The WWTP is in the southeast portion of the Base as shown on Figures 2 and 14. The WWTP ceased operations in July 2014, but according to Base personnel, it has not been decommissioned as was indicated in the 2015 PA.

The WWTP received discharge from several locations on Base where AFFF releases have occurred, including the diversion tanks at 70 row, Building 618, and the fire station. Treated wastewater discharged to Outfall #5, flowed via an unnamed drainage to a golf course lake, and ultimately to Outfall #6 where the water left the Base and discharged to Box Elder Creek. AFFF was likely released in the WWTP effluent and sludge. Additionally, water from Golf Course Lake was sometimes used for irrigation of the golf course.

SCF conducted a limited SI in 2014 to assess impacts from effluent from the WWTP, collecting sediment and surface water samples downstream from Outfall #5. Both individual and combined PFOS and PFOA concentrations exceeded current screening levels in surface water and PFOS concentrations exceeded the current screening level in sediment.

Media known to be, or are potentially, impacted by PFAS at the WWTP include surface soil, subsurface soil, groundwater, sediment, and surface water.

2.12 SPRAY NOZZLE TEST AREA – AFFF AREA 11

Spray nozzle testing was conducted in the grassed infield between the aircraft apron and the runway as shown on Figures 2 and 15. The test area was active in the 1970s and 1980s and unknown quantities of AFFF were sprayed on the ground surface during testing (CH2M Hill, May 2015).

Media potentially impacted by PFAS at the spray nozzle test area include surface soil, subsurface soil, groundwater, sediment, and surface water.

2.13 BUILDING 88240 - AFFF AREA 12

Building 88240 is in the munitions storage area on the northern portion of the Base as shown on Figures 2 and 16. The building formerly contained an AFFF fire suppression system and has a trench drain system inside the building. Under normal operating conditions, flow from the trench drains enters an oil/water separator before being released into the sanitary sewer. However, when the AFFF system was activated, a valve was used to route released AFFF into a retention pond south of Building 88240. A limited PA conducted by Ellsworth AFB indicated this pond is either unlined or clay lined (Ellsworth, November 2012). During heavy rainfall, surface water flows from the pond to a culvert south of the pond. Surface drainage in this area flows south toward the live ordnance loading area and Row 100. There are no records of accidental AFFF releases from Building 88240 and the AFFF system has been replaced with a water-only sprinkler system (CH2M Hill, May 2015).

SCF conducted a limited SI in 2014 at the Building 88240 retention pond, collecting subsurface soil, groundwater, sediment, and surface water samples. PFBS and individual and combined PFOS and PFOA concentrations exceeded the current screening level in surface water. Individual and combined PFOS and PFOA concentrations also exceeded the current screening level in groundwater. PFBS, PFOA, and PFOS were also detected above screening levels in sediment. Where detected, PFOS and PFOA concentrations in subsurface soil samples were below the current screening level. PFBS was not detected above screening levels in subsurface soil (surface soil was not sampled in 2014) (SCF, January 2015).

Media known to be, or are potentially, impacted by PFAS at Building 88240 include surface soil, subsurface soil, groundwater, sediment, and surface water.

3.0 FIELD ACTIVITIES AND FINDINGS

ASL conducted SI field activities at Ellsworth AFB between April 17, 2018, and July 31, 2018. Fieldwork was conducted in accordance with the QAPP (ASL, March 2016) and the Base-specific field sampling plan addendum to the QAPP (ASL, November 2017). A readiness review (documented in Appendix C) conducted prior to fieldwork 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. Cross-contamination avoidance procedures followed during field activities are detailed in Section 3.2.

3.1 FIELD ACTIVITIES AND SAMPLING PROCEDURES

3.1.1 Sampling Methodology

Field activities included installing monitoring wells and sampling surface soil, subsurface soil, groundwater, surface water, and sediment; samples were analyzed for PFAS compounds, including PFBS, PFOA, and PFOS. Sample locations were selected in areas most likely to have been impacted by known or suspected AFFF releases. 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 (typically in 5-foot or 10-foot intervals) and over-drilling 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 core and overseen by a senior geologist. The soil descriptions were in accordance with the Geology Supplement to the Scope of Services (USACE, June 2013) and followed the general format:

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

Surface soil samples were collected from 0 to 6 inches below ground surface (bgs) with a combination of stainless steel hand augers and stainless steel spoons. Subsurface soil samples were collected immediately above the water saturated/unsaturated soil interface either with hand augers or from the soil core generated during sonic drilling.

Sediment samples were collected using stainless steel spoons. Surface water samples were collected by attaching the sample container to an extendable rod designed for sampling and dipping the container into the water.

Field duplicate samples were collected at a frequency of one for every 10 samples for each media sampled. Matrix spike/matrix spike duplicate samples were collected at a frequency of one for every 20 samples for each media. Boring logs and sample collection forms are in Appendix C.

All soil, groundwater, sediment, and surface water samples were submitted via overnight courier to Maxxam Analytics International Corporation of Mississauga, Ontario, Canada (Maxxam), under chain of

custody procedures and analyzed for PFBS, PFOA, and PFOS using 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; 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	

Laboratory case narratives and analytical data sheets for modified EPA Method 537 are presented in Appendix D.

To provide basic soil parameter information, ASL collected representative composite surface soil and subsurface soil samples and submitted the samples to CT Laboratories of Baraboo, Wisconsin, for physiochemical parameters from each area. These analyses included potential of hydrogen (pH), particle size distribution, percent solids, and total organic carbon (TOC). Laboratory data sheets for the physiochemical parameters and a summary this data (Table E-1) are included in Appendix E.

3.1.2 Soil Borings and Monitoring Well Installation

Fifty-one soil borings were completed during the SI and monitoring wells were installed in 38 of the borings. Typically 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 threads. In two cases, 15-foot-long screens were used to increase the likelihood of intercepting adequate groundwater to sample (wells MW18PFC0403 and MW18PFC0801). Sand filter packs were installed by tremieing the sand through the outer sonic casing and vibrating it in place. Thirty-one wells were installed with flushmount completions and seven wells were installed with above ground stickup completions (three wells at the current FTA [AFFF Area 1], three wells at Building 88240 [AFFF Area 12], and one well at Outfall #3 [AFFF Area 2]). Borings where monitoring wells were not installed (13 total) were abandoned by pumping cement bentonite grout through a tremie pipe placed near the bottom of the borehole and backfilling the borehole to the surface. Boring logs and well construction diagrams are included in Appendix C. Construction details for the 38 newly installed wells are included in Table F-1 in Appendix F.

3.1.3 Well Development

Newly installed monitoring wells were developed and existing monitoring well MW930107 was redeveloped prior to sampling. Monitoring wells were developed with either air displacement or electric submersible pumps. Wells were developed until pH, temperature, turbidity, and specific conductivity stabilized. Because the wells were screened within lean clay, turbidities remained high during development with most being above the instrument upper range of 1000 nephelometric turbidity units (NTUs). One well (MW18PFC0206) produced very little water and could not be developed. Groundwater samples were collected with peristaltic pumps at 32 wells. Water levels in the seven remaining wells were below the effective range of a peristaltic pump and were sampled using electric submersible pumps. All samples were collected using new disposable low-density polyethylene (LDPE) tubing. Sampling was conducted at least 24 hours after development. Well development logs, groundwater sampling logs, and sample collection forms are included in Appendix C.

3.1.4 Data Quality

Third-party data validation was conducted on 100% of the analytical data. Overall, the quality of the data was acceptable; no data was rejected and all data is considered usable for decision-making. The precision, accuracy, and completeness results were acceptable for the project. Further details are included in the data validation report in Appendix D.

3.1.5 Surveying

Coordinates and elevations for soil borings and monitoring wells were established by Ferber Engineering Company, Inc., of Rapid City, South Dakota. All newly installed wells and existing well MW930107 were surveyed. Northing and easting coordinates were based on the South Dakota State Plane Coordinate System, South Zone, North American Datum 1983 (NAD83). Elevations were referenced to North American Vertical Datum 1988 (NAVD 88). ASL personnel recorded sediment/surface water sample points using a Trimble Geo7X handheld global positioning system (GPS) unit.

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

The following steps were taken to avoid cross-contamination from field equipment:

- Teflon[®]-containing materials (Teflon[®] tubing, bailers, tape, plumbing paste, or other Teflon[®] materials) were not used because Teflon[®] contains fluorinated compounds.
- Peristaltic pumps equipped with silicon tubing were used to sample groundwater at depths of approximately 25 feet or shallower. A submersible electric pump was used to sample groundwater at depths greater than 25 feet.
- LDPE tubing was used downhole for all sampling and well development.
- 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 crosscontamination.
- 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 following requirements for field clothing and PPE were followed to avoid cross-contamination:

• 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-TexTM 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 (LDPE 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/quality control 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

Sample containers met the following requirements to avoid cross-contamination:

- All samples were collected in high-density polyethylene 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

The following requirements were followed during wet weather to avoid cross-contamination:

- 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 was 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

The following personal hygiene requirements were followed to avoid cross-contamination:

- 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 DATA USABILITY

The quality of all analytical data was acceptable; no data was rejected and all data was considered usable for decision-making.

3.4 DEVIATIONS FROM THE FIELD SAMPLING PLAN

There were no significant deviations from the field sampling plan (ASL, November 2017). Minor deviations included the installation of 15-foot screens in two wells—instead of 10-foot screens—(see Section 3.1.2) and the inability to achieve low turbidities during development of some wells (see Section 3.1.3).

3.5 CURRENT FIRE TRAINING AREA (FTA) – AFFF AREA 1

3.5.1 Sample Locations

To assess possible PFAS impacts from use of AFFF at the current FTA, five surface soil samples (four primary and one duplicate), five subsurface soil samples (four primary and one duplicate), and five groundwater samples (four primary and one duplicate) were collected. Surface and subsurface soil samples were collected from soil borings completed for installation of monitoring wells MW18PFC0101, MW18PFC0102, and MW18PFC0103 and from soil boring SB18PFC0102. Groundwater samples were collected from each new monitoring well and from existing monitoring well MW930107. Sample locations for AFFF Area 1 are shown on Figure 5 in Appendix A.

3.5.2 Soil Descriptions

Four soil borings completed at the current FTA were terminated at depths ranging from 15.0 to 40.0 feet bgs. Soil types and USCS designations encountered primarily consisted of lean clay (CL) with intervals of well and poorly graded sand (SW and SP) and well graded gravel (GW). Detailed boring logs are included in Appendix C.

3.5.3 Groundwater Flow

Groundwater levels were gauged at three new monitoring wells and one existing well at the current FTA on June 1, 2018. Groundwater was detected at depths ranging from 14.69 feet to 31.75 feet below top of casing (btoc) and at elevations ranging from 3156.63 feet above NAVD 88 (at existing well MW930107) to 3175.98 feet above NAVD 88 (at MW18PFC0101). Groundwater contours developed from these water level measurements indicate shallow groundwater flows east-southeast as shown on Figure 5 in Appendix A. Groundwater level measurements and elevations are summarized in Table F-1 in Appendix F.

3.5.4 Analytical Results

Surface Soil

Five surface soil samples (four primary and one duplicate) were collected at the current FTA. PFBS and PFOA were detected in all five samples, but at concentrations below their respective screening levels. PFOS was detected at concentrations above the screening level in all five samples. Surface soil analytical results are summarized in Table 3 and shown on Figure 17 in Appendix A.

		ELSWH01-001-	ELSWH01-001-	ELSWH01-002-
	Sample ID	SS-001	SS-901 (dup)	SS-001
	Date Sampled	05/17/18	05/17/18	05/16/18
	Sample Depth			
	(ft bgs)	0 - 0.5	0 - 0.5	0 - 0.5
	Screening Level	Result	Result	Result
Analyte	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
Perfluorobutane Sulfonate (PFBS)	130,000 ^a 13 ^b	4.9 J	4.1 J	0.58 J
Perfluorooctanoic Acid (PFOA)	126°	4.1 J	15 J	2.7
Perfluorooctane Sulfonate (PFOS)	126°	1,900 J	3,300 J	740

Table 3 Current	Fire Training	Area (AFFF	Area 1) Surface	Soil Analytical Results
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		ELSWH01-003-	ELSWH01-004-
	Sample ID	SS-001	SS-001
	Date Sampled	05/15/18	05/16/18
	Sample Depth		
	(ft bgs)	0 - 0.5	0 - 0.5
	Screening Level	Result	Result
Analyte	(µg/kg)	(µg/kg)	(µg/kg)
Perfluorobutane Sulfonate (PFBS)	130,000 ^a 13 ^b	0.32 J	3.6 J
Perfluorooctanoic Acid (PFOA)	126°	2.3	21
Perfluorooctane Sulfonate (PFOS)	126°	300	1,800 J

Table 3 Current Fire Training Area (AFFF Area 1) Surface Soil Analytical Results (continued)

Bold values indicate analyte detected at concentration indicated. Shaded results indicate value exceeds screening criteria. ^a EPA Regional Screening Level for Residential Soil (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^b EPA Regional Screening Level for Protection of Groundwater (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^c Screening level calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl search). gram AFFF = aqueous film forming foam

$\mu g/kg =$	micrograms	per	kil	lc
r8 - 8	meregrame	P • •		. •

bgs = below ground surface

SS = surface soil

ELSWH = ERPIMS designation for Ellsworth Air Force Base

J = reported concentration is an estimated value

ft = foot or feetdup = duplicate

ID = identification

Subsurface Soil

Five subsurface soil samples (four primary and one duplicate) were also collected from soil borings at the current FTA. PFBS and PFOA were detected in all five samples, but at concentrations below their respective screening levels. PFOS was detected in all five samples, and exceeded the screening level in two samples. Subsurface soil analytical results are summarized in Table 4 and shown on Figure 17 in Appendix A.

Table 4 Current Fire Training Area (AFFF Area 1) Subsurface Soil Analytical Results

		ELSWH01-	ELSWH01-001-SO-	ELSWH01-002-
	Sample ID	001-SO-013	913 (dup)	SO-012
	Date Sampled	05/17/18	05/17/18	05/16/18
	Sample Depth			
	(ft bgs)	13 - 14	13 - 14	12 - 13
	Screening Level	Result	Result	Result
Analyte	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
Perfluorobutane Sulfonate (PFBS)	130,000 ^a 13 ^b	0.71 J	0.82 J	2.5 J
Perfluorooctanoic Acid (PFOA)	126°	1.4	1.2	4.1 J
Perfluorooctane Sulfonate (PFOS)	126°	72	70 J	630

	Sample ID	ELSWH01-003-SO-025	ELSWH01-004-SO-012
	Date Sampled	05/15/18	05/16/18
	Sample Depth		
	(ft bgs)	25 - 26	12 - 13
	Screening Level	Result	Result
Analyte	(µg/kg)	(µg/kg)	(µg/kg)
Perfluorobutane	130,000ª	0.40 1	0.80
Sulfonate (PFBS)	13 ^b	0.40 J	0.89
Perfluorooctanoic	1260	3.4	26
Acid (PFOA)	120	3.4	2.0
Perfluorooctane	126°	0.55 1	540 1
Sulfonate (PFOS)	120	0.33 0	540 J

Table 4 Current Fire Training Area (AFFF Area 1) Subsurface Soil Analytical Results (continued)

Bold values indicate analyte detected at concentration indicated. Shaded results indicate value exceeds screening criteria. ^a EPA Regional Screening Level for Residential Soil (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^b EPA Regional Screening Level for Protection of Groundwater (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^c Screening level calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl search). AFFF = aqueous film forming foam

 $\mu g/kg = micrograms per kilogram$

bgs = below ground surface

SO = subsurface soil

ELSWH = ERPIMS designation for Ellsworth Air Force Base

J = reported concentration is an estimated value

Soil Physiochemical Analyses

To provide basic soil parameter information, composite surface and subsurface soil samples were collected from AFFF Area 1 soil borings for pH, TOC, percent solids, and grain size analysis. Surface soil sample ELSWH01-005-SS-001 was composed of equal aliquots of soil collected from 0 to 6 inches bgs at the four borings completed at Area 1. Subsurface soil sample ELSWH01-005-SO-025 was composed of equal aliquots of soil collected from the same borings at depths ranging from 12 to 26 feet bgs. Table E-1 summarizing the physiochemical data and supporting laboratory data sheets are included in Appendix E.

ft = foot or feet

dup = duplicate

ID = identification

Groundwater

Five groundwater samples (four primary and one duplicate) were collected from three new monitoring wells and one existing well at the current FTA. PFBS was detected in all five samples, but at concentrations below the screening level. PFOA and PFOS were also detected in each of the five groundwater samples at individual and combined concentrations above the screening level. Groundwater analytical results are summarized in Table 5 and shown on Figure 18 in Appendix A.

	Well Number	MW18PFC0101	MW18PFC0101	MW18PFC0102
	Sample ID	ELSWH01-001-	ELSWH01-001-	ELSWH01-003-
		GW-015	GW-915 (dup)	GW-035
	Date Sampled	05/20/18	05/20/18	05/21/18
	Screened			
	Interval (ft bgs)	9.2 - 19.2	9.2 - 19.2	27.8 - 37.8
	Screening Level	Result	Result	Result
Analyte	(µg/L)	(µg/L)	(µg/L)	(μg/L)
Perfluorobutane	40a	12	0.0	22
Sulfonate (PFBS)	40"	13	9.9	
Perfluorooctanoic	0.07b	0.7	0.2	12
Acid (PFOA)	0.07-	9.7	0.5	12
Perfluorooctane	0.07b	41	44	17
Sulfonate (PFOS)	0.07	41	44	1/
Combined	0.07%	50.7	52.2	20
PFOA+PFOS	0.07	50.7	52.5	29

|--|

	Well Number	MW18PFC0103	MW930107
	Sample ID	ELSWH01-004-	ELSWH01-
		GW-018	MW930107-GW-
			034
	Date Sampled	05/21/18	05/16/18
	Screened		
	Interval (ft bgs)	9.4 - 19.4	24.5-34.5
	Screening Level	Result	Result
Analyte	(µg/L)	(µg/L)	(µg/L)
Perfluorobutane	10a	26	20
Sulfonate (PFBS)	40	2.0	20
Perfluorooctanoic	0.07 ^b	0.0	15
Acid (PFOA)	0.07	9.0	15
Perfluorooctane	0.07b	97	72
Sulfonate (PFOS)	0.07	02	12
Combined	0.07°	01.0	87
PFOA+PFOS	0.07	71.0	07

Bold values indicate analyte detected at concentration indicated.

Shaded results indicate value exceeds screening criteria.

^a EPA Regional Screening Level for Tap Water (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^b EPA, May 2016a. Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS) and EPA, May 2016b. Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA).

 $^{\rm c}$ The EPA Health Advisory value for drinking water of 0.07 $\mu g/L$ applies to the combined detected concentrations of PFOS and PFOA.

$\mu g/L = micrograms per liter$	AFFF = aqueous film forming foam	bgs = below ground surface
ID = identification	ft = foot or feet	GW = groundwater
ELSWH = ERPIMS designation for El	lsworth Air Force Base	dup = duplicate

3.5.5 Conclusions

Past use of AFFF at the current FTA has resulted in releases of PFAS to the environment. Media impacted by PFAS above screening levels at AFFF Area 1 include surface and subsurface soil (PFOS) and groundwater (PFOS and PFOA).

3.6 70, 80, 90 ROWS AND OUTFALL #3 – AFFF AREA 2

3.6.1 Sample Locations

To further assess PFAS impacts from previous releases of AFFF at the 70, 80, 90 Rows, three surface soil samples, two subsurface soil samples, and five groundwater samples (four primary and one duplicate) were collected. Surface soil samples were collected from soil borings completed for installation of monitoring wells MW18PFC0205, MW18PFC0206, and MW18PFC0207 and subsurface soil samples were collected from soil borings completed for installation of monitoring wells MW18PFC0204 and MW18PFC0205. Groundwater samples were collected from each monitoring well. Sample locations for the 70, 80, 90 Rows are shown on Figure 6a in Appendix A.

To assess possible PFAS impacts at Outfall #3, three subsurface soil samples and three groundwater samples were collected. Subsurface soil samples were collected from soil borings completed for installation of monitoring wells MW18PFC0201, MW18PFC0202, and MW18PFC0203 and groundwater samples were collected from each of the three monitoring wells.

Four paired sediment and surface water samples were also collected at Outfall #3. During the initial field effort in April-June 2018, paired sediment and surface water samples (one primary and one duplicate for each media) were mistakenly collected from Pond #3 (location SW18PFC0204) rather than from a low lying wet area west of Pond #3. On July 31, 2018, paired sediment and surface water samples (one primary and one duplicate from each media) were collected in the correct location west of Pond #3 (location SW18PFC0204A). Sample locations for samples collected at Outfall #3 are shown on Figure 6b in Appendix A.

3.6.2 Soil Descriptions

Four soil borings completed at the 70, 80, 90 Rows were terminated at depths ranging from 35.0 to 45.0 feet bgs and three soil borings completed at Outfall #3 were terminated at depths ranging from 20.0 to 50.0 feet bgs. Soil types encountered were variable and included lean clay (CL), fat clay (CH), poorly graded sand (SP), silty sand (SM) and well graded gravel (GW). Detailed boring logs are included in Appendix C.

3.6.3 Groundwater Flow

Groundwater levels were gauged at four new monitoring wells at the 70, 80, 90 Rows and at three new monitoring wells at Outfall #3 on June 1, 2018. Groundwater at the 70, 80, 90 Rows was detected at depths ranging from 19.51 feet to 33.74 feet btoc and at elevations ranging from 3201.48 feet above NAVD 88 (at MW18PFC0207) to 3214.85 feet above NAVD 88 (at MW18PFC0206). Groundwater contours developed from these water level measurements and from adjacent AFFF Areas 5 and 9 indicate shallow groundwater flows southeast as shown on Figure 6a in Appendix A.

Groundwater at Outfall #3 was detected at depths ranging from 4.47 feet to 14.07 feet btoc and at elevations ranging from 3194.73 feet above NAVD 88 (at MW18PFC0203) to 3198.31 feet above NAVD 88 (at MW18PFC0202). Groundwater contours developed from these water level measurements indicate shallow groundwater flows southwest as shown on Figure 6b in Appendix A. Groundwater level measurements and elevations are summarized in Table F-1 in Appendix F.

3.6.4 **Analytical Results**

Surface Soil

Three surface soil samples were collected at the 70, 80, 90 Rows. PFBS was not detected in any of the samples. PFOS and PFOA were detected in all three samples, but at concentrations below the screening level. Surface soil was not identified as media of concern at Outfall #3 and was not sampled (ASL, November 2017). Surface soil analytical results are summarized in Table 6 and shown on Figure 19a in Appendix A.

	Sample ID	ELSWH02-006- SS-001	ELSWH02-007- SS-001	ELSWH02-008- SS-001
	Date Sampled	05/01/18	05/03/18	05/02/18
	Sample Depth (ft bgs)	0 - 0.5	0 - 0.5	0 - 0.5
Analyte	Screening Level (µg/kg)	Result (µg/kg)	Result (µg/kg)	Result (µg/kg)
Perfluorobutane Sulfonate (PFBS)	130,000ª 13 ^b	0.65 U	0.55 U	0.55 U
Perfluorooctanoic Acid (PFOA)	126°	1.4	1.4	0.83 J
Perfluorooctane Sulfonate (PFOS)	126°	47	9.1	4.6

Table 6 70, 8	80, 90 Rows	(AFFF Area	2) Surface So	oil Analytical Results ¹
,	,	(,	•

¹Surface soil was not identified as media of concern at Outfall #3 and was not sampled.

Bold values indicate analyte detected at concentration indicated.

^a EPA Regional Screening Level for Residential Soil (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^b EPA Regional Screening Level for Protection of Groundwater (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^c Screening level calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl search). AFFF = aqueous film forming foam

 $\mu g/kg = micrograms per kilogram$

bgs = below ground surface

SS = surface soil

ELSWH = ERPIMS designation for Ellsworth Air Force Base

J = reported concentration is an estimated value

U = analyte was not detected above the reported value

Subsurface Soil

Five subsurface soil samples were collected at AFFF Area 2; two samples were collected at the 70, 80, 90 Rows and three samples were collected at Outfall #3. PFBS and PFOA were not detected in any of the samples. PFOS was detected in both subsurface soil samples collected at the 70, 80, 90 Rows and in one of three subsurface soil samples collected at Outfall #3. All detected PFOS concentrations were below the screening level. Subsurface soil analytical results are summarized in Table 7 and shown on Figures 19a and 19b in Appendix A.

ft = foot or feet

ID = identification

		ELSWH02-001-	ELSWH02-002-	ELSWH02-003-
	Sample ID	SO-030	SO-031	SO-004
	Location	Outfall #3	Outfall #3	Outfall #3
	Date Sampled	04/26/18	04/25/18	04/25/18
	Sample Depth (ft			
	bgs)	30 - 31	31 - 32	4 - 5
	Screening Level	Result	Result	Result
Analyte	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
Perfluorobutane	130,000ª	0.48 11	0.50.11	0.55 U
Sulfonate (PFBS)	13 ^b	0.48 0	0.30 0	0.55 0
Perfluorooctanoic Acid	1260	0.77 II	0.80 11	0.66 11
(PFOA)	120	0.770	0.80 0	0.88 0
Perfluorooctane	1260	0.77 U	0.8011	4.0
Sulfonate (PFOS)	120	0.770	0.80 0	4.0

- I able 7 70, 00, 20 Kows and Outlan #3 (AFFF Alea 2) Subsultace Son Analytical Kesu	Table 7 70, 80, 90 Rows and Outf	fall #3 (AFFF Area	(a 2) Subsurface Soil	Analytical Result
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		ELSWH02-005-	ELSWH02-006-
	Sample ID	SO-034	SO-024
	Location	70, 80, 90 Rows	70, 80, 90 Rows
	Date Sampled	05/07/18	05/01/18
	Sample Depth (ft		
	bgs)	34 - 35	24 - 25
	Screening Level	Result	Result
Analyte	(µg/kg)	(µg/kg)	(µg/kg)
Perfluorobutane	130,000ª	0.41 U	0.55 U
Sulfonate (PFBS)	13 ^b	0.41 0	0.55 0
Perfluorooctanoic Acid	1260	0.66 11	0.6611
(PFOA)	120	0.00 0	0.88 0
Perfluorooctane	124¢	27 I	111
Sulfonate (PFOS)	120°	2/ J	1.1 J

Bold values indicate analyte detected at concentration indicated.

^a EPA Regional Screening Level for Residential Soil (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^b EPA Regional Screening Level for Protection of Groundwater (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^c Screening level calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl search).

 $\mu g/kg = micrograms$ per kilogram AFFF = aqueous film forming foam

bgs = below ground surface

SO = subsurface soil

ELSWH = ERPIMS designation for Ellsworth Air Force Base

J = reported concentration is an estimated value

U = analyte was not detected above the reported value

Soil Physiochemical Analyses

To provide basic soil parameter information, composite surface and subsurface soil samples were collected from AFFF Area 2 soil borings for pH, TOC, percent solids, and grain size analysis. Surface soil sample ELSWH02-009-SS-001 was composed of equal aliquots of soil collected from 0 to 6 inches bgs at three of the five borings at Area 2 (where surface soil was sampled). Subsurface soil sample ELSWH2-009-SO-024 was composed of equal aliquots of soil collected from all five borings at Area 2 at depths ranging from 4 to 35 feet bgs. Table E-1 summarizing the physiochemical data and supporting laboratory data sheets are included in Appendix E.

- ft = foot or feet
- ID = identification

Groundwater

Eight groundwater samples (seven primary and one duplicate) were collected from seven new monitoring wells at AFFF Area 2 (four wells at the 70, 80, 90 Rows and three wells at Outfall #3). PFBS was detected in each of the four primary samples and in the duplicate sample at the 70, 80, 90 Rows, all at concentrations below the screening level. PFBS was also detected in two of the three samples collected at Outfall #3 at concentrations below the screening level. PFOA and PFOS were also detected in the four primary samples and in the duplicate sample at the 70, 80, 90 Rows, all at individual and/or combined concentrations above the screening level. PFOA and PFOS were also detected in two of the three samples collected at Outfall #3 with both individual and combined concentrations above the screening level. Groundwater analytical results are summarized in Table 8 and shown on Figures 20a and 20b in Appendix A.

	Well Number	MW18PFC0201	MW18PFC0202	MW18PFC0203	MW18PFC0204
	Location	Outfall #3	Outfall #3	Outfall #3	70, 80, 90 Rows
		ELSWH02-001-	ELSWH02-002-	ELSWH02-003-	ELSWH02-005-
	Sample ID	GW-035	GW-035	GW-013	GW-040
	Date Sampled	05/04/18	05/04/18	04/26/18	05/23/18
	Screened Interval				
	(ft bgs)	30 - 40	29.3 - 39.3	5.8 - 15.8	34 - 44
	Screening Level	Result	Result	Result	Result
Analyte	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
Perfluorobutane	40a	0.015 U	0.63	0.017 I	0.60
Sulfonate (PFBS)	0	0.015 0	0.05	0.017 J	0.09
Perfluorooctanoic	0.07 ^b	0.010 U	0.78	0.48	0 30
Acid (PFOA)	0.07	0.010 0	0.70	0.40	0.50
Perfluorooctane	0.07 ^b	0.015 U	0.28	0.74	0.56
Sulfonate (PFOS)	0.07	0.015 0	0.20	0.74	0.30
Combined	0.07°	ND	1.06	1 22	0.86
PFOA+PFOS	0.07		1.00	1.22	0.00

	Well Number	MW18PFC0205	MW18PFC0206	MW18PFC0207	MW18PFC0207
	Location	70, 80, 90 Rows			
		ELSWH02-006-	ELSWH02-007-	ELSWH02-008-	ELSWH02-008-
	Sample ID	GW-030	GW-018	GW-029	GW-929 (dup)
	Date Sampled	05/04/18	05/18/18	05/18/18	05/18/18
	Screened Interval				
	(ft bgs)	23.8 - 33.8	10.1 - 20.1	24.2 - 34.2	24.2 - 34.2
	Screening Level	Result	Result	Result	Result
Analyte	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
Perfluorobutane Sulfonate (PFBS)	40ª	0.011 J	0.0096 J	0.055 J	0.019 J
Perfluorooctanoic Acid (PFOA)	0.07 ^b	0.030	0.024	0.12 J	0.040 J
Perfluorooctane Sulfonate (PFOS)	0.07 ^b	0.074	0.17	2.5 J	0.97 J
Combined PFOA+PFOS	0.07°	0.104	0.194	2.62 J	1.01 J

Bold values indicate analyte detected at concentration indicated. Shaded results indicate value exceeds screening criteria.

^a EPA Regional Screening Level for Tap Water (November 2018) (https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf). ^bEPA, May 2016a. Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS) and EPA, May 2016b. Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA).

The EPA Health Advisory value for drinking water of 0.07 µg/L applies to the combined detected concentrations of PFOS and PFOA.

AFFF = aqueous film forming foam

 $\mu g/L = micrograms per liter$

ft = foot or feet

bgs = below ground surface dup = duplicate GW = groundwater ND = not detected

ID = identification ELSWH = ERPIMS designation for Ellsworth Air Force Base

J = reported concentration is an estimated value

<u>Sediment</u>

Four sediment samples (two primary and two duplicate) were collected near Outfall #3. PFBS was not detected in any of the samples. PFOS and PFOA were detected in all four samples, but at concentrations below the screening level. Sediment analytical results are summarized in Table 9 and shown on Figure 19b in Appendix A.

	Sample ID	ELSWH02-004- SD-001	ELSWH02-004- SD-901 (dup)	ELSWH02-004- SD-001A	ELSWH02-004- SD-901A (dup)
	Sample Date	04/26/18	04/26/18	07/31/18	07/31/18
	Sample Depth (ft bgs)	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
Analyte	Screening Level (µg/kg)	Result (µg/kg)	Result (µg/kg)	Result (µg/kg)	Result (µg/kg)
Perfluorobutane Sulfonate (PFBS)	130,000ª 13 ^b	3.4 U	4.9 U	0.60 U	0.65 U
Perfluorooctanoic Acid (PFOA)	126°	5.2 J	9.2 J	0.69 J	0.90 J
Perfluorooctane Sulfonate (PFOS)	126°	57 J	90 J	23 J	11 J

 Table 9 Outfall #3 (AFFF Area 2) Sediment Analytical Results¹

¹Sediment was not identified as media of concern at the 70, 80, 90 Rows and was not sampled.

Bold values indicate analyte detected at concentration indicated.

^a EPA Regional Screening Level for Residential Soil (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^b EPA Regional Screening Level for Protection of Groundwater (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^c Screening level calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl search). AFFF = aqueous film forming foam

 $\mu g/kg = micrograms per kilogram$

bgs = below ground surface SD = sediment

ELSWH = ERPIMS designation for Ellsworth Air Force Base

J = reported concentration is an estimated value

U = the analyte was not detected at the reported value

Surface Water

Four surface water samples (two primary and two duplicate) were also collected at Outfall #3. PFBS was detected in all four samples, but at concentrations below the screening level. PFOS and PFOA were detected in all four samples at both individual and combined concentrations above the screening level. Surface water analytical results are summarized in Table 10 and shown on Figure 20b in Appendix A.

ft = foot or feet

dup = duplicate

ID = identification
	Sample ID	ELSWH02-004- SW-001	ELSWH02-004- SW-901 (dup)	ELSWH02- 004-SW-001A	ELSWH02- 004-SW-901A (dup)
	Date Sampled	04/26/18	04/26/18	07/31/18	07/31/18
	Screening Level	Result	Result	Result	Result
Analyte	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
Perfluorobutane	/0ª	0.015 T	0.015 T	0.030	0.029
Sulfonate (PFBS)	40	0.015 5	0.013 0	0.050	0.027
Perfluorooctanoic	0.07 ^b	0.35	0.38	0.13	0.14
Acid (PFOA)	0.07	0.35	0.30	0.15	0.14
Perfluorooctane	0.07b	0.44	0.42	0.37	0.32
Sulfonate (PFOS)	0.07	0.44	0.42	0.37	0.32
Combined	0.07%	0.70	0.80	0.50	0.46
PFOA+PFOS	0.07	0.79	0.00	0.30	0.40

Table 10 Outfall #3 (AFFF Area 2) Surface Water Analytical Results¹

¹Surface water was not identified as media of concern at the 70, 80, 90 Rows and was not sampled.

Bold values indicate analyte detected at concentration indicated.

Shaded results indicate value exceeds screening criteria.

^a EPA Regional Screening Level for Tap Water (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^bEPA, May 2016a. Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS) and EPA, May 2016b. Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA).

^cThe EPA Health Advisory value for drinking water of $0.07 \ \mu g/L$ applies to the combined detected concentrations of PFOS and PFOA.

 $\mu g/L = micrograms per liter$

bgs = below ground surface

ft = foot or feet

ELSWH = ERPIMS designation for Ellsworth Air Force Base

J = reported concentration is an estimated value

3.6.5 Conclusions

Past releases of AFFF at the 70, 80, 90 Rows and Outfall #3 have resulted in releases of PFAS to the environment. Media impacted by PFAS above screening levels at AFFF Area 2 include groundwater (PFOS and PFOA) at both the 70, 80, 90 Rows and Outfall #3 and surface water (PFOS and PFOA) at Outfall #3.

3.7 BUILDING 618 – AFFF AREA 3

3.7.1 Sample Locations

To further assess PFAS impacts from apparent AFFF releases at Building 618, five subsurface soil samples (four primary and one duplicate) and three groundwater samples were collected. Subsurface soil samples were collected from soil borings completed for installation of monitoring wells MW18PFC0301, MW18PFC0302, and MW18PFC0303 and from soil boring SB18PFC0304. Groundwater samples were collected from each monitoring well. Sample locations for AFFF Area 3 are shown on Figure 7 in Appendix A.

AFFF = aqueous film forming foam ID = identification SW = surface water dup = duplicate

3.7.2 Soil Descriptions

Four soil borings completed at Building 681 were terminated at depths ranging from 15.0 to 20.0 feet bgs. Soil types encountered were highly variable and included lean clay (CL), fat clay (CH), silt (ML), clayey sand (SC), poorly graded sand (SP), clayey gravel (GC), poorly graded gravel (GP) and well graded gravel (GW). Detailed boring logs are included in Appendix C.

3.7.3 Groundwater Flow

Groundwater levels were gauged at three new monitoring wells at Building 618 on June 1, 2018. Groundwater was detected at depths ranging from 8.91 feet to 11.28 feet btoc and at elevations ranging from 3168.04 feet above NAVD 88 (at MW18PFC0302) to 3170.39 feet above NAVD 88 (at MW18PFC0301). Groundwater contours developed from these water level measurements indicate shallow groundwater flows southeast as shown on Figure 7 in Appendix A. Groundwater level measurements and elevations are summarized in Table F-1 in Appendix F.

3.7.4 Analytical Results

Surface Soil

Surface soil was not identified as media of concern at AFFF Area 3 and was not sampled (ASL, November 2017).

Subsurface Soil

Five subsurface soil samples (four primary and one duplicate) were collected at AFFF Area 3 around UST 618. PFBS was not detected in any of the samples. PFOA was detected in one primary sample, and PFOS was detected in three of four primary samples and in the duplicate sample, all at concentrations below the screening level. Subsurface soil analytical results are summarized in Table 11 and shown on Figure 21 in Appendix A.

		ELSWH03-001-	ELSWH03-002-	ELSWH03-002-
	Sample ID	<u>SO-009</u>	<u>SO-011</u>	SO-911 (dup)
	Date Sampled	05/17/18	05/06/18	05/06/18
	Sample Depth			
	(ft bgs)	9 - 10	11 - 12	11 - 12
	Screening Level	Result	Result	Result
Analyte	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
Perfluorobutane	130,000ª	0.40 U	0.50 U	0.40 U
Sulfonate (PFBS)	13 ^b	0.49 0	0.30 0	0.49 0
Perfluorooctanoic Acid	1260	0.40 1	0.80 11	0.78 11
(PFOA)	120	0.09 J	0.80 0	0.78 0
Perfluorooctane	1260	110 I	0.80 I	0.47 1
Sulfonate (PFOS)	120°	110 J	0.80 U	U.4 / J

Fable 11 Building 61	8 (AFFF Area 3) Subsurface Soil Analytical Results
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	Sample ID	ELSWH03-003-SO-011	ELSWH03-004-SO-011	
	Date Sampled	05/06/18	05/07/18	
	Sample Depth			
	(ft bgs)	11 - 12	11 - 12	
	Screening Level	Result	Result	
Analyte	(µg/kg)	(µg/kg)	(µg/kg)	
Perfluorobutane Sulfonate	130,000ª	0.47.11	0.45 11	
(PFBS)	13 ^b	0.47 0	0.43 0	
Perfluorooctanoic Acid	1260	0.74 11	0.72 11	
(PFOA)	120	0.74 0	0.72 0	
Perfluorooctane Sulfonate	126°	85	56	
(PFOS)	120	0.3	5.0	

Table 11 Building 618 (AFFF Area 3) Subsurface Soil Analytical Results (continued)

Bold values indicate analyte detected at concentration indicated.

^a EPA Regional Screening Level for Residential Soil (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^b EPA Regional Screening Level for Protection of Groundwater (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^c Screening level calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl search). AFFF = aqueous film forming foam

 $\mu g/kg = micrograms per kilogram$

bgs = below ground surface

SO = subsurface soil

ELSWH = ERPIMS designation for Ellsworth Air Force Base

J = reported concentration is an estimated value

U = analyte was not detected above the reported value

Soil Physiochemical Analyses

To provide basic soil parameter information, a composite subsurface soil sample was collected from AFFF Area 3 soil borings for pH, TOC, percent solids, and grain size analysis. Subsurface soil sample ELSWH03-005-SO-011 was composed of equal aliquots of soil collected from the four borings at Area 3 at depths ranging from 9 to 12 feet bgs. No surface soil samples were collected at Area 3. Table E-1 summarizing the physiochemical data and supporting laboratory data sheets are included in Appendix E.

ft = foot or feet

dup = duplicate

ID = identification

<u>Grou</u>ndwater

Groundwater samples were collected from three new monitoring wells at UST 618, adjacent to Building 618. PFBS was detected in all three samples, but at concentrations below the screening level. PFOA and PFOS were also detected in each of the three groundwater samples at individual and combined concentrations above the screening level. Groundwater analytical results are summarized in Table 12 and shown on Figure 22 in Appendix A.

	Well Number	MW18PFC0301	MW18PFC0302	MW18PFC0303
		ELSWH03-001-	ELSWH03-002-	ELSWH03-003-
	Sample ID	GW-015	GW-017	GW-016
	Date Sampled	05/24/18	05/10/18	05/10/18
	Screened Interval			
	(ft bgs)	9 - 19	9.6 - 19.6	9 - 19
	Screening Level	Result	Result	Result
Analyte	(µg/L)	(µg/L)	(µg/L)	(µg/L)
Perfluorobutane Sulfonate	40^{a}	0.044	0.059	0.086
(PFBS)				
Perfluorooctanoic Acid	0.07 ^b	0.073	0.12	0.10
(PFOA)	0.07	0.075	0.12	0.10
Perfluorooctane Sulfonate	0.07b	1.6	1.4	1.2
(PFOS)	0.07°	1.0	1.4	1.5
Combined PFOA+PFOS	0.07°	1.673	1.52	1.40

Table 12 Building 618 (AFFF Area 3) Groundwater Analytical Results

Bold values indicate analyte detected at concentration indicated.

Shaded results indicate value exceeds screening criteria.

^a EPA Regional Screening Level for Tap Water (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^bEPA, May 2016a. Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS) and EPA, May 2016b. Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA).

The EPA Health Advisory value for drinking water of 0.07 μ g/L applies to the combined detected concentrations of PFOS and PFOA.

 $\mu g/L = micrograms per liter$

bgs = below ground surface

GW = groundwater

ELSWH = ERPIMS designation for Ellsworth Air Force Base

AFFF = aqueous film forming foam

ft = foot or feet ID = identification

ID = identificatio

3.7.5 Conclusions

Past releases of AFFF at Building 618 have resulted in releases of PFAS to the environment. Groundwater is the only sampled media impacted by PFAS (PFOS and PFOA) above screening levels at AFFF Area 3.

3.8 FORMER FIRE STATION (BUILDING 7506) – AFFF AREA 4

3.8.1 Sample Locations

To assess possible PFAS impacts from reported releases of AFFF at the former Fire Station (Building 7506), three surface soil samples, five subsurface soil samples, and three groundwater samples were collected. Surface and subsurface soil samples were collected from soil borings completed for installation of monitoring wells MW18PFC0401, MW18PFC0402, and MW18PFC0403; subsurface soil samples were also collected from soil borings SB18PFC0404 and SB18PFC0405. Groundwater samples were collected from each monitoring well. Sample locations for AFFF Area 4 are shown on Figure 8 in Appendix A.

3.8.2 Soil Descriptions

Five soil borings completed at the former fire station were terminated at depths ranging from 35.0 to 50.0 feet bgs. Soil types encountered were variable, consisting primarily of lean clay (CL) with some intervals

of silty sand (SM) and lesser amounts of fat clay (CH), silt (ML), clayey sand (SC), clayey gravel (GC), and well graded gravel (GW). Detailed boring logs are included in Appendix C.

3.8.3 Groundwater Flow

Groundwater levels were gauged at three new monitoring wells at the former fire station (Building 7506) on June 1, 2018. Groundwater was detected at depths ranging from 20.39 feet to 29.28 feet bloc and at elevations ranging from 3183.14 feet above NAVD 88 (at MW18PFC0403) to 3191.24 feet above NAVD 88 (at MW18PFC0401). Groundwater contours developed from these water level measurements indicate shallow groundwater flows south-southeast as shown on Figure 8 in Appendix A. Groundwater level measurements and elevations are summarized in Table F-1 in Appendix F.

3.8.4 Analytical Results

<u>Surface Soil</u>

Three surface soil samples were collected at the site of the former fire station (Building 7506). PFBS and PFOA were detected in all three samples at concentrations below their respective screening levels. PFOS was also detected in all three samples and exceeded the screening level in one sample. Surface soil analytical results are summarized in Table 13 and shown on Figure 23 in Appendix A.

	Sample ID	ELSWH04-001- SS-001	ELSWH04-002- SS-001	ELSWH04-003- SS-001
	Date Sampled	05/22/18	05/18/18	05/18/18
	Sample Depth (ft bgs)	0 - 0.5	0 - 0.5	0 - 0.5
Analyte	Screening Level (μg/kg)	Result (µg/kg)	Result (µg/kg)	Result (μg/kg)
Perfluorobutane Sulfonate (PFBS)	130,000 ^a 13 ^b	0.38 J	0.40 J	8.2 J
Perfluorooctanoic Acid (PFOA)	126°	3.0	2.9	62
Perfluorooctane Sulfonate (PFOS)	126°	48	82	3,000

Table 13 Former Fire Station (Building 7506) (AFFF Area 4) Surface Soil Analytical Results

Bold values indicate analyte detected at concentration indicated.

Shaded results indicate value exceeds screening criteria.

^a EPA Regional Screening Level for Residential Soil (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^b EPA Regional Screening Level for Protection of Groundwater (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^c Screening level calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search).

 $\mu g/kg = micrograms per kilogram$

AFFF = aqueous film forming foam

ft = foot or feet ID = identification

bgs = below ground surface SS = surface soil

ELSWH = ERPIMS designation for Ellsworth Air Force Base

J = reported concentration is an estimated value

Subsurface Soil

Five subsurface soil samples were collected at the site of the former fire station (Building 7506). PFBS and PFOA were detected in all five samples and PFOS was detected in four samples. All PFBS, PFOA,

and PFOS detections were below their respective screening levels. Subsurface soil analytical results are summarized in Table 14 and shown on Figure 23 in Appendix A.

		ELSWH04-001-	ELSWH04-002-	ELSWH04-003-
	Sample ID	SO-029	SO-035	SO-027
	Date Sampled	05/22/18	05/18/18	05/18/18
	Sample Depth			
	(ft bgs)	29 - 30	35 - 36	27 - 28
	Screening Level	Result	Result	Result
Analyte	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
Perfluorobutane	130,000ª	0.62 1	0.61 I	0.53 1
Sulfonate (PFBS)	13 ^b	0.02 J	0.01 J	0.55 J
Perfluorooctanoic	1240	1.0	1.6	2.1
Acid (PFOA)	120	1.9	1.0	2.1
Perfluorooctane	1260	101	76	11
Sulfonate (PFOS)	120°	1.0 U	/.0	11

Table 14 Former Fire Station (Building 7506) (AFFF Area 4) Subsurface Soil Analytical Results

		ELSWH04-004-	ELSWH04-005-
	Sample ID	SO-031	SO-020
	Date Sampled	05/18/18	05/18/18
	Sample Depth		
	(ft bgs)	31 - 32	20 - 21
	Screening Level	Result	Result
Analyte	(µg/kg)	(µg/kg)	(µg/kg)
Perfluorobutane	130,000ª	0.41.1	0 2 0 T
Sulfonate (PFBS)	13 ^b	0.41 J	0.28 J
Perfluorooctanoic	1940	0.96 1	0.24 T
Acid (PFOA)	120	0.00 J	0.24 J
Perfluorooctane	1260	10	15
Sulfonate (PFOS)	120	10	1.5

Bold values indicate analyte detected at concentration indicated.

^a EPA Regional Screening Level for Residential Soil (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^b EPA Regional Screening Level for Protection of Groundwater (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^c Screening level calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search).

 $\mu g/kg = micrograms \ per \ kilogram$

bgs = below ground surface

SO = subsurface soil

ELSWH = ERPIMS designation for Ellsworth Air Force Base

J = reported concentration is an estimated value

U = analyte was not detected above the reported value

Soil Physiochemical Analyses

To provide basic soil parameter information, composite surface and subsurface soil samples were collected from AFFF Area 4 soil borings for pH, TOC, percent solids, and grain size analysis. Surface soil sample ELSWH04-006-SS-001 was composed of equal aliquots of soil collected from 0 to 6 inches bgs at three of the five borings completed at Area 4 (where surface soil was sampled). Subsurface soil sample ELSWH04-006-SO-035 was composed of equal aliquots of soil collected from each of the five borings at depths ranging from 20 to 36 feet bgs. Table E-1 summarizing the physiochemical data and supporting laboratory data sheets are included in Appendix E.

AFFF = aqueous film forming foam ft = foot or feet

dup = duplicateID = identification

Groundwater

Groundwater samples were collected from three new monitoring wells at the former fire station (Building 7506). PFBS was detected in all three samples, but at concentrations below the screening level. PFOA and PFOS were also detected in each of the three groundwater samples at individual and combined concentrations above the screening level. Groundwater analytical results are summarized in Table 15 and shown on Figure 24 in Appendix A.

	Well Number	MW18PFC0401	MW18PFC0402	MW18PFC0403
		ELSWH04-001-	ELSWH04-002-	ELSWH04-003-
	Sample ID	GW-032	GW-038	GW-033
	Date Sampled	05/31/18	05/31/18	05/31/18
	Screened Interval			
	(ft bgs)	24.3 - 34.3	33.9 - 43.9	24.0 - 39.0
	Screening Level	Result	Result	Result
Analyte	(µg/L)	(µg/L)	(µg/L)	(µg/L)
Perfluorobutane	/0a	0.11	0.048	0.40
Sulfonate (PFBS)	40	0.11	0.040	0.40
Perfluorooctanoic	0.07 ^b	0.31	0.11	0.76
Acid (PFOA)	0.07	0.51	0.11	0.70
Perfluorooctane	0.07 ^b	0.16	0.71	0 79
Sulfonate (PFOS)	0.07	0.10	0.71	0.77
Combined	0.07°	0.47	0.82	1 55
PFOA+PFOS	0.07	0.47	0.02	1.33

Table 15 Former	Fire Station	(Building	7506) (AFFF	Area 4) Grou	ndwater Analytical Results
		\ B	/ (,	•

Bold values indicate analyte detected at concentration indicated.

Shaded results indicate value exceeds screening criteria.

^a EPA Regional Screening Level for Tap Water (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^bEPA, May 2016a. Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS) and EPA, May 2016b. Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA).

^cThe EPA Health Advisory value for drinking water of 0.07 μ g/L applies to the combined detected concentrations of PFOS and PFOA.

AFFF = aqueous film forming foam

ID = identification

GW = groundwater

 $\mu g/L = micrograms per liter$

bgs = below ground surface

ft = foot or feet

ELSWH = ERPIMS designation for Ellsworth Air Force Base

3.8.5 Conclusions

Past releases of AFFF at the former fire station have resulted in releases of PFAS to the environment. Media impacted by PFAS above screening levels at AFFF Area 4 include surface soil (PFOS) and groundwater (PFOS and PFOA).

3.9 B-52 CRASH (1972) – AFFF AREA 5

3.9.1 Sample Locations

To assess possible PFAS impacts from use of AFFF at the B-52 crash site, three surface soil samples, four subsurface soil samples (three primary and one duplicate), and two groundwater samples were collected. Surface and subsurface soil samples were collected from soil borings completed for installation of monitoring wells MW18PFC0501 and MW18PFC0502. A subsurface soil sample was also collected from

soil boring SB18PFC0503 and groundwater samples were collected from both monitoring wells. Sample locations for AFFF Area 5 are shown on Figure 9 in Appendix A.

3.9.2 **Soil Descriptions**

Three soil borings completed at the B-52 crash site were terminated at depths ranging from 15.0 to 35.0 feet bgs. Soil types encountered were variable, consisting primarily of lean clay (CL) with some intervals of silty sand (SM) and lesser amounts of fat clay (CH), silt (ML), clayey sand (SC), and well graded gravel (GW). Detailed boring logs are included in Appendix C.

3.9.3 **Groundwater Flow**

Groundwater levels were gauged at two new monitoring wells at the B-52 crash site on June 1, 2018. Groundwater was detected at depths of 17.43 feet and 19.40 feet bloc and at elevations of 3202.83 feet above NAVD 88 (at MW18PFC0501) and 3203.08 feet above NAVD 88 (at MW18PFC0502). Groundwater contours developed from these water level measurements and from adjacent AFFF Area 2 (70, 80, 90 Rows) indicate shallow groundwater flows southeast as shown on Figure 9 in Appendix A. Groundwater level measurements and elevations are summarized in Table F-1 in Appendix F.

3.9.4 **Analytical Results**

Surface Soil

Three surface soil samples were collected at the B-52 crash site. PFBS was not detected in any of the three samples. PFOA and PFOS were detected in all three samples at concentrations below the screening level. Surface soil analytical results are summarized in Table 16 and shown on Figure 25 in Appendix A.

		ELSWH05-001-	ELSWH05-002-	ELSWH05-003-
	Sample ID	SS-001	SS-001	SS-001
	Date Sampled	05/02/18	05/01/18	05/02/18
	Sample Depth	0 05	0.05	0.05
	(It Ugs) Screening Level	<u> </u>	U - U.J Rosult	0 - 0.5 Result
Analyte	μg/kg)	(μg/kg)	(μg/kg)	μg/kg)
Perfluorobutane Sulfonate (PFBS)	130,000 ^a 13 ^b	0.50 U	0.60 U	0.55 U
Perfluorooctanoic Acid (PFOA)	126°	1.8	0.62 J	3.1
Perfluorooctane Sulfonate (PFOS)	126°	68	11	75

Table 16 B-52 Crash (AFFF Area 5) Surface Soil Analytical Results

Bold values indicate analyte detected at concentration indicated.

^a EPA Regional Screening Level for Residential Soil (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^b EPA Regional Screening Level for Protection of Groundwater (November 2018)

(https://semspub.epa.gov/work/HO/197416.pdfhttps://semspub.epa.gov/work/HO/197416.pdf).

^c Screening level calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl search). AFFF = aqueous film forming foam

 $\mu g/kg = micrograms per kilogram$

bgs = below ground surface

SS = surface soil

ELSWH = ERPIMS designation for Ellsworth Air Force Base

J = reported concentration is an estimated value

U = analyte was not detected above the reported value

ft = foot or feet

ID = identification

<u>Subsurfac</u>e Soil

Four subsurface soil samples (three primary and one duplicate) were collected at the B-52 crash site. PFBS was not detected in any of the samples. PFOA was detected in one sample and PFOS was detected in three samples; all at concentrations below the screening level. Subsurface soil analytical results are summarized in Table 17 and shown on Figure 25 in Appendix A.

	Sample ID	ELSWH05-001- SO-028	ELSWH05-002- SO-020	ELSWH05-003- SO-009	ELSWH05-003- SO-909 (dup)
	Date Sampled	05/02/18	05/01/18	05/02/18	05/02/18
	Sample Depth (ft bgs)	28 - 29	20 - 21	9 - 10	9 - 10
Analyte	Screening Level (µg/kg)	Result (µg/kg)	Result (µg/kg)	Result (µg/kg)	Result (µg/kg)
Perfluorobutane Sulfonate (PFBS)	130,000 ^a 13 ^b	0.48 U	0.46 U	0.50 U	0.47 U
Perfluorooctanoic Acid (PFOA)	126°	0.77 U	0.73 U	0.80 U	0.37 J
Perfluorooctane Sulfonate (PFOS)	126°	0.37 J	0.73 U	0.90 J	1.4

 Table 17 B-52 Crash (AFFF Area 5) Subsurface Soil Analytical Results

Bold values indicate analyte detected at concentration indicated.

^a EPA Regional Screening Level for Residential Soil (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^b EPA Regional Screening Level for Protection of Groundwater (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^c Screening level calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl search). AFFF = aqueous film forming foam

 $\mu g/kg = micrograms per kilogram$

bgs = below ground surface

SO = subsurface soil

ELSWH = ERPIMS designation for Ellsworth Air Force Base

J = reported concentration is an estimated value

U = analyte was not detected at the reported value

Soil Physiochemical Analyses

To provide basic soil parameter information, composite surface and subsurface soil samples were collected from AFFF Area 5 soil borings for pH, TOC, percent solids, and grain size analysis. Surface soil sample ELSWH05-004-SS-001 was composed of equal aliquots of soil collected from 0 to 6 inches bgs at the three borings completed at Area 5. Subsurface soil sample ELSWH05-004-SO-020 was composed of equal aliquots of soil collected from the same borings at depths ranging from 9 to 29 feet bgs. Table E-1 summarizing the physiochemical data and supporting laboratory data sheets are included in Appendix E.

ft = foot or feetdup = duplicate

ID = identification

Groundwater

Two groundwater samples were collected from two new monitoring wells at the B-52 crash site. PFBS was detected in both samples, but at concentrations below the screening level. PFOA and PFOS were also detected in both groundwater samples at individual and combined concentrations above the screening level. Groundwater analytical results are summarized in Table 18 and shown on Figure 26 in Appendix A.

	Well Number	MW18PFC0501	MW18PFC0502
	Sample ID	ELSWH05-001-GW-030	ELSWH05-002-GW-025
	Date Sampled	05/04/18	05/03/18
	Screened Interval (ft bgs)	24.1 - 34.1	19 - 29
Analyte	Screening Level (μg/L)	Result (µg/L)	Result (µg/L)
Perfluorobutane Sulfonate (PFBS)	40ª	0.015 J	0.014 J
Perfluorooctanoic Acid (PFOA)	0.07 ^b	0.095	0.088
Perfluorooctane Sulfonate (PFOS)	0.07 ^b	0.34	0.24
Combined PFOA+PFOS	0.07°	0.435	0.328

Table 18 B-52 Crash (AFFF Area 5) Groundwater Analytical Results

Bold values indicate analyte detected at concentration indicated.

Shaded results indicate value exceeds screening criteria.

^a EPA Regional Screening Level for Tap Water (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^bEPA, May 2016a. Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS) and EPA, May 2016b. Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA).

^cThe EPA Health Advisory value for drinking water of $0.07 \ \mu g/L$ applies to the combined detected concentrations of PFOS and PFOA.

 $\mu g/L = micrograms per liter$

bgs = below ground surface

ft = foot or feet

ELSWH = ERPIMS designation for Ellsworth Air Force Base

J = reported concentration is an estimated value

3.9.5 Conclusions

Use of AFFF at the B-52 crash site has resulted in a release of PFAS to the environment. Groundwater is the only media impacted by PFAS (PFOS and PFOA) above screening levels at AFFF Area 5.

3.10 B-1 CRASH (1988) – AFFF AREA 6

3.10.1 Sample Locations

To assess possible PFAS impacts from use of AFFF at the B-1 crash site in 1988, five surface soil samples (four primary and one duplicate), four subsurface soil samples, and four groundwater samples (three primary and one duplicate) were collected. Surface and subsurface soil samples were collected from soil borings completed for installation of monitoring wells MW18PFC0601, MW18PFC0602, and MWPFC0603 and from soil boring SB18PFC0604. Groundwater samples were collected from each monitoring well. Sample locations for AFFF Area 6 are shown on Figure 10 in Appendix A.

3.10.2 Soil Descriptions

Four soil borings completed at the B-1 crash site were terminated at depths ranging from 20.0 to 60.0 feet bgs. Soil types encountered were variable, consisting primarily of lean clay (CL) with occasional intervals

AFFF = aqueous film forming foam ID = identification GW = groundwater of silty sand (SM), silt (ML), clayey sand (SC), and well graded sand (SW). Detailed boring logs are included in Appendix C.

3.10.3 Groundwater Flow

Groundwater levels were gauged at three new monitoring wells at the B-1 crash site on June 1, 2018. Groundwater was detected at depths ranging from 10.77 feet to 14.92 feet bloc and at elevations ranging from 3150.99 feet above NAVD 88 (at MW18PFC0603) to 3160.98 feet above NAVD 88 (at MW18PFC0601). Groundwater contours developed from these water level measurements indicate shallow groundwater flows south as shown on Figure 10 in Appendix A. Groundwater level measurements and elevations are summarized in Table F-1 in Appendix F.

3.10.4 Analytical Results

Surface Soil

Five surface soil samples (four primary and one duplicate) were collected at the B-1 crash site. PFBS was not detected in any of the samples. PFOS and PFOA were detected in all five samples, but at concentrations below the screening level. Surface soil analytical results are summarized in Table 19 and shown on Figure 27 in Appendix A.

		ELSWH06-001-	ELSWH06-002-	ELSWH06-003-
	Sample ID	SS-001	SS-001	SS-001
	Date Sampled	05/06/18	05/05/18	05/05/18
	Sample Depth			
	(ft bgs)	0 - 0.5	0 - 0.5	0 - 0.5
	Screening Level	Result	Result	Result
Analyte	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
Perfluorobutane	130,000ª	0.45 U	0.55 U	0.40 U
Sulfonate (PFBS)	13 ^b	0.43 0	0.33 0	0.49 0
Perfluorooctanoic		0.70 1	0731	0.57 1
Acid (PFOA)	126°	0./9 J	0.75 5	0.37 J
Perfluorooctane		61	68	16
Sulfonate (PFOS)	126°	UI	0.0	О.Т

Table 19 B-1 Crash (AFFF Area 6) Surface Soil Analytical Results

		ELSWH06-004-	ELSWH06-004-
	Sample ID	SS-001	SS-901 (dup)
	Date Sampled	05/06/18	05/06/18
	Sample Depth		
	(ft bgs)	0 - 0.5	0 - 0.5
	Screening Level	Result	Result
Analyte	(µg/kg)	(µg/kg)	(µg/kg)
Perfluorobutane Sulfonate	130,000ª	0.46.11	0.40.11
(PFBS)	13 ^b	0.40 0	0.49 0
Perfluorooctanoic Acid		121	101
(PFOA)	126°	1.2 J	1.0 J
Perfluorooctane Sulfonate		20.1	22
(PFOS)	126°	29 J	22

Table 19 B-1 Crash	(AFFF Area 6) Surface Soil Anal	ytical Results (continued)
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Bold values indicate analyte detected at concentration indicated.

^a EPA Regional Screening Level for Residential Soil (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^b EPA Regional Screening Level for Protection of Groundwater (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

cScreening level calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search).

 $\mu g/kg = micrograms per kilogram$ AFFF = aqueous film forming foam

bgs = below ground surface dup = duplicateft = foot or feetID = identification SS = surface soil

ELSWH = ERPIMS designation for Ellsworth Air Force Base

J = reported concentration is an estimated value

U = analyte was not detected above the reported value

Subsurface Soil

Four subsurface soil samples were also collected at the B-1 crash site. PFBS and PFOA were not detected in any of the samples. PFOS was detected in two of the four samples, but at concentrations below the screening level. Subsurface soil analytical results are summarized in Table 20 and shown on Figure 27 in Appendix A.

Table 20 B-1 Crash (AFFF Area 6) Subsurface Soil Analytical Results

		ELSWH06-	ELSWH06-002-	ELSWH06-003-	ELSWH06-004-
	Sample ID	001-SO-012	SO-010	SO-054	SO-035
	Date Sampled	05/06/18	05/05/18	05/05/18	05/06/18
	Sample Depth	10 10	10 11	54 55	25. 24
	(ft bgs)	12 - 13	10 - 11	54 - 55	35 - 30
	Screening				
	Level	Result	Result	Result	Result
Analyte	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
Perfluorobutane	130,000ª	0.43 U	0.48 11	0.4611	0.50 U
Sulfonate (PFBS)	13 ^b	0.43 0	0.48 0	0.40 0	0.50 0
Perfluorooctanoic	126	0.69.11	0.76 11	0.72.11	0.00.11
Acid (PFOA)	120°	0.08 0	0.76 U	0.73 0	0.80 0
Perfluorooctane	1269	0771	0.51 1	0.72 11	0.00.11
Sulfonate (PFOS)	126°	U.// J	0.51 J	0.73 U	0.80 U

Bold values indicate analyte detected at concentration indicated.

^a EPA Regional Screening Level for Residential Soil (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^b EPA Regional Screening Level for Protection of Groundwater (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^c Screening level calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl search).

 $\mu g/kg = micrograms per kilogram$ AFFF = aqueous film forming foam SO = subsurface soil ID = identification

bgs = below ground surface ft = foot or feet

J = reported concentration is an estimated value

ELSWH = ERPIMS designation for Ellsworth Air Force Base U = analyte was not detected above the reported value

Soil Physiochemical Analyses

To provide basic soil parameter information, composite surface and subsurface soil samples were collected from AFFF Area 6 soil borings for pH, TOC, percent solids, and grain size analysis. Surface soil sample ELSWH06-005-SS-001 was composed of equal aliquots of soil collected from 0 to 6 inches bgs at the four borings completed at Area 6. Subsurface soil sample ELSWH06-005-SO-054 was composed of equal aliquots of soil collected from the same borings at depths ranging from 10 to 55 feet bgs. Table E-1 summarizing the physiochemical data and supporting laboratory data sheets are included in Appendix E.

<u>Groundwater</u>

Four groundwater samples (three primary and one duplicate) were collected from three new monitoring wells at the B-1 crash site. PFBS was detected in three of the four samples, but at concentrations below the screening level. PFOA and PFOS were also detected in one of the three groundwater samples at individual and combined concentrations above the screening level. Groundwater analytical results are summarized in Table 21 and shown on Figure 28 in Appendix A.

	Well Number	MW18PFC0601	MW18PFC0602	MW18PFC0602	MW18PFC0603
		ELSWH06-001-	ELSWH06-002-	ELSWH06-002-	ELSWH06-003-
	Sample ID	GW-018	GW-018	GW-918 (dup)	GW-055
	Date Sampled	05/09/18	05/09/18	05/09/18	05/07/18
	Screened				
	Interval				
	(ft bgs)	8.6 - 18.6	8.9 - 18.9	8.9 - 18.9	49.3 - 59.3
	Screening				
	Level	Result	Result	Result	Result
Analyte	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
Perfluorobutane	40^{a}	0.022	0 016 J	0.015 J	0.015 U
Sulfonate (PFBS)	10	0.022	0.010 0	0.015 0	0.015 0
Perfluorooctanoic	0.07^{b}	0 19	0.010 U	0.010 U	0.010 U
Acid (PFOA)	0.07	0.17	0.010 0	0.010 0	0.010 0
Perfluorooctane	0 07 ^b	0.40	0.015 U	0.015 U	0.015 U
Sulfonate (PFOS)	0.07	0.40	0.015 0	0.015 0	0.015 0
Combined	0.07°	0.50	ND	ND	ND
PFOA+PFOS	0.07	0.39	ND	ND	ND

 Table 21 B-1 Crash (AFFF Area 6) Groundwater Analytical Results

Bold values indicate analyte detected at concentration indicated.

Shaded results indicate value exceeds screening criteria.

^a EPA Regional Screening Level for Tap Water (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

ft = foot or feet

^bEPA, May 2016a. Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS) and EPA, May 2016b. Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA).

bgs = below ground surface

GW = groundwater

 $^{\circ}$ The EPA Health Advisory value for drinking water of 0.07 μ g/L applies to the combined detected concentrations of PFOS and PFOA.

AFFF = aqueous film forming foam

 $\mu g/L = micrograms per liter$

dup = duplicate

ID = identification ND = not detected

ELSWH = ERPIMS designation for Ellsworth Air Force Base

J = reported concentration is an estimated value

U = analyte was not detected at the reported value

3.10.5 Conclusions

Use of AFFF at the B-1 crash site has resulted in a release of PFAS to the environment. Groundwater is the only media impacted by PFAS (PFOS and PFOA) above screening levels at AFFF Area 6.

3.11 DELTA TAXIWAY WEST CRASH (2000) – AFFF AREA 7

3.11.1 Sample Locations

To assess possible PFAS impacts from a 2000 AFFF spill on Delta Taxiway West (resulting from a vehicle crash), four surface soil samples, four subsurface soil samples, and three groundwater samples were collected. Surface and subsurface soil samples were collected from soil borings completed for installation of monitoring wells MW18PFC0701, MW18PFC0702, and MWPFC0703 and from soil boring SB18PFC0704. Groundwater samples were collected from each monitoring well. Sample locations for AFFF Area 7 are shown on Figure 11 in Appendix A.

3.11.2 Soil Descriptions

Four soil borings completed at the Delta Taxiway West crash site were terminated at depths ranging from 20.0 to 60.0 feet bgs. Soil types encountered were highly variable, consisting primarily of lean clay (CL) with occasional intervals of silty sand (SM), well graded sand (SW), silt (ML), clayey sand (SC), and clayey gravel (GC). Detailed boring logs are included in Appendix C.

3.11.3 Groundwater Flow

Groundwater levels were gauged at three new monitoring wells at the Delta Taxiway West crash site on June 1, 2018. Groundwater was detected at depths ranging from 13.66 feet to 15.41 feet bloc and at elevations ranging from 3189.84 feet above NAVD 88 (at MW18PFC0702) to 3190.55 feet above NAVD 88 (at MW18PFC0703). Groundwater contours developed from these water level measurements indicate shallow groundwater flows southeast as shown on Figure 11 in Appendix A. Groundwater level measurements and elevations are summarized in Table F-1 in Appendix F.

3.11.4 Analytical Results

Surface Soil

Four surface soil samples were collected at the Delta Taxiway West crash site. PFBS was not detected in any of the samples. PFOS was detected in all four samples and PFOA was detected in three of four samples, all at concentrations below the screening level. Surface soil analytical results are summarized in Table 22 and shown on Figure 29 in Appendix A.

-					
	Sample ID	ELSWH07- 001-SS-001	ELSWH07-002- SS-001	ELSWH07-003- SS-001	ELSWH07-004- SS-001
	Date Sampled	05/08/18	05/09/18	05/15/18	05/08/18
	Sample Depth (ft bgs)	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
Analyte	Screening Level (µg/kg)	Result (µg/kg)	Result (µg/kg)	Result (µg/kg)	Result (µg/kg)
Perfluorobutane Sulfonate (PFBS)	130,000a 13 ^b	0.55 U	0.45 U	0.43 U	0.50 U
Perfluorooctanoic Acid (PFOA)	126°	2.6	0.36 J	0.69 U	0.60 J
Perfluorooctane Sulfonate (PFOS)	126°	18	18	1.8	5.9

Table 22 Delta Taxiway West Crash (AFFF Area 7) Surface Soil Analytical Results

Bold values indicate analyte detected at concentration indicated.

^a EPA Regional Screening Level for Residential Soil (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^b EPA Regional Screening Level for Protection of Groundwater (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^o Screening level calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl search). AFFF = aqueous film forming foam

 $\mu g/kg = micrograms per kilogram$

bgs = below ground surface

SS = surface soil

ELSWH = ERPIMS designation for Ellsworth Air Force Base

J = reported concentration is an estimated value

U = analyte was not detected above the reported value

Subsurface Soil

Four subsurface soil samples were also collected at the Delta Taxiway West crash site. PFBS and PFOA were not detected in any of the samples. PFOS was detected in two of four samples, both at concentrations below the screening level. Subsurface soil analytical results are summarized in Table 23 and shown on Figure 29 in Appendix A.

ft = foot or feet

ID = identification

	Sample ID	ELSWH07-001- SO-029	ELSWH07-002- SO-013	ELSWH07-003- SO-016	ELSWH07-004- SO-013
	Date Sampled	05/08/18	05/09/18	05/15/18	05/08/18
	Sample Depth (ft bgs)	29 - 30	13 - 14	16 - 17	13 - 14
Analyte	Screening Level (µg/kg)	Result (µg/kg)	Result (µg/kg)	Result (µg/kg)	Result (µg/kg)
Perfluorobutane Sulfonate (PFBS)	130,000 ^a 13 ^b	0.50 U	0.41 U	0.40 U	0.41 U
Perfluorooctanoic Acid (PFOA)	126°	0.80 U	0.66 U	0.64 U	0.65 U
Perfluorooctane Sulfonate (PFOS)	126°	0.80 U	1.1	0.34 J	0.65 U

Table 25 Delta Taxiway west Urash (AFFF Area 7) Subsurface Soli Analytical
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Bold values indicate analyte detected at concentration indicated.

^a EPA Regional Screening Level for Residential Soil (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^b EPA Regional Screening Level for Protection of Groundwater (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^c Screening level calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search).

 $\mu g/kg = micrograms \ per \ kilogram$

bgs = below ground surface

SO = subsurface soil

ELSWH = ERPIMS designation for Ellsworth Air Force Base

J = reported concentration is an estimated value

U = analyte was not detected above the reported value

Soil Physiochemical Analyses

To provide basic soil parameter information, composite surface and subsurface soil samples were collected from AFFF Area 7 soil borings for pH, TOC, percent solids, and grain size analysis. Surface soil sample ELSWH07-005-SS-001 was composed of equal aliquots of soil collected from 0 to 6 inches bgs at the four borings completed at Area 7. Subsurface soil sample ELSWH07-005-SO-001 was composed of equal aliquots of soil collected from 13 to 30 feet bgs. Table E-1, summarizing the physiochemical data, and supporting laboratory data sheets are included in Appendix E.

Groundwater

Groundwater samples were collected from three new monitoring wells at the Delta Taxiway West crash site. PFBS was detected in two of the three samples, but at concentrations below the screening level. PFOA and PFOS were also detected in two of the three groundwater samples; however, both the individual and combined concentrations of PFOA and PFOS were below the screening level. Groundwater analytical results are summarized in Table 24 and shown on Figure 30 in Appendix A.

AFFF = aqueous film forming foam ft = foot or feet

- dup = duplicate
- ID = identification

	Well Number	MW18PFC0701	MW18PFC0702	MW18PFC0703
		ELSWH07-001-	ELSWH07-002-	ELSWH07-003-
	Sample ID	GW-035	GW-021	GW-021
	Date Sampled	05/15/18	05/21/18	05/21/18
	Screened Interval (ft bgs)	29.1 - 39.1	14.3 - 24.3	14.1 - 24.1
Analyte	Screening Level (µg/L)	Result (µg/L)	Result (µg/L)	Result (µg/L)
Perfluorobutane Sulfonate (PFBS)	40ª	0.015 U	0.018 J	0.016 J
Perfluorooctanoic Acid (PFOA)	0.07 ^b	0.010 U	0.010 J	0.0094 J
Perfluorooctane Sulfonate (PFOS)	0.07 ^b	0.015 U	0.017 J	0.017 J
Combined PFOA+PFOS	0.07 ^b	ND	0.027 J	0.0264 J

Table 24 Delta Taxiwa	y West Crash (A	AFFF Area 7) Ground	water Analytical Results
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Bold values indicate analyte detected at concentration indicated.

^a EPA Regional Screening Level for Tap Water (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^bEPA, May 2016a. Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS) and EPA, May 2016b. Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA).

^cThe EPA Health Advisory value for drinking water of 0.07 μ g/L applies to the combined detected concentrations of PFOS and PFOA.

 $\mu g/L = micrograms \ per \ liter$

bgs = below ground surface

ft = foot or feet

ELSWH = ERPIMS designation for Ellsworth Air Force Base

J = reported concentration is an estimated value

U = analyte was not detected above the reported value

3.11.5 Conclusions

Although an AFFF spill occurred at the Delta Taxiway West crash site, soil and groundwater were not impacted by PFBS, PFOA, or PFOS above screening levels.

3.12 MARTEN CRASH (2006) – AFFF AREA 8

3.12.1 Sample Locations

To assess possible PFAS impacts from use of AFFF at a 2006 truck crash, four surface soil samples, five subsurface soil samples (four primary and one duplicate), and three groundwater samples were collected. Surface and subsurface soil samples were collected from soil borings completed for installation of monitoring wells MW18PFC0801, MW18PFC0802, and MWPFC0803 and from soil boring SB18PFC0804. Groundwater samples were collected from each monitoring well. Sample locations for AFFF Area 8 are shown on Figure 12 in Appendix A.

AFFF = aqueous film forming foam ID = identification GW = groundwater ND = not detected

3.12.2 Soil Descriptions

Four soil borings completed at the Marten crash site were terminated at depths ranging from 50.0 to 60.0 feet bgs. Soils encountered at Area 8 were very consistent; lean clay (CL) was the only soil type encountered in each of the four borings. Detailed boring logs are included in Appendix C.

3.12.3 Groundwater Flow

Groundwater levels were gauged at three new monitoring wells at the Marten crash site on June 1, 2018. Groundwater was detected at depths ranging from 14.36 feet to 15.07 feet bloc and at elevations ranging from 3058.49 feet above NAVD 88 (at MW18PFC0802) to 3059.65 feet above NAVD 88 (at MW18PFC0801). Groundwater contours developed from these water level measurements indicate shallow groundwater flows south-southeast as shown on Figure 12 in Appendix A. Groundwater level measurements and elevations are summarized in Table F-1 in Appendix F.

3.12.4 Analytical Results

Surface Soil

Four surface soil samples were collected at the Marten crash site. PFBS was not detected in any of the samples. PFOS and PFOA were detected in all four samples, but at concentrations below the screening level. Surface soil analytical results are summarized in Table 25 and shown on Figure 31 in Appendix A.

	Sample ID	ELSWH08-001- SS-001	ELSWH08-002- SS-001	ELSWH08-003- SS-001	ELSWH08-004- SS-001
	Date Sampled	04/23/18	04/22/18	04/21/18	04/21/18
	Sample Depth (ft bgs)	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
Analyte	Screening Level (µg/kg)	Result _(µg/kg)	Result (µg/kg)	Result _(µg/kg)	Result (µg/kg)
Perfluorobutane Sulfonate (PFBS)	130,000 ^a 13 ^b	0.60 U	0.45 U	0.45 U	0.50 U
Perfluorooctanoic Acid (PFOA)	126°	0.64 J	0.57 J	0.75 J	1.1
Perfluorooctane Sulfonate (PFOS)	126°	13	5.2	12	12

Table 25 Marten Crash (2006) (AFFF Area 8) Surface Soil Analytical Results

Bold values indicate analyte detected at concentration indicated.

^a EPA Regional Screening Level for Residential Soil (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^b EPA Regional Screening Level for Protection of Groundwater (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^c Screening level calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search). AFFF = aqueous film forming foam

 $\mu g/kg = micrograms per kilogram$

bgs = below ground surface

SS = surface soil

ELSWH = ERPIMS designation for Ellsworth Air Force Base

U = analyte was not detected above the reported value

ID = identification J = reported concentration is an estimated value

ft = foot or feet

Subsurface Soil

Five subsurface soil samples (four primary and one duplicate) were collected at the Marten crash site. PFBS, PFOS, and PFOA were not detected in any of the samples. Subsurface soil analytical results are summarized in Table 26 and shown on Figure 31 in Appendix A.

		ELSWH08-001-	ELSWH08-002-	ELSWH08-002-
	Sample ID	SO-030	SO-040	SO-940 (dup)
	Date Sampled	04/23/18	04/23/18	04/23/18
	Sample Depth			
	(ft bgs)	30 - 31	40 - 41	40 - 41
	Screening Level	Result	Result	Result
Analyte	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
Perfluorobutane Sulfonate (PFBS)	130,000 ^a 13 ^b	0.60 U	0.55 U	0.60 U
Perfluorooctanoic Acid (PFOA)	126°	0.96 U	0.88 U	0.96 U
Perfluorooctane Sulfonate (PFOS)	126°	0.96 U	0.88 U	0.96 U

Table 26 Marten Crash	(2006)	(AFFF A	rea 8) Sub	surface Soil	Analytical Results
	(/	(

		ELSWH08-003-	ELSWH08-004-
	Sample ID	SO-046	SO-051
	Date Sampled	04/22/18	04/22/18
	Sample Depth		
	(ft bgs)	46 - 47	51 - 52
	Screening Level	Result	Result
Analyte	(µg/kg)	(µg/kg)	(µg/kg)
Perfluorobutane Sulfonate (PFBS)	130,000 ^a 13 ^b	0.55 U	0.50 U
Perfluorooctanoic Acid (PFOA)	126°	0.88 U	0.80 U
Perfluorooctane Sulfonate (PFOS)	126°	0.88 U	0.80 U

^a EPA Regional Screening Level for Residential Soil (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^b EPA Regional Screening Level for Protection of Groundwater (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^c Screening level calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search). AFFF = aqueous film forming foam

µg/kg = micrograms per kilogram

bgs = below ground surface

- SO = subsurface soil
- ELSWH = ERPIMS designation for Ellsworth Air Force Base

U = analyte was not detected above the reported value

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To provide basic soil parameter information, composite surface and subsurface soil samples were collected from AFFF Area 8 soil borings for pH, TOC, percent solids, and grain size analysis. Surface soil sample ELSWH08-005-SS-001 was composed of equal aliquots of soil collected from 0 to 6 inches bgs at the four borings completed at Area 8. Subsurface soil sample ELSWH08-005-SO-046 was composed of equal aliquots of soil collected from the same borings at depths ranging from 30 to 52 feet bgs. Table E-1 summarizing the physiochemical data and supporting laboratory data sheets are included in Appendix E.

ft = foot or feet

dup = duplicate

ID = identification

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<u>Groundwater</u>

Groundwater samples were collected from three new monitoring wells at the Marten crash site. PFBS, PFOS, and PFOA were not detected in any of the samples. Groundwater analytical results are summarized in Table 27 and shown on Figure 32 in Appendix A.

	Well Number	MW18PFC0801	MW18PFC0802	MW18PFC0803
	Sample ID	ELSWH08-001- GW-044	ELSWH08-002- GW-045	ELSWH08-003- GW-045
	Date Sampled	05/01/18	04/26/18	04/26/18
	Screened Interval (ft bgs)	35.9 - 50.9	39.3 - 49.3	40.1 - 50.1
Analyte	Screening Level (µg/L)	Result (µg/L)	Result (µg/L)	Result (µg/L)
Perfluorobutane Sulfonate (PFBS)	40ª	0.015 U	0.015 U	0.015 U
Perfluorooctanoic Acid (PFOA)	0.07 ^b	0.010 U	0.010 U	0.010 U
Perfluorooctane Sulfonate (PFOS)	0.07 ^b	0.015 U	0.015 U	0.015 U
Combined PFOA+PFOS	0.07°	ND	ND	ND

|--|

^a EPA Regional Screening Level for Tap Water (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^bEPA, May 2016a. Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS) and EPA, May 2016b. Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA).

^cThe EPA Health Advisory value for drinking water of 0.07 μ g/L applies to the combined detected concentrations of PFOS and PFOA.

 $\mu g/L = micrograms per liter$

bgs = below ground surface

ft = foot or feet

ELSWH = ERPIMS designation for Ellsworth Air Force Base U = analyte was not detected above the reported value

3.12.5 Conclusions

Although AFFF was used at the Marten crash site, soil and groundwater have not been impacted by PFBS, PFOS, or PFOA above screening levels.

3.13 CRASH 4 (2001) – AFFF AREA 9

3.13.1 Sample Locations

To assess possible PFAS impacts from an AFFF spill from emergency response vehicle "Crash 4," four surface soil samples (three primary and one duplicate), three subsurface soil samples, and two groundwater samples were collected. Surface and subsurface soil samples were collected from soil borings SB18PFC0901, MW18PFC0902, and SB18PFC0903. Monitoring wells installed in soil borings SB18PFC0901 and SB18PFC0902 did not produce water and were determined to be too shallow. These wells were abandoned and deeper replacement wells MW18PFC0901A and MW18PFC0902A were installed near the original well locations and sampled. Sample locations for AFFF Area 9 are shown on Figure 13 in Appendix A.

AFFF = aqueous film forming foam ID = identification GW = groundwater ND = not detected

3.13.2 Soil Descriptions

Five soil borings completed at the Crash 4 spill site were terminated at depths ranging from 18.0 to 35.0 feet bgs. Soil types encountered were highly variable, consisting primarily of lean clay (CL) with occasional intervals of silty sand (SM), well graded sand (SW), fat clay (CH), silt (ML), and clayey sand (SC). Detailed boring logs are included in Appendix C.

3.13.3 Groundwater Flow

Groundwater levels were gauged at two new monitoring wells at the Crash 4 spill site on June 1, 2018. Groundwater was detected at depths of 25.70 feet and 31.72 feet bloc and at elevations of 3215.09 feet above NAVD 88 (at MW18PFC0901A) and 3222.52 feet above NAVD 88 (at MW18PFC0902A). Groundwater contours developed from these water level measurements and from adjacent AFFF Area 2 (70, 80, 90 Rows) indicate shallow groundwater flows southeast as shown on Figure 13 in Appendix A. Groundwater level measurements and elevations are summarized in Table F-1 in Appendix F.

3.13.4 Analytical Results

Surface Soil

Four surface soil samples (three primary and one duplicate) were collected at the Crash 4 spill site. PFBS was not detected in any of the samples. PFOS was detected in all four samples and PFOA was detected in two of the three primary samples and in the duplicate sample, all at concentrations below the screening level. Surface soil analytical results are summarized in Table 28 and shown on Figure 33 in Appendix A.

	Sample ID	ELSWH09- 001-SS-001	ELSWH09-002- SS-001	ELSWH09-002- SS-901 (dup)	ELSWH09-003- SS-001
	Date Sampled	05/21/18	05/21/18	05/21/18	05/04/18
	Sample Depth (ft bgs)	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
Analyte	Screening Level (µg/kg)	Result (µg/kg)	Result (µg/kg)	Result (µg/kg)	Result (µg/kg)
Perfluorobutane Sulfonate (PFBS)	130,000 ^a 13 ^b	0.49 U	0.55 U	0.55 U	0.60 U
Perfluorooctanoic Acid (PFOA)	126°	0.62 J	0.88 U	0.64 J	1.1 J
Perfluorooctane Sulfonate (PFOS)	126°	32	4.0 J	31 J	3.0

 Table 28 Crash 4 (AFFF Area 9) Surface Soil Analytical Results

Bold values indicate analyte detected at concentration indicated.

^a EPA Regional Screening Level for Residential Soil (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^b EPA Regional Screening Level for Protection of Groundwater (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^c Screening level calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl search).

 $\mu g/kg = \text{micrograms per kilogram}$ AFFF = aqueous film forming foam ft = foot or feet ID = identification SS = surface soil SS = surface soil

ELSWH = ERPIMS designation for Ellsworth Air Force Base J = reported concentration is an estimated value U = analyte was not detected above the reported value

<u>Subsurface Soil</u>

Three subsurface soil samples were collected at the Crash 4 spill site. PFBS was not detected in any of the samples. PFOS was detected in two of three samples and PFOA was detected in one of three samples, all at concentrations below the screening level. Subsurface soil analytical results are summarized in Table 29 and shown on Figure 33 in Appendix A.

	Sample ID	ELSWH09-001- SO-005	ELSWH09-002- SO-005	ELSWH09-003- SO-028
	Date Sampled	05/21/18	05/21/18	05/04/18
	Sample Depth (ft bgs)	5 - 6	5 - 6	28 - 29
Analyte	Screening Level (µg/kg)	Result (µg/kg)	Result (μg/kg)	Result (μg/kg)
Perfluorobutane Sulfonate (PFBS)	130,000 ^a 13 ^b	0.49 U	0.50 U	0.42 U
Perfluorooctanoic Acid (PFOA)	126°	4.5	0.80 U	0.67 U
Perfluorooctane Sulfonate (PFOS)	126°	1.0	2.1	0.67 U

Table 29 Crash 4	(AFFF Area 9) Subsurface Soil	Analytical Results
	`	/	•/

Bold values indicate analyte detected at concentration indicated.

^a EPA Regional Screening Level for Residential Soil (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^b EPA Regional Screening Level for Protection of Groundwater (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^c Screening level calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search).

 $\mu g/kg = micrograms per kilogram$ AFFF = aqueous film forming foam bgs = below ground surface

ft = foot or feet SO = subsurface soil ID = identification

ELSWH = ERPIMS designation for Ellsworth Air Force Base U = analyte was not detected above the reported value

Soil Physiochemical Analyses

To provide basic soil parameter information, composite surface and subsurface soil samples were collected from AFFF Area 9 soil borings for pH, TOC, percent solids, and grain size analysis. Surface soil sample ELSWH09-004-SS-001 was composed of equal aliquots of soil collected from 0 to 6 inches bgs at the three borings completed at Area 9. Subsurface soil sample ELSWH09-004-SO-028 was composed of equal aliquots of soil collected from the same borings at depths ranging from 5 to 29 feet bgs. Table E-1 summarizing the physiochemical data and supporting laboratory data sheets are included in Appendix E.

Groundwater

Groundwater samples were collected from two new monitoring wells at the Crash 4 spill site. PFBS was detected in one sample at a concentration below the screening level. PFOS and PFOA were detected in both samples. PFOS exceeded the screening level in one groundwater sample and the combined PFOS and PFOA concentrations exceeded the screening level in both samples. Groundwater analytical results are summarized in Table 30 and shown on Figure 34 in Appendix A.

	Well Number	MW18PFC0901A	MW18PFC0902A
		ELSWH09-001-	ELSWH09-002-
	Sample ID	GW-033A	GW-030A
	Date Sampled	05/31/18	05/31/18
	Screened Interval (ft bgs)	23.9 - 33.9	24.1 - 34.1
Analyte	Screening Level (µg/L)	Result (μg/L)	Result (μg/L)
Perfluorobutane Sulfonate (PFBS)	40ª	0.016 U	0.017 J
Perfluorooctanoic Acid (PFOA)	0.07 ^b	0.013 J	0.065
Perfluorooctane Sulfonate (PFOS)	0.07 ^b	0.16	0.0076 J
Combined PFOA+PFOS	0.07°	0.173 J	0.0726 J

Table 30 Crash 4 (AFFF Area 9) Groundwater Analytical Results

Bold values indicate analyte detected at concentration indicated.

Shaded results indicate value exceeds screening criteria.

^a EPA Regional Screening Level for Tap Water (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^bEPA, May 2016a. Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS) and EPA, May 2016b. Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA).

 $^{\circ}$ The EPA Health Advisory value for drinking water of 0.07 μ g/L applies to the combined detected concentrations of PFOS and PFOA.

 $\mu g/L = micrograms per liter$

bgs = below ground surface

ft = foot or feet

ELSWH = ERPIMS designation for Ellsworth Air Force Base

J = reported concentration is an estimated value

U = analyte was not detected above the reported value

3.13.5 Conclusions

An AFFF spill at the Crash 4 site has resulted in a release of PFAS to the environment. Groundwater is the only media impacted by PFAS (PFOS and PFOA) above screening levels at AFFF Area 9.

3.14 WASTEWATER TREATMENT PLANT – AFFF AREA 10

3.14.1 Sample Locations

To further assess PFAS impacts from releases of AFFF from the WWTP, three surface soil samples, three subsurface soil samples, and four groundwater samples (three primary and one duplicate) were collected. Surface and subsurface soil samples were collected from soil borings completed for installation of monitoring wells MW18PFC1001 and MW18PFC1002 at the former unlined sludge drying beds and MW18PFC1003 on the golf course. Groundwater samples were also collected from each monitoring well. In addition, paired surface water and sediment samples were collected at location SW18PFC1004 downstream from the former WWTP effluent discharge in an unnamed drainage that flows to a lake on the golf course. Sample locations for AFFF Area 10 are shown on Figure 14 in Appendix A.

AFFF = aqueous film forming foam ID = identification GW = groundwater

3.14.2 Soil Descriptions

Three soil borings completed at the WWTP were terminated at depths ranging from 40.0 to 60.0 feet bgs. Gravel fill (GP and GW) was encountered at borings MW18PFC1001 and MW18PFC1002 installed in the former sludge drying beds. Subsurface soil encountered below the gravel fill at the sludge bed borings and encountered at the ground surface at MW18PFC1003 was very uniform, consisting entirely of lean clay (CL). Detailed boring logs are included in Appendix C.

3.14.3 Groundwater Flow

Groundwater levels were gauged at three new monitoring wells at the WWTP on June 4, 2018. Groundwater was detected at depths ranging from 7.99 feet to 9.80 feet btoc and at elevations ranging from 3105.17 feet above NAVD 88 (at MW18PFC1003) to 3113.58 feet above NAVD 88 (at MW18PFC1001). Groundwater contours developed from these water level measurements indicate shallow groundwater flows southeast as shown on Figure 14 in Appendix A. Groundwater level measurements and elevations are summarized in Table F-1 in Appendix F.

3.14.4 Analytical Results

Surface Soil

Three surface soil samples were collected at the WWTP. PFBS was not detected in any of the samples. PFOS was detected in all three samples and exceeded the screening level in one sample. PFOA was also detected in all three samples, but at concentrations below the screening level. Surface soil analytical results are summarized in Table 31 and shown on Figure 35 in Appendix A.

	Sample ID	ELSWH10-001- SS-001	ELSWH10-002- SS-001	ELSWH10-003- SS-001
	Date Sampled	04/24/18	05/04/18	05/24/18
	Sample Depth (ft bgs)	0 - 0.5	0 - 0.5	0 - 0.5
Analyte	Screening Level (µg/kg)	Result (µg/kg)	Result (µg/kg)	Result (µg/kg)
Perfluorobutane Sulfonate (PFBS)	130,000 ^a 13 ^b	0.55 U	0.60 U	0.60 U
Perfluorooctanoic Acid (PFOA)	126°	0.97 J	1.5	1.9
Perfluorooctane Sulfonate (PFOS)	126°	5.4	5.2	140

Table 31 Wastewater Treatment Plant (AFFF Area 10) Surface Soil Analytical Results

Bold values indicate analyte detected at concentration indicated.

Shaded results indicate value exceeds screening criteria.

^a EPA Regional Screening Level for Residential Soil (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^b EPA Regional Screening Level for Protection of Groundwater (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^c Screening level calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl search). AFFF = aqueous film forming foam

 $\mu g/kg = micrograms per kilogram$

bgs = below ground surface

SS = surface soil

ELSWH = ERPIMS designation for Ellsworth Air Force Base

J = reported concentration is an estimated value

U = analyte was not detected above the reported value

M2027.0003

ft = foot or feet

ID = identification

<u>Subsurface Soil</u>

Three subsurface soil samples were collected at the WWTP. PFBS, PFOS, and PFOA were not detected in any of the samples. Subsurface soil analytical results are summarized in Table 32 and shown on Figure 35 in Appendix A.

	Sample ID	ELSWH10-001- SO-040	ELSWH10-002- SO-029	ELSWH10-003- SO-050
	Date Sampled	04/24/18	05/04/18	05/31/18
	Sample Depth (ft bgs)	40 - 41	29 - 30	50 - 51
Analyte	Screening Level (μg/kg)	Result (µg/kg)	Result (µg/kg)	Result (µg/kg)
Perfluorobutane Sulfonate (PFBS)	130,000 ^a 13 ^b	0.49 U	0.55 U	0.55 U
Perfluorooctanoic Acid (PFOA)	126°	0.78 U	0.88 U	0.88 U
Perfluorooctane Sulfonate (PFOS)	126°	0.78 U	0.88 U	0.88 U

 Table 32 Wastewater Treatment Plant (AFFF Area 10) Subsurface Soil Analytical Results

^a EPA Regional Screening Level for Residential Soil (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^b EPA Regional Screening Level for Protection of Groundwater (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^c Screening level calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search). µg/kg = micrograms per kilogram AFFF = aqueous film forming foam

μg/kg = micrograms per kilogram bgs = below ground surface SO = subsurface soil

ELSWH = ERPIMS designation for Ellsworth Air Force Base

ID = identificationU = analyte was not detected above the reported value

ft = foot or feet

Soil Physiochemical Analyses

To provide basic soil parameter information, composite surface and subsurface soil samples were collected from AFFF Area 10 soil borings for pH, TOC, percent solids, and grain size analysis. Surface soil sample ELSWH10-005-SS-001 was composed of equal aliquots of soil collected from 0 to 6 inches bgs at the three borings completed at Area 10. Subsurface soil sample ELSWH10-005-SO-040 was composed of equal aliquots of soil collected from the same borings at depths ranging from 29 to 51 feet bgs. Table E-1 summarizing the physiochemical data and supporting laboratory data sheets are included in Appendix E.

<u>Groundwater</u>

Four groundwater samples (three primary and one duplicate) were collected from three new monitoring wells at the WWTP. PFBS was not detected in any of the samples. PFOS and PFOA were detected in one primary sample; however, both individual and combined concentrations were below the screening level. Groundwater analytical results are summarized in Table 33 and shown on Figure 36 in Appendix A.

	Well Number	MW18PFC1001	MW18PFC1002	MW18PFC1002	MW18PFC1003
		ELSWH10-001-	ELSWH10-002-	ELSWH10-002-	ELSWH10-003-
	Sample ID	GW-045	GW-035	GW-935 (dup)	GW-059
	Date Sampled	05/19/18	05/19/18	05/19/18	06/03/18
	Screened				
	Interval				
	(ft bgs)	38.8 - 48.8	29.3 - 39.3	29.3 - 39.3	49.4 - 59.4
	Screening				
	Level	Result	Result	Result	Result
Analyte	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
Perfluorobutane	$40^{\rm a}$	0.015 U	0.015 U	0.015 U	0.017 U
Sulfonate (PFBS)	-10	0.015 0	0.015 0	0.015 0	0.017 0
Perfluorooctanoic	0.07 ^b	0.010 U	0.010 U	0.010 U	0 0065 1
Acid (PFOA)	0.07	0.010 0	0.010 0	0.010 0	0.0005 5
Perfluorooctane	0.07 ^b	0.015 U	0.015 U	0.015 U	0.014 T
Sulfonate (PFOS)	0.07	0.015 0	0.015 0	0.015 0	0.017 0
Combined	0 07 ^b	ND	ND	ND	0.0205.1
PFOA+PFOS	0.07				0.0203 J

Table 33 Wastewater Treatment Plant (AFFF Area 10) Groundwater Analytical Results

Bold values indicate analyte detected at concentration indicated.

^a EPA Regional Screening Level for Tap Water (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^bEPA, May 2016a. Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS) and EPA, May 2016b. Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA).

^cThe EPA Health Advisory value for drinking water of 0.07 μ g/L applies to the combined detected concentrations of PFOS and PFOA.

 μ g/L = micrograms per liter AFFF = aqueous film forming foam ID = identification ft = foot or feet

m bgs = below ground surface dup = duplicate GW = groundwater J = reported concentration is an estimated value

ELSWH = ERPIMS designation for Ellsworth Air Force Base U = analyte was not detected above the reported value

<u>Sedim</u>ent

One sediment sample was collected downstream from the WWTP. PFBS and PFOA were detected at concentrations below their respective screening levels and PFOS was detected at a concentration above the screening level. Sediment analytical results are summarized in Table 34 and shown on Figure 35 in Appendix A.

	Sample ID	ELSWH10-004-SD-001
	Date Sampled	05/16/18
	Sample Depth (ft bgs)	0 - 0.5
	Screening Level	Result
Analyte	(µg/kg)	(µg/kg)
Perfluorobutane Sulfonate (PFBS)	130,000 ^a 13 ^b	1.9 J
Perfluorooctanoic Acid (PFOA)	126°	8.8
Perfluorooctane Sulfonate (PFOS)	126°	710

Table 34 Wastewater Treatment Plant (AFFF Area 10) Sediment Analytical Results

Bold values indicate analyte detected at concentration indicated. Shaded results indicate value exceeds screening criteria. ^a EPA Regional Screening Level for Residential Soil (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^b EPA Regional Screening Level for Protection of Groundwater (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^c Screening level calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl search).

 $\mu g/kg = micrograms per kilogram$ AFFF = aqueous film forming foam bgs = below ground surface ft = foot or feetSD = sedimentID = identification ELSWH = ERPIMS designation for Ellsworth Air Force Base

J = reported concentration is an estimated value

Surface Water

One surface water sample was also collected downstream from the WWTP. PFBS was detected at a concentration below the screening level. PFOS and PFOA were detected at individual and combined concentrations above the screening level. Surface water analytical results are summarized in Table 35 and shown on Figure 36 in Appendix A.

Table 35 Wastewater Treatment Plant (AFFF Area 10) Surface Water Analytical Results

	Sample ID	ELSWH10-004-SW-001
	Date Sampled	05/16/18
	Screening Level (µg/L)	Result (µg/L)
Perfluorobutane Sulfonate (PFBS)	40ª	0.12
Perfluorooctanoic Acid (PFOA)	0.07 ^b	0.22
Perfluorooctane Sulfonate (PFOS)	0.07^{b}	0.96
Combined PFOA+PFOS	0.07 ^b	1.18

Bold values indicate analyte detected at concentration indicated.

Shaded results indicate value exceeds screening criteria.

^a EPA Regional Screening Level for Tap Water (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^bEPA, May 2016a. Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS) and EPA, May 2016b. Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA).

^cThe EPA Health Advisory value for drinking water of 0.07 µg/L applies to the combined detected concentrations of PFOS and PFOA.

 $\mu g/L = micrograms per liter$

ID = identification

ELSWH = ERPIMS designation for Ellsworth Air Force Base

AFFF = aqueous film forming foam SW = surface water ID = identification

3.14.5 Conclusions

Past releases of AFFF-impacted effluent from the WWTP have resulted in releases of PFAS to the environment. Media impacted by PFAS above screening levels at AFFF Area 10 include surface soil (PFOS), sediment (PFOS), and surface water (PFOS and PFOA).

3.15 SPRAY NOZZLE TEST AREA – AFFF AREA 11

3.15.1 Sample Locations

To assess possible PFAS impacts from releases of AFFF at the spray nozzle test area, five surface soil samples, six subsurface soil samples (five primary and one duplicate), and three groundwater samples were collected. Surface and subsurface soil samples were collected from soil borings completed for installation of monitoring wells MW18PFC1101, MW18PFC1102, and MW18PFC1103 and from soil borings SB18PFC1104 and SB18PFC1105. Groundwater samples were also collected from each monitoring well. In addition, paired sediment and surface water samples were collected at location SW18PFC1106 at a storm drain outfall downgradient from the spray test area and southwest of Pumphouse #2. Sample locations for AFFF Area 11 are shown on Figure 15 in Appendix A.

3.15.2 Soil Descriptions

Five soil borings completed at the spray nozzle test area were terminated at depths ranging from 15.0 to 25.0 feet bgs. Soil types encountered were highly variable and included lean clay (CL), fat clay (CH), silt, (ML), silty sand (SM), poorly graded sand (SP), well graded sand (SW), clayey sand (SC), clayey gravel (GC), and well graded gravel (GW). Detailed boring logs are included in Appendix C.

3.15.3 Groundwater Flow

Groundwater levels were gauged at three new monitoring wells at the spray nozzle test area on June 1, 2018. Groundwater was detected at depths ranging from 9.32 feet to 13.76 feet bloc and at elevations ranging from 3181.15 feet above NAVD 88 (at MW18PFC1103) to 3187.80 feet above NAVD 88 (at MW18PFC1101). Groundwater contours developed from these water level measurements (and from wells in adjacent AFFF Areas 4 and 7) indicate shallow groundwater flows southeast as shown on Figure 15 in Appendix A. Groundwater level measurements and elevations are summarized in Table F-1 in Appendix F.

3.15.4 Analytical Results

<u>Surface Soil</u>

Five surface soil samples were collected at the spray nozzle test area. PFBS was not detected in any of the samples. PFOS was detected in all five samples and PFOA was detected in four of five samples, all at concentrations below the screening level. Surface soil analytical results are summarized in Table 36 and shown on Figure 37 in Appendix A.

	Samala ID	ELSWH11-001-	ELSWH11-002-	ELSWH11-003-
	Date Sample ID	05/09/18	05/09/18	05/04/18
	Sample Depth (ft bgs)	0 - 0.5	0 - 0.5	0 - 0.5
Analyte	Screening Level (µg/kg)	Result (µg/kg)	Result (µg/kg)	Result (μg/kg)
Perfluorobutane Sulfonate (PFBS)	130,000 ^a 13 ^b	0.43 U	0.42 U	0.50 U
Perfluorooctanoic Acid (PFOA)	126°	1.1	0.34 J	0.80 U
Perfluorooctane Sulfonate (PFOS)	126°	5.9	6.7	0.46 J

Table 36 Spray Nozzle Test Area (AFFF Area 11) Surface Soil Analytical Results

	Sample ID	ELSWH11-004- SS-001	ELSWH11-005- SS-001
	Date Sampled	05/09/18	05/04/18
	Sample Depth (ft bgs)	0 - 0.5	0 - 0.5
Analyte	Screening Level (µg/kg)	Result (µg/kg)	Result (µg/kg)
Perfluorobutane Sulfonate (PFBS)	130,000 ^a 13 ^b	0.48 U	0.48 U
Perfluorooctanoic Acid (PFOA)	126°	0.59 J	0.59 J
Perfluorooctane Sulfonate (PFOS)	126°	15	9.6

Bold values indicate analyte detected at concentration indicated.

^a EPA Regional Screening Level for Residential Soil (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^b EPA Regional Screening Level for Protection of Groundwater (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^c Screening level calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search).

 $\mu g/kg = micrograms per kilogram$

bgs = below ground surface

SS = surface soil

ELSWH = ERPIMS designation for Ellsworth Air Force Base

J = reported concentration is an estimated value

U = analyte was not detected above the reported value

Subsurface Soil

Six subsurface soil samples (five primary and one duplicate) were also collected at the spray nozzle test area. PFBS was not detected in any of the samples. PFOS was detected in three of five primary samples and PFOA was detected in one of five primary samples, all at concentrations below the screening level. Subsurface soil analytical results are summarized in Table 37 and shown on Figure 37 in Appendix A.

AFFF = aqueous film forming foam ft = foot or feet

ID = identification

	Sample ID	ELSWH11-001- SO-012	ELSWH11-002- SO-010	ELSWH11H-002- SO-910 (dup)
	Date Sampled	05/09/18	05/09/18	05/09/18
	Sample Depth (ft bgs)	12 - 13	10 - 11	10 - 11
Analyte	Screening Level (µg/kg)	Result (µg/kg)	Result (µg/kg)	Result (µg/kg)
Perfluorobutane Sulfonate (PFBS)	130,000 ^a 13 ^b	0.41 U	0.50 U	0.50 U
Perfluorooctanoic Acid (PFOA)	126°	0.65 U	0.79 U	0.80 U
Perfluorooctane Sulfonate (PFOS)	126°	0.51 J	0.79 U	0.80 U

Table 37 Spray Nozzl	e Test Area (AFFI	F Area 11) Subsurf	face Soil Anal	vtical Results
		· · · · · · · · · · · · · · · · · · ·		

	Sample ID	ELSWH11-003- SO-015	ELSWH11-004- SO-012	ELSWH11-005- SO-013
	Date Sampled	05/04/18	05/09/18	05/09/18
	Sample Depth (ft bgs)	15 - 16	12 - 13	13 - 14
Analyte	Screening Level (µg/kg)	Result (µg/kg)	Result (µg/kg)	Result (µg/kg)
Perfluorobutane Sulfonate (PFBS)	130,000 ^a 13 ^b	0.46 U	0.55 U	0.48 U
Perfluorooctanoic Acid (PFOA)	126°	0.42 J	0.88 U	0.77 U
Perfluorooctane Sulfonate (PFOS)	126°	1.0	0.88 U	0.31 J

Bold values indicate analyte detected at concentration indicated.

^a EPA Regional Screening Level for Residential Soil (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^b EPA Regional Screening Level for Protection of Groundwater (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^c Screening level calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl search). AFFF = aqueous film forming foam

µg/kg = micrograms per kilogram

bgs = below ground surface

SO = subsurface soil

ELSWH = ERPIMS designation for Ellsworth Air Force Base

J = reported concentration is an estimated value

U = analyte was not detected above the reported value

Soil Physiochemical Analyses

To provide basic soil parameter information, composite surface and subsurface soil samples were collected from AFFF Area 11 soil borings for pH, TOC, percent solids, and grain size analysis. Surface soil sample ELSWH11-007-SS-001 was composed of equal aliquots of soil collected from 0 to 6 inches bgs at the five borings completed at Area 11. Subsurface soil sample ELSWH11-007-SO-015 was composed of equal aliquots of soil collected from the same borings at depths ranging from 10 to 16 feet bgs. Table E-1 summarizing the physiochemical data and supporting laboratory data sheets are included in Appendix E.

ft = foot or feetdup = duplicate

ID = identification

Groundwater

Groundwater samples were collected from three new monitoring wells at the spray nozzle test area. PFBS was detected in all three of the samples at concentrations below the screening level. PFOS and PFOA were also detected in all three groundwater samples at individual and combined concentrations above the screening level. Groundwater analytical results are summarized in Table 38 and shown on Figure 38 in Appendix A.

	Well Number	MW18PFC1101	MW18PFC1102	MW18PFC1103
		ELSWH11-001-	ELSWH11-002-	ELSWH11-003-
	Sample ID	GW-015	GW-015	GW-020
	Date Sampled	05/20/18	05/20/18	05/20/18
	Screened Interval (ft bgs)	9.2 - 19.2	9.1 - 19.1	13.5 - 23.5
Analyte	Screening Level (µg/L)	Result (µg/L)	Result (µg/L)	Result (µg/L)
Perfluorobutane Sulfonate (PFBS)	40ª	0.061	0.044	0.077
Perfluorooctanoic Acid (PFOA)	0.07 ^b	0.25	0.16	0.13
Perfluorooctane Sulfonate (PFOS)	0.07 ^b	0.25	0.25	0.34
Combined PFOA+PFOS	0.07°	0.50	0.41	0.47

Table 38 Sprav	Nozzle T	'est Area (AFFF	Area 11)	Groundwater	Analytical Resul	ts
				· · · ·)			

Bold values indicate analyte detected at concentration indicated.

Shaded results indicate value exceeds screening criteria.

^a EPA Regional Screening Level for Tap Water (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^bEPA, May 2016a. Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS) and EPA, May 2016b. Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA).

^cThe EPA Health Advisory value for drinking water of 0.07 µg/L applies to the combined detected concentrations of PFOS and PFOA. AFFF = aqueous film forming foam

ID = identification

GW = groundwater

 $\mu g/L = micrograms per liter$

bgs = below ground surface

ft = foot or feet

ELSWH = ERPIMS designation for Ellsworth Air Force Base

<u>Sed</u>iment

One sediment sample was collected at a storm drain downgradient from the spray test area. PFBS was not detected in the sample and PFOS and PFOA were detected at concentrations below the screening level. Sediment analytical results are summarized in Table 39 and shown on Figure 37 in Appendix A.

	Sample ID	ELSWH11-006-SD-001
	Date Sampled	05/16/18
	Sample Depth (ft bgs)	0 - 0.5
Analyte	Screening Level	Result
Perfluorobutane Sulfonate (PFBS)	130,000 ^a 13 ^b	1.3 U
Perfluorooctanoic Acid (PFOA)	126°	1.9 J
Perfluorooctane Sulfonate (PFOS)	126°	81

Table 39 Spray Nozzle Test Area (AFFF Area 11) Sediment Analytical Results

Bold values indicate analyte detected at concentration indicated.

^a EPA Regional Screening Level for Residential Soil (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^b EPA Regional Screening Level for Protection of Groundwater (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^c Screening level calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl search).

µg/kg = micrograms per kilogram	AFFF = aqueous film forn
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ft = foot or feet SD = sediment

ELSWH = ERPIMS designation for Ellsworth Air Force Base

U = analyte was not detected above the reported value

ning foam bgs = below ground surface ID = identification

J = reported concentration is an estimated value

Surface Water

One surface sample was also collected at the storm drain downgradient from the spray test area. PFBS, PFOS, and PFOA were all detected in the sample. PFBS and PFOA concentrations were below the screening level, but the PFOS concentration and the combined PFOS and PFOA concentration were above the screening level. Surface water analytical results are summarized in Table 40 and shown on Figure 38 in Appendix A.

Table 40 Spray Nozzle Test Area (AFFF Area 11) Surface Water Analytical Results

	Sample ID	ELSWH11-006-SW-001	
	Date Sampled	05/16/18	
Analyte	Screening Level	Result	
Perfluorobutane Sulfonate (PFBS)	40ª	0.011 J	
Perfluorooctanoic Acid (PFOA)	0.07 ^b	0.057	
Perfluorooctane Sulfonate (PFOS)	0.07 ^b	0.43	
Combined PFOA+PFOS	0.07°	0.487	

Bold values indicate analyte detected at concentration indicated.

Shaded results indicate value exceeds screening criteria.

^a EPA Regional Screening Level for Tap Water (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^bEPA, May 2016a. Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS) and EPA, May 2016b. Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA).

The EPA Health Advisory value for drinking water of $0.07 \mu g/L$ applies to the combined detected concentrations of PFOS and PFOA.

 $\mu g/L = micrograms$ per liter AFFF = aqueous film forming foam bgs = below ground surface ID = identification ft = foot or feet SW = surface water ELSWH = ERPIMS designation for Ellsworth Air Force Base

J = reported concentration is an estimated value

3.15.5 Conclusions

Past releases of AFFF at the spray nozzle test area have resulted in releases of PFAS to the environment. Media impacted by PFAS above screening levels at AFFF Area 11 include groundwater (PFOS and PFOA) and surface water (PFOS and PFOA).

3.16 BUILDING 88240 – AFFF AREA 12

3.16.1 Sample Locations

To further assess PFAS impacts from apparent AFFF releases at Building 88240, four surface soil samples (three primary and one duplicate), three subsurface soil samples, and three groundwater samples were collected. Surface and subsurface soil samples were collected from soil borings completed for installation of monitoring wells MW18PFC1201, MW18PFC1202, and MW18PFC1203 and groundwater samples were collected from each monitoring well. In addition, paired sediment and surface water samples were collected at location SW18PFC1204 at a culvert south of, and downstream from, the pond. Sample locations for AFFF Area 12 are shown on Figure 16 in Appendix A.

3.16.2 Soil Descriptions

Three soil borings completed at Building 88240 were terminated at depths ranging from 35.0 to 55.0 feet bgs. Lean clay (CL) was encountered in each of the three borings. Detailed boring logs are included in Appendix C.

3.16.3 Groundwater Flow

Groundwater levels were gauged at three new monitoring wells at Building 88240 area on June 1, 2018. Groundwater was detected at depths ranging from 12.49 feet to 30.50 feet bloc and at elevations ranging from 3291.66 feet above NAVD 88 (at MW18PFC1203) to 3318.02 feet above NAVD 88 (at MW18PFC1201). Groundwater contours developed from these water level measurements indicate shallow groundwater flows south as shown on Figure 16 in Appendix A. Groundwater level measurements and elevations are summarized in Table F-1 in Appendix F.

3.16.4 Analytical Results

Surface Soil

Four surface soil samples (three primary and one duplicate) were collected south of Building 88240. PFBS was detected in two of three primary samples at concentrations below the screening level. PFOA was detected in all four samples at concentrations below the screening level. PFOS was detected in all four samples at concentrations below the screening level. PFOS was detected in all four samples at concentrations below the screening level. PFOS was detected in all four samples at concentrations below the screening level. PFOS was detected in all four samples at concentrations below the screening level. PFOS was detected in all four samples at concentrations above the screening level. Surface soil analytical results are summarized in Table 41 and shown on Figure 39 in Appendix A.

	Samala D	ELSWH12-001-	ELSWH12-001-	ELSWH12-002-	ELSWH12-003-
	Sample ID	<u>55-001</u>	55-901 (dup)	55-001	55-001
	Sample Denth	04/19/10	04/19/10	04/19/10	04/20/10
	(ft bgs)	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
	Screening				
	Level	Result	Result	Result	Result
Analyte	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
Perfluorobutane Sulfonate (PFBS)	130,000 ^a 13 ^b	1.1 J	5.5 U	0.65 U	0.55 J
Perfluorooctanoic Acid (PFOA)	126°	5.2	9.7 J	1.1 J	2.4
Perfluorooctane Sulfonate (PFOS)	126°	260 J	390 J	250	160

Table 41 Building 88240 (AFFF Area 12) Surface Soil Analytical Results

Bold values indicate analyte detected at concentration indicated.

Shaded results indicate value exceeds screening criteria.

^a EPA Regional Screening Level for Residential Soil (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^b EPA Regional Screening Level for Protection of Groundwater (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^c Screening level calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search). bgs = below ground surface

$$\mu g/kg = micrograsft = foot or feet$$

ams per kilogram AFFF = aqueous film forming foam SS = subsurface soil

dup = duplicate

ID = identification

ELSWH = ERPIMS designation for Ellsworth Air Force Base

J = reported concentration is an estimated value

U = analyte was not detected above the reported value

Subsurface Soil

Three subsurface soil samples were also collected south of Building 88240. PFBS, PFOS, and PFOA were detected in one of three samples, all at concentrations below their respective screening levels. Subsurface soil analytical results are summarized in Table 42 and shown on Figure 39 in Appendix A.

Table 42 Building 88240 (AFFF Area 12) Subsurface Soil Analytical Results

	Sample ID	ELSWH12-001-	ELSWH12-002-	ELSWH12-003-
		SO-023	SO-036	SO-006
	Date Sampled	04/19/18	04/19/18	04/20/18
	Sample Depth			
	(ft bgs)	23 - 24	36 - 37	6 - 7
	Screening Level	Result	Result	Result
Analyte	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
Perfluorobutane	130,000ª	0.50 U	0.60 U	11 I
Sulfonate (PFBS)	13 ^b	0.50 0	0.00 0	1.1 J
Perfluorooctanoic		0.8011	0.06.11	17
Acid (PFOA)	126°	0.80 0	0.90 0	1./
Perfluorooctane		0.80 11	0.06 U	00
Sulfonate (PFOS)	126°	0.00 U	0.90 U	00

Bold values indicate analyte detected at concentration indicated.

^a EPA Regional Screening Level for Residential Soil (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^b EPA Regional Screening Level for Protection of Groundwater (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^c Screening level calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search).

 $\mu g/kg = micrograms per kilogram$ AFFF = aqueous film forming foam bgs = below ground surface

ft = foot or feetID = identification J = reported concentration is an estimated value

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

ELSWH = ERPIMS designation for Ellsworth Air Force Base

Soil Physiochemical Analyses

To provide basic soil parameter information, composite surface and subsurface soil samples were collected from AFFF Area 12 soil borings for pH, TOC, percent solids, and grain size analysis. Surface soil sample ELSWH12-005-SS-001 was composed of equal aliquots of soil collected from 0 to 6 inches bgs at the three borings completed at Area 12. Subsurface soil sample ELSWH12-005-SO-036 was composed of equal aliquots of soil collected from the same borings at depths ranging from 6 to 37 feet bgs. Table E-1 summarizing the physiochemical data and supporting laboratory data sheets are included in Appendix E.

Groundwater

Groundwater samples were collected from three new monitoring wells south of Building 88240. PFBS was detected in two of three samples at concentrations below the screening level. PFOS was detected in all three samples and exceeded the screening level in two samples. PFOA was detected in two of three samples and exceeded the screening level in one sample. Combined PFOS and PFOA concentrations also exceeded the screening level in two of three samples. Groundwater analytical results are summarized in Table 43 and shown on Figure 40 in Appendix A.

	Well Number	MW18PFC1201	MW18PFC1202	MW18PFC1203
	Sample ID	ELSWH12-001- GW-032	ELSWH12-002- GW-045	ELSWH12-003- GW-016
	Date Sampled	04/25/18	04/22/18	04/22/18
	Screened Interval (ft bgs)	24.6 - 34.6	37.9 - 47.9	5.1 - 15.1
Analyte	Screening Level (µg/L)	Result (µg/L)	Result (µg/L)	Result (µg/L)
Perfluorobutane Sulfonate (PFBS)	40ª	0.31	0.015 U	2.8
Perfluorooctanoic Acid (PFOA)	0.07 ^b	0.035	0.010 U	0.11
Perfluorooctane Sulfonate (PFOS)	0.07 ^b	0.096	0.056	1.1
Combined PFOA+PFOS	0.07°	0.131	0.056	1.21

Table 43 Building 882	40 (AFFF Area 12	2) Groundwater A	Analytical Results
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Bold values indicate analyte detected at concentration indicated.

Shaded results indicate value exceeds screening criteria.

^a EPA Regional Screening Level for Tap Water (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^bEPA, May 2016a. Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS) and EPA, May 2016b. Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA).

^cThe EPA Health Advisory value for drinking water of 0.07 μ g/L applies to the combined detected concentrations of PFOS and PFOA.

 $\mu g/L = micrograms \ per \ liter$

bgs = below ground surface

ft = foot or feet

ELSWH = ERPIMS designation for Ellsworth Air Force Base

U = analyte was not detected above the reported value

M2027.0003

AFFF = aqueous film forming foam ID = identification GW = groundwater

<u>Sedim</u>ent

One sediment sample was collected at a culvert downstream from Building 88240. PFBS, PFOS, and PFOA were detected in the sample, but at concentrations below the screening level. Sediment analytical results are summarized in Table 44 and shown on Figure 39 in Appendix A.

	Sample ID	ELSWH12-004-SD-001	
	Date Sampled	04/22/18	
	Sample Depth (ft bgs)	0 - 0.5	
	Screening Level	Result	
Analyte	(µg/kg)	(µg/kg)	
Perfluorobutane Sulfonate (PFBS)	130,000 ^a 13 ^b	1.9	
Perfluorooctanoic Acid (PFOA)	126°	1.5	
Perfluorooctane Sulfonate (PFOS)	126°	59	

Table 44 Building 88240 (AFFF Area 12) Sediment Analytical Results

Bold values indicate analyte detected at concentration indicated.

^a EPA Regional Screening Level for Residential Soil (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^b EPA Regional Screening Level for Protection of Groundwater (November 2018)

(https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

^c Screening level calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search). AFFF = aqueous film forming foam

 $\mu g/kg = micrograms per kilogram$

bgs = below ground surface

SD = sediment

ELSWH = ERPIMS designation for Ellsworth Air Force Base

Surface Water

One surface water sample was also collected at the culvert downstream from Building 88240. PFBS was detected but at a concentration below the screening level. PFOS and PFOA were detected at both individual and combined concentrations above the screening level. Surface water analytical results are summarized in Table 45 and shown on Figure 40 in Appendix A.

ft = foot or feet

ID = identification
	Sample ID	ELSWH12-004-SW-001
	Date Sampled	04/22/18
Analyte	Screening Level (μg/L)	Result (μg/L)
Perfluorobutane Sulfonate (PFBS)	40ª	2.9
Perfluorooctanoic Acid (PFOA)	0.07 ^b	0.82
Perfluorooctane Sulfonate (PFOS)	0.07 ^b	3.8
Combined PFOA+PFOS	0.07^{b}	4.62

Table 45 Building 88240 (AFFF Area 12) Surface Water Analytical Results

Bold values indicate analyte detected at concentration indicated.

Shaded results indicate value exceeds screening criteria.

^a EPA Regional Screening Level for Tap Water (November 2018)

^bEPA, May 2016a. Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS) and EPA, May 2016b. Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA).

^cThe EPA Health Advisory value for drinking water of 0.07 μ g/L applies to the combined detected concentrations of PFOS and PFOA.

AFFF = aqueous film forming foam

ID = identification SW = surface water

$\mu g/L = micrograms per liter$
bgs = below ground surface
ft = foot or feet
FI SWH = ERPIMS designation for Elles

ELSWH = ERPIMS designation for Ellsworth Air Force Base

3.16.5 Conclusions

Past releases of AFFF at Building 88240 have resulted in releases PFAS to the environment. Media impacted by PFAS above screening levels at AFFF Area 12 include surface soil (PFOS), groundwater (PFOS and PFOA), and surface water (PFOS and PFOA).

3.17 INVESTIGATION-DERIVED WASTE

The USAF has awarded a separate contract to others for the removal and disposal of soil and water investigation-derived waste (IDW) generated during this SI. All waste soil and water were placed in Department of Transportation (DOT)-approved steel drums (53 drums of soil and 19 drums of water) and staged on pallets in Building 6905, pending disposal. Note that the readiness review forms (Appendix C) indicate some IDW would not be containerized; however, all IDW was drummed for offsite disposal based on regulator input. A representative sample was collected from each media, submitted to CT Laboratories, and analyzed for total petroleum hydrocarbons, toxicity (using the Toxicity Characteristic Leaching Procedure [TCLP] for the full TCLP list of analytes), flashpoint, pH, cyanide, and sulfide. A representative sample of each media was also submitted to Maxxam and analyzed for PFAS. These analytical results have been submitted to the USAF electronically and are also included in Appendix G. All IDW was removed from the Base by Heritage Transport LLC (EPA ID IND058484114) in two shipments on July 23, 2018, and July 25, 2018, and transported to Heritage Environmental Services of Kansas City, Missouri (EPA ID MOD981505555), for disposal. Note that these waste shipments and manifests included additional IDW drums generated during an ongoing RI at the former FTA (by others). A copy of the waste manifests are in Appendix G.

⁽https://semspub.epa.gov/work/HQ/197416.pdfhttps://semspub.epa.gov/work/HQ/197416.pdf).

4.0 GROUNDWATER PATHWAY

The objectives of groundwater sampling during the SI were to

- determine if a confirmed release of PFAS has occurred at sites selected for SI;
- determine if PFAS are present in groundwater at the site in concentrations exceeding the EPA lifetime Has, tap water RSLs, or a state standard; and
- identify potential receptor pathways with immediate impacts to human health.

4.1 HYDROGEOLOGY

One shallow unconfined aquifer and three confined aquifers (the Inyan Kara, the Minnelusa, and the Madison) have been identified at Ellsworth AFB (EA, May 1995). These aquifers (from shallowest to deepest) are discussed below.

Shallow Unconfined Aquifer

The upper shallow aquifer consists of both alluvial and colluvial deposits and weathered/fractured Pierre Shale. The shallow aquifer is absent in some areas and extends in depth from only a few feet below the surface to 60 feet or less in depth in other areas. The thickness and yield of the shallow aquifer depend upon the extent of alluvial material and the thickness of water-yielding fractures in the Pierre Shale. In several areas toward the northern end of Ellsworth AFB, no groundwater-bearing zones were found, while in the southern area of the Base, alluvial sand and gravel beds and shallow fracture zones typically produce less than 2 gallons per minute to monitoring wells. The shallow, unconfined aquifer at Ellsworth AFB is present within the fractured shale horizon near the top of the Pierre Shale and the contiguous overlying deposits of unconsolidated material. The shallow unconfined aquifer is considered a federal Class IIB aquifer (potential drinking water source). In addition, according to ARSD 74:54:01:03, any groundwater in South Dakota that has an ambient concentration of 10,000 milligrams per liter (mg/L) or less of total dissolved solids is classified as having the beneficial use of drinking water supplies suitable for human consumption. Groundwater within the shallow aquifer generally flows southeast in the northern portion of the Base and to the south-southeast within the southern portion of the Base. None of the confined aquifers discussed below are in hydraulic communication with the shallow unconfined aquifer. Further, shallow groundwater from the Base likely discharges to Box Elder Creek, south of the Base precluding migration of impacted groundwater further south.

Inyan Kara Aquifer

The Inyan Kara Aquifer is a confined aquifer bounded by confining beds of the Pierre Shale and other relatively impermeable Upper Cretaceous strata above and Permian-Jurassic strata below. The aquifer lies about 1,900 feet beneath Ellsworth AFB and consists of 350 to 500 feet of permeable sandstone belonging to the Fall River and Lakota Formations. Groundwater flow direction is assumed based on published data; west of Ellsworth AFB, it is assumed to be toward the east-northeast based on the direction of dip.

Minnelusa Aquifer

The Minnelusa Aquifer is a confined aquifer that lies beneath approximately 1,000 feet of Permian-Jurassic confining beds and above Pennsylvanian confining beds. The aquifer is a limestone unit approximately 600 feet thick and lies 3,460 feet beneath Ellsworth AFB. Groundwater flow direction is assumed to be toward the east-northeast based on the direction of dip.

Madison Aquifer

The Madison Aquifer (also known as Pahasapa Aquifer) is the deepest aquifer used as a drinking water source in the region. This limestone aquifer averages 350 feet in thickness, lies 4,150 feet bgs, and is

below a 240- to 450-foot-thick Lower Pennsylvanian confining unit. Groundwater flow direction is assumed to be toward the east-northeast in the direction of dip.

4.1.1 Drinking Water Sources

Base Drinking Water

Five public water supply wells installed in deep bedrock aquifers previously provided drinking water for the Base, but these wells have been abandoned/decommissioned. Base drinking water is now supplied by the Rapid City Municipal Distribution System. Sources of water for this system come from two infiltration galleries installed in the Rapid Creek alluvium: Jackson Springs Gallery and Girl Scout Gallery. These galleries are on Rapid Creek, approximately 11 miles southwest of and upstream from the mid-point of the Base airfield. Water is also drawn from eight wells that tap the Minnelusa and Madison aquifers (Rapid City Water Division, 2017).

Off-Base Public and Community Drinking Water Sources from Groundwater

The City of Box Elder, approximately 1 mile south of the Base, uses groundwater as a drinking water source. Groundwater is extracted from six wells with total depths ranging from 2,000 feet to 4,574 feet and tap the Inyan Kara and Madison aquifers (see Map ID locations 89 through 94 on Figure 41 in Appendix A).

The city of New Underwood, approximately 12 miles east-southeast and downstream from the Base (on Box Elder Creek), also uses groundwater as a drinking water source. Groundwater is extracted from the Inyan Kara aquifer from two wells (Wells #1 and #2) with total depths of 2,762 feet and 2,960 feet, respectively.

Sunset Ranch, a private housing development approximately 7.5 miles east-southeast, also uses groundwater as a drinking water source. The Sunset Ranch well was drilled to a depth of 2,954 feet deep and plugged back to a depth of 2,631 feet. The well report indicates multiple sections of well screen were installed from 2,398 to a depth of 2,486 within the Dakota Sandstone slightly above the Inyan Kara aquifer (SD DENR, July 2018).

4.1.2 Off-Base Drinking Water Wells within Four Miles of Ellsworth AFB

SD DENR Well Database Wells

Based on information in the SD DENR well database and as shown on Figure 41 in Appendix A, there are 72 wells within four miles of the Base including 59 domestic wells, seven municipal wells, five stock wells, and one irrigation well. Six of the municipal wells are deep wells owned by the City of Box Elder and one (Well 68 on Figure 41) is a shallow private community well (30 feet deep) which provides water for the Plainsview Mobile Manor Public Water System (map location 95 on Figure 41). Well 68 is 1.1 miles southwest of the current FTA and 1.8 miles south of Outfall #3. A second private community system (Whispering Willows) included in the SD DENR water supply system database was indicated immediately north of location 95; however, this system purchases water from the City of Box Elder (SD DENR, August 2018b).

Of the 72 wells within 4 miles of the base, 11 wells (including the six municipal wells for the City of Box Elder) are deep—ranging from 1,624 feet to 4,574 feet—and are less vulnerable to surface contaminants.

The remaining 61 wells (within four miles) are 100 feet deep or less and would be vulnerable to contaminants released to the ground surface. Most of the shallow wells are either upgradient or side gradient from the Base and are unlikely to be impacted by AFFF releases. Downgradient wells, however,

are at risk of PFAS impacts. The extent of PFAS impacts to groundwater south of the Base are unclear at this time. Stage 3 of an ongoing RI being conducted by others will further assess the southern extent of impacted groundwater and determine the extent to which Box Elder Creek may act as a hydraulic barrier.

Wells Not Listed in the SD DENR Database

A recent (2018) off-Base door-to-door survey and sampling effort conducted for the Air Force by others has determined that there are several water wells classified as household use or non-household use south of (and potentially downgradient from) the Base which were not listed in the SD DENR database. Preliminary results of this sampling effort indicated a number of these wells have been impacted by PFOS and PFOA at concentrations above the EPA HA of 0.07 μ g/L.

4.1.3 Groundwater Use Restrictions

Groundwater-use restrictions have been established in several areas surrounding the Base, as shown on Figure 41 (Krebs, August 2018). Most of the areas of restricted groundwater use were established due to trichloroethene (TCE)-impacted groundwater (Ellsworth, February 2012). One groundwater-use restriction area south of the Base was established due to PFAS-impacted groundwater. A PFAS groundwater plume originating from the former FTA (AOC PFC-1) is migrating off-Base to the south (CB&I, August 2017; Ayuda, November 2017). Note that there are numerous domestic wells that are not shown on Figure 41 because they are located within these areas of groundwater use restrictions. Groundwater use restrictions have not been established in areas where the door-to-door survey and sampling (discussed above) identified impacted drinking water wells.

4.2 CURRENT FIRE TRAINING AREA – AFFF AREA 1

Both individual and combined PFOA and PFOS concentrations in shallow groundwater at the current FTA (AFFF Area 1) exceeded the screening level. Groundwater at the site flows east-southeast toward an unnamed tributary of Box Elder Creek. Groundwater at AOC PFC-1 (immediately south of the current FTA) flows south-southeast (Ayuda, August 2017). Based on south-southeast groundwater flow and the presence of downgradient off-Base wells that have been impacted above the EPA HA, the human exposure pathway for ingestion of impacted groundwater is potentially complete.

4.3 70, 80, 90 ROWS AND OUTFALL #3 – AFFF AREA 2

Both individual and combined PFOA and PFOS concentrations in shallow groundwater exceeded the screening level at 70, 80, 90 Rows and at Outfall #3 (AFFF Area 2). Groundwater at the outfall flows southwest towards an unnamed tributary of Box Elder Creek. Based on the SD DENR database and the door-to-door survey, there are several shallow domestic wells south of and potentially downgradient from Outfall #3, as shown on Figure 41. The domestic wells represent a potentially complete human ingestion exposure pathway via consumption of impacted drinking water.

Groundwater at the 70, 80, 90 Rows flows southeast toward Box Elder Creek. Based on southeast groundwater flow and the presence of downgradient off-Base wells that have been impacted above the EPA HA, the human exposure pathway for ingestion of impacted groundwater is potentially complete.

4.4 BUILDING 618 – AFFF AREA 3

Both individual and combined PFOA and PFOS concentrations in shallow groundwater exceeded the screening level at Building 618 (AFFF Area 3). Groundwater at Building 618 flows southeast toward Box

Elder Creek. Based on southeast groundwater flow and the presence of downgradient off-Base wells that have been impacted above the EPA HA, the human exposure pathway for ingestion of impacted groundwater is potentially complete.

4.5 FORMER FIRE STATION (BUILDING 7506) – AFFF AREA 4

Both individual and combined PFOA and PFOS concentrations in shallow groundwater exceeded the screening level at the former fire station (AFFF Area 4). Groundwater flows south-southeast toward Box Elder Creek. Based on south-southeast groundwater flow and the presence of downgradient off-Base wells that have been impacted above the EPA HA, the human exposure pathway for ingestion of impacted groundwater is potentially complete.

4.6 B-52 CRASH (1972) – AFFF AREA 5

Both individual and combined PFOA and PFOS concentrations in shallow groundwater exceeded the screening level at the B-52 crash site (AFFF Area 5). Groundwater flows southeast toward Box Elder Creek. Based on southeast groundwater flow and the presence of downgradient off-Base wells that have been impacted above the EPA HA, the human exposure pathway for ingestion of impacted groundwater is potentially complete.

4.7 B-1 CRASH (1988) – AFFF AREA 6

Both individual and combined PFOA and PFOS concentrations in shallow groundwater exceeded the screening level in one of three monitoring wells installed at the B-1 crash site (AFFF Area 6). Although the extent appears to be limited, PFAS impacts to groundwater have not been fully delineated. Groundwater at the site flows south toward Box Elder Creek. Based on groundwater flow to the south and the presence of downgradient off-Base wells that have been impacted above the EPA HA, the human exposure pathway for ingestion of impacted groundwater is potentially complete.

4.8 DELTA TAXIWAY WEST CRASH (2000) – AFFF AREA 7

Combined PFOA and PFOS concentrations in shallow groundwater at the Delta Taxiway West vehicle crash site (AFFF Area 7) did not exceed the screening level. Since PFAS concentrations in groundwater are below the screening level at the crash site, the human exposure pathway through the ingestion of impacted drinking water is incomplete.

4.9 MARTEN CRASH (2006) – AFFF AREA 8

Combined PFOA and PFOS concentrations in shallow groundwater at the Marten truck crash site (AFFF Area 8) did not exceed the screening level. Since PFAS concentrations in groundwater are below the screening level at the crash site, the human exposure pathway through the ingestion of impacted drinking water is incomplete.

4.10 CRASH 4 (2001) – AFFF AREA 9

Individual and/or combined PFOA and PFOS concentrations in shallow groundwater exceeded the screening level at the Crash 4 spill site (AFFF Area 9). Groundwater at the site flows southeast toward AFFF Area 2 and ultimately toward Box Elder Creek. Based on southeast groundwater flow and the

presence of downgradient off-Base wells that have been impacted above the EPA HA, the human exposure pathway for ingestion of impacted groundwater is potentially complete.

4.11 WASTEWATER TREATMENT PLANT – AFFF AREA 10

Combined PFOA and PFOS concentrations in shallow groundwater at the WWTP (AFFF Area 10) did not exceed the screening level. Since PFAS concentrations in groundwater are below the screening level at the WWTP, the human exposure pathway through the ingestion of impacted groundwater migrating from the WWTP is incomplete. Note, however, that the surface water pathway (as discussed in Section 5.11) is potentially complete based on possible surface water to groundwater impacts downstream from the WWTP.

4.12 SPRAY NOZZLE TEST AREA – AFFF AREA 11

Both individual and combined PFOA and PFOS concentrations in shallow groundwater exceeded the screening level at the spray nozzle test area (AFFF Area 11). Groundwater flows southeast toward Box Elder Creek. Based on southeast groundwater flow and the presence of downgradient off-Base wells that have been impacted above the EPA HA, the human exposure pathway for ingestion of impacted groundwater is potentially complete.

4.13 BUILDING 88240 – AFFF AREA 12

Both individual and combined PFOA and PFOS concentrations in shallow groundwater exceeded the screening level at Building 88240 (AFFF Area 12). Groundwater at Area 12 flows south toward AFFF Areas 2 and 9. From Areas 2 and 9, groundwater flows southeast toward Box Elder Creek. Based on south to southeast groundwater flow and the presence of downgradient off-Base use wells that have been impacted above the EPA HA, the human exposure pathway for ingestion of impacted groundwater is potentially complete.

5.0 SURFACE WATER PATHWAY

The objectives of surface water sampling during the SI were to

- determine if a confirmed release of PFAS has occurred at sites selected for SI;
- determine if PFAS are present in surface water at the site in concentrations exceeding the EPA lifetime HAs, tap water RSLs, or a state standard; and
- identify potential receptor pathways with immediate impacts to human health.

5.1 BASE HYDROLOGIC SETTING

Ellsworth AFB is located within the Missouri River Basin. The north border of Ellsworth AFB is a steep northward-facing escarpment drained by seven unnamed ephemeral drainages which flow into Elk Creek approximately 5 miles to the northeast. Surface drainage on the plateau itself (and most of the Base) follows a topographic slope primarily flowing south-southeast via retention ponds, ditches, storm sewers, and ephemeral streams with eventual discharge into Box Elder Creek one mile to the south; although, some surface flow in the western and southwestern portions of Ellsworth AFB is southwest toward an unnamed drainage west of the installation that ultimately discharges to Box Elder Creek. Elk Creek is a perennial stream while Box Elder is considered ephemeral. Ephemeral streams contain water only when sufficient runoff is available to support flow, typically during or immediately following precipitation events (EA, May 1994). Floodplains occur along the main Base drainage, as well as along several of the creek drainages on the northern and southern portion of the Base. The northern limit of the Box Elder Creek floodplain is approximately 50 feet south of the southern Base boundary (Ellsworth AFB, 2017).

Drinking Water Sources from Surface Water

Although groundwater provides the bulk of drinking water in the region, the Rapid City Municipal Distribution System also uses surface water from Rapid Creek. This surface water originates from drainage areas west of Rapid City and upstream from the Base. This drainage area also includes Deerfield Reservoir on Castle Creek and Pactola Reservoir on Rapid Creek. The distribution system drinking water intakes are also upstream from the Base (Rapid City Water Division, 2017).

There are no drinking water intakes within 15 miles downstream of the Base. Sunset Ranch, a private housing development approximately 7.5 miles east-southeast of the Base, uses groundwater as a drinking water source. The city of New Underwood, approximately 12 miles east-southeast and downstream from Ellsworth (on Box Elder Creek), also obtains drinking water from groundwater (SD DENR, June 2018).

Potential Migration of Surface Water to Groundwater

Although there are no drinking water intakes within 15 miles downstream of the Base, surface water in Box Elder Creek and its tributaries may migrate to groundwater seasonally or at least during periods of low precipitation and lower groundwater levels. Known as "losing stream" conditions, the possible migration of surface water to groundwater could result in PFAS impacts to shallow drinking water wells near Box Elder Creek and downstream from the Base.

5.2 CURRENT FIRE TRAINING AREA – AFFF AREA 1

Surface water was not identified as media of concern at AFFF Area 1 and no surface water samples were collected. Surface water south of the current FTA is being investigated by others as part of an RI at the former fire training area.

5.3 70, 80, 90 ROWS AND OUTFALL #3 – AFFF AREA 2

Surface water from the 70, 80, 90 Rows drains to the southwest to Pond #3 and flows off-Base at Outfall #3 and ultimately to Box Elder Creek (Figure 2, Appendix A). PFOS and PFOA were detected above screening levels in surface water in Pond #3 (in 2014 and 2018), in a low-lying area west of Pond #3 (in 2018), and at Outfall #3 (in 2014). As discussed in Section 5.1, although there are no drinking water intakes within 15 miles downstream of the Base, there is the potential of surface water impacts to groundwater. Shallow drinking water wells downstream from Outfall #3 represent a potentially complete human exposure pathway for ingestion of impacted drinking water.

5.4 BUILDING 618 – AFFF AREA 3

There are no surface water bodies near Building 618. Surface water was not identified as media of concern and no surface water samples were collected.

5.5 FORMER FIRE STATION (BUILDING 7506) – AFFF AREA 4

There are no surface water bodies near Building 7506. Surface water was not identified as media of concern and no surface water samples were collected.

5.6 B-52 CRASH (1972) – AFFF AREA 5

There are no surface water bodies near the B-52 crash site. Surface water was not identified as media of concern and no surface water samples were collected.

5.7 B-1 CRASH (1988) – AFFF AREA 6

There are no surface water bodies near the B-1 crash site. Surface water was not identified as media of concern and no surface water samples were collected.

5.8 DELTA TAXIWAY WEST CRASH (2000) – AFFF AREA 7

There are no surface water bodies near the Delta Taxiway West crash site. Surface water was not identified as media of concern and no surface water samples were collected.

5.9 MARTEN CRASH (2006) – AFFF AREA 8

There are no surface water bodies near the Marten crash site. Surface water was not identified as media of concern and no surface water samples were collected.

5.10 CRASH 4 (2001) – AFFF AREA 9

There are no surface water bodies near the Crash 4 site. Surface water was not identified as media of concern and no surface water samples were collected.

5.11 WASTEWATER TREATMENT PLANT – AFFF AREA 10

Until it ceased operation in July 2014, the WWTP received discharge from several locations on Base where AFFF releases have occurred and discharged effluent potentially impacted by PFAS at Outfall #5 (Figure 2, Appendix A). This effluent then flowed via an unnamed drainage feature to Golf Course Lake, off-Base to Outfall #6, and ultimately to Box Elder Creek. PFOS and PFOA were detected above screening levels in surface water samples collected from the drainage downstream from Outfall #5 (in 2014 and in 2018) and from Golf Course Lake (in 2014). As discussed in Section 5.1, although there are no drinking water intakes within 15 miles downstream of the Base, there is the potential of surface water impacts to groundwater. The possible presence of shallow drinking water wells downstream from Outfall #6 represents a potentially complete human exposure pathway for ingestion of impacted drinking water.

5.12 SPRAY NOZZLE TEST AREA – AFFF AREA 11

Surface water from the spray nozzle test area drains to the southeast to an unnamed tributary of Box Elder Creek and flows off-Base at Outfall #1 (Figure 2, Appendix A). PFOS (and combined PFOS and PFOA) were detected above the screening level in a surface water sample collected at a storm drain outfall southwest of the test area and upstream from Outfall #1. As discussed in Section 5.1, although there are no drinking water intakes within 15 miles downstream of the Base, there is the potential of surface water impacts to groundwater. The presence of shallow drinking water wells downstream from Outfall #1 represents a potentially complete human exposure pathway for ingestion of impacted drinking water.

5.13 BUILDING 88240 – AFFF AREA 12

When the AFFF system was activated in Building 88240, the water/foam mixture was routed into a retention pond south of Building 88240. During heavy rainfall, surface water flows from the pond to a culvert south of the pond. From the culvert, surface water flows south toward the live ordnance loading area and Row 100. Any surface water that does not infiltrate the subsurface would likely flow to Outfall #3. PFOS and PFOA were detected above the screening level in a surface water sample collected from the retention pond (in 2014) and at the culvert south of the retention pond (in 2018). Surface water at Outfall #3 (Figure 2, Appendix A) ultimately flows to Box Elder Creek. As discussed in Section 5.1, although there are no drinking water intakes within 15 miles downstream of the Base, there is the potential of surface water impacts to groundwater. The presence of shallow drinking water wells downstream from Outfall #3 represents a potentially complete human exposure pathway for ingestion of impacted drinking water.

6.0 SOIL AND SEDIMENT EXPOSURE AND AIR PATHWAYS

The objectives of soil and sediment sampling during the SI were to

- determine if a confirmed release of PFAS has occurred at sites selected for SI;
- determine if PFAS are present in soil and sediment at the site in concentrations exceeding residential soil screening levels, or a state standard; and
- identify potential receptor pathways with immediate impacts to human health.

The approved QAPP and site-specific QAPP addendum indicated PFOS and PFOA concentrations in soil would be compared to calculated residential RSLs. RSLs protective of groundwater for PFOS and PFOA are typically several orders of magnitude lower than residential RSLs. Soil pathways discussed below do not include possible exposure to surface soil from use of PFAS-impacted groundwater for irrigation.

6.1 CURRENT FIRE TRAINING AREA – AFFF AREA 1

PFOS was detected in surface and subsurface soil at concentrations above the residential screening level at the current FTA. The FTA surface is covered with concrete pavement and the surrounding area is vegetated, inhibiting fugitive dust emissions. Human ingestion through exposure to the soil is also unlikely. Although a complete human ingestion pathway is unlikely, PFOS-impacted surface soil could represent an ongoing source of groundwater impacts. Sediment was not identified as media of concern at AFFF Area 1.

6.2 70, 80, 90 ROWS AND OUTFALL #3 – AFFF AREA 2

Where detected, PFAS concentrations in surface soil, subsurface soil, and sediment samples collected at the 70, 80, 90 Rows and Outfall #3 were below residential screening levels. PFOS was, however, detected in a sediment sample collected from Pond #3 in 2014 at a concentration above the residential screening level. Although human ingestion of PFAS through exposure to the sediment is unlikely, PFOS-impacted sediment at Pond #3 could represent an ongoing source of surface water and/or groundwater impacts.

6.3 BUILDING 618 – AFFF AREA 3

Where detected, PFAS concentrations in subsurface soil at Building 618 were below residential screening levels (both in samples collected during this SI in 2018 and in samples collected in 2014). Lacking concentrations of PFAS above residential screening levels, the human ingestion pathway is incomplete at AFFF Area 3. Surface soil and sediment were not identified as media of concern at Area 3.

6.4 FORMER FIRE STATION (BUILDING 7506) – AFFF AREA 4

PFOS was detected in one surface soil sample at Area 4 at a concentration above the residential screening level. The area is well vegetated and the surrounding area paved inhibiting fugitive dust emissions. Human ingestion through exposure to the soil is also unlikely. Although a complete human ingestion pathway is unlikely, PFOS-impacted surface soil could represent an ongoing source of groundwater impacts. Sediment was not identified as media of concern at AFFF Area 4.

6.5 B-52 CRASH (1972) – AFFF AREA 5

Where detected, PFAS concentrations in surface and subsurface soil samples collected at the B-52 crash site were below residential screening levels. Lacking concentrations of PFAS above residential screening

levels, the human ingestion pathway is incomplete at AFFF Area 5. Sediment was not identified as media of concern at Area 5.

6.6 B-1 CRASH (1988) – AFFF AREA 6

Where detected, PFAS concentrations in surface and subsurface soil samples collected at the B-1 crash site were below residential screening levels. Lacking concentrations of PFAS above residential screening levels, the human ingestion pathway is incomplete at AFFF Area 6. Sediment was not identified as media of concern at Area 6.

6.7 DELTA TAXIWAY WEST CRASH (2000) – AFFF AREA 7

Where detected, PFAS concentrations in surface and subsurface soil samples collected at the Delta Taxiway West crash site were below residential screening levels. Lacking concentrations of PFAS above residential screening levels, the human ingestion pathway is incomplete at AFFF Area 7. Sediment was not identified as media of concern at Area 7.

6.8 MARTEN CRASH (2006) – AFFF AREA 8

Where detected, PFAS concentrations in surface and subsurface soil samples collected at the Marten crash site were below residential screening levels. Lacking concentrations of PFAS above residential screening levels, the human ingestion pathway is incomplete at AFFF Area 8. Sediment was not identified as media of concern at Area 8.

6.9 CRASH 4 (2001) – AFFF AREA 9

Where detected, PFAS concentrations in surface and subsurface soil samples collected at the Crash 4 spill site were below residential screening levels. Lacking concentrations of PFAS above residential screening levels, the human ingestion pathway is incomplete at AFFF Area 9. Sediment was not identified as media of concern at Area 9.

6.10 WASTEWATER TREATMENT PLANT – AFFF AREA 10

PFOS was detected at concentrations above the residential screening level in one surface soil sample (collected in 2018) and in two sediment samples (one collected in 2014 and one collected in 2018). Both sediment samples were collected downgradient and downstream from the WWTP on the adjacent golf course. The area is well vegetated, which would inhibit fugitive dust emissions. Human ingestion through exposure to the soil or sediment is also unlikely. Although a complete human ingestion pathway is unlikely, PFOS-impacted surface soil and sediment could represent an ongoing source of groundwater and/or surface water impacts.

6.11 SPRAY NOZZLE TEST AREA – AFFF AREA 11

Where detected, PFAS concentrations in surface soil, subsurface soil, and sediment samples collected at the spray nozzle test area were below residential screening levels. Lacking concentrations of PFAS above residential screening levels, the human ingestion pathway is incomplete at AFFF Area 11.

6.12 BUILDING 88240 – AFFF AREA 12

PFOS was detected in surface soil samples collected at Area 12 at concentrations above the residential screening level. The area is well vegetated, which would inhibit fugitive dust emissions, and human ingestion through exposure to the soil is also unlikely. PFAS concentrations in the one sediment sample collected during this SI were below residential screening levels. PFBS, PFOA, and PFOS concentrations in a sediment sample collected from the retention pond in 2014 all exceeded their respective screening values. Although a complete human ingestion pathway is unlikely, PFOS-impacted surface soil could represent an ongoing source of groundwater impacts at AFFF Area 12.

7.0 UPDATES TO CONCEPTUAL SITE MODELS

The following sections contain updates to the conceptual site models (CSMs) for AFFF Areas 1 through 12 as presented in the QAPP addendum (ASL, November 2017). The discussions address PFOA and PFOS in soil, groundwater, surface water, and sediment. Based on analytical results presented in Sections 3.0, PFOS and PFOA are the primary PFAS contaminants of concern. PFBS detections in all samples collected from all media for this SI were below screening levels. PFBS will not be discussed in the following sections with the exception of Section 7.12, Building 88240 (AFFF Area 12), where PFBS was detected above the current screening level in a surface water sample collected in 2014.

7.1 CURRENT FIRE TRAINING AREA – AFFF AREA 1

The QAPP addendum CSM identified surface soil, subsurface soil, and groundwater as media potentially impacted by releases of AFFF at the current FTA (ASL, November 2017). PFOS was detected in surface and subsurface soil at concentrations above the residential screening level. However, as discussed in Section 6.1, human ingestion of impacted soil is unlikely. PFOS and PFOA were also detected in groundwater at concentrations above screening levels and, as discussed in Section 4.2, the human exposure pathway for ingestion of impacted groundwater is potentially complete. Surface soil, subsurface soil, and groundwater remain media of concern at AFFF Area 1.

7.2 70, 80, 90 ROWS AND OUTFALL #3 – AFFF AREA 2

The QAPP addendum CSM identified surface soil, subsurface soil, and groundwater as media potentially impacted by releases of AFFF at the 70, 80, 90 Rows and identified subsurface soil, groundwater, sediment, and surface water as media potentially impacted by releases of AFFF to Outfall #3 (ASL, November 2017). PFOS and PFOA were not detected above residential screening levels in surface soil or subsurface soil at the 70, 80, 90 Rows or in subsurface soil or sediment at Outfall #3 during this SI. PFOS was detected in a 2014 sediment sample at a concentration above the current residential screening level.

PFOS and PFOA were detected in groundwater above screening levels at the 70, 80, 90 Rows. As discussed in Section 4.3, the human ingestion exposure pathway for impacted groundwater at the 70, 80, 90 Rows is potentially complete and groundwater remains media of concern.

PFOS and PFOA were also detected in surface water and groundwater above screening levels at Outfall #3. As discussed in Section 5.3, the human exposure pathway for ingestion of impacted surface water via drinking water is potentially complete based on possible surface water to groundwater impacts. In addition, as discussed in Section 4.3, due to the presence of shallow domestic wells potentially downgradient from Outfall #3, the human exposure pathway for the ingestion of impacted groundwater is potentially complete. Further, although a complete human ingestion exposure pathway from impacted sediment has not been identified (based on current receptors), sediment remains media of concern at AFFF Area 2 (in addition to groundwater and surface water).

7.3 BUILDING 618 – AFFF AREA 3

The QAPP addendum CSM identified subsurface soil and groundwater as media potentially impacted by releases of AFFF at Building 618 (ASL, November 2017). PFOS and PFOA were not detected above residential screening levels in subsurface soil. PFOS and PFOA were, however, detected in groundwater at concentrations above screening levels. As discussed in Section 4.4, the human exposure pathway for ingestion of impacted groundwater is potentially complete and groundwater remains media of concern at AFFF Area 3.

7.4 FORMER FIRE STATION (BUILDING 7506) – AFFF AREA 4

The QAPP addendum CSM identified surface soil, subsurface soil, and groundwater as media potentially impacted by releases of AFFF at the former fire station (ASL, November 2017). PFOS was detected in surface soil at concentrations above the residential screening level. However, as discussed in Section 6.1, human ingestion of impacted surface soil is unlikely. PFOS and PFOA were not detected above residential screening levels in subsurface soil. PFOS and PFOA were, however, detected in groundwater at concentrations above screening levels. As discussed in Section 4.5, the human exposure pathway for ingestion of impacted groundwater is potentially complete. Surface soil and groundwater remain media of concern at AFFF Area 4.

7.5 B-52 CRASH (1972) – AFFF AREA 5

The QAPP addendum CSM identified surface soil, subsurface soil, and groundwater as media potentially impacted by use of AFFF at the B-52 crash site (ASL, November 2017). PFOS and PFOA were not detected in surface soil or subsurface soil at concentrations above the residential screening level. PFOS and PFOA were, however, detected in groundwater at concentrations above screening levels. As discussed in Section 4.6, the human exposure pathway for ingestion of impacted groundwater is potentially complete and groundwater remains media of concern at AFFF Area 5.

7.6 B-1 CRASH (1988) – AFFF AREA 6

The QAPP addendum CSM identified surface soil, subsurface soil, and groundwater as media potentially impacted by use of AFFF at the B-1 crash site (ASL, November 2017). PFOS and PFOA were not detected in surface soil or subsurface soil at concentrations above the residential screening level. PFOS and PFOA were, however, detected in groundwater at concentrations above screening levels. As discussed in Section 4.7, the human exposure pathway for ingestion of impacted groundwater is potentially complete and groundwater remains media of concern at AFFF Area 6.

7.7 DELTA TAXIWAY WEST CRASH (2000) – AFFF AREA 7

The QAPP addendum CSM identified surface soil, subsurface soil, and groundwater as media potentially impacted by use of AFFF at the Delta Taxiway West crash site. As discussed in Sections 6.7 and 4.8, PFOS and PFOA concentrations in surface soil, subsurface soil, and groundwater were all below their respective screening levels. Lacking contaminant levels above screening levels, human exposure pathways are incomplete at AFFF Area 7. Several other PFAS compounds were detected in soil and groundwater at AFFF Area 7 for which there are currently no HA or RSL values. Future characterization may be warranted at Area 7 if state or federal soil/groundwater standards are promulgated for any of these analytes.

7.8 MARTEN CRASH (2006) – AFFF AREA 8

The QAPP addendum CSM identified surface soil, subsurface soil, and groundwater as media potentially impacted by use of AFFF at the Marten crash site. As discussed in Sections 6.8 and 4.9, PFOS and PFOA concentrations in surface soil, subsurface soil, and groundwater were all below screening levels. Lacking contaminant levels above screening levels, human exposure pathways are incomplete and no media remain a concern at AFFF Area 8. Several other PFAS compound were detected in soil and groundwater at AFFF Area 8 for which there are currently no HA or RSL values. Future characterization may be

warranted at Area 8 if state or federal soil/groundwater standards are promulgated for any of these analytes.

7.9 CRASH 4 (2001) – AFFF AREA 9

The QAPP addendum CSM identified surface soil, subsurface soil, and groundwater as media potentially impacted by use of AFFF at the Crash 4 spill site (ASL, November 2017). PFOS and PFOA were not detected in surface soil or subsurface soil at concentrations above the residential screening level. PFOS and combined PFOS and PFOA were, however, detected in groundwater at concentrations above screening levels. As discussed in Section 4.10, the human exposure pathway for ingestion of impacted groundwater is potentially complete and groundwater remains media of concern at AFFF Area 9.

7.10 WASTEWATER TREATMENT PLANT (WWTP) – AFFF AREA 10

The QAPP addendum CSM identified surface soil, subsurface soil, groundwater, sediment, and surface water as media potentially impacted by releases of AFFF in effluent from the WWTP (ASL, November 2017). PFOS was detected in surface soil and sediment at concentrations above the residential screening level. However, as discussed in Section 6.10, human ingestion of impacted soil or sediment is unlikely. PFOS and PFOA were also detected in surface water at concentrations above the screening level. As discussed in Section 5.11, the human ingestion exposure pathway for impacted surface water is potentially complete based on possible surface water to groundwater impacts. PFOS and PFOA were not detected in subsurface soil or groundwater at concentrations above screening levels. Surface soil, sediment, and surface water remain media of concern at AFFF Area 10.

7.11 SPRAY NOZZLE TEST AREA – AFFF AREA 11

The QAPP addendum CSM identified surface soil, subsurface soil, groundwater, sediment, and surface water as media potentially impacted by releases of AFFF at the spray nozzle test area (ASL, November 2017). PFOS and PFOA were not detected in surface soil, subsurface soil, or sediment at concentrations above the residential screening level. PFOS and PFOA were, however, detected in groundwater and surface water at concentrations above screening levels. As discussed in Sections 4.12 and 5.12, the human ingestion exposure pathways for impacted surface water and groundwater are potentially complete and remain media of concern at AFFF Area 11.

7.12 BUILDING 88240 – AFFF AREA 12

The QAPP addendum CSM identified surface soil, subsurface soil, groundwater, sediment, and surface water as media potentially impacted by releases of AFFF at Building 88240 (ASL, November 2017). PFOS was detected in surface soil at concentrations above the residential screening level. PFBS, PFOA, and PFOS were also detected in a 2014 sediment sample collected from the retention pond, all at concentrations exceeding their respective screening values. However, as indicated in Section 6.12, human ingestion of impacted soil or sediment is unlikely. PFOS and PFOA were not detected in subsurface soil at concentrations above residential screening levels.

PFOS and PFOA were also detected in groundwater and surface water at concentrations above screening levels. As discussed in Sections 4.13 and 5.13, the human ingestion exposure pathways for impacted surface water and groundwater are potentially complete. Surface soil, groundwater, sediment, and surface water remain media of concern at AFFF Area 12.

8.0 CONCLUSIONS AND RECOMMENDATIONS

ASL completed SIs at 12 known or suspected areas of AFFF releases at Ellsworth AFB, as detailed in the site-specific QAPP addendum (ASL, November 2017). The areas inspected included

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•	Current Fire Training Area	AFFF Area 1
٠	70, 80, 90 Rows and Outfall #3	AFFF Area 2
٠	Building 618	AFFF Area 3
٠	Former Fire Station (Building 7506)	AFFF Area 4
•	B-52 Crash (1972)	AFFF Area 5
٠	B-1 Crash (1988)	AFFF Area 6
٠	Delta Taxiway West Crash (2000)	AFFF Area 7
٠	Marten Crash (2006)	AFFF Area 8
٠	Crash 4 (2001)	AFFF Area 9
•	Wastewater Treatment Plant	AFFF Area 10
٠	Spray Nozzle Test Area	AFFF Area 11
•	Building 88240	AFFF Area 12

The objectives of the SIs were to

- determine if a confirmed release of PFAS has occurred at sites selected for SI;
- determine if PFAS are present in soil, groundwater, surface water, or sediment at the site in concentrations exceeding the EPA lifetime HAs or tap water RSLs, residential soil screening levels, or a state standard;
- identify potential receptor pathways with immediate impacts to human health; and
- provide recommendations for follow-on investigations if detected concentrations of PFAS equal or exceed project action levels (PALs). For PFAS without a specific numerical screening value, results will be discussed in terms of whether the chemical was detected.

Surface soil and/or subsurface soil and groundwater were sampled at each of the 12 AFFF areas. Sediment and surface water were also sampled at

- Outfall #3 (AFFF Area 2),
- the WWTP (AFFF Area 10),
- the spray nozzle test area (AFFF Area 11), and
- Building 88240 (AFFF Area 12).

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.

A 2014 screening-level site investigation conducted at Ellsworth AFB determined the presence of combined PFOS and PFOA above screening levels in groundwater at the 70, 80, 90 Rows and Outfall #3, Building 618, and Building 88240 (now designated AFFF Areas 2, 3, and 12). The 2014 investigation also determined the presence of combined PFOS and PFOA at concentrations above screening levels in surface water at Outfall #3 (AFFF Area 2) and the WWTP (AFFF Area 10). The 2014 investigation also determined the presence of combined PFOS, PFOA, and PFBS above screening levels in surface water and sediment at the Building 88240 retention pond (AFFF Area 12). PFOS was also detected above screening levels in sediment samples collected at Outfall #3 and the WWTP.

All samples were analyzed for 18 PFAS compounds, including PFBS, PFOA, and PFOS, using modified EPA Method 537. Analytical results for PFBS in soil, sediment, groundwater, and surface water were compared to published EPA RSLs (HQ=0.1). Analytical results for PFOA and PFOS in soil and sediment were compared to calculated residential RSLs (126 μ g/kg for both PFOA and PFOS; HQ=0.1). Analytical

results for PFOA and PFOS in groundwater and surface water were compared to the EPA HA of 0.07 μ g/L (for the individual and combined concentrations of PFOA and PFOS) for drinking water.

AFFF releases at Ellsworth AFB have resulted in PFOA and PFOS concentrations above screening levels in groundwater at AFFF Areas 1, 2, 3, 4, 5, 6, 9, 11, and 12 (nine of 12 areas investigated). Human ingestion exposure pathways for impacted groundwater are potentially complete at AFFF Areas 1, 2, 3, 4, 5, 6, 9, 11, and 12. Impacted groundwater at from these areas may be migrating off-Base and may have impacted downgradient domestic wells. The presence of PFOA and PFOS in groundwater represents a potentially complete human ingestion exposure pathway, and may pose immediate risk to human health. Sampling of private domestic wells downgradient of the base (conducted by others) indicated the presence of PFOS and PFOA at concentrations above the EPA HA in several wells. The groundwater ingestion exposure pathway for groundwater is incomplete for AFFF Areas 7, 8, and 10 where PFOA and PFOS concentrations were below screening levels.

PFOA and PFOS were also detected at concentrations above screening levels in surface water at AFFF Areas 2, 10, 11, and 12. Impacted surface water discharging from Outfall #3 (AFFF Area 2) and from Outfall #5 (at the former WWTP at AFFF Area 10) may be impacting groundwater downstream from the outfalls. There is also the potential for discharge of impacted groundwater from the base to surface water (i.e., Box Elder Creek and its tributaries) based on groundwater flow to the southeast. The human ingestion exposure pathway for impacted surface water is, therefore, potentially complete via surface water to groundwater interactions.

PFOS was also detected above residential screening levels in surface soil at AFFF Areas 1, 4, 10 and 12; in subsurface soil at Area 1; and in sediment at AFFF Area 10. Complete human ingestion exposure pathways for PFOS-impacted soil or sediment are unlikely, but impacted soil or sediment could represent a continuing source for groundwater and/or surface water impacts.

Table 46 (at the end of this section) summarizes detected concentrations of PFBS, PFOA, and PFOS for media sampled at each area. Brief summaries of key findings, conclusions, and recommendations for each area (focusing on PFOA and PFOS screening level exceedances) are included in Sections 8.1 through 8.12.

8.1 CURRENT FIRE TRAINING AREA – AFFF AREA 1

Use of AFFF during training activities at the current FTA has resulted in PFAS impacts to surface soil, subsurface soil, and groundwater at concentrations above screening levels. PFOS was detected in surface soil at a maximum concentration of 3,300 μ g/kg and in subsurface soil at a maximum concentration of 630 μ g/kg. PFOS and PFOA were detected in groundwater at a maximum combined concentration of 91 μ g/L.

PFOS concentrations above residential screening levels in soil do not represent an immediate risk to human health. As indicated in Section 6.1, human ingestion of PFOS-impacted surface soil is unlikely. However, as indicated in Section 4.2, the human ingestion exposure pathway for impacted groundwater is potentially complete. Surface soil, subsurface soil, and groundwater remain media of concern at the current FTA and an RI is recommended.

8.2 70, 80, 90 ROWS AND OUTFALL #3 – AFFF AREA 2

Releases of AFFF at the 70, 80, 90 Rows and Outfall #3 have resulted in PFAS impacts to groundwater at concentrations above screening levels (at both the 70, 80, 90 Rows and Outfall #3) and to surface water

(at Outfall #3). PFOS and PFOA were detected in groundwater at a maximum combined concentration of 2.62 μ g/L at the 70, 80, 90 Rows and 1.22 μ g/L at Outfall #3. PFOS and PFOA were detected in surface water at a maximum combined concentration of 0.80 μ g/L at Outfall #3.

PFOS/PFOA concentrations above screening levels in groundwater at the 70, 80, 90 Rows represent an immediate risk to human health. As indicated in Section 4.3, the human ingestion exposure pathway for impacted groundwater at the 70, 80, 90 Rows is potentially complete. Groundwater remains media of concern at the 70, 80, 90 Rows and an RI is recommended.

PFOS/PFOA concentrations above screening levels in surface water at Outfall #3 also represents an immediate threat to human health. As indicated in Section 5.2, the human ingestion exposure pathway is potentially complete for impacted surface water (based on possible surface water to groundwater impacts). PFOS/PFOA concentrations above screening levels in groundwater at Outfall #3 also represent an immediate risk to human health. As indicated in Section 4.3, the human ingestion exposure pathway for impacted groundwater is potentially complete at Outfall #3. Based on the presence of domestic wells potentially downgradient from Outfall #3 and the possible, immediate threat to human health, an expanded SI is recommended. Subsequent to this SI, sampling of private domestic wells downgradient of Outfall #3 was conducted and an additional groundwater investigation is in progress. This work is being performed under a separate contract by others.

8.3 BUILDING 618 – AFFF AREA 3

Releases of AFFF at Building 618 have resulted in PFAS impacts to groundwater at concentrations above screening levels. PFOS and PFOA were detected in groundwater at a maximum combined concentration of 1.673 μ g/L. PFOS/PFOA concentrations above screening levels in groundwater represent an immediate risk to human health. As indicated in Section 4.4, the human ingestion exposure pathway for impacted groundwater is potentially complete. Groundwater remains media of concern at Building 618 and an RI is recommended.

8.4 FORMER FIRE STATION (BUILDING 7506) – AFFF AREA 4

Releases of AFFF at the former fire station have resulted in PFAS impacts to surface soil and groundwater above screening levels. PFOS was detected in surface soil above the residential screening level at a concentration of 3,000 μ g/kg. PFOS and PFOA were detected in groundwater at a maximum combined concentration of 1.55 μ g/L.

PFOS concentrations above the residential screening level in surface soil do not represent an immediate risk to human health. As indicated in Section 6.4, human ingestion of PFOS-impacted soil is unlikely. PFOS/PFOA concentrations above screening levels in groundwater do represent an immediate risk to human health. As indicated in Section 4.5, the human ingestion exposure pathway for impacted groundwater is potentially complete. Surface soil and groundwater remain media of concern at Building 618 and an RI is recommended.

8.5 B-52 CRASH (1972) – AFFF AREA 5

Use of AFFF at the B-52 crash site has resulted in PFAS impacts to groundwater at concentrations above screening levels. PFOS and PFOA were detected in groundwater at a maximum combined concentration of 0.435 μ g/L. PFOS/PFOA concentrations above screening levels in groundwater represent an immediate risk to human health. As indicated in Section 4.6, the human ingestion exposure pathway for

impacted groundwater is potentially complete. Groundwater remains media of concern at the B-52 crash site, and an RI is recommended.

8.6 B-1 CRASH (1988) – AFFF AREA 6

Use of AFFF at the B-1 crash site has resulted in PFAS impacts to groundwater at concentrations above screening levels. PFOS and PFOA were detected in groundwater at a maximum combined concentration of 0.59 μ g/L. PFOS/PFOA concentrations above screening levels in groundwater represent an immediate risk to human health. As indicated in Section 4.7, the human ingestion exposure pathway for impacted groundwater is potentially complete. Groundwater remains media of concern at the B-1 crash site and an RI is recommended.

8.7 DELTA TAXIWAY WEST CRASH (2000) – AFFF AREA 7

As discussed in Sections 6.7 and 4.8, release of AFFF at the Delta Taxiway West crash site has not resulted in PFAS impacts to surface soil, subsurface soil, or groundwater above screening levels. Lacking concentrations of PFAS above screening levels, there are no complete exposure pathways, and a determination of NFRAP is recommended for AFFF Area 7.

8.8 MARTEN CRASH (2006) – AFFF AREA 8

As discussed in Sections 6.8 and 4.9, use of AFFF at the Marten crash site has not resulted in PFAS impacts to surface soil, subsurface soil, or groundwater above screening levels. Lacking concentrations of PFAS above screening levels, there are no complete exposure pathways, and a determination of NFRAP is recommended for AFFF Area 8.

8.9 CRASH 4 (2001) – AFFF AREA 9

A release of AFFF at the Crash 4 spill site has resulted in PFAS impacts to groundwater at concentrations above screening levels. PFOS and PFOA were detected in groundwater at a maximum combined concentration of 0.173 μ g/L (estimated value). PFOS/PFOA concentrations above screening levels in groundwater represent an immediate risk to human health. As indicated in Section 4.10, the human ingestion exposure pathway for impacted groundwater is potentially complete. Groundwater remains media of concern at the Crash 4 spill site and an RI is recommended.

8.10 WASTEWATER TREATMENT PLANT – AFFF AREA 10

Releases of AFFF impacted effluent at the WWTP have resulted in PFAS impacts to surface soil, sediment, and surface water at concentrations above screening levels. PFOS was detected in surface soil and sediment at maximum concentrations of 140 μ g/kg and 710 μ g/kg, respectively. PFOS and PFOA were detected in surface water at a maximum combined concentration of 1.18 μ g/L.

PFOS/PFOA concentrations above screening levels in surface soil and sediment do not represent an immediate risk to human health. As indicated in Section 6.10, human ingestion of impacted soil or sediment is unlikely. As indicated in Section 5.11, the human ingestion exposure pathway for impacted surface water is potentially complete (based on possible surface water to groundwater impacts). Surface soil, groundwater, sediment, and surface water remain media of concern at the WWTP, and an RI is recommended.

8.11 SPRAY NOZZLE TEST AREA – AFFF AREA 11

Releases of AFFF at the spray nozzle test area have resulted in PFAS impacts to groundwater and surface water at concentrations above screening levels. PFOS and PFOA were detected in groundwater and surface water at maximum combined concentrations of 0.50 μ g/L and 0.487 μ g/L, respectively.

PFOS/PFOA concentrations above screening levels in groundwater and surface water do not represent an immediate risk to human health. As indicated in Sections 4.12 and 5.12, the human ingestion exposure pathway for impacted groundwater and surface water are potentially complete. Groundwater and surface water remain media of concern at the spray nozzle test area and an RI is recommended.

8.12 BUILDING 88240 – AFFF AREA 12

Releases of AFFF at Building 88240 have resulted in PFAS impacts to surface soil, groundwater, and surface water at concentrations above screening levels. PFOS was detected in surface soil at a maximum concentration of 390 μ g/kg (estimated). PFOS and PFOA were detected in groundwater and surface water at maximum combined concentrations of 1.21 μ g/L and 4.62 μ g/L, respectively.

As indicated in Section 6.12, human ingestion through exposure to impacted soil is unlikely. PFOS/PFOA concentrations above screening levels in groundwater and surface water represent an immediate risk to human health. As indicated in Sections 4.13 and 5.13, the human ingestion exposure pathway for impacted groundwater and surface water are potentially complete. Groundwater and surface water remain media of concern at the spray nozzle test area and an RI is recommended.

	Associated		Maximum		Number of Samples /	Exceeds	Potentially Complete	
	Existing		Detected	Screening	Number of	Screening	Exposure	
AFFF Area	IRP ID	Parameter	Concentration	Level	Exceedances ^a	Level	Pathway	Recommendation
		Surface Soil	(µg/kg)	(µg/kg)				
		PFBS	4.9 J	130,000 ^b 13 ^c	4/0	No	N	
		PFOA	21	126 ^d	4/0	No	INO	
	Not an existing	PFOS	3,300 J ⁱ	126 ^d	4/4	Yes		
AFFF Area 1		Subsurface Soil	(µg/kg)	(µg/kg)				
		PFBS	2.5 J	130,000 13	4/0	No	No	Advance area to RI
Current FIA	site	PFOA	4.1 J	126	4/0	No	INO	
		PFOS	630	126	4/2	Yes		
		Groundwater	(µg/L)	(µg/L)				
		PFBS	28	40 ^e	4/0	No		
		PFOA	15	0.07 ^f	4/4	Yes	Yes ¹	
		PFOS	82	0.07 ^f	4/4	Yes		
		PFOA + PFOS	91 ^h	0.07 ^g	4/4	Yes		

Table 46 Summary of PFBS, PFOA, and PFOS Detections and Screening Level Exceedances

AFFF Area	Associated Existing IRP ID	Parameter	Maximum Detected Concentration	Screening Level	Number of Samples / Number of Exceedances ^a	Exceeds Screening Level	Potentially Complete Exposure Pathway	Recommendation
		Surface Soil	(µg/kg)	(µg/kg)				
		PFBS	ND	130,000 13	3/0	No	NI-	
		PFOA	1.4	126	3/0	No	NO	
		PFOS	47	126	3/0	No		
		Subsurface Soil	(µg/kg)	(µg/kg)				
		PFBS	ND	130,000 13	5/0	No	NI-	
	Not an existing	PFOA	ND	126	5/0	No	NO	Expanded SI (Outfall #3)
		PFOS	27 J	126	5/0	No		
		Groundwater	(µg/L)	(µg/L)				
AFFF Area 2		PFBS	0.69	40	7/0	No	Yes ¹	
70, 80, 90 Rows and		PFOA	0.78	0.07	7/4	Yes		
Outfall #3	site	PFOS	2.5 J	0.07	7/7	Yes		
Outlain #5		PFOA + PFOS	2.62 J ^h	0.07	7/7	Yes		(70, 80, 90 Rows)
		Sediment	(µg/kg)	(µg/kg)				(70, 00, 90 10003)
		PFBS	ND	130,000 13	1/0	No	NL	
		PFOA	9.2 J ⁱ	126	1/0	No	NO	
		PFOS	90 J ⁱ	126	1/0	No		
		Surface Water	(µg/L)	(µg/L)				
		PFBS	0.015 J	40	1/0	No		
	Ī	PFOA	0.38 ⁱ	0.07	1/1	Yes	$\mathbf{V}_{\mathbf{es}}^{1}$	
		PFOS	0.44	0.07	1/1	Yes	1 05	
		PFOA + PFOS	0.80 ⁱ	0.07	1/1	Yes		

 Table 46 Summary of PFBS, PFOA, and PFOS Detections and Screening Level Exceedances (continued)

	Associated		Maximum		Number of Samples /	Exceeds	Potentially Complete	
A FFF A moo	Existing	Davamatar	Detected	Screening	Number of Exceedences ^a	Screening	Exposure	Decommondation
AFFF Alea	IKF ID	Subsurface Soil			Exceedances	Level	ratiiway	Recommendation
		PFBS	ND	130,000 13	4/0	No	N	
	Nution	PFOA	0.69 J	126	4/0	No	INO	
AFFF Area 3	Not an	PFOS	110 J	126	4/0	No		
Building 618	site	Groundwater	(µg/L)	(µg/L)				Advance area to RI
	Site	PFBS	0.086	40	3/0	No		
		PFOA	0.12	0.07	3/3	Yes	Vecl	
		PFOS	1.6	0.07	3/3	Yes	105	
		PFOA + PFOS	1.673 ^h	0.07	3/3	Yes		
		Surface Soil	(µg/kg)	(µg/kg)				
		PFBS	8.2 J	130,000 13	3/0	No	No	
		PFOA	62	126	3/0	No		
		PFOS	3,000	126	3/1	Yes		
AFEE Area 4		Subsurface Soil	(µg/kg)	(µg/kg)				
Former Fire	Not an existing	PFBS	0.62 J	130,000 13	5/0	No	N	A decenses areas to DI
(Building 7506)	site	PFOA	2.1	126	5/0	No	INO	Advance area to KI
(Building 7500)		PFOS	11	126	5/0	No		
		Groundwater	(µg/L)	(µg/L)				
		PFBS	0.40	40	3/0	No		
		PFOA	0.76	0.07	3/3	Yes	Vec ¹	
		PFOS	0.79	0.07	3/3	Yes	1 65	
		PFOA + PFOS	1.55	0.07	3/3	Yes		

 Table 46 Summary of PFBS, PFOA, and PFOS Detections and Screening Level Exceedances (continued)

	Associated		Maximum		Number of Samples /	Exceeds	Potentially Complete	
	Existing		Detected	Screening	Number of	Screening	Exposure	
AFFF Area	IRP ID	Parameter	Concentration	Level	Exceedances ^a	Level	Pathway	Recommendation
		Surface Soil	(µg/kg)	(µg/kg)				
		PFBS	ND	130,000 13	3/0	No	No	
		PFOA	3.1	126	3/0	No	INO	
		PFOS	75	126	3/0	No		
		Subsurface Soil	(µg/kg)	(µg/kg)				
AFFF Area 5 B-52 Crash	Not an existing	PFBS	ND	130,000 13	3/0	No	Na	Advance area to RI
(1972)	site	PFOA	0.37 J ⁱ	126	3/0	No	INO	
		PFOS	1.4 ⁱ	126	3/0	No		
		Groundwater	(µg/L)	(µg/L)				
		PFBS	0.015 J	40	2/0	No		
		PFOA	0.095	0.07	2/2	Yes	Vacl	
		PFOS	0.34	0.07	2/2	Yes	1 05	
		PFOA + PFOS	0.435	0.07	2/2	Yes		
		Surface Soil	(µg/kg)	(µg/kg)				
		PFBS	ND	130,000 13	4/0	No	No	
		PFOA	1.8 J	126	4/0	No	INO	
		PFOS	61	126	4/0	No		
		Subsurface Soil	(µg/kg)	(µg/kg)				
AFFF Area 6 B-1 Crash	Not an existing	PFBS	ND	130,000 13	4/0	No	No	A lassing to DI
(1988)	site	PFOA	ND	126	4/0	No	INO	Advance area to RI
		PFOS	0.77 J	126	4/0	No		
		Groundwater	(µg/L)	(µg/L)				
		PFBS	0.022	40	3/0	No		
		PFOA	0.19	0.07	3/1	Yes	Vacl	
		PFOS	0.40	0.07	3/1	Yes	1 08	
		PFOA + PFOS	0.59	0.07	3/1	Yes		

 Table 46 Summary of PFBS, PFOA, and PFOS Detections and Screening Level Exceedances (continued)

	Associated		Maximum		Number of Samples /	Exceeds	Potentially Complete	
	Existing		Detected	Screening	Number of	Screening	Exposure	
AFFF Area	IRP ID	Parameter	Concentration	Level	Exceedances ^a	Level	Pathway	Recommendation
		Surface Soil	(µg/kg)	(µg/kg)				
		PFBS	ND	130,000 13	4/0	No	No	
		PFOA	2.6	126	4/0	No	INO	
		PFOS	18	126	4/0	No		
AFEE Area 7		Subsurface Soil	(µg/kg)	(µg/kg)				
Delta Taxiway	Not an existing	PFBS	ND	130,000 13	4/0	No	Na	No further response
(2000)	site	PFOA	ND	126	4/0	No	INO	action planned.
(2000)		PFOS	1.1	126	4/0	No		
		Groundwater	(µg/L)	(µg/L)				
		PFBS	0.018 J	40	3/0	No		
		PFOA	0.010 J	0.07	3/0	No	No	
		PFOS	0.017 J	0.07	3/0	No	INU	
		PFOA + PFOS	0.027 J	0.07	3/0	No		
		Surface Soil	(µg/kg)	(µg/kg)				
		PFBS	ND	130,000 13	4/0	No	No	
		PFOA	1.1	126	4/0	No	INO	
		PFOS	13	126	4/0	No		
		Subsurface Soil	(µg/kg)	(µg/kg)				
AFFF Area 8 Marten Crash	Not an existing	PFBS	ND	130,000 13	4/0	No	Na	No further response
(2006)	site	PFOA	ND	126	4/0	No	INO	action planned.
		PFOS	ND	126	4/0	No		
		Groundwater	(µg/L)	(µg/L)				
		PFBS	ND	40	3/0	No		
		PFOA	ND	0.07	3/0	No	No	
		PFOS	ND	0.07	3/0	No	INU	
		PFOA + PFOS	ND	0.07	3/0	No		

 Table 46 Summary of PFBS, PFOA, and PFOS Detections and Screening Level Exceedances (continued)

	Associated		Maximum		Number of Samples /	Exceeds	Potentially Complete	
	Existing		Detected	Screening	Number of	Screening	Exposure	
AFFF Area	IRP ID	Parameter	Concentration	Level	Exceedances ^a	Level	Pathway	Recommendation
		Surface Soil	(µg/kg)	(µg/kg)				
		PFBS	ND	130,000 13	3/0	No	NI-	
		PFOA	1.1 J	126	3/0	No	INO	
	Not an existing	PFOS	32	126	3/0	No		
AFFF Area 9		Subsurface Soil	(µg/kg)	(µg/kg)				
		PFBS	ND	130,000 13	3/0	No	No	
Crash 4 (2001)	site	PFOA	4.5	126	3/0	No	INO	Advance area to KI.
		PFOS	2.1	126	3/0	No		
		Groundwater	(µg/L)	(µg/L)				
		PFBS	0.017 J	40	2/0	No		
		PFOA	0.065	0.07	2/0	No	Yes ¹	
		PFOS	0.16	0.07	2/1	Yes		
		PFOA + PFOS	0.173 J ^h	0.07	2/2	Yes		

 Table 46 Summary of PFBS, PFOA, and PFOS Detections and Screening Level Exceedances (continued)

	Associated Existing		Maximum Detected	Screening	Number of Samples / Number of	Exceeds Screening	Potentially Complete Exposure	
AFFF Area	IRP ID	Parameter	Concentration	Level	Exceedances ^a	Level	Pathway	Recommendation
		Surface Soil	(µg/kg)	(µg/kg)				
		PFBS	ND	130,000 13	3/0	No	No	
		PFOA	1.9	126	3/0	No	INU	
		PFOS	140	126	3/1	Yes		
		Subsurface Soil	(µg/kg)	(µg/kg)				
		PFBS	ND	130,000 13	3/0	No	Ne	
	Not an existing	PFOA	ND	126	3/0	No	INO	
		PFOS	ND	126	3/0	No		
		Groundwater	(µg/L)	(µg/L)				
AFFF Area 10		PFBS	ND	40	3/0	No		
WWTP		PFOA	0.0065 J	0.07	3/0	No		Advance area to RI.
** ** 11	site	PFOS	0.014 J	0.07	3/0	No	NO	
		PFOA + PFOS	0.0205 J	0.07	3/0	No		
		Sediment	(µg/kg)	(µg/kg)				
		PFBS	1.9 J	130,000 13	1/0	No	Ne	
		PFOA	8.8	126	1/0	No	INO	
		PFOS	710	126	1/1	Yes		
		Surface Water	(µg/L)	(µg/L)				
		PFBS	0.12	40	1/0	No		
		PFOA	0.22	0.07	1/1	Yes	\mathbf{Ves}^1	
		PFOS	0.96	0.07	1/1	Yes	1 03	
		PFOA + PFOS	1.18	0.07	1/1	Yes		

 Table 46 Summary of PFBS, PFOA, and PFOS Detections and Screening Level Exceedances (continued)

	Associated		Maximum		Number of Samples /	Exceeds	Potentially Complete	
	Existing		Detected	Screening	Number of	Screening	Exposure	
AFFF Area	IRP ID	Parameter	Concentration	Level	Exceedances ^a	Level	Pathway	Recommendation
		Surface Soil	(µg/kg)	(µg/kg)				
		PFBS	ND	130,000 13	5/0	No	No	
		PFOA	1.1	126	5/0	No	INO	
		PFOS	15	126	5/0	No		
		Subsurface Soil	(µg/kg)	(µg/kg)				
		PFBS	ND	130,000 13	5/0	No	NI-	
	Not an existing	PFOA	0.42 J	126	5/0	No	INO	
		PFOS	1.0	126	5/0	No		
		Groundwater	(µg/L)	(µg/L)				
AFFF Area 11		PFBS	0.077	40	3/0	No		
Spray Nozzle		PFOA	0.25	0.07	3/3	Yes	Yes ¹	Advance area to RI.
Test Area	site	PFOS	0.34	0.07	3/3	Yes		
		PFOA + PFOS	0.50 ^h	0.07	3/3	Yes		
		Sediment	(µg/kg)	(µg/kg)				
		PFBS	ND	130,000 13	1/0	No	NI-	
		PFOA	1.9 J	126	1/0	No	INO	
		PFOS	81	126	1/0	No		
		Surface Water	(µg/L)	(µg/L)				
		PFBS	0.011 J	40	1/0	No		
		PFOA	0.057	0.07	1/0	No	\mathbf{Ves}^1	
		PFOS	0.43	0.07	1/1	Yes	1 05	
		PFOA + PFOS	0.487	0.07	1/1	Yes		

 Table 46 Summary of PFBS, PFOA, and PFOS Detections and Screening Level Exceedances (continued)

AFFF Area	Associated Existing IRP ID	Parameter	Maximum Detected Concentration	Screening Level	Number of Samples / Number of Exceedances ^a	Exceeds Screening Level	Potentially Complete Exposure Pathway	Recommendation
		Surface Soil	(µg/kg)	(µg/kg)				
		PFBS	1.1 J	130,000 13	3/0	No	No	
		PFOA	9.7 J	126	3/0	No	INO	
		PFOS	390 J	126	3/3	Yes		
		Subsurface Soil	(µg/kg)	(µg/kg)				
		PFBS	1.1 J	130,000 13	3/0	No	λŢ	
	Not an existing	PFOA	1.7	126	3/0	No	No	
		PFOS	88	126	3/0	No		
		Groundwater	(µg/L)	(µg/L)				
A = E = A = 12		PFBS	2.8	40	3/0	No		
Building 88240		PFOA	0.11	0.07	3/1	Yes	Ves ¹	A dyance area to PI
Dunuing 88240	site	PFOS	1.1	0.07	3/2	Yes	1 05	Auvalice alea to KI.
		PFOA + PFOS	1.21	0.07	3/2	Yes		
		Sediment	(µg/kg)	(µg/kg)				
		PFBS	1.9	130,000 13	1/0	No	NT.	
		PFOA	1.5	126	1/0	No	NO	
		PFOS	59	126	1/0	No		
		Surface Water	(µg/L)	(µg/L)				
		PFBS	2.9	40	1/0	No		
		PFOA	0.82	0.07	1/1	Yes	\mathbf{Ves}^1	
		PFOS	3.8	0.07	1/1	Yes	1 05	
		PFOA + PFOS	4.62	0.07	1/1	Yes		

 Table 46 Summary of PFBS, PFOA, and PFOS Detections and Screening Level Exceedances (continued)

^a Includes only primary samples unless an exceedance only occurred in a duplicate sample. In those instances, only the duplicate is included. ^b EPA Regional Screening Levels for soil protective of groundwater (November 2018) (https://semspub.epa.gov/work/HQ/197416.pdfhttps://se

(https://semspub.epa.gov/work/HQ/197416.pdf).thtps://semspub.epa.gov/work/HQ/197416.pdf).^d Screening levels were calculated using the EPA Regional Screening Level Calculator (https://ema-prgs.ornl.gov/cgibin/chemicals/csl_search). EPA Regional Screening Levels for tapwater (November 2018) (https://semspub.epa.gov/work/HQ/197416.pdf).thtps://semspub.epa.gov/work/HQ/197416.pdf). Screening Level listed in *Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA)* (EPA, May 2016) and *Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS)* (EPA, May 2016a). The EPA Health Advisory value for drinking water of 0.07 µg/L applies to the combined detected concentrations of PFOS and PFOA. ^h Maximum PFOA + PFOS concentration shown is the highest combined PFOA and PFOS concentration detected in a specific groundwater or surface water 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. ¹Duplicate result. ¹Sampling of private domestic wells and investigation of groundwater downgradient of the Base has been completed by others.

Bold values exceed screening levels.

 $\mu g/kg = micrograms per kilogram$

ID = identification

PFOA = perfluorooctanoic acid

μg/L = micrograms per liter IRP = Installation Restoration Program PFOS = perfluorooctane sulfonate AFFF = aqueous film forming foam J = the reported concentration is an estimated value.

 $\begin{array}{ll} J = \mbox{the reported concentration is an estimated value.} & \mbox{ND} = \mbox{not detected} \\ RI = \mbox{remedial investigation} & SI = \mbox{site inspection} \end{array}$

FTA = fire training area PFBS = perfluorobutane sulfonate WWTP = wastewater treatment plant

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Appendix A Figures Appendix B RSL Calculation

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 _{ree} (exposure time) hours/day	24
ET (child exposure time) hours/day	24
ET (adult exposure time) hours/day	24
ET (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 _{rec} (exposure duration) years	26
ED _{roc.} (exposure duration - child) years	6
ED _{roc.a} (exposure duration - adult) years	20
ED_{n_2} (mutagenic exposure duration) years	2
ED _{2.6} (mutagenic exposure duration) years	4
$ED_{\kappa_{16}}$ (mutagenic exposure duration) years	10
ED _{16.26} (mutagenic exposure duration) years	10
BW, rec. (body weight - child) kg	15
BW _{rec.a} (body weight - adult) kg	80
BW_{α} (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 _{rec} (exposure frequency - child) days/year	350
EF _{res-a} (exposure frequency - adult) days/year	350

Default Resident Equation Inputs for Soil

Variable	Value
$EF_{n,2}$ (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 recard (age-adjusted soil ingestion factor) mg/kg	36750
IFSM _{rac_adj} (mutagenic age-adjusted soil ingestion factor) mg/kg	166833.3
IRS _{rec} (soil intake rate - child) mg/day	200
IRS, (soil intake rate - adult) mg/day	100
IRS_{n} (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 _{resarti} (age-adjusted soil dermal factor) mg/kg	103390
DFSM, (mutagenic age-adjusted soil dermal factor) mg/kg	428260
AT _{ree} (averaging time - resident carcinogenic)	365
City	Default
A (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
$U_{_{\mathrm{m}}}$ (mean annual wind speed) m/s	4.69
U, (equivalent threshold value)	11.32
$F(x)$ (function dependent on U $_{m}/U_{t}$) unitless	0.194

2
Default Resident Equation Inputs for Soil

Variable	Value
City _{ve} (Climate Zone) Selection	Default
A (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/L	0.43396
Theta (air-filled soil porosity) Li/Li	0.28396
Theta _w (water-filled soil porosity) L $_{water}/L_{eoil}$	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 _{VE mace-Inading} (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 (VF mass-limit acres)	0.5
T (exposure interval) yr	26
d ٍ (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

Che	emical	CAS Number	• Mutagen?	In VOC? (mg	gestion SF /kg-day) ⁻¹	SFO 1 Ref	Inhalation Unit Risk (ug/m ³⁾⁻¹	IUR Ref	RfD (mg/kg-da	Rfi y) Re	D RfC f (mg/m³	RfC	GIABS	6 ABS	5 RBA	So Satura Concent (mg/l	il tion ration ‹g)	S (mg/L)
Perfluorooc sulfonic aci	ctane d (PFOS)	1763-23-7	1 No	No	-		-		2.00E-05	D	-		1	0.1	1	-		6.80E+02
Perfluorooc (PFOA)	tanoic acid	335-67-1	No	No 7.	00E-02	D	-		2.00E-05	D	-		1	0.1	1	-		9.50E+03
K (cm³/g) 3.72E+02 1.15E+02	K (cm ^{3 - -}	/sup>/g)	HLC (atm-m ³/mole -	Henry's Law Constan e) (unitless -	H`Bo and P t HLC Ref 53	ormal oiling Point T (K) 32.15	BP Ref PHYSPRO PHYSPRO	Tei P P	Critical mperature T _{crit} (K) -	T _{crit} Ref	D _{ia} (cm²/s) 2.07E-02 2.26E-02	D _{.м} (cm² 5.25E 5.79E	/ /s) (cr -06 -06	D _A n²/s) -	Partice Emiss Fact (m³/l 1.36E	ulate sion Vol cor +09 +09	atilizati Factor (m³/kg) - -	on
Ingestion SL TR=1E-06 (mg/kg) -	Dermal SL TR=1E-06 (mg/kg) -	Inhalation SL TR=1E-06 (mg/kg) -	Carcinogeni SL TR=1E-06 (mg/kg) -	Ingestion C SL Child THQ=0.1 (mg/kg) 1.56E-01	Dermal SL Child THQ=0. (mg/kg) 6.59E-0	l Inha C 1 TH) (m	alation Nor SL Child Q=0.1 Ig/kg)	ncarc S Ch THI (mg 1.26	inogenic iL hild = 0.1 //kg) E-01	Ingest SL Adu THQ= (mg/k 1.67E+	ion Der S It Ad 0.1 THQ (mg (mg 0.0 3.95E	mal L ult =0.1 /kg)	Inhalati SL Aduli THQ=0 (mg/kg	on N t).1 g)	oncaro S Ad TH (mg 1.17	cinogenic SL dult I=0.1 g/kg) 'E+00	Scree Le (mg 1.26E	ening vel I/kg) -01
9.93E+00	3.53E+01	-	7.75E+00	1.56E-01	6.59E-0 ⁻	1	-	1.26	E-01	1.67E+	-00 3.95E	E+00	-		1.17	'E+00	nc 1.26E nc	-01

Inhalation Unit Risk To>	cicity Metad	ata										5
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											

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) Perfluorooctanoic acid (PFOA)	1763-23-1 335-67-1	7.00E-02	DWSHA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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
Perfluorooct	ane sulfonic	acid (PFOS)	1763-23-1	2.00E-05	DWSHA	NA	NA	NA
Perfluorooct	anoic acid (F	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	

Cł	nemical	CASNUM	Chronic Inhalation Reference Concentration 1 (mg/m ³)	Toxicity Source	Inhalation Chronic Reference Concentration Basis	Inh Cł Ref Conc Con	alation nronic erence entration fidence .evel	Inha Ch Refe Conce Critic	alation Ironic erence entration al Effect	Inhalation Chronic Reference Concentration Target Organ
Perfluorooctane Perfluorooctanoi	sulfonic acid (PF c acid (PFOA)	OS) 1763-23-1 335-67-1		-						
Inhalation Chronic Reference Concentration Modifying Factor	Inhalation Chronic Reference Concentration Uncertainty Factor	Inhalation Chronic Reference Concentration Species	Inhalation Chronic Reference Concentration Route	Inhalat Chror Referer Concentr Stud Durati	ion Inhala nic Chro nce Refere ration Concen ly Stu on Refere	tion nic ence tration dy ence	Inhalat Chroi Refere Concenti Note	ion nic nce ration		

Appendix C

Readiness Review Forms, Field Forms, and Boring Logs

Employee Name: Arek Turolski

Job Number: M2027.0003

Job Location: Ellsworth AFB

Job Tasks:

Surface water sampling, groundwater sampling, soil sampling – surface soil and subsurface soil, soil boring logging, surface water and sediment sampling, mob/demob 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 nitrile gloves

Documents Needed:

Field forms: Boring log, GW sampling log, sample log, log book, calibration sheets

Meeting Notes:

We'll have one mini sonic rig working this installation with Justin as the geologist and Arek serving as back up. The rotation schedule is

April 17–26 – Travel out on April 16, return on April 27 – Ash, Justin, Miles, Arek May 1–May 10 – Travel out on April 30, return on May 11 – Ash, Justin, Matt B., Arek May 15–24 – Travel out on May 14, return on May 25 – Ash, Justin, Miles, Arek

If a fourth shift is required, it will start after Memorial Day by traveling out on the 29th.

Justin has PTO scheduled for Friday May 4 through Sunday May 6 and Arek will be on the rig these days.

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We have only one existing well to be redeveloped/sampled at Site 1 and four SW/SD samples (three of which are off airfield).

Airfield work

Dig permits have been subcontracted and work will be started on April 5th for those. The subcontractor will have all non-airfield locations cleared by April 16th and all airfield locations cleared by May 1. We also have several locations that are soil borings only in which wells will not be installed.

Hotels/Storage Unit/Vehicles

The hotel for this work will be the Residence Inn at 581 Watiki Way, Box Elder South Dakota 57719. MAKE SURE YOU DO NOT USE GOVERNMENT RATE. Once you've read through this go ahead and book your rooms so you have them. Government rate is nearly twice as expensive as the standard rate for the first rotation. That may change during following rotations but ensure you're getting the cheapest rate available. Jenny – Please have the sample bottles shipped to this location for delivery no later than Monday the 16th. We'll need 20 gallons of PFC-free water to start with. They should be addressed to Ash Willis.

For vehicles – Justin is driving an Aerostar vehicle in from Hill AFB and I have arranged for two commercial truck pickups to be waiting for us at the airport on Monday the 16th. They'll be delivered there on Friday the 13th and have Ash and Arek's name attached to them. You guys will rent as normal from the airport counter but will be on the same monthly rate that was negotiated for Hill AFB which was 1050/month plus tax with 2500 miles of driving. <u>Make sure your rental agreements have the rate/mileage listed before you sign for the trucks</u>. Miles and Matt, get with Arek and Ash to coordinate your flights as you guys will be riding.

Ash will be organizing the storage unit and equipment the week of April 9th and he'll be coordinating with Justin on the storage unit, etc. If/when you guys have questions regarding equipment or a storage unit just let me know.

IDW

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Equipment Packed for travel on: April 14

Travel Dates:

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Constation

Employee Name: Ash Willis

Job Number: M2027.0003

Job Location: Ellsworth AFB

Job Tasks:

Surface water sampling, groundwater sampling, soil sampling – surface soil and subsurface soil, soil boring logging, surface water and sediment sampling, mob/demob 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 nitrile gloves

Documents Needed:

Field forms: Boring log, GW sampling log, sample log, log book, calibration sheets

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Cargedian

Employee Name: Justin Vojak

Job Number: M2027.0003

Job Location: Ellsworth AFB

Job Tasks:

Surface water sampling, groundwater sampling, soil sampling – surface soil and subsurface soil, soil boring logging, surface water and sediment sampling, mob/demob 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

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Documents Needed:

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Constation

Employee Name: Matthew Butterworth

Job Number: M2027.0003

Job Location: Ellsworth AFB

Job Tasks:

Surface water sampling, groundwater sampling, soil sampling – surface soil and subsurface soil, soil boring logging, surface water and sediment sampling, mob/demob 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 nitrile gloves

Documents Needed:

Field forms: Boring log, GW sampling log, sample log, log book, calibration sheets

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Constation

Employee Name: Miles Nielson

Job Number: M2027.0003

Job Location: Ellsworth AFB

Job Tasks:

Surface water sampling, groundwater sampling, soil sampling – surface soil and subsurface soil, soil boring logging, surface water and sediment sampling, mob/demob 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 nitrile gloves

Documents Needed:

Field forms: Boring log, GW sampling log, sample log, log book, calibration sheets

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Cargedian

		A	erostar SES	Suc	BORING LOC	G -	M\	N1	8P	FC	0101	Site Name Drilling Comp Drilling Metho Driller	: AFFF Area 1 pany : Cascade Drilling od : Mini Sonic : Dennis Schweisthal
	AI	FF AF Pr	Areas (Omaha District) FF Site Inspection oject# M2027.0003		End Date Northing Easting	: 0 : 0 : 6 : 1	5/17 5/17 678 242	7/18 7/18 66.1 47.9	3 7			Logged By Borehole Dia Boring Comp	: Arek Turolski meter : 6.0 in. letion : 2.0 in. PVC Monitoring Well
		Ells	worth Air Force Base		Total Depth (ft)**	: 3	0.0	.27				Depth to Wat Signature	Prek Timbski
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	Water Levels During Drilling DESCR	Mea *Noi Datu **Be (bgs	asurements rth American Vertical um (NAVD88) feet (ft) elow Ground Surface s) feet (ft) ON	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Water Level	SAMPLE TYPE	s	AMPLE ID	MW18PFC0101 Elev (TOC): 3192.60
-0	1		(0.0 - 2.0) Lean Clay, low d stiff, slightly moist, 10YR, 3	lensit 8/3, da	y, low plasticity, ark brown		CL			SS	ELSW	/H01-001-SS-001 lote: Interval 0.0 - 0.5 ft	4inX4in Pro Top Cover 2ftX2ftX4in. Pad — Grout: 0.0 - 1.0 ft bgs Mix Used: Portland Cement (94 lb bao)
	2	100	(2.0 - 5.0) Lean Clay, high overy stiff, dry, 10YR 4/3, browith 10YR 8/1, white	dens own,	ity, low plasticity, trace mottling	0	CL						Sodium Bentonite (~3 lbs), Water (~7 gallons) — Bentonite Seal 1/4 in. Uncoated Pellets 1.0 - 5.0 ft bgs
-	3	75	(5.0 - 10.0) Lean Clay, med plasticity, very stiff, dry, 10`	dium YR 5/	density, low '3, brown		CL						Riser 2.0 in. Sch 40 PVC
10-	4	100	(10.0 - 14.5) Gravelly Sand coarse, sub-rounded to rou 10YR, 5/3, brown, Gravel: (round, fine to coarse	l, Iow ind, v (40%	density, fine to vell graded, dry,), sub-round to	0	sw	<u>//</u>		so	ELSW	/H01-001-SO-013 lote: Interval 3 0 - 140 ET	— Filter Pack 20/30 Standard Sand Silica Sand 5.0 - 20.0 ft bgs
15-	5		(14.5 - 15.0) Gravelly Sand	l, l ow	density, fine to		s٧	J	▼				Screen (10.0 ft)
	6		coarse, sub-rounded to rou wet, 10YR 5/3, brown, Grav sub-round to round fine to	und, v vel: (4 coar	veii graded, 40%), se		G٧	/					9.2 - 19.2 rt bgs 0.010 in. continuous wrap vee wire Sch 40 PVC
-	7		(15.0 - 16.0) Gravel, low de sub-round, to round, well g	ensity radeo	, fine to coarse, d, wet, 10YR,		СГ						
-	8	100	(16.0 - 17.0) Clay with Grav medium plasticity, stiff, wet yelllowish brown, Gravel: (3 sub-round to round	vel, n , 10Y 30%)	nedium density, /R, 5/4, , fine to coarse,		CL						End Can
20-			(17.0 - 20.0) Lean Clay, hig plasticity, very stiff, dry, 10 mottled with 10YR, 6/2, ligh 10YR, 6/6, brownish yellow End of Borehole 20.0 ft bgs	gh de YR, 4 nt bro /	nsity, low /1, dark gray, wnish gray and					<u> </u>	<u> </u>		

		A	erostar SES	LLC	BORING LOG) -	M۱	N1	8P	FC	:0102	Site Name Drilling Comp Drilling Metho Driller	: AFFF Area 1 pany : Cascade Drilling pd : Mini Sonic : Dennis Schweisthal
	AI	FF Af	Areas (Omaha District) FFF Site Inspection		Start Date End Date Northing Easting	: 0 : 0 : 6 : 1	5/15 5/16 6805 2429	/18 /18 54.33	3 54			Logged By Borehole Dia Boring Comp	: Arek Turolski meter : 6.0 in. letion : 2.0 in. PVC Monitoring Well
		Ells	worth Air Force Base		Surface Elev. (ft)* Total Depth (ft)**	: 3 : 4	187. 0.0	26				Depth to Wat Signature	ter (ft) f: 26.0, Tundski
L.			Water Levels	Mea *Noi Datu	asurements rth American Vertical um (NAVD88) feet (ft)		LOGY			ш			
TH IN FEI 29s)	RVAL	ECOVER		**Be (bgs	elow Ground Surface s) feet (ft)	(mdd	S \ LITHC	sell Color	er Level	PLE TYP	s	AMPLE ID	MW18PFC0102 Elev (TOC): 3189.50
DEP'	INTE	% RE	DESCRI	IPTI	ON	PID (USC:	Muns	Wate	SAM			Stickup
-0			(0.0 - 4.0) ORGANIC CLAY 6/2, very dark brown, organ etc.), moist	∕, hig nic ma	h plasticity, 10YR aterial (roots,	0				SS	ELSW	/H01-003-SS-001 lote: Interval 0.0 - 0.5 ft	Cover 2ftX2ftX4in Pad
-	1	100					он						
-	5 (4.0 - 5.0) CLAY, brittle, low p 10YR 4/1, dark gray, dry (5.0 - 7.0) CLAYEY SILT, brit gravish brown, dry			v plas	sticity, dry,	0		1.13					
5-				oritt le ,	10YR 4/2, dark								
-	3	(5.0 - 7.0) CLAYEY SILT, brittl grayish brown, dry					ML						
-	4	60	(7.0 - 10.0) SAND, poorly g grained, subanglular, 10YR (10%) GRAVEL, poorly gra	rade 3/3 ded,	d, fine to medium dark brown. dry	0	SP						— Grout: 0.0 - 17.0 ft bgs Mix Used: Portland Cement
10	5		(10.0 - 13.0) GRAVEL, well clay, medium, sub-rounded 10YR 4/3, brown, dry	l grac I to si	led with trace ub-angular,	-	GW						(94 lb bag) Sodium Bentonite (~3 lbs), Water (~7 gallons)
_		80		- 11 - 11	hand an offend								Riser 2.0 in. Sch 40 PVC
-	6		10YR 5/3, brown, moist	sucity	y, nara, moulea,	0	CL						
15-	7		(15.0 - 16.0) CLAY, mediur very dary grayish brown, m 10YR 6/8 brownish yellow,	n pla ottleo mois	sticity, 10YR 3/2, d with CLAY, t		CL						
-	8	80	(16.0 - 18.0) CLAY, low pla 4/1, dark gray, slightly mois	sticity	y, hard, 10YR	0	CL						
-	9		(18.0 - 20.0) CLAY, very ha 10YR 3/2, very dary grayisl	ard, Ic h brov	ow plasticity, wn, damp		CL						
20-	10		(20.0 - 22.0) CLAY, low pla 3/1, very dark gray, dry	sticit	y, hard, 10YR		CL						— Bentonite Seal 1/4 in. Uncoated Pellets 17.0 - 22.0 ft bgs

	Aerostar SES AFFF Areas (Omaha District) AFFF Site Inspection			BORING LC	DG	-	M\ 5/15	//1 /	8P	FC	0102	Site Name Drilling Comp Drilling Metho Driller Logged By	: AFFF Area 1 bany : Cascade Drilling bd : Mini Sonic : Dennis Schweisthal : Arek Turolski
	AF	FF AF Pr	Areas (Omaha District) FFF Site Inspection oject# M2027.0003	End Date Northing Easting	•*	: 08 : 66 : 12	5/16 5805 2429	/18 54.33 946.6	3 64			Borehole Dia Boring Comp	meter : 6.0 in. letion : 2.0 in. PVC Monitoring Well
		Ells	worth Air Force Base	Total Depth (ft)*	L) **	. 3 : 4().0	20				Signature	er(π) : 20,0 Lad ski
H IN FEET gs)	RVAL	COVERY	Water Levels ▲ During Drilling	Measurements *North American Vertical Datum (NAVD88) feet (ft) **Below Ground Surface (bgs) feet (ft))	(mdi	\LITHOLOGY	ell Color	. Level	LE TYPE	S	AMPLE ID	MW18PFC0102 Elev (TOC): 3189.50
DEPT (b	INTEF	% RE	DESCR	IPTION		PID (F	nscs	Munse	Water	SAMF			
22-	11	100	(22.0 - 25.0) CLAY, low pla 10YR 3/1, very dark gray, 10YR 4/6, dark yellowish b	asticity, hard, brittle mottled with CLAY, prown, damp		0	CL						
	12					0	СШ		-	so	ELSW	H01-003-SO-025 ote: Interval	
27 -	13	100	(25.8 - 26.0) CLAY, with tra plasticity, 10YR 4/1, dark g (26.0 - 30.0) CLAY, low pla 3/1, very dark gray, mottled 4/6, dark yellowish brown,	ace gravel, high gray, moist asticity, hard, 10YR d with CLAY, 10YR moist	_/	0	CL					25.0-26.0 FŤ	Riser 2.0 in. Sch 40 PVC Filter Pack 20/30 Standard Sand
	14		(30.0 - 32.0) CLAY, low pla 3/2, very dark grayish brow	asticity, hard, 10YR vn, dry			CL						22.0 - 39.0 ft bgs
	15	100	(32.0 - 34.0) CLAY, low pla 3/1, very dark gray, mottled 3/3, dark brown, dry	asticity, hard, 10YR d with CLAY, 10YR		0	CL						
	16		(34.0 - 35.0) CLAY, low pla 10YR 3/1, very dark gray, (asticity, hard, britt l e, dry			CL	12					wrap vee wire Sch 40 PVC
-	-		(35.0 - 36.5) CLAYwith trac plasticity, hard, 10YR 3/1,	ce gravel, low very dark gray, dry			CL SH						
37-	17	100	(36.8 - 40.0) CLAY with tra plasticity, hard, 10YR 3/1,	icel gravel, low very dark gray, dry		0	CL						End Cap
-			End of Porchala 40 ft has										Borehole collapse 39.0-40.0 ft bgs
42-			Ena or Borenole 40 ft bgs										

	AI	FFF Af Pr Ells	Areas (Omaha District) FFF Site Inspection oject# M2027.0003 worth Air Force Base	S	BORING LOC Start Date End Date Northing Easting Surface Elev. (ft)* Total Depth (ft)**	5 - : 5/ : 5/ : 66 : 12 : 31 : 15	SE 16/1 16/1 5790 2428 186.6	8 18 8 8 8.88 49.9 50	PF	C0	102	Site Name Drilling Compan Drilling Method Driller Borehole Diame Boring Completi Abandonment D DTW During Dril Logged by: Signature:	: AFFF Area 1 y : Cascade Drilling : Mini Sonic : Dennis Schweisthal ter : 6.0 on : Abandoned w/ Grout ate : 05/16/18 lling (ft) 13.0 : Arek Turolski
TH IN FEET (bgs)	ERVAL	ECOVERY	Water Levels ▲ During Drilling	Me *No Datr **Be (bgs	asurements rth American Vertical um (NAVD88) feet elow Ground Surface s) feet	(mdd)	S	isell Soil Color	th to Water (DTW)			SAMPLE ID	REMARKS
DEP	ILN	8 8 8	DESCR	IPTI	ON	DIG	USU USU	Mun	Dep	SAN			
-0 -	1	100	(0.0 - 4.0) FAT CLAY, high heavy organics (roots, gra 3/1, very dark gray,	n plas ss, se	ticity, soft, moist, eeds),10 YR,	2	СН			SS	ELS	SWH-01-002-SS-001 Note: Interval 0.0 - 1.0 ft	Borehole
5-			(4.0-5.0) LEAN CLAY, me stiff, moist, organic matter yellowish brown (5.0-8.0) LEAN CLAY, low moist, 10 YR, 4/2, dark gra	dium , 10 Y r plast ayish	plasticity, medium /R, 4/4, dark icity, very stiff, brown	- 1	CL						
-	2	60	(8.0-13.0) SANDY GRAVE sub-angular to round, mois brown, Sand: (30%), angu medium grained	EL, fin st, 10 Iar-su	e to coarse, YR, 3/3, dark ıb-round,								
- 10	3	80	(13.0-14.0) SAND, mediur	n grai	ned, angular to	0	GV SF	1	V	so	ELS	SWH-01-002-SO-012 Note: Interval 12.0 - 13.0 ft	
- 15-			(10%), fine, sub-angular to (14.0-15.0) CLAY with GR plasticity, hard, moist, 10 Gravel: (30%), coarse, sub Total Depth of Boring 15.0	AVEL AVEL AVEL AVEL A A A A A A A A A A A A A A A A A A A	d Gravels ., medium /3, dark brown, nd to round GS		CL						
	М	[202	7.0003			C-14	Ļ						3/6/19

		A	erostar SES	LLC	BORING LOC	- 6	M\ 5/16	V1 8	3PI	FC	0103	Site Name Drilling Comp Drilling Metho Driller	:AF any:Ca od:Mi :De	FFF Area 1 ascade Drilling ini Sonic ennis Schweisthal enk Turolski
	AI	FFF AF Pr	Areas (Omaha District) FF Site Inspection oject# M2027.0003		End Date Northing Easting	: 0 : 6 : 1	5/16 678 2420	%/18 39.64 361.4	5 54			Borehole Dia Boring Comp	meter : 6.0 letion : 2.0 Mi	0 in. 0 in. PVC onitoring Well
		Ellsv	vorth Air Force Base		Surface Elev. (ft)* Total Depth (ft)**	: 3 : 2	187. 0.0	.29				Depth to Wat Signature	er (ft) <u>13</u>	3.0 Tindski
			Water Levels	Mea	asurements		Σ							
ET		≿	During Drilling	*Noi Dati	rth American Vertical um (NAVD88) feet (ft)		OL0(<u>ـ</u>		<u>m</u>				
I I I (i	AL	OVEF		**Be (bgs	elow Ground Surface s) feet (ft)	ε Έ	Η Η Η	Colo	evel	1			MW18PF0	C0103
PTH HTd	TERV	RECO				Idd) (CS	Insell	ater L	MPLI	s	AMPLE ID		
	Ľ	%	DESCRI	PH	ON	ЫЧ	SU	Mu	Ň	SA				Stickup 4inX4in Pro Top Cover 2X2X4in Pod
0-			(0.0 - 2.0) ORGANIC CLAY 10YR 3/1, very dark grav, c	/, me organ	dium plasticity, ic material	0				SS	ELSW	H01-004-SS-001 lote: Interval		Grout:
-	1		(roots, etc.), moist	0			ОН					0.0 - 0.5 ft	<u></u>	Mix Used: Portland Cement
-			(2.0 - 5.0) CLAY, low plasti	citv. (drv. 10YR 5/3.	-		Z/)						(~3 lbs), Water (~7 gallons)
-		100	brown, dry		, , , , , , , , , , , , , , , , , , ,]]]						
_	2					0	CL	11						— Bentonite Seal 1/4 in. Uncoated
								11						Pellets 1.0 - 5.0 ft bgs
5-			(5.0 - 7.0) CLAY, low plastic	city, I	oritt l e, 10YR 5/3,	1		11						
-	3		brown, dry				CL]]						
-			(7.0. 12.0) CRAVEL walk	Crad	ad fina ta	-								—— Riser
_		80	coarse grained, 10YR 4/2, medium to coarse grained	brow and	n with SAND, ular to sub	0								2.0 in. Sch 40 PVC
			rounded, dry	, ang									1991 - 1992 - 199	
-	4						GN							
10-														
-														- Filter Dock
_														20/30 Standard Sand Silica Sand
	5	100	(12.0 - 13.0) GRAVEL, well coarse grained, subangular	l grac r to ro	ded, fine to ound, 10YR 4/4,	0	GN		_	so	ELSW	H01-004-SO-012		5.0 - 20.0 it bgs
-		1	brown with SAND, medium angular to sub-rounded, mo	to co pist	barse grained,	0						11.0-12.0 ft		
-			(13.0 - 16.0) GRAVEL, well coarse grained, subangular	l grac r to ro	led, fine to ound, 10YR 4/4,									
15-	0		brown, with SAND, medium angular so sub-angular, we	n to c et	oarse grained,		GW							
_														9.4 - 19.4 ft bgs 0.010 in. continuous
			(16.0 - 20.0) CLAY, low pla brown, mottled with 10YR 4	sticity 4/1, d	y, 10YR 5/3, ark gray, moist			11						Sch 40 PVC
-	1	100				0		11						
	7						CL	11						
-								11					222	
20-								11					B	End Cap
			End of Borehole 20.0 ft bgs	6										

		A	erostar SE		G -	M	W1	8F	PFC	:0201	Site Name Drilling Com Drilling Meth Driller	: AFFF Area 2 npany : Cascade Drilling hod : Mini Sonic : Dennis Schweisthal
	AF	FF AF Pr	Areas (Omaha District) FFF Site Inspection oject# M2027.0003	Start Date End Date Northing Easting Surface Elev. (ft)		04/2 04/2 6734 1238 3212	5/18 5/18 168 3430 2.87	17 .83			Logged By Borehole Di Boring Com Depth to Wa	: Justin Vojak iameter : 6.0 in. ipletion : 2.0 in. PVC Monitoring Wéll ater (ft) : 31.0
	1	Ells	worth Air Force Base	Total Depth (ft)**	: :	50.0		1			Signature	
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	Water Levels During Drilling	Measurements *North American Vertical Datum (NAVD88) feet (ft) **Below Ground Surface (bgs) feet (ft) IPTION	PID (ppm)	JSCS / LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SA	MPLE ID	Well: MW18PFC0201 Elev (TOC): 3212.29
	1	40	(0.0 - 5.0) CLAY, low plas 10YR 4/3, brown, with GR moist	ticity, very stiff, AVEL (30%), slightly	0	CL			0,			Flush Mount,12-in diam Manhole - 8 in. skirt Pad - 2ft X 2ft X 4in.
5	2	90	(5.0 - 10.0) CLAY, mediun 10YR 5/2 grayish brown, t 4/1, dark gray, dry	n plasticity, stiff, race mottling 10YR	0	CL						Grout:
10-	3	30	(10.0 - 15.0) CLAY, mediu 10YR 5/2, grayish brown,	ım plasticity, stiff, dry	0	CL						Riser 2.0 in Sch 40 PVC
- 15	4	70	(15.0 - 18.0) FAT CLAY, h stiff, 10YR 5/2 grayish bro	igh plasticity, medium wn, dry	0	сн						
- 20-	5		(18.0 - 18.5) FAT CLAY, h stiff, 10YR 5/2, grayish bro (40%), dry (18.5 - 20.0) CLAY, low pl 10/20 clock to the second	igh plasticity, medium own with GRAVEL asticity, very stiff,		CH CL						
- -	7	80	(20.0 - 24.0) CLAY, hard, grayish brown, trace mottl gray, 10YR 6/6, brownish	wn, trace mottling v, dry 10YR 6/2, light ing, 10YR 4/1, dark yellow, dry	0	CL						- Bentonite Seal 1/4 in. Uncoated Pellets 20.0 - 25.0 ft bgs
25-	8		(24.0 - 31.2) CLAY, hard, gray, dry	10YR 3/1, very dark								Filter Pack
	9		0.2' SILTSTONE lesne fro	m 31.0 - 31.2								20/30 Standard Sand Silica Sand 25.0 - 42.0 ft bgs



	AI	FFF AF Pr	Areas (Omaha District) FFF Site Inspection oject# M2027.0003	Suc	Start Date End Date Northing Easting Surface Elev. (ft)**	G -	04/2 04/2 6733 1238 3211	W 1 5/18 5/18 302.3 3543 1.88	8F	PFC	:0202	Site Name Drilling Com Drilling Meth Driller Logged By Borehole Di Boring Com Depth to Wa	: A npany : C nod : N : D : J ameter : 6 pletion : 2 N ater (ft) : 3	AFFF Area 2 Cascade Drilling Mini Sonic Dennis Schweisthal ustin Vojak 5.0 in. 2.0 in. PVC Monitoring Well
			Water Levels	Mea	asurements		2010		TW)			Olghature	<u>-</u>	
EPTH IN FEET (bgs)	TERVAL	RECOVERY		*Nor Datu **Be (bgs	th American Vertical Im (NAVD88) feet (ft) Iow Ground Surface) feet (ft)	D (ppm)	SCS / LITHOLOO	unsell Color	epth to Water (D	AMPLE TYPE	SA	MPLE ID	Well: MW Elev (TOC	18PFC0202 C): 3211.33
-0	Z	%					S 	ž	ľ	້ ເ				Flush Mount,12-in.diamete Manhole - 8-in. skirt
- - - -	1	100	4/3, brown, with GRAVEL	(35%)), moist	0	CL							Pad - 2tt X 2tt X 4in
5-	2	80	(5.0 - 10.0) CLAY, low pla 10YR 6/2 light brownish y 10YR 6/6, brownish yellov	sticity ellow, v, dry	, very stiff, mottled with	0	CL							
10- - - -	3	80	(10.0 - 15.0) CLAY, hard, brownish gray, mottled wit brownish, yellow, dry	10YR th 10Y	6/2, light R 6/6,	0	CL							Grout 0.6-21.0 ft bgs Mix Used: Portland Cement (94 lb bag) Sodium Bentonite (-3 lbs) Water (7 gallons) Riser 2.0 in Sch 40 PVC
15-	4	100	(15.0 - 19.0) CLAY, low pl 6/2, light brownish gray, m brownish yellow, and 10Y	lasticit nott l ed R 4/1,	y, hard, 10YR with 10YR 6/6, dark gray, dry	0	CL							
20-	- 5		(19.0 - 21.0) CLAY, hard, gray, mottled with 10YR 6 dry	10YR /6, bro	3/1, very dark ownish yellow,		CL							
25-	6	95	(21.0 - 32.3) CLAY, hard, gray, dry 0.3' SILTSTONE Lense fr	10YR om 32	3/1, very dark .0 - 32.3	0	CL							 Bentonite Seal 1/4' Uncoated Pellets 21.0-26.0 ft bgs Filter Pack 20/30 Red Flint Sand 26.0-40.0 ft bgs

	AI	FFF AF Pro	Areas (Omaha District) FF Site Inspection oject# M2027.0003	BORING Start Date End Date Northing Easting Surface Elev Total Depth (LOG	: 04 : 04 : 04 : 67 : 12 : 32 : 40	M \ 4/25 4/25 733 238 211 0.0	N1 5/18 5/18 02.3 54388	8P	FC	:0202	Site Name Drilling Con Driller Logged By Borehole Di Boring Com Depth to Wa Signature	AFFF Area 2 : Cascade Drilling : Mini Sonic : Dennis Schweisth : Justin Vojak iameter : 6.0 in. pletion : 2.0 in. PVC Monitoring Well ater (ft) : 32.0	nal
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	Water Levels During Drilling DESCR	Measurements *North American Verti Datum (NAVD88) feet **Below Ground Surfa (bgs) feet (ft) PTION	ical t (ft) ace	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SA	MPLE ID	Well: MW18PFC0202 Elev (TOC): 3211.33	
- 28	6	100	(32.3 - 40) CLAY, bard 10	VR 3/1 verv dark			CL		▼	SO	ELSWH No 3	102-002-SO-031 te: Interval 1.0-32.0 ft	Riser 2.0 in Sch 40 PV Filter Pack 20/30 Red Flint	√C Sand
33- - - - - 38-	8	100	(32,3 - 40) CLAY, hard, 10 gray, dry	rR 3/1, very dark		0	CL						26.0-40.0 ft bgs 26.0-40.0 ft bgs 0.010 in. continu wrap vee wire Sch 40 PVC	Ious
- - 43 –			End of Borehole 40.0 ft bgs	;									End Cap	
- - 48 -														
53 –														

	AF	FFF AF Pr Ellsv	Areas (Omaha District) FF Site Inspection oject# M2027.0003	Start Date End Date Northing Easting Surface Elev. (ft)* Total Depth (ft)**	3 - : 0 : 0 : 6 : 1 : 3 : 2	A /25 4/25 7323 2383 197. 0.0	N18 5/18 5/18 32.77 356.9	3 P	FC02	203	Site Name Drilling Comp Drilling Metho Driller Logged By Borehole Diat Boring Compl Depth to Wate Signature	: AFFF Area 2 pany : Cascade Drilling pd : Mini Sonic : Dennis Schweisthal : Justin Vojak meter : 6.0 in. letion : 2.0 in. PVC Monitoring Well per (ft) : 5.0 :
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	Water Levels M ▲ During Drilling + C ★ (DESCRIP	Measurements North American Vertical Datum (NAVD88) feet (ft) *Below Ground Surface bgs) feet (ft)	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Water Level	SAMPLE TYPE	S	ample ID	Well: MW18PFC0203 Elev (TOC): Elev (TOC): 3199.20 Stickup 4.0 in Pro Top Cover 2ftX2ftX4in Pad
-0 - -	1	80	(0.0 - 3.0) FAT CLAY, high pl 4/3, brown, with GRAVEL (35 (3.0 - 5.0) GRAVEL, well grad	asticity, soft, 10YR %), moist ded, fine to coarse,		СН						Grout Grout O.0 - 1.0 ft bgs Mix Used: Portland Cement (94 lb bag) Sodium Bentonite (~3 lbs) Water (~7 gallons) — Bentonite Seal 1/4 in. Uncoated Pellets
- 5-	2		subangular to sub-rounded, 1 with CLAY (20%),slightly moi (5.0 - 7.0) SAME AS ABOVE	I0YR 4/3, borwn, st , wet		GW	-	▼	so	elsw N	H02-003-SO-004 lote: Interval 4.0 - 5.0 FT	1.0-3.0 ft bgs Riser 2.0 in. Sch 40 PVC
- - 10-	4	60	(7.0 - 10.0) CLAY, medium pl 10YR 3/1, very dark gray, wit dry (10.0 - 20.0) CLAY, hard, 10 ^v gray, dry	lasticity, very stiff, h GRAVEL (30%), rR 3/1, very dark	0	CL						Filter Pack 20/30 Red Flint Sand 3.0-17.0 ft bgs
-	-	90	Si Gy, di y		0							
- 15 - -	- 5	100			0	CL						E End Cap
- 20			End of Borehole 20.0 ft bgs									Borehole collapse 17.0-20.0 ft bgs

		A	erostar SES		G -	M	W1	8F	PFC	0204	Site Name Drilling Com Drilling Meth Driller	: A pany : C lod : N : C	VFFF Area 2 Cascade Drilling /lini Sonic Dennis Schweisthal
	Ał	FF Af Pr	Areas (Omaha District) FFF Site Inspection oject# M2027.0003	Start Date End Date Northing Easting Surface Elev. (ft)*		05/0 05/0 6764 1241 3246	7/18 7/18 120.2 1833 3.39	28 .69			Logged By Borehole Dia Boring Comp Depth to Wa	: J ameter : 6 oletion : 2 M iter (ft) : 3	ustin Vojak 5.0 in. 9.0 in. PVC Monitoring Well 15.0
		Ells	worth Air Force Base	Total Depth (ft)**	: •	45.0	1				Signature	:	11- With
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	Water Levels	Measurements North American Vertical Patum (NAVD88) feet (ft) Below Ground Surface Ogs) feet (ft)	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SA	MPLE ID	Well: MW [.] Elev (TOC	18PFC0204 Հ): 3245.90 ✓── Flush Mount,12-in.diameter
-0 - -	• 1	100	(0.0 - 2.0) CLAY, low plastic 3/3, dark brown, with GRAVI graded, fine to coarse, sub-r slightly moist	y, soft, 10 YR L (20%), well bunded to round,		CL							Manhole - 8-in. skirt Pad - 2ft X 2ft X 4in
5-	2		(2.0 - 5.0) FAT CLAY, high p 10YR 3/3, with GRAVEL (20 fine to coarse, sub-rounded moist	lasticity, stiff, %), well graded, o round, slightly	0	сн							
-	3	80	(5.0 - 8.5) CLAY, low plastic 10YR 3/3, dark brown, with (well graded, fine to coarse, s round, slightly moist	y, medium to stiff, SRAVEL (40%), ub-rounded to	0	CL							
- 10-	4		(8.5 - 10) CLAY, medium pla 10YR 4/3, brown, mottled wi brownish gray, dry	sticity, very stiff, h 10YR 6/2, light		CL							
- - - 15-		100	10.0 - 29.0) FAT CLAY, nig 10YR 6/3, pale brown, slight	i piasticity, stiπ, y moist	0								- Grout 0.5-25.0 ft bgs Mix Used: Portland Cement (94 lb bag) Sodium Bentonite (~3 lbs) Water (~7 gallons)
- - - 20-	5	75			0	сн							
-		75			0								
25-		80			0							截	Bentonite Seal 1/4 in. Uncoated
30-	6	100	(29.0 - 30.3) CLAY, medium stiff, 10YR 4/3, brown, with 0 well graded, fine to coarse, s round, dry	plasticity, very RAVEL (30%), ub-rounded to	0	CL ML		-					Pellets 25.0-30.0 ft bgs — Filter Pack 20/30 Red Flint Sand 30.0-45.0 ft bgs
	8		(30.3 - 31.0) SILT, loose, 10 with GRAVEL (30%), well gr coarse, sub-rounded to roun	/R 4/3, brown, aded, fine to d, dry	0	CL							-

	AF	FFF AF Pro	Areas (Omaha District) FF Site Inspection oject# M2027.0003	Start Date End Date Northing Easting Surface Elev. (ft)* Total Depth (ft)**	G -	05/0 05/0 6764 1241 3246 45.0	7/18 7/18 120.2 1833 3.39	8P	FC	0204	Site Name Drilling Com Drilling Meth Driller Logged By Borehole Dia Boring Comp Depth to Wa Signature	pany od ameter oletion ter (ft)	: AFFF Area 2 : Cascade Drilling : Mini Sonic : Dennis Schweisthal : Justin Vojak : 6.0 in. : 2.0 in. PVC Monitoring Well : 35.0
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	Water Levels Turing Drilling DESCRI	Measurements *North American Vertical Datum (NAVD88) feet (ft) **Below Ground Surface (bgs) feet (ft) PTION	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SA	MPLE ID	Well:⊺ Elev (/ MW18PFC0204 TOC): 3245.90
33 —	8				10		111					I 🌆	
-	9	100	(33.5 - 35.0) SILT, loose, 1	0YR 6/3, pale	1	м				-	00.005.00.00		
- - 38—	10	80	brown, with GRAVEL (40% to coarse, sub-rounded to (35.0 - 38.5) CLAY, mediur 10YR 4/3, brown, with GR/ graded, fine to coarse, sub slightly moist), well graded, fine ound, dry n plasticity, stiff, \VEL (30%), well -rounded to round,	0	CL		•	SO	ELSWH No 3:	02-005-SO-034 te: Interval 3.0 - 34.0 ft		Riser 2.0 in Sch 40 PVC — Filter Pack 20/30 Red Flint Sand
-	11		(38.5 - 40.0) CLAY, low pla 10YR 4/3, brown, with GRA	sticity, very stiff, \VEL (30%), well]	CL							30.0-45.0 ft bgs
-	12		graded, fine to coarse, sub \dry	-rounded to round,	1	GC							Screen (10.0 ft)
-	13		(40.0 - 41.0) CLAYEY GRA	VEL, well graded,		sc	1]]						0.010 in. continuous wrap vee wire
43— - -	14	100	5/3, brown, wet (41.0 - 42.0) CLAYEY SAN to coarse, sub-rounded to brown, with GRAVEL (10% to medium, sub-rounded to	D, well graded, fine ound, 10YR 5/3,), well graded, fine round, wet	0	CL							End Cap
- - 48— -			(42.0 - 45.0) CLAY, low pla 10YR 4/1, dark gray, mottle light brownish gray and 10' yellow, dry End of Borehole 45.0 ft bgs	sticity, very stiff, ed with 10YR 6/2, /R 6/6 brownish									
- - 53 — -													
- 58 — - -													
63-													

	AF	A	erostar SES Areas (Omaha District)	BORING LO Start Date End Date	G -	• M 05/0 05/0	W1	8F	PFC	0205	Site Name Drilling Com Drilling Meth Driller Logged By Borehole Dia	pany od	: AFFF Area 2 : Cascade Drilling : Mini Sonic : Dennis Schweisthal : Justin Vojak : 6.0 in.
		AF Pre	FFF Site Inspection oject# M2027.0003	Northing Easting Surface Elev. (ft)*	:	6742 124 3227	249 1547 7.10	12 .02			Boring Com	oletion iter (ft)	: 2.0 in. PVC Monitoring Well : 24.5
	-	Ells\	worth Air Force Base	Total Depth (ft)**	:	35.0 T	1				Signature		· · · · · · · · · · · · · · · · · · ·
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	Water Levels M ▲ During Drilling * t D *** (k DESCRIP	easurements lorth American Vertical atum (NAVD88) feet (ft) Below Ground Surface gs) feet (ft)	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SA	MPLE ID	Well: N Elev (1	WW18PFC0205 TOC): 3226.71 — Flush Mount,12-in.diameter1
0-	1		(0.0 - 1.0) CLAY, medium pla	sticity, medium	Τ	СІ	11		SS	ELSWH	102-006-SS-001		Manhole - 8-in. skirt Pad - 2ft X 2ft X 4 in
-	2	100	stiff, 10YR 4/3, brown, slightly (1.0 - 5.0) FAT CLAY, high pl 10YR 6/3, pale brown, dry	noist asticity, stiff,	0	СН				Nc	ite: Interval 0.0 - 0.5 ft		
	3	80	(5.0 - 10.0) CLAY, low plastic 10YR 5/3, brown, with GRAV	ity, very stiff, EL (10%), dry	0	CL							Grout 0.4 - 15.0 ft bgs Mix Used: Portland Cement (94 lb bag Sodium Bentonite (-3 lbs) Water (-7 gallons)
10-	4		(10.0 - 10.5) CLAY, low plast	city, soft, 10YR		CL	11						
-	5	100	(10.5 - 15.0) SILTY SAND, w coarse, round, loose, 10YR 6 gray, with GRAVEL (40%), w coarse, sub-rounded to round	ell graded, fine to /2, light brownish ell graded, fine to , dry	0	SM							Riser 2.0 in Sch 40 PVC
		100			0							and the second se	
15- - - - -	6	80	(15.0 - 20.0) SILTY SAND, w coarse, loose, 10YR 6/3, pale GRAVEL (40%), well graded, sub-rounded to round, slightly	ell graded, fine to brown, with fine to coarse, moist	o	SM							- Bentonite Seal 1/4' Uncoated Pellets 15.0 - 20.0 ft bgs
20-	7		(20.0 - 24.5) FAT CLAY, high 10YR 5/4, yellowish brown, m	plasticity, soft, oist		СН							- Filter Pack 20/30 Red Flint Sand 20.0 - 35.0 ft bgs

	AF	FF AF	Areas (Omaha District) FF Site Inspection oject# M2027.0003	5	Start Date End Date Northing Easting Surface Elev. (ft)*	G -	• M 05/0 05/0 6742 1241 3227 35.0	1/18 1/18 1/18 249.1 1547 7.10	8F	PFC	:0205	Site Name Drilling Com Drilling Meth Driller Logged By Borehole Dia Boring Comp Depth to Wa Signature	pany od ameter oletion ter (ft)	: AF : Ca : Mir : De : Jus : 6.0 : 2.0 Mo : 24.	FF Area 2 scade Drilling ni Sonic nnis Schweisthal stin Vojak in. n. PVC nitoring Well
			Water Levels	Mea	surements	Γ			ŝ			olghatalo		·	7
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	During Drilling DESCR	*Norf Datu **Bel (bgs)	th American Vertical m (NAVD88) feet (ft) ow Ground Surface feet (ft)	PID (ppm)	USCS / LITHOLOG	Munsell Color	Depth to Water (DTV	SAMPLE TYPE	SA	MPLE ID	Well: N Elev (1	MW18 FOC):	PFC0205 3226.71
22-								//							
-	7	60				0	сн		•	so	ELSWH	02-006-SO-024 te: Interval			— Riser 2.0 in Sch 40 PVC
-	8		(24.5 - 25.0) CLAYEY SAN fine, round, loose, 10YR 5	ID, po /4, yel	oorly graded, Iowish brown,		SC	1			2:	3.0 – 24.0 ft			
-	9		with GRAVEL (20%), well coarse, sub-rounded to rou	grade und, w	d, fine to /et			1							
27 —	10	80	(25.0 - 26.0) CLAY, mediu 10YR 5/4 yellowish brown, (30%), slightly moist	m pla with (sticity, stiff, GRAVEL	0	CL							6. 6. 6. 6. 6. 6.	
-	11		(26.0 - 27.5) SANDY CLA very pale brown, with GRA graded, fine to coarse, sub	Ƴ, haro ∖VEL (bangul	d, 10YR 7/4, (40%), well lar to		GC						n (n c		— Filter Pack 20/30 Red Flint Sand 20.0 - 35.0 ft bgs
-	12 13		(27.5 - 29.4) CLAYEY GR/ fine to coarse, subangular	AVEL, to rou	well graded, ind, 10YR 5/4		GC								
-			0.4' SILTSTONE Lense fro	om 29.	.0 - 29.4									255	
32-		100	(29.4 - 31.0) CLAYEY GRA fine to coarse, subangular yellowish brown, wet	AVEL, to rou	well graded, ind, 10YR 5/4,			11							wrap vee wire Sch 40 PVC
-	14		(31.0 - 35.0) SANDY CLA 10YR 5/3, brown, with GR, graded, fine to coarse, sub wet	Ƴ, low AVEL ⊳-roun	plasticity, stiff, (30%), well ded to round,	0	CL								— End Cap
-			End of Borehole 35.0 ft bg	s				11							
-			-												
37-															
_															
_															
_															
-															
42-															

		A	erostar SES	BORING-	M	W1	8P	FC	:02	06	Site Name Drilling Com Drilling Meth Driller	pany od	: AFFF Area 2 : Cascade Drilling : Mini Sonic : Dennis Schweisthal
	AI	FFF AF Pr	Areas (Omaha District) FFF Site Inspection oject# M2027.0003	Start Date End Date Northing Easting Surface Elev. (ft)*		05/0 05/0 3757 1241 3234	3/18 3/18 723.7 1866 1.85	12 .27			Logged By Borehole Dia Boring Comp Depth to Wa	ameter detion ter (ft)	: Justin Vojak : 6.0 in. : 2.0 in. PVC Monitoring Well : 15.0
		Elis	Water Levels].].		S			Signature		- y vory
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY		North American Vertical Datum (NAVD88) feet (ft) Below Ground Surface ogs) feet (ft)	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Depth to Water (DTM	SAMPLE TYPE	SA	MPLE ID	Well: f Elev (*	MW18PFC0206 TOC): 3234.36 Elush Mount 12-in diameter
-0	1	100	(0.0 - 5.0) CLAY, medium pla 3/3, dark brown, with GRAVE graded, fine to coarse, sub-ro slightly moist	asticity, stiff, 10YR EL (15%), well bunded to round,		CL			SS	ELSW I No	102-007-SS-001 ote: Interval 0.0 - 0.5 ft		Manhole -8-in. skirt Pad - 2ft X 2ft X 4 in Grout 0.5 - 1.0 ft bgs Mix Used: Portland Cement (94 lb bag) Sodium Bentonite (~3 lbs)
5-			(5.0 - 14.0) FAT CLAY, high	plasticity, soft,	0								Water (~/ gallons) — Bentonite Seal 1/4 in Uncoated Pellets 15.0 - 20.0 ft bgs
-		25	10YR 3/3 dark brown, with G poorly graded, fine, sub-roun slightly moist	RAVEL (5%), ded to round,	0								2.0 in Sch 40 PVC
- 10	2				0	сн							
-		20	(14.0 - 15.0) SAND poorly g	raded fine round									- Filter Pack
15-	3		loose, 10YR 5/3, brown, with well graded, fine to coarse, s	GRAVEL (30%), ub-rounded to		SP		▾					20/30 Red Flint Sand 7.0 - 22.0 ft bgs
-	4		round, moist (15.0 -16.0) SAND, poorly gr	aded, fine, round,		SP							
-	5	100	loose, 10YR 5/3 brown, mois (16.0 - 19.0) SAND, well grad coarse, sub-rounded to roun 5/3, brown, with GRAVEL (40 fine to coarse, sub-rounded, moist	t ded, fine to d, loose, 10YR 0%), well graded, to round, slightly	0	sw							Screen (10.0 ft) 10.1 - 20.1 ft bgs 0.010 in. continuous wrap vee wire Sch 40 PVC
20-	6	100	(19.0 - 23.0) SILTY SAND, w coarse, sub-rounded to round brown, with GRAVEL (40%), to coarse, sub-rounded to rounded to r	ell graded, fine to d, 10YR 5/3, well graded, fine und, dry	0	sм							End Cap

		A	erostar SES	BORING-	M	₩1 05/0	1 8F)3/1	⊃F(8	C0	206	Site Name Drilling Com Drilling Meth Driller Logged By	: AFFF Area 2 1pany : Cascade Drilling hod : Mini Sonic : Dennis Schweisthal : Justin Vojak
	AI	FFF Af Pr Ells	Areas (Omaha District) FFF Site Inspection oject# M2027.0003 worth Air Force Base	End Date Northing Easting Surface Elev. (ft)* Total Depth (ft)**		05/0 675 124 323 35.0)3/1 723 186 4.85)	8 .12 6.27 5	,		Borehole Di Boring Com Depth to Wa Signature	ameter : 6.0 in. pletion : 2.0 in. PVC Monitoring Well ater (ft) : 15.0
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	Water Levels	Measurements North American Vertical Datum (NAVD88) feet (ft) *Below Ground Surface bgs) feet (ft)	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Depth to Water (DTW)		S/	AMPLE ID	Well: MW18PFC0206 Elev (TOC): 3234.36
- 22	6		(23.0 - 25.0) SILT, loose, 10 brown, with GRAVEL (25%), round, dry	YR 7/4 very pale subangular to		SN ML	1					
- 27-	8	100	(25.0 - 28.5) SILTY SAND, v coarse, sub-rounded, to roun brown, with GRAVEL (40%), to coarse, sub-rounded to ro	vell graded, fine to nd, 10YR 5/3 well graded, fine und, dry	0	SN	1					
	9		(28.5 - 30.0) CLAY, low plas 6/2 light brownish gray, mott gray and 10YR 6/6, brownish (30.0 - 32.0) CLAX low plac	ticity, stiff, 10YR led with 10YR 5/1, n yellow, dry		СГ						— Bentonite 1/4 in. chips 22.0 - 35.0 ft bgs
32-	10	-	10YR 4/1, dark gray, mottled brownish yellow, with GRAV graded, fine to coarse, sub-r dry	l with 10YR 6/6, EL (25%), well ounded to round,		СГ						
-	11	80	(32.0 - 35.0) CLAY, hard, 10 mottled with 10YR 6/6, brow	YR 4/1, dark gray, nish yellow, dry	0	CL						
-		1	End of Borehole 35.0 ft bgs		1	1						
37-	-											
-												
42-	-											

		A	erostar SES	Start Date	G -	M 05/0	W1	8F	PFC	0207	Site Name Drilling Com Drilling Meth Driller Logged By Borebole Dia	pany od	: AFFF Area 2 : Cascade Drilling : Mini Sonic : Dennis Schweisthal : Justin Vojak : 6.0 in
	AF	FF Af Pr	Areas (Omaha District) FFF Site Inspection oject# M2027.0003	Northing Easting Surface Elev. (ft)*	: (6744 1242 3222	2,10 2462 2,41	37 .51			Boring Com	oletion iter (ft)	: 2.0 in. PVC Monitoring Well : 26.0
		Ells	worth Air Force Base	I otal Depth (ft)**	::	35.0 T	-				Signature		1. 1/10/
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	Water Levels	Veasurements North American Vertical Datum (NAVD88) feet (ft) **Below Ground Surface (bgs) feet (ft) PTION	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SA	MPLE ID	Well: M Elev (T	1W18PFC0207 'OC): 3221.96
-0	1	100	(0.0 - 3.0) CLAY, medium plastiff, 10YR 4/3, brown, with 0 well graded, fine to coarse, s round, slightly moist	asticity, medium GRAVEL (20%), sub-rounded,		CL			SS	ELSW⊢ No (102-008-SS-001 te: Interval 0.0 - 0.5 ft		Plush Mount, 12-in, diameter Manhole - 8-in. skirt Pad - 2ft X 2ft X 4 in
	2	80	(3.0 - 9.0) CLAY, medium pl 5/3, brown, dry	asticity, stiff, 10YR	0	CL							Grout 0.5 - 15.0 ft bgs Mix Used: Portland Cement (94 lb bag) Sodium Bentonite (~3 lbs) Water (~7 gallons)
10-	• 3		(9.0 - 11.0) SAND, poorly gra loose, 10YR 4/3, brown, with well graded, fine to coarse, s round, slightly moist (11.0 - 14.0) SILTY SAND, v	aded, fine, round, n GRAVEL (20%), sub-rounded to vell graded, fine to	-	SP							Riser 2.0 in Sch 40 PVC
-	4	100	5/3, brown, with GRAVEL (4 fine to coarse, sub-rounded	0%) well graded, to round, dry	0	sм							
- 15-	5	100	(14.0 - 15.0) SILTY SAND, v coarse, sub-rounded to roun 8/3, very pale brown, with Gi well graded, fine to coarse, s	vell graded, fine to Id, loose, 10YR RAVEL (40%), sub-rounded, to	0	SM							
	6		(round, dry (15.0 - 20.0) SILTY SAND, v coarse, loose, 10YR 5/3, bro (45%), well graded, fine to c sub-rounded to round, slight	vell graded, fine to wn, with GRAVEL oarse, ly moist	0	SM							- Bentonite Seal 1/4 in Uncoated Pellets 16.0 - 21.0 ft bgs

	AF	FFF AF Pro	Areas (Omaha District) FF Site Inspection bject# M2027.0003	Suce BORING LO Start Date End Date Northing Easting Surface Elev. (ft)* Total Depth (ft)**	G -	M 05/0 05/0 3744 1242 3222 35.0	2/18 2/18 2/18 400.8 2462 2.41	8F	PFC	:0207	Site Name Drilling Com Drilling Meth Driller Logged By Borehole Di Boring Com Depth to Wa Signature	pany nod ameter pletion ater (ft)	: AFFF Area 2 : Cascade Drilling : Mini Sonic : Dennis Schweisthal : Justin Vojak : 6.0 in. : 2.0 in. PVC Monitoring Well : 26.0
			Water Levels	Measurements		۲ ۲		TW)			I		1
EPTH IN FEET (bgs)	TERVAL	RECOVERY		*North American Vertical Datum (NAVD88) feet (ft) **Below Ground Surface (bgs) feet (ft)	D (ppm)	SCS / LITHOLO	unsell Color	pth to Water (D	AMPLE TYPE	SA	AMPLE ID	Well: M Elev (1	MW18PFC0207 FOC): 3221.96
四 18-	Ξ	%	DESCR	IPTION	<u> </u> ≣	<u> </u> 9	ž	ð	୍ର ୬	1			201 1000004
-	6	80	(20.0 - 21.0) SILT, loose,	10YR 8/3, very pale		SM							— Bentonite Seal 1/4 in Uncoated Pellets 16.0 - 21.0 ft bgs
- - 23–	8	100	(21.0 - 24.0) SILTY SAND coarse, sub-rounded to ro 5/3, brown, with GRAVEL fine to coarse, sub-rounde hydrocarbon odor, dry	e, well graded, fine to und, loose, 10YR (45%), well graded, ed to round,	475	SM							Riser 2.0 in Sch 40 PVC
-	9		(24.0 - 25.0) SILTY GRAV to coarse, subangular to ro 8/3 very pale brown, dry	′EL, well graded, fine ound, loose, 10YR		GN		▼					
-	10		(25.0 - 26.0) SILTY SAND coarse, sub-round to roun brown, with GRAVEL (30% to coarse, sub-rounded to	y, well graded, fine to d, loose, 10YR 5/3, %), well graded, fine round, dry		SM							
- 28–	. 11	100	(26.0 - 31.5) CLAYEY GR fine to coarse, sub-rounde 3/2, very dark brown, hydr	AVEL, well graded, ed to round, 10YR ocarbon odor, wet	1823	GC							— Filter Pack 20/30 Red Flint Sand 21.0 - 35.0 ft bgs
- - 33-	12	100	(31.5 - 34.5) CLAY, very s brownish gray, mottled wit and 10YR 6/6, brownish y	tiff, 10YR 6/2 light h 10YR 4/1, gray ellow, dry	-	CL							Screen (10.0 ft) 24.2 - 34.2 ft bgs 0.010 in. continuous wrap vee wire Sch 40 PVC
	13		(34.5 - 35.0) CLAY, hard,	10YR 7/1, very dark	10	CL							End Cap
			End of Borehole 35.0 ft bg	IS								_	

	AF	A	erostar SES	Start Date End Date	G -	M 05/1 05/1	W1 7/18 7/18	8F	PFC	0301	Site Name Drilling Com Drilling Meth Driller Logged By Borehole Dia	pany od ameter	: AFFF Area 3 : Cascade Drilling : Mini Sonic : Dennis Schweisthal : Justin Vojak : 6.0 in.	
		AF Pr	FFF Site Inspection oject# M2027.0003	Northing Easting	:	6686 1246	683.3 6302	38 .67			Boring Com	bletion	: 2.0 in. PVC Monitoring Well	
	1	Ells	worth Air Force Base	Total Depth (ft)**	::	20.0	1.59				Depth to Wa Signature	ter (ft)	10.0	
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	Water Levels M During Drilling *N Da *** (b DESCRIPT	easurements orth American Vertical trum (NAVD88) feet (ft) Below Ground Surface gs) feet (ft)	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SA	MPLE ID	Well: I Elev (MW18PFC0301 TOC): 3179.30	
0	· 1	40	(0.0 - 10.0) FAT CLAY, high p 10YR 3/3, dark brown, with G well graded, fine to medium, s round, moist	lasticity, stiff, RAVEL (30%), ub-rounded to	0	СН			so	ELSWH	103-001-SO-009		Flush Mount, 12-in. diameter Manhole - 8-in. skirt Pad - 2ft X 2ft X 4 in Grout 0.3 - 1.0 ft bgs Mix Used: Portland Cement (94 lb bag) Sodium Bentonite (~3 lbs) Water (~7 gallons) Bentonite Seal 1/4 in Uncoated Pellets 1.0 - 5.0 ft bgs Riser 2.0 in Sch 40 PVC	
10-	2		(10.0 - 12.0) FAT CLAY, high 10YR 5/4, yellowish brown, w (10%), well graded, fine to me sub-rounded to round, wet	plasticity, soft, th GRAVEL dium,		сн		▼		Nc S	ite: Interval 9.0 - 10.0 ft			
	3	80	(12.0 - 13.0) CLAYEY GRAVE fine to coarse, sub-rounded to 5/3, brown, wet (13.0 - 20.0) CLAY, low plasti 10YR 4/1, darkgray, mottled v light brownish gray and trace brownished yellow, dry	EL, well graded, round, 10YR bity, very stiff, rith 10YR 6/2, 10YR 6/6,	2	GC							Filter Pack 20/30 Red Flint Sand 5.0 - 20.0 ft bgs	
-	4	65			0	CL							9.0-19.0 fb dgs 0.010 in. continuous wrap vee wire Sch 40 PVC	
20-		1	End of borehole 20.0 ft bgs		1	I		I	1	I				
		A	erostar SES.	BORING LO	G - :	• M 05/0	W1)6/18	8F	PFC	:0302	Site Name Drilling Com Drilling Meth Driller Logged By	pany od	: AFFF : Casca : Mini S : Denni : Justin	Area 3 ade Drilling Sonic is Schweisthal i Vojak
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	AF	FF AF	Areas (Omaha District) FFF Site Inspection	End Date Northing	:	05/0 6686 1246)6/18 607.2 6345	.7 85			Borehole Dia Boring Comp	ameter detion	: 6.0 in : 2.0 in Monit	. PVC oring We ll
		Pr Ells	oject# M2027.0003 worth Air Force Base	Surface Elev. (ft)* Total Depth (ft)**	:	3179 20.0	9.66)	.00			Depth to Wa Signature	ter (ft)	: 12.0	Man
			Water Levels M	easurements		2		TW)					/	
PTH IN FEET (bgs)	ERVAL	RECOVERY	During Drilling *N Da	orth American Vertical atum (NAVD88) feet (ft) Below Ground Surface gs) feet (ft)	(mdd)	CS / LITHOLO	nsell Color	oth to Water (D	MPLE TYPE	SA	MPLE ID	Well: M Elev (1	MW18PF0 FOC): 317	00302 9.32
	Ľ	Ч %	DESCRIPT	ION		NS N	Mur	Dep	SAN			_		Flush Mount,12-in. diameter Manhole - 8-in. skirt
-0 - - - -	1	100	(0.0 - 5.0) GRAVEL FILL, loos sub-angular to round, well gra 5/2, grayish brown	e, fine to coarse, ded, dry, 10 YR,	0	GP								Viannoie - 8-in. Skirt Pad - 2ft X 2ft X 4in Grout J.4 - 1.0 ft bgs Wix Used: Portland Cement (94 lb bag) Sodium Bentonite (~3 lbs) Water (~7 gallons) Bentonite Seal 1/4 in Uncoated Pellets 10 - 5.0 ft bos
5	2	90	(5.0 - 12.0) FAT CLAY, high p 10YR 7/4, very pale brown, sl	lasticity, stiff, ghtly moist	0	сн								1.0 - 5.0 π bgs Riser 2.0 in Sch 40 PVC
- 10			(42.0. 12.0) CLAY, Jaw Plant					▼	so	ELSWH No 1	103-002-SO-012 te: Interval 1.0 - 12.0 ft			Filter Pack
-	3	100	4/3, brown, with GRAVEL (20 fine to coarse, su -round to ro (13.0 - 15.0) CLAYEY SAND, loose, 10YR 4/3 brown, with 0 well graded, fine to coarse, su	well graded, fine, With well graded, fine, Well graded, fine, WAVEL (20%), b-rounded to	41	CL SC								20/30 Red Flint Sand 5.0 - 20.0 ft bgs
15-	5		round, wet (15.0 - 17.0) SAND, well grad 10YR4/3, brown, wet	ed, fine, loose,	-	SP								Screen (10.0 ft) 9.6 - 19.6 ft bgs 9.010 in.continuous
-	6 7		(17.0 - 17.5) CLAY, medium p strong odor, 10YR 4/3, brown (35%), well graded, fine to coa sub-rounded to round, wet	lasticity, stiff, , with GRAVEL arse,	0	CL GV	V						5	Sch 40 PVC
20-	8		(17.5 - 17.8) GRAVEL, well gr coarse, sub-rounded to round 5/3, brown, wet	aded, fine to , loose, 10YR		CL								End Cap
20			(17.8 - 20.0) CLAY, stiff, 10YF brownish gray, mottled with 10 gray, dry	R 6/2, light DYR 4/1, dark										
			End of borehole 20.0 ft bgs											

		A	erostar SES	BORING LO Start Date	G - :	• M	W1	8F	PFC	0303	Site Name Drilling Com Drilling Meth Driller Logged By	: AF pany : Ca od : Mi : De : Ju	FFF Area 3 ascade Drilling ini Sonic ennis Schweisthal istin Vojak
	Ał	FF Af Pr Ells	Areas (Omaha District) FFF Site Inspection oject# M2027.0003 worth Air Force Base	End Date Northing Easting Surface Elev. (ft)* Total Depth (ft)**		05/0 6686 1246 3180 20.0	6/18 631.0 6273 0.137)55 .021 7			Borehole Dia Boring Comp Depth to Wa Signature	ameter : 6.0 bletion : 2.0 Mi ter (ft) : 12 :	0 in. 0 in. PVC onitoring We ll 2.0
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	Water Levels	Measurements *North American Vertical Datum (NAVD88) feet (ft) **Below Ground Surface (bgs) feet (ft) PTION	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SA	MPLE ID	Well: MW18 Elev (TOC)	BPFC0303 : 3179.65 — Flush Mount 12 in, diameter
0	1		(0.0 - 2.0) SILT, loose, 10YF slightly moist	R 4/3, brown,		ML	-						Manhole - 8-in. skirt Pad - 2ft X 2ft X 4 in Grout 0.5 - 1.0 ft bgs Mix Used: Portland Cement
-	2	100	(2.0 - 3.5) CLAY, medium pl 10YR 4/3 brown, with GRAV graded, fine to coarse, sub- dry (3.5 - 5.0) CLAY, hard, 10YI	lasticity, very stiff, /EL (30%), well rounded to round, 	13	CL							(94 lb bag) Sodium Bentonite (~3 lbs) Water (~7 gallons) — Bentonite Seal
5-	3		(5.0 - 9.0) CLAYEY SAND, pround loose, 10YR 4/3, brow	e, dry poorly graded, fine, vn, dry	-	CL							1/4 in Uncoated Pellets 1.0 - 5.0 ft bgs Riser 2.0 in Sch 40 PVC
-	4	55			10	sc							
10-	5		(9.0 - 10.0) CLAY, low plast 10YR 5/3, brown, with GRA' graded, fine to coarse, sub- dry	icity, very stiff, VEL (30%), well rounded to round,		CL							
-	6	65	(10.0 - 12.0) SILT, loose, 10 brown, dry (12.0 - 14.0) GRAVEL, well coarse, sub-rounded to rour	OYR 6/3, pale graded, fine to nd, loose, 10YR		ML		¥	so	ELSWH No 1 ⁷	03-003-SO-012 te: Interval 1.0 - 12.0 ft		— Filter Pack 20/30 Red Flint Sand 5.0 - 20.0 ft bas
-	7		4/3, brown, wet (14.0 - 20.0) CLAY, low plas	sticity, hard, 10YR	75	GW							Ĵ
15 — - -	8	95	4/1, dark gray, trace 10YR 6 yellow, dry	/6 brownish	10	CL							Screen (10.0 ft) 9.0 - 19.0 ft bgs 0.010 in. continuous wrap vee wire Sch 40 PVC
- 20—			End of Borehole 20.0 ft bgs										— End Cap

	AF	FF Af Pr Ells	Areas (Omaha District) FFF Site Inspection oject# M2027.0003 worth Air Force Base	Start Date End Date Northing Easting Surface Elev. (ft)* Total Depth (ft)**	: 5/(: 5/(: 66 : 12 : 31 : 15	SB 07/18 07/18 8696 4623 82.6	18 3 3 5.14 37.6 8	PF	C0	304	Site Name Drilling Compan Driller Borehole Diame Boring Completi Abandonment D DTW During Dril Logged by: Signature:	: AFFF Area 3 y : Cascade Drilling : Mini Sonic : Dennis Schweisthal ter : 6.0 on : Abandoned w/ Grout ate : 05/07/18 ling (ft) 12.0 : Justin Vojak
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	Water Levels	Aeasurements North American Vertical Datum (NAVD88) feet) *Below Ground Surface bgs) feet TION	PID (ppm)	USCS	Munsell Soil Color	Depth to Water (DTW)	SAMPLE TYPE		SAMPLE ID	REMARKS
-0-	1	100	(0.0 - 1.0) SILT, soft, non-pla 4/3, brown, (1.0-5.0) GRAVEL FILL	stic, dry, 10 YR,	0	ML GW			SS	ELS	SWH-03-004-SS-001 Note: Interval 0.0 - 1.0 ft	Borehole
5	2	50	(5.0-6.0) LEAN CLAY, low pla slightly moist, 10 YR, 3/3, dar (6.0-8.0) LEAN CLAY, mediu dry, 10 YR, 4/2, dark grayish (8.0-10.0) LEAN CLAY, medi dry, 10 YR, 4/3, brown, mottle white	asticity, soft, k brown m plasticity, stiff, brown um plasticity, stiff, ed, 10 YR, 8/1,	0	CL CL						
10- - - - -	3	90	(10.0-11.0) SILT with GRAVE dry, Gravel: (15%), fine to co- round (11.0-12.0) CLAY with GRAV plasticity, medium stiff, slight brown, Gravel: (15%), fine to to round (12.0-14.0) CLAYEY GRAVE coarse, sub-round to round, v to wet, 10 Yr, 4/3, brown (14.0-15.0) CLAY with GRAV plasticity, medium stiff, moist Gravel: (35%), fine to coarse	EL, soft, non-plastic, arse, sub-round to EL, medium y moist, 10 YR, 5/3, coarse, sub-round L, loose, fine to vell graded, dampt EL, medium , 10 YR, 5/3, brown, , sub-round to	0	ML CL GC		V	so	ELS	WH-03-004-SO-011 Note: Interval 11.0 - 12.0 ft	
15-			Total Depth of Boring 15.0 ft	BGS		1		1	1	1		

AFFF Areas (Omaha District) AFFF Site Inspection Project# M2027.0003 Start Date : 05/22/18 Logged By Borehole Diamete Boring Completion Ellsworth Air Force Base Surface Elev. (ft)* : 3212.00 Depth to Water (ft Signature Water Levels Measurements *000000000000000000000000000000000000	: Cascade Drilling : Mini Sonic : Dennis Schweisthal
Ellsworth Air Force Base Total Depth (ft)** : 35.0 Signature Image: Signature Water Levels Measurements	: Justin Vojak er : 6.0 in. n : 2.0 in. PVC Monitoring Well t) : 30.0
Ling Water Levels Measurements Model asurements Measurements Model asurements Model asurements	1 Man
0 (0.0 - 10) CLAY, medium plasticity, stiff, 10YR 4/3, brown, with GRAVEL (30%), well graded, fine to coarse, subangular to round, slightly moist ELSWH04-001-SS-001 Note: Interval 0.0 - 0.5 ft	ell: MW18PFC0401 ev (TOC): 3211.63
	Grout: 0.4 - 14.0 ft bgs Mix Used: Portland Cement (94 lb bag) Sodium Bentonite (~3 lbs) Water (~7 gallons)
10 (10.0 - 15.0) SILTY SAND, well graded, fine to coarse, sub-round to round, loose, 10YR 5/3, brown, with GRAVEL (40%), well graded, fine to coarse, sub-round to round, slightly moist 2 80 0 SM 15 0	Riser 2.0 in. Sch 40 PVC
3 (15.0 - 15.5) CLAY, low plasticity, stiff, 10YR 5/3, brown, trace mottling with 10YR 4/1, dark gray, with GRAVEL (30%), well graded, fine to 4 4 5 5 6 6 5/3, brown, trace mottling with 10YR 4/1, dark 6	— Bentonite Seal 1/4 in. Uncoated Pellets 14.0 - 19.0 ft bgs

	AF	FFF AF	Areas (Omaha District) FF Site Inspection oject# M2027.0003	5	Start Date End Date Northing Easting Surface Eley, (ft)*	G -	05/22 05/22 05/22 1243 3212	2/18 2/18 2/18 572.7 8823	8F	PFC	0401	Site Name Drilling Com Drilling Meth Driller Logged By Borehole Dia Boring Com	pany iod ameter pletion	: AFF : Caso : Mini : Deni : Justi : 6.0 ii : 2.0 ii Mon : 30.0	F Area 4 cade Drilling Sonic nis Schweisthal n Vojak n. n. PVC itoring Well
		Ells	worth Air Force Base		Total Depth (ft)**	::	35.0	1				Signature		:	11- May
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	Water Levels During Drilling DESCR	Mea *Nor Datu **Be (bgs	surements th American Vertical m (NAVD88) feet (ft) low Ground Surface feet (ft)	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SA	MPLE ID	Well: N Elev (1	ИW18РF ГОС): 32	-CO401 211.63
19—	6	80					sм								
-	7	90	(20.0 - 24.0) CLAY, low pl dark gray, mottled with 10 brownish gray and 10YR 6 slightly moist	asticit YR 6/ź δ/6, br	y, 10YR 4/1, 2, light ownish yellow,	0	CL							的现在分词 化化化化化化化化化化化化	- Riser 2.0 in. Sch 40 PVC
24-	8		(24.0 - 24.2) GRAVEL, 10	YR5/1	, gray, slightly		GC								
-	9		(24.2 - 25.5) CLAY, low pl	asticit	/ y, 10YR 4/1,		CL								
_	10		brownish gray and 10YR 6	9R 6/2 6/6, br	2, light ownish yellow,		GC						2014 2014 2014		
- - 29-	11	100	(25.5 - 26.5) CLAYEY GR. fine to medium, sub-round 10YR 5/3, brown, with trac (26.5 - 30.0) CLAY, low pl 10YR 4/1, dark gray, mottl light brownish gray with tra brownish yellow, dry	AVEL led to ce san asticit led wit ace 10	well graded, rounded, loose, d, dry y, very stiff, th 10YR 6/2, IYR 6/6,	ο	CL			so	ELSWH	04-001-SO-029 te: Interval		a ta	- Filter Pack 20/30 Standard Sand Silica Sand 19.0 - 35.0 ft bgs
-	12		(30.0 - 31.0) CLAYEY GR		well graded,		GC				29	9.0 – 30.0 ft			
	13	100	(31.0 - 35.0) CLAY, low pl 10YR 4/1 dark gray, with t 6/2, light brownish gray ar brownish yellow, dry	asticit race n d 10Y	/, dark gray, // //////////////////////////////////	o	CL								- Screen (10.0 ft) 24.3 - 34.3 ft bgs 0.010 in. continuous wrap vee wire Sch 40 PVC
		-	End of borehole 35.0 ft bg	S											

	AF	FF AF	Areas (Omaha District) FF Site Inspection oject# M2027.0003	Start Date End Date Northing Easting	G -	05/1 05/1 6724	W1 8/18 8/18 406.{ 3939	8F	PFC	:0402	Site Name Drilling Com Drilling Meth Driller Logged By Borehole Dia Boring Com	pany od ameter oletion	: AFFF Area 4 : Cascade Drilling : Mini Sonic : Dennis Schweisthal : Justin Vojak : 6.0 in. : 2.0 in. PVC Monitoring Well
		Ellsv	worth Air Force Base	Surface Elev. (ft)* Total Depth (ft)**	: :	3213 45.0	3.35				Depth to Wa Signature	ter (ft)	36.0
			Water Levels M	easurements		75		TW)					
TH IN FEET (bgs)	ERVAL	ECOVERY	✓ During Drilling *N Da **E (bg	orth American Vertical tum (NAVD88) feet (ft) Below Ground Surface gs) feet (ft)	(mdd)	SS / LITHOLOG	isell Color	th to Water (D	APLE TYPE	SA	MPLE ID	Well: M Elev (T	1W18PFC0402 'OC): 3212.98
DEF	E Z	Я %	DESCRIPT	ION	E	ns	Mur	Dep	SAN				✓── Flush Mount,12-in.diameter
-0 	1	100	(0.0 - 5.0) CLAY, medium plas 3/3, dark brown, with GRAVEI graded, fine to medium, sub-re slightly moist	ticity, stiff, 10YR . (20%), well bunded to round,	0	CL			SS	ELSWH No	104-002-SS-001 ote: Interval 0.0 - 0.5 ft		Manhole - 8-in. skirt Pad - 2ft X 2ft X 4 in.
5-	2	0	(5.0 - 10.0) NO RECOVERY -	rock in drill bit	0								Grout: 0.4 - 24.0 ft bgs Mix Lead:
- 10	3	100	(10.0 - 13.0) CLAY, low plastic 4/3, brown, dry (13.0 - 18.0) SILT SAND, well coarse, sub-rounded to round	ity, stiff, 10YR graded, fine to loose, 10YR	0	CL		-					Portland Cement (94 lb bag) Sodium Bentonite (~3 lbs) Water (~7 gallons)
15_			5/3, brown, with GRAVEL (30 fine to coarse, sub-rounded to	%), well graded, round, dry									
-	4	70			0	SM							Riser 2.0 in. Sch 40 PVC
-	5	ĺ	(18.0 - 19.0) SILT, loose, 10Y GRAVEL, well graded, fine to	R 2/2, with coarse.		МL							
-	6		subangular to sub-rounde, dry (19.0 - 20.0) CLAY low plastic		1	CL							
- 20	7	• 70	4/3, brown, with GRAVEL (40° fine to coarse, sub-rounded to (20.0 - 22.5) CLAYEY SAND, to coarse, sub-rounded to rou 5/3, brown, with GRAVEL (35° fine to coarse, sub-rounded to	%), well graded, round, dry well graded, fine nd, loose, 10YR %), well graded, round, dry		sc							
25-	8		(22.5 - 36.0) CLAY, low plastic 10YR 4/1, dark gray, mottled v light brownish gray and 10YR yellow, dry	ity, very stiff, vith 10YR 6/2, 6/6, brownish	0	CL							Bentonite Seal 1/4 in. Uncoated Pellets 24.0 - 29.0 ft bgs



	AF	FFF . AF Pro	Areas (Omaha District) FF Site Inspection oject# M2027.0003	Start Date End Date Northing Easting Surface Elev. (ft)* Total Depth (ft)**	G -	05/1 05/2 6723 1243 3210 50.0	8/18 2/18 345.0 3863 0.94	8F	PFC	:0403	Site Name Drilling Com Driller Logged By Borehole Di Boring Com Depth to Wa Signature	: AFFF Area 4 npany : Cascade Drilling hod : Mini Sonic : Dennis Schweisthal : Justin Vojak iameter : 6.0 in. npletion : 2.0 in. PVC Monitoring Well ater (ft) : 28.0
DEPTH IN FEET (bgs)	NTERVAL	% RECOVERY	Water Levels M ▲ During Drilling * C * (DESCRIP	leasurements North American Vertical latum (NAVD88) feet (ft) Below Ground Surface ogs) feet (ft)	PID (ppm)	JSCS / LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SA	MPLE ID	Well: MW18PFC0403 Elev (TOC): 3210.55
 - - -	1	100	(0.0 - 4.0) CLAY, medium pla 4/3, brown, with GRAVEL (15 fine to coarse, sub-rounded to moist	sticity, stiff, 10YR %), well graded, o round, slightly	0	CL			SS	ELSWH	104–003–SS-001 te: Interval 0.0 - 0.5 ft	Flush Mount, 12-in, diameter Manhole - 8-in. skirt Pad - 2ft X 2ft X 4 in.
- 5 -	2	90	(4.0 - 5.0) CLAY, low plastici 10YR 5/3 brown, mottled with dry (5.0 - 7.0) CLAY, low plastici brown, dry (7.0 - 8.5) CLAY, low plastici	y, very stiff, 10YR 8/1, white, y, stiff, 10YR 4/3, y, medium stiff,	0	CL						0.4 - 14.0 ft bgs Mix Used: Portland Cement (94 lb bag) Sodium Bentonite (~3 lbs) Water (~7 gallons)
- - 10—	5		10YR 5/3, brown, dry (8.5 - 10.0) CLAY, medium p 10YR 4/3, brown, dry	asticity, very stiff,		CL						
-	6	100	(10.0 - 14.0) CLAY, medium 10YR 5/3, brown, mottled wit white, with GRAVEL (15%), v to medium, sub-rounded to r	olasticity, sitff, h 10YR 8/1, vell graded, fine bund, dry	0	CL						
- 15 – -	7		(14.0 - 15.0) CLAY, medium 10YR 6/3, pale brown, dry (15.0 - 23.5) FAT CLAY, high stiff, 10YR 6/3, pale brown, s	plasticity, stiff, plasticity, medium lightly moist		CL						Riser 2.0 in. Sch 40 PVC Bentonite Seal 1/4 in. Uncoated Pellets 14.0 - 19.0 ft bgs
- - 20 – -	8	60				сн						
- - 25 –	9 10	100	(23.5 - 24.0) FAT CLAY, high stiff, 10YR 6/3, pale brown, v slighty moist (24.0 - 25.0) CLAY, low plast 10YR 4/1, dark gray, mottled	plasticity, medium ith trace gravels, icity, very stiff, with 10YR 6/2,	0	CH CL CL						Screen (15.0 ft) 24.0 - 39.0 ft bgs 0.010 in. continuous wrap vee wire
- - - 30-	11		light brownish gray and trace brownish yellow, dry (25.0 - 26.0) CLAY, medium stiff, 10YR 4/1, dark gray, mo 6/2, light brownish gray and with GRAVEL (15%), well gra coarse, sub-rounded to roun	10YR 6/6, olasticity, very ttled with 10YR 0YR 5/3, brown, ided, fine to d, dry	0	CL		▼	SO	ELSWH No 2	104-003-SO-028 te: Interval 7.0 - 28.0 ft	Sch 40 PVC — Filter Pack 20/30 Standard Sand Silica Sand 19.0 - 40.0 ft bgs

	AI	A FFF Af Pr	Areas (Omaha District) FF Site Inspection oject# M2027.0003	5	BORING LO Start Date End Date Northing Easting	G -	- M 05/1 05/2 6723 1243	8/18 2/18 345.0	8F	PFC	20403	Site Name Drilling Com Drilling Meth Driller Logged By Borehole Dia Boring Com	pany iod ameter oletion	: AFFF Area 4 : Cascade Drilling : Mini Sonic : Dennis Schweisthal : Justin Vojak : 6.0 in. : 2.0 in. PVC Monitoring Well
		Ells	worth Air Force Base		Surface Elev. (ft)' Total Depth (ft)**	* :	3210 50.0).94)				Depth to Wa Signature	iter (ft)	28.0
			Water Levels	Mea	asurements		۲		Ñ					/
TH IN FEET (bgs)	ERVAL	ECOVERY	▼ During Drilling	*Nor Datu **Be (bgs	th American Vertical ım (NAVD88) feet (ft) low Ground Surface) feet (ft)	(mqq)		isell Color	th to Water (D ¹		S/	AMPLE ID	Well: Elev (MW18PFC0403 (TOC): 3210.55
DEF	I	% R	DESCR	IPTI(NC	DI	Insc	Mun	Dep	SAN				
30-	12	4	(20.5	4' - '4		-								
			10YR 4/1, dark brown, mot brown, wet	ttled v	y, very stiπ, with 10YR 5/3,			1						
	- 14	100	(31.0-35.0) CLAY, low plas 10YR 4/1, dark gray, moth light brownish gray with tra brownish yellow, wet	sticity ed wi ice 10	, very stiff, th 10YR 6/2, 0YR 6/6,	0	CL							 Screen (15.0 ft) 24.0 - 39.0 ft bgs 0.010 in. continuous wrap vee wire Sch 40 PVC
- 35	15		(35.0 - 38.0) CLAY, low pla 10YR 3/1, bery dark gray,	asticit dry	y, very stiff,	0	CL							— Filter Pack
- 40-	- 16	100	(38.0 - 40.0) CLAY, low pla 10YR 4/1, dark gray, mottl light brownish gray and tra brownish yellow, dry	asticit ed wi ce 10	y, very stiff, th 10YR 6/2, IYR 6/6,		СГ							20/30 Standard Sand Silica Sand 19.0 - 40.0 ft bgs End Cap
- - -	17		(40.0 - 45.0) CLAY, low pla 3/1, very dark gray, dry	asticit	y, hard, 10YR	0	CL							
45 -	-	100	(45.0 - 50.0) CLAY, low pla 3/1, very dark gray, with tra 6/2, light brownish gray, dr	asticit ace m y	y, hard, 10YR nottling 10YR	-								— Borehole collapse 40.0 - 50.0 ft bgs
-	18					0	CL							
50-	<u> </u>		End of Borehole 50.0 ft ba	s				11						
-	-			-										
55-	-													

		A	erostar SES	BORING LOG	; -	SB 18/18	18	PF	CO	404	Site Name Drilling Compan Drilling Method Driller Borehole Diame	: AFFF Area 4 y : Cascade Drilling : Mini Sonic : Dennis Schweisthal ter : 6.0
	AF	FF AF Pro Ellsv	Areas (Omaha District) FFF Site Inspection oject# M2027.0003 worth Air Force Base	End Date Northing Easting Surface Elev. (ft)* Total Depth (ft)**	: 5/ : 67 : 12 : 32 : 35	18/18 243 4388 12.5	3 1.41 34.0 0	8			Boring Completi Abandonment D DTW During Dril Logged by: Signature:	on : Abandoned w/ Grout ate : 05/18/18 ling (ft) 32.0 : Justin Vojak :
IEPTH IN FEET (bgs)	NTERVAL	S RECOVERY	Water Levels During Drilling	Measurements *North American Vertical Datum (NAVD88) feet **Below Ground Surface (bgs) feet	(ID (ppm)	ISCS	lunsell Soil Color	epth to Water (DTW)	AMPLE TYPE		SAMPLE ID	REMARKS
 	1	100	(0.0 - 5.0) CLAY with GRAV stiff, very slightly moist, 10 Gravel: (15%), fine to mediu round	EL, low plasticity, (R, 4/3, brown, m, sub-round to	0	CL			0			Borehole
- - 5-			(5.0-7.5) LEAN CLAY, low p 10 YR, 5/3, brown	lasticity, stiff, dry,	0							
-	2	80	(7.5-10.0) LEAN CLAY, med stiff, very slightly moist, 10 Y mottled, 10 YR, 8/1, white	ium plasticity, very R, 4/3, brown,		CL						
10-			(10.0-12.0) FAT CLAY, high stiff, very slightly moist, 10 Y	plasticity, medium R, 6/3, pale brown	0	сн						
- - 15-	3	60	(12.0-16.0) SILTY SAND wit fine to coarse, sub-round to dry, 10 YR, 5/3, brown, Grav coarse, sub-round to round	h GRAVEL, loose, round, well graded, el: (40%), fine to	0	SM						
- - -	4	80	(16.0-17.0) CLAY with GRAV plasticity, medium stiff, very YR, 6/3, pale brown, Gravel: medium, sub-round to round (17.0-22.0) SILTY SAND wit fine to coarse, sub-round to dry, 10 YR, 5/3, brown, Grav	/EL, medium slightly moist, 10 (15%), fine to h GRAVEL, loose, round, well graded, rel: (40%), fine to		CL						
20-	5		coarse, sub-round to round		0	SM						

	AF	FF AF Pr	Areas (Omaha District) FF Site Inspection bject# M2027.0003	Luc	BORING LOG Start Dat End Date Northing Easting Surface Elev. (ft)* Total Depth (ft)**	: 5/ ⁻ : 5/ ⁻ : 67 : 12 : 32 : 35	SB 18/18 243 2432 4388 12.5	18 3 1.41 34.03 0	PF 8	CO	9404	Site Name Drilling Compan Drilling Method Driller Borehole Diame Boring Completi Abandonment D DTW During Dril Logged by: Signature:	: AFFF Area 4 y : Cascade Drilling : Mini Sonic : Dennis Schweisthal ter : 6.0 on : Abandoned w/ Grout late : 05/18/18 lling (ft) 32.0 : Justin Vojak
			Water Levels	Mea	asurements				TW)			I	
EET		ž	▲ During Drilling	*Nor Datu	th American Vertical um (NAVD88) feet			Color	ter (D ⁻	Щ			
H IN F	SVAL	COVE		**Be (bgs	low Ground Surface) feet	(mq		ell Soil	to Wa	LE TY		SAMPLE ID	
DEPT (b	INTEF	% RE(DESCR	IPTI	ON	pID (p	nscs	Munse	Depth	SAMP			REMARKS
22-	5	80	(22.0-24.0) CLAY with GR/ plasticity, medium stiff, dry, 10 YR, 5/3, brown, Gravel: coarse, sub-round to round	AVEL 10 Y (35%	, medium 'R, 5/3, brown,)), fine to		CL						
-			(24.0-32.0) LEAN CLAY, Io stiff, dry, 10 YR, 4/1, dark g	ow pla gray, i	sticity, very mottled, 10 YR,				1 1 1				
27-	6	80	6/2, light brownish gray, an brownish yellow	d trad	ce 10 YR, 6/6,	0	CL						
-						0							
-										so	ELS	SWH-04-004-SO-031 Note: Interval	
32-	7	100	(32.0-32.5) GRAVEL, loose sub-round to round, well gr 5/3, brown,	e, fine aded	e to coarse, , wet, 10 YR,		GW					31.0 - 32.0 ft	
-	-		stiff, dry, 10 YR, 4/1, dark g 6/2, light brownish gray, 10 yellow	gray, i YR,	mottled, 10 YR, 6/6, brownish		CL						
			Total Depth of Boring 35.0	ft BG	S								
37-													
-													
42-													

	AF	FF Af Pr	Areas (Omaha District) FF Site Inspection oject# M2027.0003	LLC	BORING LOC Start Date End Date Northing Easting Surface Elev. (ft)*	: 5/ : 5/ : 67 : 12 : 32	SB 18/1 18/1 2252 2437 212.0	8 8 8 8.09 22.0	PF	CO	9405	Site Name Drilling Compan Drilling Method Driller Borehole Diame Boring Completi Abandonment D DTW During Dril Logged by:	: AFFF Area 4 y : Cascade Drilling : Mini Sonic : Dennis Schweisthal ter : 6.0 on : Abandoned w/ Grout ate : 05/22/18 ling (ft) 21.0 : Justin Vojak
	-	Ells	worth Air Force Base		Total Depth (ft)**	: 25	5.0 T	-			1	Signature:	· H. Mag
EPTH IN FEET (bgs)	TERVAL	RECOVERY	Water Levels	Me *No Dat **Be (bg:	asurements rth American Vertical um (NAVD88) feet elow Ground Surface s) feet	D (ppm)	scs	unsell Soil Color	pth to Water (DTW)	MPLE TYPE		SAMPLE ID	REMARKS
	Ľ	%	DESCRI	РП		ШШ	S S	Σ	De	SA			
- U - - -	1	100	(0.0 - 2.0) LEAN CLAY, med medium stiff, slightly moist, brown (2.0 - 10.0) LEAN CLAY, low stiff, dry, 10 YR, 4/3, brown, 8/1, white	dium 10 N w pla , mo	n plasticity, /R, 3/3, dark asticity, very ttled, 10 YR,	0	CL						Borehole
5-						0							
-	2	80	(7.5 - 10.0) LEAN CLAY, mo stiff, very slightly moist, 10 \ mottled, 10 YR, 8/1, white	ediu YR, ⁄	m plasticity, very 4/3, brown,		CL						
10-			(10.0 - 11.5) CLAYEY SANI grained, round, poorly grade yellowish brown	D, l o ed, c	ose, fine Iry, 10 YR, 5/4,		sc	11					
15-	3	75	(11.5 - 19.0) SILTY SAND v fine to coarse, sub-round to dry, 10 YR, 6/2, light browni (40%), fine to coarse, sub-r	vith rou ish g ound	GRAVEL, loose, nd, well graded, jray, Gravel: d to round	0	SM						
-	4	80	(40.0		d accord a code		SM						
20-	5	95	(19.0 - 19.5) SAND, fine gra graded, dry, 10 YR, 7/8, yel (19.5 - 20.0) SANDY GRAV coarse, sub-angular to sub- dry, 10 YR, 7/1, light gray	Iow /EL, rour	loose, fine to id, well graded,	0	<u>GŴ</u> ML GC		•	so	ELS	WH-04-005-SO-020 Note: Interval 20.0 - 21.0 ft	
25-			(20.0 - 21.0) SILT with GRA non-plastic, dry, 10 YR, 7/3, Gravel: (20%), fine to mediu round	vel , ver um, :	_, soft, y pale brown, sub-round to		CL	1]]					
-			(21.0 - 23.0) CLAYEY GRA coarse, sub-round to round, to wet, 10 YR, 5/3, brown	VEL , we	, loose, fine to I graded, damp								
30-	-		(23.0 - 25.0) CLAY with GR. plasticity, stiff, slightly moist Gravel: (25%), fine to coars round	AVE :,, 10 :e, si	L, medium YR, 5/3, brown, ub-round to								
	-		i otal Depth of Boring 25.0 f	πBG	5								
35 -	-												

	AF	A FF	Areas (Omaha District)	Start Date End Date Northing Easting	G -	- M 05/0 05/0 673 ⁻	W1 2/18 2/18 715.8	8F	PFC	0501	Site Name Drilling Com Drilling Meth Driller Logged By Borehole Dia Boring Com	pany od ameter pletion	: AFFF Area 5 : Cascade Drilling : Mini Sonic : Dennis Schweisthal : Justin Vojak : 6.0 in. : 2.0 in. PVC Monitoring Well
		Ells	worth Air Force Base	Surface Elev. (ft)* Total Depth (ft)**	· ; ;	3222 35.0	2.61)	.00			Depth to Wa Signature	ter (ft)	29.0
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	Water Levels M ▲ During Drilling * (I DESCRIP	leasurements North American Vertical atum (NAVD88) feet (ft) Below Ground Surface ogs) feet (ft)	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	Sł	AMPLE ID	Well: I Elev (MW18PFC0501 TOC): 3222.23
0-	- 1		(0.0 - 2.0) CLAY, medium pla 3/3, dark brown, slightly mois	sticity, stiff, 10YR t		CL			ss	ELSWI No	H05-001-SS-001 ote: Interval 0.0 - 0.5 ft		Manhole - 8-in. skirt Pad - 2ft X 2ft X 4 in.
-	2	100	(2.0 - 5.0) CLAY, medium pla 5/3, brown, dry	sticity, stiff, 10YR	0	CL							
5	3	100	(5.0 - 10.0) CLAY, low plastic 10YR 6/3, pale brown, dry	ity, very stiff,	0	CL							Grout: 0.4 - 16.0 ft bgs Mix Used: Portland Cement (94 lb bag) Sodium Bentonite (~3 lbs) Water (~7 gallons)
-10	- 4		(10.0 - 12.0) CLAY, low plast 10YR 4/3, brown, dry	city, very stiff,		CL							Riser 2.0 in. Sch 40 PVC
-	- 5	100	(12.0 - 14.0) SILTY SAND, w coarse, sub-rounded to round 6/2, light brownish gray, with well graded, fine to coarse, s round, dry	ell graded, fine to d, loose, 10YR GRAVEL (40%), ub-rounded to	0	siv							
15-	6		(14.0 - 14.5) CLAY, medium 10YR 5/4, yellowish brown, d (14.5 - 18.0) SILTY SAND, w coarse, sub-rounded to round 6/2, light brownish gray, with well graded, fine to coarse, s round, dry	olasticity, stiff, ry ell graded, fine to d, loose, 10YR GRAVEL (40%), ub-rounded to		CL	1	-					- Bentonite Seal
					0								1/4 in. Uncoated Pellets 16.0 - 21.0 ft bgs

		A	erostar SES		G -	- M'	W1	8F	PFC	:0501	Site Name Drilling Com Drilling Meth Driller	pany od	: AFFF Area 5 : Cascade Drilling : Mini Sonic : Dennis Schweisthal
	AF	FF Af Pr	Areas (Omaha District) FFF Site Inspection oject# M2027.0003	Start Date End Date Northing Easting	::	05/02 05/02 6737 1241	2/18 2/18 715.8 1664	34 .63			Logged By Borehole Dia Boring Comp	ameter detion	: Justin Vojak : 6.0 in. : 2.0 in. PVC Monitoring Well
		Ellsv	worth Air Force Base	Total Depth (ft)*	:	3222	2.61				Depth to Wa Signature	ter (ft)	29.0
H IN FEET	VAL	OVERY	Water Levels I	Jeasurements North American Vertical Jatum (NAVD88) feet (ft) *Below Ground Surface bgs) feet (ft)	(mc	\ LITHOLOGY	ll Color	to Water (DTW)	LE TYPE			Well: I Elev (MW18PFC0501 TOC): 3222.23
DEPTH (bg	INTER	% REC	DESCRIP	TION	PID (p	nscs	Munse	Depth :	SAMPI	54	AMPLE ID		
18-	8]	(18.0 - 18.5) FAT CLAY, hig	nt plasticity, soft,	1	Сн	///						
-	9	65	(18.5 - 20.0) SILTY SAND, v coarse, sub-round to round, light brown, with GRAVEL (4	rell graded, fine to loose, 10YR 6/2, 0%), well graded,		sм							Bentonite Seal 1/4 in, Uncoated Pellets 16.0 - 21.0 ft bgs
-	10		(20.0 - 22.0) SILTY SAND, v coarse, sub-rounded to roun brown, with GRAVEL (40%), to coarse, subangular to sub	/ell graded, fine to d, loose, 10YR 5/3 well graded, fine -round, dry		SM							
	11	60	(22.0 - 23.0) FAT CLAY, hig 10YR 5/1, gray, mottled with brownish vellow moist	n plasticity, soft, 10YR 6/6,		сн							Riser
- 23	12		(23.0 - 25.0) SILTY SAND, v coarse, sub-rounded to roun 5/3, brown, with GRAVEL (4 well graded, fine to coarse, s round, dry	rell graded, fine to d, loose, 10YR 0%), well graded, ub-rounded to	0	sм							
- - 28-	13	60	(25.0 - 29.0) CLAY, medium stiff, 10YR 4/3, brown, with 0 well graded, fine to coarse, s round, dry	plasticity, medium BRAVEL (25%), ub-rounded to	0	CL			so	ELSWH	105-001-SO-028		- Filter Pack 20/30 Standard Sand Silica Sand 21.0 - 35.0 ft bgs
-	14 15		(29.0 - 29.5) CLAY, medium stiff, 10YR 4/3, brown, with (plasticity, medium GRAVEL (25%),		CL SC				Nc 21	ote: Interval 8.0 - 29.0 ft		24.1 - 34.1 ft bgs 0.010 in. continuous wrap vee wire Sch 40 PVC
	16	100	well graded, fine to coarse, s round, wet (29.5 - 30.0) CLAYEY SANE fine, round, 10YR 5/4, yellow GRAVEL (30%), well graded sub-rounded to round, moist (30.0 - 35.0) CLAY, hard, 10 gray, dry	up-rounded to , poorly graded, ish brown, with , fine to coarse, YR 3/1, very dark	o	CL							
			End of Borehole 35.0 ft bgs										End Cap

		A	erostar SES	BORING LO	G -	M	W1	8F	PFC	:0502	Site Name Drilling Com Drilling Meth Driller	pany od	: AFFF Area 5 : Cascade Drilling : Mini Sonic : Dennis Schweisthal
	AF	FF / AF Pre	Areas (Omaha District) FFF Site Inspection oject# M2027.0003	Start Date End Date Northing Easting Surface Eley. (ft)*		05/1 05/1 6736 124 ⁷ 3220	1/18 1/18 352.2 1543	26 .83			Logged By Borehole Dia Boring Com	ameter pletion	: Justin Vojak : 6.0 in. : 2.0 in. PVC Monitoring Well : 20.5
		Ells	worth Air Force Base	Total Depth (ft)**	::	30.0	1	1			Signature		20.3
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	Water Levels Me	asurements rth American Vertical um (NAVD88) feet (ft) elow Ground Surface s) feet (ft) ON	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SA	MPLE ID	Well: M Elev (*	MW18PFC0502 TOC): 3220.51 — Flush Mount, 12-in, diameter
0-	1		(0.0 - 1.0) CLAY, medium plast	icity, stiff, 10YR		CL	1		SS	ELSWH	105-002-SS-001		Manhole - 8-in. skirt Pad - 2ft X 2ft X 4 in.
-		100	SANDY SILT, (1.0 - 5.0) CLAY plasticity, stiff, 10YR 4/2, dark g dry	medium grayish brown,						Nc	ıte: Interval 0.0 - 0.5 ft		
-	2				0	CL							Grout: 0.3 - 11.0 ft bgs Mix Used: Portland Cement (94 lb bag) Sodium Bentonite (~3 lbs)
	3	60	(5.0 - 10.0) CLAY, hard, 10YR brown, dry	5/2, grayish	0	CL							Water (~7 gallons)
10-							1						
	4		(10.0 - 11.0) CLAY, low plastici 4/2, dark grayish brown, slightly	ty, stiff, 10YR / moist		CL							Riser 2.0 in. Sch 40 PVC
-	5	60	(11.0 - 13.0) CLAY, medium pla stiff, 10YR 6/2, light brownish g with 10YR 6/6, brownish yellow	asticity, medium ray, mottled , dry	0	CL							
-	6	100	(13.0 - 14.0) SILTY SAND, wel coarse, loose, 10YR 4/3, browr GRAVEL, well graded, fine to c sub-rounded to round, dry	graded, fine to , with oarse, /		SM							— Bentonite Seal 1/4 in. Uncoated Pellets 15.0 - 23.0 ft bgs
15-	7		(14.0 - 16.0) SILT, loose, 10YR brown, with GRAVEL (35%), we to coarse, sub-rounded to roun	. 7/3, very pale ell graded, fine d, dry		ML							
	8		(16.0 - 20.0) SILTY SAND, well coarse, sub-rounded to round, 6/2, light brownish gray, with G well graded, fine to coarse, sub round, dry	graded, fine to loose, 10YR RAVEL (45%), angular to	0	sм							— Filter Pack 20/30 Standard Sand Silica Sand 16.0 - 30.0 ft bgs

	AF	FF AF Pr	Areas (Omaha District) FF Site Inspection oject# M2027.0003	S c	BORING LO Start Date End Date Northing Easting Surface Elev. (ft)* Total Depth (ft)**	G -	M ' 05/1 05/1 6736 1241 3220 30.0	1/18 1/18 352.2 1543).85	8F	PFC	0502	Site Name Drilling Com Driller Logged By Borehole Di Boring Com Depth to Wa Signature	pany nod ameter pletion ater (ft)	: AFI : Cas : Mir : Der : Jus : 6.0 : 2.0 Mo : 20. :	FF Area 5 scade Drilling ni Sonic nnis Schweisthal tin Vojak in. n. PVC nitoring Well
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	Water Levels During Drilling DESCR	Mea *Nor Datu **Be (bgs	asurements th American Vertical um (NAVD88) feet (ft) dow Ground Surface) feet (ft)	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SA	MPLE ID	Well: Elev (PFC0502 3220.51
- 18	8	60	(20.0 - 20.5) CLAY, mediu	ım p l a	sticity, medium	-	SM			so	ELSWH	05-002-SO-020 fe: Interval			— Riser 2.0 in. Sch 40 PVC
-	10	90	stiff, 10YR 4/3, brown, wit well graded, fine to coarse round, dry (20.5 - 21.0) CLAY, mediu stiff, 10YR 4/3, brown, wit well graded, fine to coarse round, moist	h GRA e, sub im pla h GRA e, sub	AVEL (35%), -rounded to asticity, medium AVEL (35%), -rounded to		CL SM				- 19	9.0 - 20.0 ft			
- 23	12		(21.0 - 22.0) SILTY SAND coarse, sub-rounded to ro 4/3, brown, with GRAVEL coarse, subangular to sub (22.0 - 25.0) SILTY SAND loose, 10YR 7/4, very pale GRAVEL (40%), well grad	, well und, I , well -roun , pool e brow led, fir	graded, fine to oose, 10YR graded, fine to ded, dry ly graded, fine, rn, with ne to coarse,	2600	sм								— Filter Pack 20/30 Standard Sand Silica Sand 16.0 - 30.0 ft bgs
-	13	60	sub-rounded to round, dry (25.0 - 27.5) CLAY, low pl 4/3, brown, with GRAVEL fine to coarse, sub-rounde	asticit (35% ed to r	y, stiff, 10YR), well graded, ound, wet	- 365	CL								— Screen (10.0 ft) 19.0 - 29.0 ft bgs 0.010 in. continuous wrap vee wire Sch 40 PVC
- 28	14		(27.5 - 30.0) SANDY CLA stiff, 10YR 5/4, yellowish k (30%), well graded, fine to sub-rounded to round, dry	Y, Iow prown coar	v plasticity, very , with GRAVEL se,		CL								— End Cap
-			End of Borehole 30.0 ft bg	IS											
33–															

	AF	FF AF Pr	Areas (Omaha District) FF Site Inspection oject# M2027.0003	Start Date End Date Northing Easting Surface Elev. (ft)* Total Depth (ft)**	: 05 : 05 : 67 : 12 : 32 : 15	-02- -02- 378 415 223.	18 18 7.51 72.5 32	PF	C0	503	Site Name Drilling Compan Drilling Method Driller Borehole Diame Boring Completi Abandonment D DTW During Dril Logged by: Signature:	: AFFF Site 5 y : Cascade Drilling : Mini Sonic : Dennis Schweisthal ter : 6.0 on : Abandoned w/ Grout ate : 05-02-18 lling (ft) 10.0 : Justin Vojak
DEPTH IN FEET (bgs)	NTERVAL	6 RECOVERY	Water Levels <u> </u> During Drilling DESCRIF	Measurements *North American Vertical Datum (NAVD88) feet **Below Ground Surface (bgs) feet	(mdd) Ole	JSCS	Aunsell Soil Color	Depth to Water (DTW)	SAMPLE TYPE		SAMPLE ID	REMARKS
-0	1	100	(0.0 - 5.0) CLAY with GRAVE plasticity, medium stiff, slight debris seen throughout, 10 Y Gravel: fine to coarse, sub-ro	EL, medium ly moist, plastic ′R, 4/3, brown, ound to round	0	CL	W		ss	ELS	WH-05-003-SS-001 Note: Interval 0.0 - 1.0 ft	Borehole
5	2	40	(5.0 - 10.0) GRAVEL FILL, P and plastic debris	rieces of Cement,	0	GW			50	ELS	WH-05-003-SO-009	
- 10 - - -	3	100	(10.0 - 12.0) CLAY with GRA plasticity, soft, saturated, pla throughout, 10 YR, 5/3, brow fine to coarse, sub-angular to (12.0 - 14.0) CLAY with GRA stiff, moist, 10 YR, 5/4, yellov (45%), fine to coarse, sub-ro	VEL, medium stic debris seen n, Gravel: (30%), o sub-round VEL, low plasticity, wish brown, Gravel: und to round	0	CL		•		-	Note: Interval 9.0 - 10.0 ft	
- 15–			(14.0 - 15.0) SILT with GRAV non-plastic, dry, 10 YR, 6/2, Gravel: (40%), fine to coarse round End of Borehole 15.0 ft BGS	/EL, soft, light brownish gray, a, sub-round to		ML						

		A	erostar SES	BORING LOG Start Date		M 05/0	IVV 06/1	/18 8	P	-C(0601	Site Nar Drilling Drilling I Driller Logged	ne Company Method By	: AFFF Area 6 : Cascade Drilling : Mini-Sonic : Dennis Schweisthal : Justin Vojak
	AI	FF Af Pr	Areas (Omaha District) FF Site Inspection oject# M2027.0003	End Date Northing Easting Surface Elev (ft)*	::	05/0 666 124 317	06/1 532 655 4.4	8 2.62 51.3 5	0			Borehol Boring (Depth to	e Diameter Completion Water (ft)	: 6.0 in. : 2.0 in. PVC Monitoring Well : 13,0
		Ells	worth Air Force Base	Total Depth (ft)**	::	20.0) 					Signatu	re	11 Mag
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	Water Levels ▲ During Drilling DESCR	Measurements *North American Vertical Datum (NAVD88) feet (ft) **Below Ground Surface (bgs) feet (ft) PTION	PID (nnm)			Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SAM	IPLE I D	Well: MW1 Elev (TOC)	3PFC0601 : 3174.16
0-			(0.0-2.0) Silt, Iow density, n YR, 6/3, dark brown	on-plastic, dry, 10	0) M	1∟			SS	El 06-00 Note	_SWH 1-SS-001		Manhole - 8-in. skit Pad - 2ft X 2ft X 4 in. Grout Mix Used: 0.0 - 1.0 ft bgs Portland Cement
-	1	100	(2.0-5.0) LEAN CLAY, low slightly moist, 10 YR, 5/3, b YR 8/1, white	olasticity, stiff, rown, mottled with 10		с	;L				0.0) – 0.5 ft		94 lb bag Sodium Bentonite (3) lbs Water (7 gallons) — Bentonite Seal
5	2	100	(5.0-8.0) Lean Clay, high de 10 YR, 3/3, dark brown	ensity, very stiff, dry,	- 0)	;L							1/4 in. Uncoated Pellets 1.0 – 5.0 ft bgs
-		100	(8.0-10.0) Clayey Sand with density, fine to coarse, sub- graged, dry, 10 YR, 3/3, da (10%), fine to medium, sub	n Gravel, high -round to round, well rk brown, Gravel: -round to round		s	c							— Riser 2.0 in. Sch 40 PVC
- 10			(10.0-13.0) Silty Sand with fine to coarse, sub-round to dry, 10 YR, 6/3, pale brown tocoarse, sub-round to rour	Gravel, low density, o round, well graded, , Gravel: (40%), fine nd	_ 0	, si	м				EL	_SWH		— Filter Pack 20/30 Redflint Sand & Gravel 5.0 - 20.0 ft bgs
-	3	80	(13.0-14.0) Clayey Sand wi density, fine to coarse, sub graded, damp, 10 YR, 5/3, (30%), fine to coarse, sub-r	th Gravel, low -round to round, well brown, Gravel: round to round		s C	iC XL		•	SO	Note 12.0	: Interval to13.0 ft		Screen (10.0 ft) 9.2 - 19.2 ft bgs 0.010 in. continuous wrap vee wire Sch 40 PV/C
- 15	4	100	(14.0-15.0) Lean Clay, med plasticity, medium stiff, moi brown, mottled, 10 YR, 6/6, (15.0-17.5) Clay with Grave medium plasticity, stiff, dan Brown, Gravel: (30%), fine sub-round to round	lium density, high st, 10 YR, 6/3, pale brownish yellow sl, medium density, ip to wet, 10 YR, 5/3, to coarse,		, 	CL							
- 20-			(17.5-20.0) Lean Clay, high plasticity, very stiff, dry, 10 brownish gray, mottled, 10 Total depth of boring 20.0 f	density, Iow YR, 6/2, light YR, 4/1, dark gray		С		1						— End Cap
-														
25-														

	AI	FF AF Pr	Areas (Omaha District) FF Site Inspection oject# M2027.0003 worth Air Force Base	Suc	BORING LC Start Date End Date Northing Easting Surface Elev (ft) Total Depth (ft)*)G	- Г : 05 : 05 : 66 : 12 : 31 : 20	VIV 5/05/ 5/05/ 6627: 2469: 168.6	V18 18 18 3.45 89.2 52	7 7	C0602	Site I Drillir Drille Logg Borel Borin Deptl Signa	Name : AFFF Area 6 ng Company : Cascade Drilling ng Method : Mini-Sonic er : Dennis Schweisthal ged By : Justin Vojak shole Diameter : 6.0 in. ng Completion : 2.0 in. PVC Monitoring Well th to Water (ft) th to Water : 11.0
			Water Levels	Meas	surements		۲		TV)			_	
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY		*North Datun **Belc (bgs	n American Vertical n (NAVD88) feet (ft) ww Ground Surface) feet (ft)	PID (ppm)	USCS / LITHOLOG	Munsell Color	Depth to Water (D	SAMPLE TYPE	SAMPL	e ID.	Well: MW18PFC0602 Elev (TOC): 3168.37
0-			(0.0-2.0) LEAN CLAY, me medium plasticity,stiff, sli 3/3, dark brown	edium (ghtly m	density, loist, 10 YR,	0	CL			SS	ELSW 06-002-S Note: Int 0.0 - 0.	VH S-001 terval .5 ft	Pad - 2ft X 2ft X 4 in. Grout Mix Used: 0.0 - 1.0 ft bgs Portland Cement
	1	100	(2.0-4.0) LEAN CLAY wit density, medium plasticity moist, 10 YR, 3/3, Gravel coarse, sub-round to roun (4.0-5.0) GRAVELLY SA	h Grav y, stiff, I: (30% nd	el, medium very slightly), fine to		СL						94 lb bag Sodium Bentonite (3) lbs Water (7 gals) — Bentonite Seal
5-	2	70	(4.05.07) diversible for a sub-round to round, well a density, dry, 10 YR, 5/3, (to coarse, sub-round to re (5.0-10.0) SILTY SAND v density, fine to coarse, su well graded dry, 10 YR, 5 (45%), fine to coarse, sub	graded Gravel: ound with Gra Jb-rour 5/3, bro b-round	, low (45%), fine avel, low Id to round, wn, Gravel: I to round	0	SM						1/4 in. Uncoated Pellets 1.0 - 5.0 ft bgs Riser 2.0 in. Sch 40 PVC
10-			(10.0-11.0) SILT, low der	nsity, no	on-plastic,	0	ML			so	ELSW	VH	
	3	100	(11.0-11.75) Clay with GF high plasticity, soft, wet, 7 (40%), fine to coarse, sub (11.75-15.0) LEAN CLAY plasticity, very stiff, dry, 1 brownish gray, trace mott 4/1, dark gray and 10 YR yellow	AVEL 10 YR, b-round (, high (0 YR, (tling wi t, 6/6, b	, low density, 5/3, Gravel: 1 to round density, low 6/2, light th, 10 YR, rownish		CL				06-002-S(Note: Int 10.0 to1	O-010 erval 1.0 ft	
			(15.0-20.0) LEAN CLAY, plasticity, stiff, dry, 10 YR mottled, 10 YR, 6/2, light YR, 6/6, brownish yellow	mediui १, 4/1, c browni	m density, low lark gray, sh gray, 10								Sch 40 PVC
	4	80					CL						End Cap
20-		<u> </u>	Total depth of boring 20.0) ft BG	S	<u> </u>	<u> </u>	14					
15-	4	80	(10.0-11.0) SILT, low der dry, 10 YR, 6/3, pale brow (11.0-11.75) Clay with GF high plasticity, soft, wet, 7 (40%), fine to coarse, sult (11.75-15.0) LEAN CLAY plasticity, very stiff, dry, 1 brownish gray, trace mott 4/1, dark gray and 10 YR yellow (15.0-20.0) LEAN CLAY, plasticity, stiff, dry, 10 YR mottled, 10 YR, 6/2, light YR, 6/6, brownish yellow Total depth of boring 20.0	nsity, no wn RAVEL 10 YR, p-round 7, high (0 YR, (tling with 5, 6/6, b medium λ, 4/1, c browni 0 ft BG	on-plastic, , low density, 5/3, Gravel: density, low 6/2, light th, 10 YR, rownish m density, low lark gray, sh gray, 10	0				SO	ELSW 06-002-St Note: Int 10.0 to1	VH O-010 ierval 1.0 ft	Filter Pack 20/30 Redflint Sand & Gravel 5.0 - 20.0 ft bgs Screen (10.0 ft) 8.9 - 18.9 ft bgs 0.010 in continuous wrap vee wire Sch 40 PVC

	AF	FF AF Pr Ells	Areas (Omaha District) FF Site Inspection oject# M2027.0003 worth Air Force Base	Sue	BORING LC Start Date End Date Northing Easting Surface Elev (ft) Total Depth (ft)*)G	- 05 : 05 : 05 : 66 : 12 : 3 ⁻¹ : 60	M 5/05/ ⁻ 5/05/- 66039 24662 166.1 0.0	/18 18 9.96 23.0 9	3PF	C0603	Site Na Drilling Driller Logged Borehol Boring (Depth to Signatu	me Company Method By e Diameter Completion to Water (ft) re	: AFFF Area 6 : Cascade Drilling : Mini-Sonic : Dennis Schweisthal : Justin Vojak : 6.0 in. : 2.0 in. PVC Monitoring Well : 55,0
EPTH IN FEET (bgs)	VTERVAL	RECOVERY	Water Levels During Drilling	Mea *Nort Datur **Belo (bgs	surements h American Vertical m (NAVD88) feet ow Ground Surface s) feet	ID (ppm)	SCS / LITHOLOGY	lunsell Color	epth to Water (DTW)	AMPLE TYPE	SAMF	PLE ID	Well: MW18 Elev (TOC)	BPFC0603 : 3165.91
	1	100	(0.0-2.5) LEAN CLAY, m plasticity, stiff, slighty mo brown (2.5-5.0) LEAN CLAY, hi dry, 10 YR, 5/2, grayish t 10 YR 8/1, white	gh den	density, low YR, 4/3, sity, hard, mottled with	0	⊃ CL CL	-		SS	ELS 06-003- Note: I 0.0 -	SWH -SS-001 nterval 0.5 ft		Flush Mount, 12-in.diameter Manhole - 8-in. skirt Pad - 2ft X 2ft X 4 in.
5	2	100	(5.0-7.0) SILT, medium c dry, 10 YR, 4/3, brown (7.0-10.0) SANDY CLAY medium plasticity, very s brown	density, , high c tiff, dry	non-plastic, density, , 10 YR, 5/3,	- 0	мі Сі							
- 10 - - -	3	100	(10.0-14.0) LEAN CLAY, plasticity, soft, very slight light brownish gray	low de tly mois	ensity, low st, 10 YR, 6/2,	- 0	CL							
15 - - - 20	4	100	plasticity, stiff, dry, 10 YF gray, mottled, 10 YR, 4/1 trace, 10 YR, 6/6, browni	, mediu R, 6/2, I I, dark ish yell	ight brownish gray, and ow	0	СГ							— Grout Mix Used: 0.0 - 40.0 ft bgs Portland Cement 94 lb bags Sodium Bentonite
	•	100	(24.0-40.0) LEAN CLAY,	mediu	m density, low	-								(3)lbs Water (7gallons) — Riser 2.0 in. Sch 40 PVC
25		80	plasticity, stiff, dry, 10 YF mottled, 10 YR, 6/2, light trace, 10 YR, 6/6, browni	R, 4/1, d t brown ish yell	dark gray, ish gray, and ow	0								
30	•	80				0								
35-						₀		14						

	AF	FF AF Pr	Areas (Omaha District) FFF Site Inspection oject# M2027.0003 worth Air Force Base	Start Date End Date Northing Easting Surface Elev (f Total Depth (ft)	DG t)*	- : 05 : 05 : 12 : 31 : 60	5/05/ 5/05/ 5/05/ 5603 2466 166.1	V18 18 9.96 23.0 19	2 2	-C0603	Site Nar Drilling (Driller Logged Borehol Boring (Depth to Signatu	me Company Method By e Diameter Completion o Water (ft) re	: AFFF Area 6 : Cascade Drilling : Mini-Sonic : Dennis Schweisthal : Justin Vojak : 6.0 in. : 2.0 in. PVC Monitoring Well : 55.0
DEPTH IN FEET	INTERVAL	% RECOVERY	Water Levels During Drilling DESCR	Measurements *North American Vertical Datum (NAVD88) feet **Below Ground Surface (bgs) feet	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SAMF	PLE ID	Well: MW1 Elev (TOC)	8PFC0603): 3165.91
-	-	80				CL							- Grout Mix Used: 0.0 - 40.0 ft bgs Portland Cement 94 lib bags
40 - - - 45 -	-	100	(40.0-47.0) LEAN CLAY, plasticity, very stiff, dry, 1 gray, mottled,10 YR, 6/2, and trace, 10 YR, 6/6, br	, high density, low 10 YR, 4/1, dark , light brownish gray, rownish yellow	0	CL							Sodium Bentonite (3)Ibs Water (7gallons) — Bentonite Seal 1/4 in. Uncoated Pellets 40.0 - 45.0 ft bgs
- - - 50 –	-	75	(47.0-52.0) LEAN CLAY, dry, 10 YR, 4/1, dark gra with, 10 YR, 6/2, light bro YR, 6/6, brownish yellow	, high density, hard, iy, trace mottling ownish gray, and, 10	0	CL	-						Filter Pack 20/30 Redflint Sand & Gravel 45.0 - 60.0 ft bgs
- - 55 - - -	-	75	(52.0-55.0) LEAN CLAY, dry, 10 YR, 3/1, very dari with, 10 YR, 6/6, brownis (55.0-59.5) LEAN CLAY, medium plasticity, stiff, w dark gray	, high density, hard, k gray, trace mottling sh yellow, , medium density, vet, 10 YR, 3/1, very	0	CL		•	so	- ELS 06-003- Note: I 54.0 to	WH SO-054 nterval 55.0 ft		Screen (10.0 ft) 49.3 - 59.3 ft bgs 0.010 in. continuous wrap vee wire Sch 40 PVC
- 60- -	-		(59.5-60) LEAN CLAY, h stiff, dry, 10 YR, 3/1, very Total Depth of Boring 60	nigh density, very y dark gray 9.0 ft BGS		CL							End Cap
- 65 - - -	-												

	AF	FF AF Pro	Areas (Omaha District) FF Site Inspection bject# M2027.0003	5	BORING LOC Start Date End Date Northing Easting Surface Elev. (ft)* Total Depth (ft)**	5 - : 5/6 : 5/6 : 12 : 31 : 40	SB 5/18 5/18 6290 24672 69.2	6.20 20.9	PF	C0(604	Site Name Drilling Compan Drilling Method Driller Borehole Diame Boring Completi Abandonment D DTW During Dri Logged by: Signature:	: AFFF Site 6 y : Cascade Drilling : Mini Sonic : Dennis Schweisthal ter : 6.0 on : Abandoned w/ Grout late : 05/2/18 lling (ft) 36.0 : Justin Vojak
			Water Levels	Me	asurements				N)				
ET		×	During Drilling	*No Dat	rth American Vertical um (NAVD88) feet			olor	er (D]	ш			
rH IN FE ogs)	RVAL	COVER		**Be (bgs	elow Ground Surface s) feet	(mdd	6	ell Soil C	n to Wate	РLЕ ТҮР		SAMPLE ID	DEMADKS
) DEP ⁻	INTE	% RE	DESCR	IPTI	ON	DID (nsc	Muns	Dept	SAM			
0-			(0.0 - 2.0) CLAY, medium	plasti	city, stiff, 10YR	0	СL	14		SS	ELS	SWH-06-004-SS-001	Borehole
-	1	100	3/3, dark brown, slightly m (2.0 - 5.0) CLAY, very stiff	oist 10Y	R 4/3, brown,	-		11				0.0 - 1.0 ft	
-			mottled with 10YR 8/1, wh	ite, dı	ТУ	0	CL	Ŋ					
-			(5.0 - 6.0) SILT, loose, 10` \brown, dry	/R 7/	4, very pale		ML SW	/					
- - 10—	2	75	(6.0 - 7.0) SAND, well grad sub-rounded to round, loos with GRAVEL (30%), well	ded, f se, 10 grade	ine to coarse,)YR 4/3, brown, ed, fine to	0	sм						
-			(7.0 - 10.0) SILTY SAND,	ound, well g	slightly moist raded, fine to		CL	1					
-	3	100	coarse, sub-rounded to ro pale brown, with GRAVEL fine to coarse, sub-rounde	und, Ī (40% d to r	oose, 10YR 6/3, b), well graded, ound, dry	0	CL						
	4	100	(10.0 - 11.0) CLAY, low pla 5/3, brown, with GRAVEL fine to coarse, sub-rounde moist	asticit (20% d to r	y, soft, 10YR), well graded, ound, slightly	0							
- 20-			(11.0 - 15.0) CLAY, low pla 6/2, light brownish gray, m dark gray, dry	asticit ott l ec	y, stiff, 10YR I with 10YR 4/1,		CL	Ì					
-	5	85	(15.0 - 25.0) CLAY, very s gray, mottled with 10YR 6/ gray, dry	tiff, 1(2, l igl	DYR 4/1, dark ht brownish	0							
25 — - -	6	85	(25.0 - 36.0) CLAY, very s gray, mottled with 10YR 6/ with trace 10YR 6/6, brown	tiff, 10 2, l igi nish y	DYR 4/1, dark ht brownish gray ellow, dry	0							
- 20													
- 30							CL						
-	7	100				0		Ŋ					
- 35 —								Ŋ		SO	ELS	SWH-06-004-SO-035	
-	8	85	(36.0 - 37.0) CLAY, low pla 10YR 4/1, dark gray, mottl brownish gray and trace 1 yellow, with GRAVEL (25%	asticit ed wi DYR 6 %), we	y, very stiff, th 10YR 6/2, light 6/6, brownish ell graded, fine	0	CL CL					Note: Interval 35.0 - 36.0 ft	
40			to coarse, subangular to ro (37.0 - 40.0) CLAY, very s gray, mottled with 10YR 6/	bund, tiff, 10 2, l igl	wet DYR 4/1, dark ht brownish		1	77		<u> </u>	I		<u> </u>
-			End of Borehole 40.0 ft BC	s									
45 -													
-													
- 50 —													

	AF	A FF AF Pr	Areas (Omaha District) FFF Site Inspection oject# M2027.0003 worth Air Force Base	Suc	Start Date End Date Northing Easting Surface Elev (ft) Total Depth (ft)*)G	- ^ : 05 : 05 : 67 : 12 : 32 : 32	/08/ /08/ /08/ 0650 4129 04.1	/18 18 0.17 95.3 8	8 ⁸	C0701	Site Nar Drilling (Driller Logged Borehol Boring (Depth to Signatur	me Company Method By e Diameter Completion o Water (ft) re	: AFFF Area 7 : Cascade Drilling : Mini-Sonic : Dennis Schweisthal : Justin Vojak : 6.0 in. : 2.0 in. PVC Monitoring Well : 30.5
H IN FEET s)	VAL	OVERY	Water Levels ▼ During Drilling	Meas *North Datum **Belo (bgs)	urements American Vertical (NAVD88) feet w Ground Surface feet	(mc	/ LITHOLOGY	ll Color	o Water (DTW)	Е ТҮРЕ			Well: MW18 Elev (TOC):	PFC0701 3203.91
DEPTH (bg	INTER	% REC	DESCRIF	PTIO	N	PID (pr	USCS	Munse	Depth t	SAMPL	SAMF	ile i d]	— Flush Mount, 12-in.diameter
0-			(0.0-2.0) LEAN CLAY, med medium stiff, slighty moist, brown	dium p 10 YI	blasticity, R, 3/3, dark	0	CL			SS	ELS 07-001- Note: I	WH SS-001 nterval		Manhole - 8-in. skirt Pad - 2ft X 2ft X 4 in.
-	1	100	(2.0-3.0) LEAN CLAY, med slightly moist, 10 YR, 4/3, b (3.0-5.0) LEAN CLAY, low	dium p prown	blasticity, stiff,		CL				0.0 -	0.5 h		
-			stiff, drý, 10 YR, 5/3, brown	ı ı	<i></i>		CL							
-			(5.0-10.0) SilLTY SAND wi fine to coarse, sub-round to graded, dry, 10 YR, 5/3, bru (35%), fine to coarse, sub-	ith GF o rour own, round	RAVEL, loose, nd, well Gravel: I to round									
-	2	75					SM							
10-			(10.0-12.0) SILT, soft, non- YR, 6/3, pale brown	-plasti	ic, dry, 10	- 0	ML		-					— Grout Mix Used: 0.0 - 19.0 ft bgs Portland Cement 94 lb bags Sodium Bentonite
-	3	55	(12.0-14.0) CLAY with GRA plasticity, soft, very slightly brown, Gravel: (30%), fine sub-round to round	AVEL moist to coa	, high t, 10 YR, 5/3, arse,		сн							(3lbs) Water (7 gallons)
15-			(14.0-15.0) GRAVELLY SA coarse, sub-round to round very slightly moist, 10 YR, 9 Gravel: (30%), fine to coars round	AND, I d, well 5/3, b se, su	oose, fine to I graded, rown, ib-round to	0	SM SM							— Riser 2.0 in. Sch 40 PVC
-	4	40	(15.0-16.5) SILTY SAND w loose, fine to coarse, sub-re well graded, dry, 10 YR, 5/3 (30%), fine to coarse, sub-re	vith Gl ound 3, bro round	RAVEL, to round, wwn, Gravel: to round									
-			(16.5-20.0) LEAN CLAY, lo dry, 10 YR, 4/1, dark gray, 6/6 brownish yellow	ow pla mottle	sticity, stiff, ed, 10 YR,									
20-	5		(20.0-26.0) LEAN CLAY, lo stiff, dry, 10 YR, 4/1, dark g YR, 6/6 brownish yellow	ow pla gray, r	sticity, very nottled, 10	0	CL							Bentonite Seal 1/4 in, Uncoated Pellets 19.0 - 24.0 ft bgs

	AF	FF Af Pr Ells	Areas (Omaha District) FF Site Inspection oject# M2027.0003	Suc	BORING LC Start Date End Date Northing Easting Surface Elev (ft) Total Depth (ft)*)G	- ^ : 05 : 05 : 67 : 12 : 32 : 40	/08/ ⁻ /08/- /08/- 0650 4129 04.1 .0	/18 18 0.17 95.38	8 ⁸	C0701	Site Nar Drilling Driller Logged Borehol Boring (Depth to Signatu	me Company Method By e Diameter Completion o Water (ft) re	: AFFF Area 7 : Cascade Drilling : Mini-Sonic : Dennis Schweisthal : Justin Vojak : 6.0 in. : 2.0 in. PVC Monitoring Well : 30.5
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	Water Levels During Drilling DESCR	Mea *Nort Datur **Bel (bgs	surements h American Vertical m (NAVD88) feet ow Ground Surface s) feet	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SAMP	PLE ID	Well: MW1 Elev (TOC	8PFC0701): 3203.91
	5	80	(26.0-27.0) CLAY with G	RAVEL	., medium	0	CL							1/4 in. Uncoated Pellets 19.0 – 24.0 ft bgs
- 28 -	6	80	plasticity, soft, slightly mo brown, Gravel: (30%), fir sub-round to round (27.0-30.5) LEAN CLAY, 3/1, very dark gray	bist, 10 ne to co hard, d	YR, 4/3, parse, / dry, 10 YR,	0	CL			so	ELS 07-001-	WH SO-029		Riser 2.0 in. Sch 40 PVC
33-	7	80	(30.5-31.0) GRAVEL, loc sub-round to round, well 5/3, brown (31.0-35.0) LEAN CLAY, 3/1, very dark gray, mottl YR, 6/6, brownish yellow	bse, fin gradec hard, led with	e to coarse, I, wet, 10 YR, dry, 10 YR, n trace, 10		GW		▼		29.5 to	30.5. ft		Filter Pack 20/30 Redflint Sand & Gravel 24.0 - 40.0 ft bgs
	8	90	(35.0-36.0) CLAY with G plasticity, very stiff, moist dark gray, mottled, 10 YF Gravel: (35%), fine to co- sub-round (36.0-40.0) LEAN CLAY, 3/1, very dark gray, mottl YR, 6/6, brownish yellow	RAVEL t, 10 YI R, 5/3, arse, s hard, led with	-, low R, 3/1, very brown, ub-angular to dry, 10 YR, n trace, 10	0	CL							29.1 - 39.1 fbgs 0.010 in. continuous wrap vee wire Sch 40 PVC End Cap
43-			Total Depth of Boring 40	.0 ft BC	98									

	AF	FFF AF Pr	Areas (Omaha District) FF Site Inspection oject# M2027.0003	BORING LC Start Date End Date Northing Easting Surface Elev (ft) Total Depth (ft)*)G	- : 05 : 05 : 67 : 12 : 32 : 60	VIV 5/09/ 5/010 2045 2412 204.2	/18 18 0/18 8.10 53.4 21	8 ⁸	C0702	Site Nar Drilling (Drilling I Driller Logged Borehol Boring (Depth to Signatur	ne : AFFF Area 7 Company : Cascade Drilling Method : Mini-Sonic : Dennis Schweisthal By : Justin Vojak e Diameter : 6.0 in. Completion : 2.0 in. PVC Monitoring Well o Water (ft) : 14.0 re :
N FEET	١L	VERY	Water Levels Mea ▲ During Drilling *Nort Datu **Bel (bg:	surements h American Vertical n (NAVD88) feet ow Ground Surface s) feet		ITHOLOGY	Color	Water (DTW)	ТҮРЕ			Well: MW18PFC0702
DEPTH II (bgs)	INTERVA	% RECO	DESCRIPTIO	DN	PID (ppm	USCS/L	Munsell (Depth to	SAMPLE	SAMF	PLE ID	Elev (TOC): 3203.80
0			(0.0-2.0) SILT with GRAVEL, so non-plastic, very slightly moist, brown, Gravel: (20%), fine to co sub-round to round	oft, 10 YR, 5/3, barse,	0	ML			SS	ELS 07-002-	SWH -SS-001	Manhole - 8-in. skirt Pad - 2ft X 2ft X 4 in. Grout Mix Used: 0.0 - 1.0 ft bgs
-	1	100	(2.0-4.0) LEAN CLAY, medium dry, 10 YR, 4/3, brown (4.0-5.0) LEAN CLAY, low plas	plasticity, stiff,		CL CL				Note: I 0.0 -	nterval 0.5 ft	94 la bags Sodium Bentonite (3) lbs Water (7gallons)
5— - -	2	60	stiff, dry, 10 YR, 5/3, brown, mc 8/1, white (5.0-9.0) SILT, soft, non-plastic 5/3, brown,	ttlled, 10 YR, / , dry, 10 YR,	0	ML	-	4				Bentonite Seal 1/4 in. Uncoated Pellets 1.0 - 9.0 ft bgs
- - 10—			(9.0-10.0) SILT with GRAVEL, non-plastic, dry, 10 YR, 7/3, ver brown, Gravel: (25%) fine to co	soft, y pale arse,	0	ML ML	-					Riser 2.0 in. Sch 40 PVC
-	3	100	Sub-round to round (10.0-11.0) SILT, soft, non-plas YR, 6/3, pale brown (11.0-14.0) GRAVELLY SAND, coarse, sub-round to round, we	tic, dry, 10 loose, fine to ll graded,		sv	/	•	so	ELS 07-002-	SWH -SO-013	
15-			dry, 10 YR, 5/3, brown, Gravel: to coarse, sub-round to round (14.0-15.0) CLAYEY SAND witl medium dense, fine to coarse, round, well graded, slightly moi	(40%), fine	o	sc				Note: I 13.0 tc	nterval o 14.0 ft	
-	4	80	brown, Gravel: (40%), fine to co sub-round to round (15.0-25.0) LEAN CLAY, low pl stiff, dry, 10 YR, 4/1, dark gray, YR 6/6 brownish vellow	parse, asticity, very mottled, 10	0							Screen (10.0 ft) 14.3 - 24.3 ft bgs
-	5	80										0.010 in: continuous wrap vee wire Sch 40 PVC
- 25			(25.0-26.0) CLAY with GRAVEI plasticity, stiff, dry, 10 YR, 4/1, mottled, 10 YR, 5/3, brown, Gra fine to medium, sub-round to ro	., medium dark gray, avel: (30%), und	0	CL						End Cap
-	6	100	(26.0-30.0) LEAN CLAY, low pl stiff, dry, 10 YR, 4/1, dark gray, YR, 6/2, light brownish gray	asticity, very mottled, 10		CL						— Borehole collapse
30-	7		(30.0-32.0) LEAN CLAY, very s YR, 4/1, dark gray, trace mottlin YR, 6/6 brownish yellow	tiff, dry, 10 ng with, 10		СГ						





	AI	FFF AF Pr	Areas (Omaha District) FFF Site Inspection oject# M2027.0003	Surface Elev. (ft)* Total Depth (ft)**	G - : 05 : 05 : 67 : 12 : 32 : 20	SB 5/08/ 5/08/ 2054 204.1 204.1	18 18 1.55 62.0	PF	C07	Site Name Drilling Compan Drilling Method Driller Borehole Diame Boring Completi Abandonment D DTW During Dri Logged by: Signature:	: AFFF Site 7 y : Cascade Drilling : Mini Sonic : Dennis Schweisthal ter : 6.0 on : Abandoned w/ Grout ling (ft) 14.5 : Justin Vojak :	
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	Water Levels	Measurements *North American Vertical Datum (NAVD88) feet **Below Ground Surface (bgs) feet	PID (ppm)	USCS	Munsell Soil Color	Depth to Water (DTW)	SAMPLE TYPE		SAMPLE ID	REMARKS
- 0	1	100	(0.0 - 4.0) CLAY, medium 4/3, brown, slightly moist	plasticity, stiff, 10YR	0	CL			SS	ELS	WH-07-004-SS-001 Note: Interval 0.0 - 1.0 ft	Borehole
5		90	(4.0 - 7.0) CLAY, low plast 5/3, brown, mottled with 1((7.0 - 9.0) SILTY SAND, p round, loose, 10YR 6/3, pa	orly graded, fine, ale brown, dry	_	CL						
- 10- -	2		(9.0 - 10.0) SAND, well gra sub-rounded to round, loos with GRAVEL (20%), well medium, sub-rounded to ro (10.0 - 12.0) SILTY SAND coarse, sub-rounded to rou brown, with GRAVEL (40% to coarse, sub-rounded to	aded, fine to coarse, se, 10YR 4/3, brown, graded, fine to bund, dry , well graded, fine to und, loose, 10YR 5/3, 6), well graded, fine round, dry	0	SM SM						
- - 15- -			(12.0 - 14.5) SILTY SAND coarse, sub-rounded to rou brown, with GRAVEL (40% to coarse, sub-rounded to (14.5 - 15.0) CLAYEY SAN to coarse, sub-rounded to 5/3, brown, with GRAVEL, coarse, sub-rounded to rou	, well graded, fine to und, loose, 10YR 5/3, 6), well graded, fine round, moist ND, well graded, fine round, loose, 10YR well graded, fine to und, wet		SM SC CL		▼	SO	ELS	WH-07-004-SO-013 Note: Interval 13.0 - 14.5 ft	
- - - 20-	3	100	(15.0 - 16.5) CLAY, low pla 5/3, brown, with GRAVEL fine to coarse, sub-rounde (16.5 - 20.0) CLAY, low pla 4/1, dark gray, mottled with yellow, dry End of borehole 20.0 ft bgs	asticity, soft, 10YR (30%), well graded, d to round, wet asticity, stiff, 10YR n 10YR 6/6, brownish	0	CL						
- - - -												
25-												

AFFF Areas (Omaha District) AFFF Site Inspection Project# M2027.0003 BORING LOO Start Date End Date Northing Easting Surface Elev (ft)*									/18 18 3.10 02.9 6	5 PF	C0801	Site Nar Drilling Driller Logged Borehol Boring (Depth to	me Company Method By e Diameter Completion o Water (ft)	: AFFF Area 8 : Cascade Drilling : Mini-Sonic : Dennis Schweisthal : Justin Vojak : 6.0 in. : 2.0 in. PVC Monitoring Well : 31.0
	Ellsworth Air Force Base Total Depth (ft)**											Signatu	re 	1 1000
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY		PID (ppm)	USCS / LITHOLOGY	Munsell Color	Depth to Water (DTW	SAMPLE TYPE	SAMF	PLE ID	Well: MW18 Elev (TOC):	PFC0801 3074.01 — Flush Mount,12-in.diameter		
-0 - -	1	100	(0.0-2.0) CLAY with GRA plasticity, medium stiff, sl	nedium noist, 10 YR,	0	CL			SS	ELS 08-001- Note:	WH SS-001 nterval		Manhole - 8-in. skirt Pad - 2ft X 2ft X 4 in.	
- - 5 -			(2.0-8.0) LEAN CLAY, ha dark gray, mottled, 10 YF yellow	0	CL				0.0 -	0.5 ft				
- - - 10	2	90	(8.0-14.5) LEAN CLAY, H dark gray, mottled, 10 YF	0										
-	3	80	brown, and 10 YR, 6/6, b	wn, and 10 YR, 6/6, brownish yellow										Crowt Mix Llood
15	4	100	(14.5-15.0) LEAN CLAY, stiff, dry, 10 YR, 5/2, grav (15.0-20.0) LEAN CLAY,	m plasticity, own/ dry, 10 YR,	0								Oto Wix Used: 0.0 - 25.0.0 ft bgs Portland Cement 94 bags Sodium Bentonite (3bs)	
20-			6/2, light grayish brown, brownish yellow	mottled	I, 10 YR, 6/6,	0								Water (7gallons)
	5	100	3/1, very dark gray, mottl brownish yellow	led, 10	YR, 6/6,		CL	1) J						2.0 in. Sch 40 PVC
- 25	6	100	(25.0-60.0) LEAN CLAY, 3/1, very dark gray, 0.1' (hard, d gravel l	dry, 10 YR, ense at 31.0'									Bentonite Seal 1/4 in. Uncoated Pellets
30- - -	7	90				0			▼	SO	ELS 08-001- Note: I 30.0 to	WH SO-030 nterval 9 31.0 ft		25.0 – 30.0 ft bgs
- - 35-						0								
-	8	90												Filter Pack 20/30 Redflint Sand & Gravel 30.0 - 52.0 ft bgs
40	9	100					CL							— Screen (15.0 ft)
45-						0								1 35.9-50.9 ft bgs 0.010 in. continuous wrap vee wire Sch 40 PVC
- - 50-	10	100												
-	11	100											— End Cap	
55- - -	10	100		0								Bentonitel 1/4 in. Uncoated		
- - 60—	12	100										Peilets 52.0.0 - 60.0 ft bgs		



	AF	FFF AF Pro	Areas (Omaha District) FF Site Inspection oject# M2027.0003	BORING LOG - MW18PFC0803 Start Date : 04/21/18 End Date : 04/22/18 Northing : 662294.31 Easting : 1247520.46 Surface Elev (ft)* : 307387 Total Depth (ft)** : 50.0							Site Na Drilling Driller Logged Borehol Boring (Depth to Signatu	me Company Method By e Diameter Completion o Water (ft) re	: AFFF Area 8 : Cascade Drilling : Mini-Sonic : Dennis Schweisthal : Justin Vojak : 6.0 in. : 2.0 in. PVC Monitoring Well : 47.0		
DEPTH IN FEET (bgs)	LI HLA URAN LI HLA URAN LI HLA URAN LI HLA LI H				American Vertical n (NAVD88) feet w Ground Surface) feet	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SAMF	PLE ID	Well: MW1 Elev (TOC)	8PFC0803 : 3073.57 	
-00	- 1	100	(0.0-2.0) CLAY with GRA plasticity, medium stiff, sli 3/3, dark brown (2.0-5.0) LEAN CLAY, ha light brownish gray, mottle gray, 10 YR, 6/6, brownish	nedium noist, 10 YR, , 10 YR, 6/2, YR, 4/1, dark w	0	CL			SS	EL: H08-003 Note: 0.0 -	SW –SS–001 nterval 0.5 ft		Manhole - 8-in. skirt Pad - 2ft X 2ft X 4 in.		
5-	2	100	(5.0-20.0) LEAN CLAY, h dark gray, mottled, 10 YR yellow,	ard, dr 8, 6/6, t	y, 10 YR, 4/1, prownish	• 0									
10-	3	100				0	CL								
15-	4	100				0								Riser 2.0 in. Sch 40 PVC Grout Mix Used: 0.0 - 30.0 ft bgs Portland Cement 94 lb bags Sodium Bentonite (3lbs) Water (7 gallons)	
20-	5	100	(20.0-25.0) LEAN CLAY, 6/2, light grayish brown, n brownish yellow, and 10 Y	hard, c nott l ed YR, 4/1	Iry, 10 YR, , 10 YR, 6/6, , dark gray,		CL								
25-	6	100	(25.0-25.5) LEAN CLAY, very stiff, slightly moist, 10 grayish brown, mottled, 10 yellow, and 10 YR, 4/1, da (25.5-32.5) LEAN CLAY, 3/1, very dark gray	mediur 0 YR, 6 0 YR, 6 ark gra hard, c	m plasticity, 6/2, light 6/6, brownish y dry, 10 YR,	0	CL								



		A	erostar SES	BORING LOG Start Date	; - : 04	SB	18 18	PF	C0	804	Site Name Drilling Compan Drilling Method Driller Borehole Diame Boring Completi	: AFFF Site 8 y : Cascade Drilling : Mini Sonic : Dennis Schweisthal ter : 6.0 on : Abandoned w/ Grout
	Ał	-FF / AF Pro	Areas (Omaha District) FF Site Inspection oject# M2027.0003 worth Air Force Base	Northing Easting Surface Elev. (ft)* Total Depth (ft)**	: 66 : 12 : 30 : 55	237 2474 075.0	8.08 74.9)8	6			Abandonment D DTW During Dri Logged by: Signature:	ling (ft) 52.0 Justin Vojak
			Water Levels ▼ During Drilling	I Ieasurements North American Vertical			2	DTW)				
	 _			Datum (NAVD88) feet (ft) *Below Ground Surface			soil Cold	Water (I	TYPE			
EPTH IN (bgs)	ITERVA	RECO	DESCRIE	bgs) feet (ft)	ID (ppm	scs	unsell S	epth to \	AMPLE		SAMPLE ID	REMARKS
0-	≤	%	(0.0 - 1.0) CLAY, medium pla	sticity, medium stiff,			Σ		SS	FLS	SWH-08-004-SS-001	
-	1	100	10YR 3/3, dark brown, slight (1.0 - 3.0) CLAY, medium pla 4/2, dark grayish brown, with	y moist sticity, stiff, 10YR GRAVEL (20%),		CL					Note: Interval 0.0 - 1.0 ft	Borehole
-		100	dry (3.0 - 5.0) CLAY, low plastici 6/2, light brownish gray, mott dark gray and 10YR, 6/6, bro	y, very stiff, 10YR led with 10YR 4/1, wnish yellow, dry	0	CL						
5-			(5.0 - 10.0) CLAY, hard, 10Y mottled with 10YR 6/6, brown	R 4/1, dark gray, iish yellow, dry								
-		100			0	CL						
- 10-	2		(10.0 - 10.5) CLAY, medium	plasticity, medium		CL						
-			stiff, 10YR 4/1, dark gray, mo 6/6, brownish yellow, with GF (10.5 - 15.0) CLAY, hard, 10	ttled with 10YR AVEL, moist /R 4/1. dark grav.			0					
-	-	90	mottled with 10YR 6/6, brown	ish yellow, dry	0	CL						
15-			(15.0 - 25.0) CLAY, hard, 10 mottled with 10YR 6/2, light t	/R 4/1, dark gray, prownish gray and	-							
-	3	80	10YR 6/6, brownish yellow, c	ry	0							
-												
20-												
-	4	100										
- 25-					0							
			(25.0 - 26.0) CLAY, medium 10YR 5/2, grayish brown, slig (26.0 - 30.0) CLAY, bard 10	plasticity, very stiff, htly moist (R 3/1, very dark		CL						
-	$\begin{bmatrix} 26.0 - 30.0 \\ \text{gray, mottled with 10YR 6/6, brownis} \\ \end{bmatrix} \begin{bmatrix} 26.0 - 30.0 \\ \text{gray, mottled with 10YR 6/6, brownis} \\ \text{dry} \end{bmatrix}$				o	CL						
- 30-	30											

	AF	FFF AF Pro	Areas (Omaha District) FF Site Inspection bject# M2027.0003	BORING LOC Start Date End Date Northing Easting Surface Elev. (ft)* Total Depth (ft)**	2 - : 04 : 04 : 66 : 12 : 30 : 55	SB /22/ /22/ 2378 2474 5.0	18 18 8.08 74.9	PF	C0	804	Site Name Drilling Compan Drilling Method Driller Borehole Diame Boring Completi Abandonment D DTW During Dril Logged by: Signature:	: AFFF Site 8 y : Cascade Drilling : Mini Sonic : Dennis Schweisthal ter : 6.0 on : Abandoned w/ Grout ate : 04/23/18 ling (ft) 52.0 : Justin Vojak
DEPTH IN FEET (bgs)	NTERVAL	6 RECOVERY	Water Levels During Drilling DESCRI	Measurements *North American Vertical Datum (NAVD88) feet (ft) **Below Ground Surface (bgs) feet (ft) PTION	ID (ppm)	JSCS	Aunsell Soil Color	bepth to Water (DTW)	AMPLE TYPE		SAMPLE ID	REMARKS
30-	6	80	(30.0 - 35.0) CLAY, hard, 10 gray, dry	YR 3/1, very dark	0	CL						
35 — - - -	7	100	(35.0 - 36.0) CLAY, medium 10YR 5/2, grayish brown, dr (36.0 - 52.0) CLAY, hard, 10 gray, dry	plasticity, stiff, y)YR 3/1, very dark	0	CL						
40 - - - 45	8	80			0	CL						
	9	100			0							
- - - 55—	10	90	(52.0 - 52.3) CLAY, stiff, 10 gray, with GRAVEL (40%), v (52.3 - 55.0) CLAY, hard, 10 gray, dry End of borehole 55.0 ft bos	YR 3/1, very dark vet)YR 3/1, very dark	0	CL CL		▼	so	ELS	WH-08-004-SO-051 Note: Interval 51.0 - 52.0 ft	
- - - 60 —												

	AI	FF AF Pro	Areas (Omaha District) FF Site Inspection bject# M2027.0003	S	Start Date End Date Northing Easting Surface Elev (ft) Total Depth (ft)*	G -	V : 05 : 05 : 67 : 12 : 32 : 35	/24/ ⁻ /24/- 6352 4036 47.0	18 18 18 2.29 60.4	>F(C0901 <i>A</i>	Site Nar Drilling (Drilling f Driller Logged Borehol Boring (Depth to Signatu	me Company Method By e Diameter Completion o Water (ft) re	: AFFF Area 9 : Cascade Drilling : Mini-Sonic : Dennis Schweisthal : Justin Vojak : 6.0 in. : 2.0 in. PVC Monitoring Well : 29.5
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	Water Levels During Drilling DESCR	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SAMF	PLE ID	Well: MW1 Elev (TOC)	8PFC0901A :: 3246.81 Elush Mount 12-in diameter		
0 - - 5-	1	100	(0.0-2.0) LEAN CLAY, mo stiff, very slightly moist, 1 brown (2.0-5.0) CLAY with GRA stiff, moist, 10 YR, 5/3, br (45%), fine to coarse, sul (5.0-17.25) LEAN CLAY,	0	CL							Manhole - 8-in. skirt Pad - 2ft X 2ft X 4 in.		
- - - 10- -	2	80	very stiff, dry, 10 YR, 6/3	rown	0	CL							Grout Mix Used: 0.0 - 15.0 ft bgs Portland Cement 94 lb bags Sodium Bentonite (3lbs) Water (7 gallons)	
- - - - - - -	4	80	(17.25-20.0) SILTY SANI loose, fine to coarse, sub well graded very slightly	GRAVEL, to round, 10 YR 5/3	0	sм							Riser 2.0 in. Sch 40 PVC Bentonite Seal 1/4 in. Uncoated Pellets 15.0 - 20.0 ft bgs	
20 - - 25	5	60	(20.0-21.0) SILT with GR non-plastic, dry, 10 YR, 6 Gravel: (25%), fine to coa round	AVEL, 3/3, pale arse, su	soft, brown, b-round to	0	ML SM							— Filter Pack 20/30 Redflint Sand
- - - - 30 –	6	75	loose, fine to coarse, sub well graded, dry, 10 YR, (35%), fine to coarse, sul (25.0-28.0) SILT with GR non-plastic, dry, 10 YR, 6 Gravel: fine to coarse, su (28.0-29.5) SAND, loose,	b-round 5/3, brc b-rounc AVEL, 6/3, pale b-round , fine to	to round, wn, Gravel: to round loose, e brown, d to round coarse, maint 10	0	ML SW SC		V					Screen (10.0 ft) 23.9 - 33.9 ft bgs 0.010 in. continuous wrap vee wire Sch 40 PVC
- - - 35- -	7	80	YR, 5/3, brown, (29.5-30.0) CLAYEY SAN loose, fine to coarse, sub well graded, wet, 10 YR, fine to medium, sub-roun (30.0-35.0) LEAN CLAY, stiff, dry, 10 YR, 4/1, dark		CL							— End Cap		
- 40-			YR, brownish yellow Total Depth of Boring 35.	0 ft BG	S									

AFFF Areas (Omaha District) AFFF Site Inspection Project# M2027.0003 Ellsworth Air Force Base BORING LOG End Date Northing Easting Surface Elev (ft)* Total Depth (ft)**								1W ⁷ /23/ ⁷ /23/ 6165 4013 48.5 .0	18 18 5.17 36.36 7	PF(C0902 <i>A</i>	Site Nar Drilling (Drilling I Driller Logged Borehol Boring (Depth to Signatur	ne Company Method By e Diameter Completion o Water (ft) re	: AFFF Area 9 : Cascade Drilling : Mini-Sonic : Dennis Schweisthal : Justin Vojak : 6.0 in. : 2.0 in. PVC Monitoring Well : 28
PTH IN FEET (bgs)	ERVAL	Water Levels ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓				(mdd)	CS / LITHOLOGY	nsell Color	oth to Water (DTW)	ИРLЕ ТҮРЕ	SAMF	PLEID	Well: MW18 Elev (TOC)	3PFC0902A 3248.22
-0 -0 - - -	1	100	(0.0-5.0) CLAY with GRAVEL, medium plasticity, very stiff, very slightly moist, 10 YR, 5/3, brown, Gravel: (40%), fine to coarse, sub-round to round					Mur	Dep	SAN				Flush Mount, 12-in.diameter Manhole - 8-in. skirt Pad - 2ft X 2ft X 4 in.
5	2	80	(5.0-15.0) LEAN CLAY, r very stiff, dry, 10 YR, 6/3	-15.0) LEAN CLAY, medium plasticity, [,] stiff, dry, 10 YR, 6/3, pale brown										— Grout Mix Used: 0.0 - 15.0 ft bgs Portland Cement 94 lb bags Sodium Bentonite (3lbs) Water (7 gallons)
10	3	80	(45 0 00 0) I FANI CLAY			0	CL							Riser 2.0 in. Sch 40 PVC
	4	70	(15.0-20.0) LEAN CLAY, very stiff, very slighlt mois brown	medium st, 10 YF	ı plasticity, R, 6/3, pale	0	CL							— Bentonite Seal 1/4 in. Uncoated Pellets 15.0 - 20.0 ft bgs
	AF	FFF A AF Pro	Areas (Omaha District) FF Site Inspection oject# M2027.0003	Suc	Start Date End Date Northing Easting Surface Elev (ft) Total Depth (ft)*	G -	: 05 : 05 : 67 : 12 : 32	5/23/ ⁻ 5/23/- 7616 24013 248.5 5.0	18 18 5.17 36.3 7	PF(C0902A	Site Nar Drilling (Drilling I Driller Logged Borehol Boring (Depth to Signatu	ne Company Method By e Diameter Completion o Water (ft)	: AFFF Area 9 : Cascade Drilling : Mini-Sonic : Dennis Schweisthal : Justin Vojak : 6.0 in. : 2.0 in. PVC Monitoring We l
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DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	Water Levels The During Drilling DESCR	Meas *Norti Datur **Belo (bgs	surements n American Vertical n (NAVD88) feet ow Ground Surface) feet	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SAMP	LEID	Well: MW11 Elev (TOC)	BPFC0902A : 3248.22
20-	5	70 100	(20.0-21.0) FAT CLAY, h very slighlt moist, 10 YR, (21.0-22.0) SILTY SAND loose, fine to coarse, sub well graded, dry, 10 YR,	igh pla 6/3, pa with G o-round 5/3, bro	sticity, soft, ale brown RAVEL, to round, own, Gravel:	0	Сн sм							
-	6	58	(40%), fine to coarse, su (22.0-27.5) SILT with GR non-plastic, dry, 10 YR, 6 Gravel: (30%) fine to coa round	b-round AVEL, 5/3, pal arse, su	soft, e brown, b-round to									
25 - - -	7	70	(27.5-28.0) SILTY SAND loose, fine to coarse, sub well graded, damp, 10 YI Gravel: (30%), fine to coa round	with G p-round R, 5/3, arse, si	RAVEL, to round, brown, ub-round to	0	SM		▼					Filter Pack 20/30 Redflint Sand & Gravel 20.0 - 35.0 ft bgs Screen (10.0 ft) 24.1 - 34.1 ft bgs
30	8	80	(28.0-30.0) CLAY with G plasticity, very stiff, very s along gravels from 28.0' brown, Gravel: (30%), fin sub-round to round (30.0-31.0) FAT CLAY, h dry, 10 YR, 5/3, brown (31.0-34.5) CLAY with G plasticity, very stiff, dry, 1 Gravel: (20%), fine to cos round	RAVEL slightly to 28.2 le to co igh pla RAVEL 0 YR, si arse, si	., medium moist, wet 5', 10 YR, 5/3, arse, sticity, stiff, ., medium 5/3, brown, ub-round to	0	CH CL							0.010 m. continuous wrap vee wire Sch 40 PVC
35 - - - 40			(34.5-35.0) LEAN CLAY, stiff, dry, 10 YR, 4/1, darl YR, 6/6, brownish yellow Total Depth of Boring 35.	ow pla k gray, 0 ft BG	asticity, very mottled, 10 SS	}]	

	A	A	erostar SES	BC Suc S E		; 5/2 ; 5/2	SB 21/1/ 21/1/	18 8 8	PF	C0	901	Site Name Drilling Compan Drilling Method Driller Borehole Diame Boring Completi	: AFFF Area 9 y : Cascade Drilling : Mini Sonic : Dennis Schweisthal ter : 6.0 on : Abandoned w/ Grout	
		A Pı Ells	FFF Site Inspection oject# M2027.0003 worth Air Force Base	N E S	lorthing Easting Surface Elev. (ft)* Fotal Depth (ft)**	: 67 : 12 : 32 : 18	635 403 46.2 .0	8.85 57.1 25	3			Abandonment D DTW During Dri Logged by: Signature:	nate : 05/24/18 Iling (ft) 6.0 : Justin Vojak	/
IN FEET	/AL	OVERY	Water Levels ▲ During Drilling	Measur *North A Datum (I **Below (bas) fee	rements American Vertical (NAVD88) feet (ft) g Ground Surface et (ft)	(m		Soil Color	o Water (DTW)	е түре				
DEPTH (bgs	INTERV	% REC(DESCR	IPTION	J	PID (pp	uscs	Munsell	Depth to	SAMPLI		SAMPLE ID	REMARKS	
-0			(0.0 - 5.0) LEAN CLAY, me stiff, dry, 10 YR, 6/3, pale b	edium p la prown	asticity, very	0				SS	ELS	SWH-09-001-SS-001 Note: Interval 0.0 - 1.0 ft.	Borehole	
	1	60					CL							
5-			(5.0-17.0) LEAN CLAY, me stiff, wet, 10 YR, 6/3, pale	edium pla prown	asticity, very	0			•	so	ELS	6WH-09-001-SO-005 Note: Interval 5 0 - 6 0 ft		
	2	100												
10-						0	CL							
	3	100												
15-	4	100	(17.0-18.0) SILTY SAND v	rith GRA	VEL, loose,	0	SM							
		<u> </u>	and to coarse, sub-round to dry, 10 YR, 5/3, brown, Gra coarse, sub-round to round End of Borehole 18.0 ft BG	avel: (40%) avel: (40%) S	weil graded, %), fine to)					<u> </u>			
20-														

	AF	FF AF	Areas (Omaha District) FFF Site Inspection oject# M2027.0003	LLC	Start Date End Date Northing Easting Surface Elev. (ft)*	; 5/2 ; 5/2 ; 67 ; 12 ; 32	21/18 21/18	18 8 7.76 25.8 9	PF	C0	902	Site Name Drilling Compan Drilling Method Driller Borehole Diame Boring Completi Abandonment D DTW During Dri Logged by: Signaturo:	: AFFF Area 9 y : Cascade Drilling : Mini Sonic : Dennis Schweisthal ter : 6.0 on : Abandoned w/ Grout late : 05/24/18 lling (ft) 6.0 : Justin Vojak
			Water Levels	Me	asurements	. 20			Ñ			Signature.	1- 1- 1- 1- 1-
		×	▲ During Drilling	*No Dati	rth American Vertical um (NAVD88) feet (ft)			olor	er (DT	ш			
PTH IN FE (bgs)	ERVAL	RECOVER		**Be (bgs	elow Ground Surface s) feet (ft)	(mdd)	SS	sell Soil C	oth to Wate	APLE TYP		SAMPLE ID	REMARKS
	1 Z	% Р	DESCR	PTI	ON	DIG	NS N	Mur	Dep	SAI			
-0			(0.0 - 2.0) CLAY with GRAV plasticity, very stiff, moist, 1 brown, Gravel: (20%), fine sub-round to round	/EL, 0 YF to me	medium R, 6/3, pale edium,	0	CL			SS	ELS	WH-09-002-SS-001 Note: Interval 0.0 - 1.0 ft.	Borehole
-	1	100	(2.0-5.0) LEAN CLAY, med stiff, dry, 10 YR, 6/3, pale b	ium rowr	plasticity, very n			[]]					
-							CL						
5-			(5.0-15.0) LEAN CLAY, me	dium	n plasticity, very	0		1		so	ELS	3WH-09-002-SO-005	
-					1				▼			Note: Interval 5.0 - 6.0 ft	
-	2	80											
10-						0	CL						
-													
-	3	80											
-]]]					
-													
15-			(15.0-19.0) FAT CLAY, hig stiff, moist, 10 YR, 6/3, pale	h p l a e bro	sticity, medium wn,								
-													
-	4	90					CH						
-			(19 0-20 0) SILTY SAND W	ith C	RAVEL LOSS								
20-			fine to coarse, sub-round to dry, 10 YR, 6/3, pale brown	rou , Gra	nd, well graded, avel: (40%), fine	<u> </u>	SM						
			to coarse, sub-round to rou Total Depth of Boring 20.0	nd ft BG	S								

		A	erostar SES	BORING L	OG	: 5/0	SB	181	PF	C0	903	Site Name Drilling Company Drilling Method Driller Borehole Diame	: AFFF Site 9 y : Cascade Drilling : Mini Sonic : Dennis Schweisthal ter : 6.0
	AF	FF AF Pr Ells	Areas (Omaha District) FF Site Inspection oject# M2027.0003 worth Air Force Base	Northing Easting Surface Elev. (Total Depth (ft)	(ft)*)**	: 5/0 : 67 : 12 : 32 : 35	6213 3988 48.4 .0	3 3.00 32.39 4	9			Boring Completi Abandonment D DTW During Dril Logged by: Signature:	on : Abandoned w/ Grout ate : 05/04/18 lling (ft) 29.0 : Justin Vojak
TH IN FEET ogs)	RVAL	ECOVERY	Water Levels	Measurements North American Vertica Datum (NAVD88) feet (*Below Ground Surfac bgs) feet (ft)	al ft) e	ppm)	S	ell Soil Color	n to Water (DTW)	PLE TYPE		SAMPLE ID	DEMARKS
DEPT	INTE	% RE	DESCRI	TION		PID (nsc	Muns	Depth	SAM			REMARKS
-0			(0.0 - 1.0) CLAY with GRAV plasticity, medium stiff, sligh dark brown, Gravel: fine to c round	EL, medium ly moist, 10 YR, 3/3, parse, sub-round to		0	CL			SS	- ELS Not	SWH09-003-SS-001 e: Interval 0.0-0.5 ft	Borehole
-	1	100	coarse, sub-round to round, moist, 10 YR, 4/3, brown	NOSE, THE TO well graded, slightly			GC						
5-			(4.5-10.0) LEAN CLAY, med stiff, dry, 10 YR, 6/3, pale br	um p l asticity, very wn		0							
-	2	100					CL						
10			(10.0-15.0) FAT CLAY, med stiff, dry, 10 YR, 6/3, pale br	um to high p l asticity wn	,	0							
	3	100				0	СН						
			(15.0-16.0) FAT CLAY, high moist, 10 YR, 6/3, pale brow	plasticity, stiff, n		0	сн						
-	4	70	(16.0-20.0) GRAVELLY SAN coarse, sub-round to round, 10 YR, 5/3, brown, Gravel: (coarse, sub-round to round	D, loose, fine to well graded, dry, 10%), fine to			sw						
20-	5	100	(20.0-23.0) SILTY SAND with fine to coarse, sub-round to dry, 10 YR, 7/3, very pale br (40%), fine to coarse, sub-ro	n GRAVEL, loose, ound, well graded, wn, Gravel: und to round		0	sм						

	AF	FFF AF Pro	Areas (Omaha District) FF Site Inspection bject# M2027.0003	Start Date End Date Northing Easting Surface Elev. (ft)* Total Depth (ft)**	: 5/0 : 5/0 : 67 : 12 : 32 : 35	SB 04/18 04/18 6213 3988 48.4	18 3 3.00 32.39 4	PF	C0	9903	Site Name Drilling Company Drilling Method Driller Borehole Diame Boring Completio Abandonment D DTW During Dril Logged by: Signature:	: AFFF Site 9 y : Cascade Drilling : Mini Sonic : Dennis Schweisthal ter : 6.0 on : Abandoned w/ Grout ate : 05/04/18 ling (ft) 29.0 : Justin Vojak :
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	Water Levels During Drilling DESCRIF	Measurements *North American Vertical Datum (NAVD88) feet (ft) **Below Ground Surface (bgs) feet (ft) PTION	PID (ppm)	USCS	Munsell Soil Color	Depth to Water (DTW)	SAMPLE TYPE	s	SAMPLE ID	REMARKS
- 22	5	62.5	(23.0-25.0) SILT with GRAV dry, 10 YR, 7/3, very pale br (25%), fine to coarse, sub-ar	EL, soft, non-plastic, own, Gravel: ngular to round		SM ML						
- 27 –	7	50	(25.0-29.0) SILTY SAND wit fine to coarse, sub-round to dry, 10 YR, 7/3, very pale br (40%), fine to coarse, sub-ro	h GRAVEL, loose, round, well graded, own, Gravel: und to round		SM			so	ELSWI	H-09-003-SO-028 Jote: Interval	
- - 32-	8	40	(29.0-30.0) SILTY SAND wit fine to coarse, sub-round to damp, 10 YR, 7/3, very pale (40%), fine to coarse, sub-rou (30.0- 33.0) SILT with GRAV non-plastic, dry, 10 YR, 7/3, Gravel: (25%), fine to mediu round	h GRAVEL, loose, round, well graded, brown, Gravel: und to round // EL, soft, very pale brown, m, sub-round to	0	SM ML					28.0 - 29.0 ft	
-			(33.0-35.0) LEAN CLAY, ha dark gray, mottled, 10 YR, 6 Total Depth of Boring 35.0 ft	d, dry, 10 YR, 4/1, 6, brownish yellow BGS		CL						
37-												
- - 42 —												

		A	erostar SE	Suc		G	- ^	// //	/18 18	8PF	C1001	Site Nar Drilling (Drilling I Driller Logged	me Company Method Bv	: AFFF Area 10 : Cascade Drilling : Mini-Sonic : Dennis Schweisthal : Justin Vojak
	AI	FFF Af Pr	Areas (Omaha District) FFF Site Inspection oject# M2027.0003		End Date Northing Easting Surface Elev (ft	*	: 04 : 66 : 12 : 31	/24/ 754 479 22.1	18 5.64 46.0 4	7		Borehol Boring (Depth to	e Diameter Completion	: 6.0 in. : 2.0 in. PVC Monitoring Well : 41,0
		Elis	Water Levels	Moo			. 50	1.0				Signatu		1 VOVI
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY		*Nortl Datur **Belo (bgs	h American Vertical n (NAVD88) feet ow Ground Surface i) feet	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Depth to Water (DTW	SAMPLE TYPE	SAMP	PLE ID	Well: MW1 Elev (TOC)	8PFC1001 : 3121.76 — Flush Mount,12-in.diameter
-00	1	100	(0.0-0.5) CLAY with GRA plasticity,stiff, slightly mo brown (0.5-9.75) GRAVEL FILL	VEL, r ist, 10	nedium YR, 3/3, dark	0	CL			SS	ELS 10-001- Note: I 0.0 -	WH SS-001 nterval 0.5 ft		Manhole - 8-in. skirt Pad - 2ft X 2ft X 4 in.
5-	2	30				0	GP							
10-	3	80	(9.75-10.0) CLAY with G plasticity, medium stiff, sl 3/2, very dark grayish bro (10.0-17.0) LEAN CLAY, stiff, dry, 10 YR, 6/2, light mottled, 10 YR, 6/6, brow	RAVEL lightly r own, (3 low pla t brown vnish y	., high noist, 10 YR, 0%) gravel asticity, very nish gray, ellow	0	CL							
	4	80	(17.0-20.0) LEAN CLAY, stiff, dry, 10 YR, 4/1, dark YR, 6/2, light brownish gi brownish yellow	low pla k gray, ray, 10	asticity, very mottled, 10 YR, 6/6,		CL							 Riser 2.0 in. Sch 40 PVC Grout Mix Used: 0.0 - 30.0 ft bgs Portland Cement 94 lb bags Sodium Bentonite (3lbs) Water (7 gallons),
-	5	100	(20.0-25.0) LEAN CLAY, 3/1, very dark gray, mottl brownish yellow	hard, d led, 10	dry, 10 YR, YR, 6/6,	0	CL							
25-	6	100	(25.0-30.0) LEAN CLAY, 3/1, very dark gray	hard, d	dry, 10 YR,	- 0	CL							
30-		J] 0		12		l			鐵鐵	

	AI	FF Af Pr Ells	Areas (Omaha District) FF Site Inspection oject# M2027.0003 worth Air Force Base	Suc	BORING LC Start Date End Date Northing Easting Surface Elev (ft) Total Depth (ft)*)G	- : 04 : 04 : 66 : 12 : 31 : 50	M W 4/24/ ⁻ 4/24/- 57545 24794 122.1 0.0	/18 18 5.64 46.0 4	⁷	C1001	Site Nar Drilling Driller Logged Borehol Boring (Depth to Signatu	ne Company Method By e Diameter Completion o Water (ft) re	: AFFF Area 10 : Cascade Drilling : Mini-Sonic : Dennis Schweisthal : Justin Vojak : 6.0 in. : 2.0 in. PVC Monitoring Well : 41.0
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	Water Levels During Drilling DESCR	Meas *Nort Datur **Belo (bgs	surements h American Vertical n (NAVD88) feet ow Ground Surface s) feet	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SAMF	PLE ID	Well: MW1 Elev (TOC)	8PFC1001 1: 3121.76
30 - - - - - - - - - - -	8	100	(30.0-33.0) LEAN CLAY, stiff, slightly moist, 10 YR	low pla 8, 3/1, v	asticity, very /ery dark gray	0								Bentonite Seal 1/4 in. Uncoated Pellets 30.0 - 35.0 ft bgs Riser 2.0 in. Sch 40 PVC
- - - 40-	9	100				0	CL			so	ELS 10-001-	SWH SO-040		— Filter Pack 20/30
- - - 45-	10	100	(41.0-46.0) LEAN CLAY, plasticity, medium stiff, w dark gray	low to et, 10	medium YR, 3/1, very	0	CL		▼		Note: 40.0 to	nterval 9 41.0 ft		Redflint Sand & Gravel 35.0 - 50.0 ft bgs Screen (10.0 ft) 38.8- 48.8 ft bgs 0.010 in. continuous wrap vee wire Sch 40 PVC
- - - 50-	11	100	(46.0-50.0) LEAN CLAY, 3/1, very dark gray Total Depth of Boring 50.	hard, o	dry, 10 YR,		CL							— End Cap
55-	-													
- - - 60-	-													

	AF	FF Af Pr Ells	Areas (Omaha District) FFF Site Inspection oject# M2027.0003 worth Air Force Base	Suc	Start Date End Date Northing Easting Surface Elev (ft) Total Depth (ft)*)G	- Г : 05 : 05 : 66 : 12 : 31 : 40	///// 5/04/ 5/04/ 57609 24803 22.2 0.0	/18 18 9.77 36.80 6	6	C1002	Site Nar Drilling I Driller Logged Borehol Boring O Depth to Signatu	ne Company Method By e Diameter Completion o Water (ft) re	: AFFF Area 10 : Cascade Drilling : Mini-Sonic : Dennis Schweisthal : Justin Vojak : 6.0 in. : 2.0 in. PVC Monitoring Well : 30.0
EET		۲۲	Water Levels ▲ During Drilling	Meas *North Datun	American Vertical (NAVD88) feet		OLOGY		ter (DTW)	ЪЕ				1
DEPTH IN F (bgs)	NTERVAL	% RECOVE	DESCRI	(bgs)	w Ground Surface) feet	OID (ppm)	JSCS / LITH	Munsell Colc	Depth to Wa	SAMPLE TY	SAMF	PLE ID	Well: MW18 Elev (TOC):	3PFC1002 3121.75
0-	_	0	(0.0-2.0) LEAN CLAY, low stiff, slightly moist, 10 YR,	v plasti , 3/3, d	city, medium ark brown	0	CL			SS	ELS 10-002- Note: I	WH SS-001 nterval		 ─ Flush Mount,12-in.diameter ─ Manhole - 8-in. skirt ← Pad - 2ft X 2ft X 4 in.
-	1	100	(2.0-5.0) CLAY with GRAN stiff, slightly moist, 10 YR, Gravel: (30%), fine to med round	VEL, lc , 4/3, b dium, s	ow plasticity, rown, sub-round to	-	CL				0.0 -	0.5 ft		
5-			(5.0-9.0) GRAVEL, mediu coarse, sub-angular to rou dry, (fill), 10 YR, 7/3, very	ım den und, w pa l e b	se, fine to ell graded, rown	0								
-	2	60					GМ							
- 10			(9.0-10.0) CLAY with GRA plasticity, stiff, dry, 10 YR, grayish brown, Gravel: (20 coarse, sub-round to roun	AVEL, , 3/2, v 0%), fii nd	high ery dark ne to	0	СН							
-	3	55	(10.0-12.0) CLAY with GR plasticity, soft, slightly moi grayish brown, Gravel: (30 medium, sub-round to rou	RAVEL ist, 10 0%), fii ind	, medium YR, 4/2, dark ne to									— Grout Mix Used: 0.0 - 20.0 ft bgs Portland Cement 94 lb bags Sodium Bentonite (3lbs) Water (7 gallons)
- 15—			(12.0-15.0) LEAN CLAY, I stiff, dry, 10 YR, 6/3, pale YR, 6/6, brownish yellow, (15.0-20.0) LEAN CLAY, I	brown	sticity, very , mottled, 10	• 0	CL							Riser 2.0 in. Sch 40 PVC
-	4	50	stiff, dry, 10 YR, 6/3, pale YR, 5/1, Gray, 10 YR, 6/6,	brown , yellov	, mottled, 10 vish brown		CL							
-														
20-			(20.0-23.5) LEAN CLAY, H 3/1, very dark gray, mottle brownish yellow	hard, c ed, 10	lry, 10 YR, YR, 6/6,		CL							— Bentonite Seal 1/4 in. Uncoated Pellets 20.0 - 25.0 ft bgs
-	5	70	(23.5-27.0) LEAN CLAY, H	hard, c	Iry, 10 YR,	-								— Filter Pack 20/30 Redflint Sand
25—	6		אין, very dark gray,			0	CL							& Gravel 25.0 - 40.0 ft bgs

	AF	FF AF Pr	Areas (Omaha District) FF Site Inspection oject# M2027.0003	Suc	BORING LC Start Date End Date Northing Easting Surface Elev (ft) Total Depth (ft)*	•G	- N : 05/ : 05/ : 66 [°] : 124 : 312 : 40.	//VV /04/1 /04/1 7609 4803 22.26	718 8 9.77 66.80 6	PF	C1002	Site Nar Drilling I Driller Logged Borehol Boring O Depth to Signatu	me Company Method By e Diameter Completion o Water (ft) re	: AFFF Area 10 : Cascade Drilling : Mini-Sonic : Dennis Schweisthal : Justin Vojak : 6.0 in. : 2.0 in. PVC Monitoring Well : 30.0
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	Water Levels During Drilling DESCR	Meas *North Datur **Belo (bgs	Surements n American Vertical n (NAVD88) feet ow Ground Surface) feet	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SAMP	PLE ID	Well: MW18 Elev (TOC):	3PFC1002 : 3121.75
26-	6	100					cl	12						
-	7	100	(27.0-30.0) LEAN CLAY, 3/1, very dark gray	stiff, d	ry, 10 YR,	-	CL		-	SO	ELS 10-002-1	WH SO-029		Riser 2.0 in. Sch 40 PVC
- 31 — - -	8	100	(30.0-36.0) LEAN CLAY, medium stiff, wet, 10 YR,	low pla 3/1, ve	asticity, ery dark gray	- 0	CL		•		Note: II 29.0 to	nterval 30.0 ft		 Filter Pack 20/30 Redflint Sand & Gravel 25.0 - 40.0 ft bgs Screen (10.0 ft) 29.3-39.3 ft bgs
- 36 - -	9	100	(36.0-40.0) LEAN CLAY, 3/1, very dark gray	hard, d	dry, 10 YR,	0	CL							0.010 in. continuous wrap vee wire Sch 40 PVC
- 41 — - -			Total Depth of Boring 40.	0 ft BG	BS		<u> </u>							
- 46 - -														
51—														

		A	erostar SE	Suc		G	- • 0!	MV	V18	BPF	C1003	Site Nar Drilling Drilling I Driller	me Company Method By	: AFFF Area 10 : Cascade Drilling : Mini-Sonic : Dennis Schweisthal : Justin Voiak
	Ał	FF AF Pr	Areas (Omaha District) FFF Site Inspection oject# M2027.0003		End Date Northing Easting Surface Elev (ft)	*	: 0 : 6 : 1 : 1	5/31/ 6735 2482 113.3	18 3.43 09.1 30	9		Borehol Boring (Depth to	e Diameter Completion	: 6.0 in. : 2.0 in. PVC Monitoring Well : 51.0
		Ells	worth Air Force Base		Total Depth (ft)*	*	: 60	0	1	1	1	Signatu	re	1 1169
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	Water Levels During Drilling DESCR	Meas *North Daturn **Belo (bgs	surements n American Vertical n (NAVD88) feet ow Ground Surface) feet	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SAMF	PLE ID	Well: MW11 Elev (TOC)	8PFC1003 : 3113.16
-0 - - -	1	100	(0.0-5.0) CLAY with GRA stiff, very slightly moist, 1 brown, Gravel: (20%), fin sub-round to round	VEL, Id 0 YR, 3 e to co	ow plasticity, 3/3, dark arse,	0	СІ			SS	ELS 10-003- Note: 1 0.0 -	SWH -SS-001 Interval -0.5 ft		Manhole - 8-in. skirt Pad - 2ft X 2ft X 4 in.
5	2	75	(5.0-10.0) LEAN CLAY, Id very slightly moist, 10 YR gray, mottled with trace 1 10 YR, 6/6, brownish yell	ow plas 8, 6/2, li 0 YR, s ow	sticity, stiff, ight brownish 5/1, gray, and	0	СІ							
- 10 - - -	3	100	(10.0-15.0) LEAN CLAY, dry, 10 YR, 5/2, grayish b	low pla prown	asticity, stiff,	- 0	СІ							— Grout Mix Used:
15- - - - - 20-	4	90	(15.0-50.0) LEAN CLAY, 4/1, dark gray, siltstone k	hard, d ense 49	dry, 10 YR, 9.9'-50.0'	0								0.0 - 40.0 ft bgs Portland Cement 94 lb bags Sodium Bentonite (3 lbs) Water (7 gallons) — Riser 2.0 in Sch 40 PVC
-	5	95					СІ							
25-	6	100				0								
- - 30-	7	100				0								
	8													



	AF	A FFF	Areas (Omaha District) FF Site Inspection oject# M2027.0003	5	Start Date End Date Northing Easting Surface Elev (ft)*	- : 0 : 0 : 1 : 3	5/09 5/09 5/09 717 ⁻ 243(200.	/18)/18)/18 14.97 088.9 (69	PF , ,99	CC	01101	Site Name Drilling Comp Drilling Metho Driller Logged By Borehole Dia Boring Comp Depth to Wat	: AFFF Area 11 : Cascade Drilling : Mini-Sonic : Dennis Schweisthal : Justin Vojak ameter : 6.0 in. pletion : 2.0 in. PVC Monitoring Well ater (ft) : 13.0	/
		Ells	worth Air Force Base	Mo		: 2	1.0.0		5			Signature	4.444	-
PTH IN FEET (bgs)	'ERVAL	RECOVERY	✓ During Drilling	*Noi Dati **Be (bg	rth American Vertical um (NAVD88) feet elow Ground Surface gs) feet	(mqq) (CS / LITHOLOGY	nsell Color	oth to Water (DTW	MPLE TYPE	s	AMPLE ID	Well: MW18PFC01101 Elev (TOC): 3200.37	
DE	I Z	% F	DESCR	IPTI	ON		N.	Mu	Dep	SAI			Flush Mount,12-in.dia	mete
-0	1	40	(0.0-2.0) LEAN CLAY, low slightly moist, 10 YR, 3/3, c (2.0-5.0) GRAVEL FILL	plast Jark b	icity, stiff, very brown	0	CL			SS	- 01 N	ELSWH 1-001-SS-001 lote: Interval 0.0 - 0.5 ft	Manhole - 8-in. skirt Pad - 2ft X 2ft X 4 in. Grout Mix Used: 0.0 - 1.0 ft bgs Portland Cement 94 lb bag Sodium Bentonite	
						0	GN						(3) lbs Water (7 gallons) — Bentonite Seal 1/4 in. Uncoated Pallete	
-	2	60	(5.0-9.0) LEAN CLAY, low dry, 10 YR, 4/3, brown, mo white,	plasti ttled,	icity, very stiff, 10 YR, 8/1,		CL						1.0 - 5.0 ft bgs	
- 10	3	100	(9.0-10.0) CLAY with GRA plasticity, stiff, dry, 10 YR, 1 (15%), fine to coarse, sub- (10.0-13.0) CLAYEY SANE loose, fine to coarse, sub- graded, moist, 10 YR, 4/3, (40%), fine to coarse, sub- (13.0-13.5) CLAYEY SANE fine to coarse, sub-round to wet 10 YR 4/3 brown Gr	VEL, 5/3, b round 0 San ound brow round round 0 with o round avel:	medium prown, Gravel: t to round d with Gravel, to round, well n, Gravel: t to round Gravel, loose, nd, well graded, (40%) fine to	0	CL SC SC		▼	SO	- 11 - N 1	ELSWH -001-SO-012 lote: Interval 2.0 to13.0 ft	Riser 2.0 in. Sch 40 PVC Filter Pack 20/40 Redflint Sand & Gravel 5.0 - 20.0 ft bgs	
15- - - -	4	40	(13.5-14.5) SAND, loose, fi poorly graded, wet, 10 YR, (14.5-15.0) CLAYEY SANE fine to coarse, sub-round to damp, 10 YR, 4/3, brown, (coarse, sub-round to round (15.0-19.0) SAND, loose, fi	ine gr 4/3, 0 with 0 rour Grave	rained, round, brown Gravel, loose, nd, well graded, sl: (40%), fine to rained, round,	240	SP						0.010 in. continuous wrap vee wire Sch 40 PVC	
20-		<u> </u>	poorly graded, saturated, 1 (19.0-19.5) CLAY with GR/ plasticity, stiff, damp, staini YR, 5/3, brown, Gravel: find sub-round to round (19.5-20.0) FAT CLAY, hig dry, 10 YR, 4/2, dark grayis Total depth of boring 20.0 f	0 YR AVEL ing pe e to c h pla sh bro	, 4/3, brown , medium etroleum odor, 10 coarse, sticity, very stiff, own						<u> </u>			
25														

	AI	FF Af Pr	Areas (Omaha District) FFF Site Inspection oject# M2027.0003 worth Air Force Base	Suc	Start Date End Date Northing Easting Surface Elev (ft) Total Depth (ft)*	G -	: 0: : 0: : 6: : 1: : 3: : 2:	5/09/ ⁻ 5/09/- 70932 2436 ⁻ 193.4 0.0	18 18 2.52 79.8	>FC	201102	Site Nar Drilling Driller Logged Borehol Boring (Depth to Signatu	me Company Method By e Diameter Completion o Water (ft) re	: AFFF Area 11 : Cascade Drilling : Mini-Sonic : Dennis Schweisthal : Justin Vojak : 6.0 in. : 2.0 in. PVC Monitoring Well : 11.0
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	Water Levels During Drilling	Meas *Nortl Datur **Belo (bgs	n American Vertical n (NAVD88) feet bw Ground Surface) feet	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SAMF	PLE ID	Well: MW18 Elev (TOC):	3PFC01102 : 3193.12 — Flush Mount,12-in,diameter
-0 - - -	1	100	(0.0-2.0) CLAY with GRA medium stiff, slightly moi brown, Gravel: (15%), fir sub-round to round (2.0-6.0) GRAVEL FILL	VEL, Id st, 10 \ le to co	ow plasticity, ′R, 4/3, arse,	0	СІ			SS	ELS 011-002 Note: I 0.0 -	SWH -SS-001 nterval 0.5 ft		Manhole - 8-in. skirt Pad - 2ft X 2ft X 4 in. Grout Mix Used: 0.0 - 1.0 ft bgs Portland Cement 94 lb bag Sodium Bentonite (3) lbs Water (7 gallons)
- 5-	2	0	(6.0-10.0) GRAVELLY S	AND, Id	pose, fine to	0	GV	N						— Bentonite Seal 1/4 in. Uncoated Pellets 1.0 - 5.0 ft bgs
	3	60	to coarse, sub-round to round to round to round to round to r	, Grave	biab	- 0	sv	N			ELS	SWH		Riser 2.0 in. Sch 40 PVC
-	4	80	(10.0-11.0) CLAY with G plasticity, soft, moist, 10 Gravel: (15%), fine to co- round (11.0-12.0) CLAYEY GR coarse, sub-round to rou wet, 10 YR, 4/3, brown	AVEL YR, 5/3 arse, si AVEL, nd, wel	, ngn 8, brown, Jub-round to loose, fine to I graded,		G		•	SO	Note: I 10.0 to	nterval o11.0 ft		Filter Pack 20/30 Redflint Sand & Gravel 5.0 - 20.0 ft bgs
	5	95	(12.0-15.5) LEAN CLAY, medium stiff, wet, 10 YR (35%), fine to coarse, su (15.5-20.0) LEAN CLAY, stiff, dry, 10 YR, 4/1, darl YR, 6/2, light grayish bro brownish yellow	low pla , 4/3, bi b-round low pla < gray, wn, 10	asticity, rown, Gravel: d asticity, very mottled, 10 YR, 6/6,	0	СІ							Screen (10.0 ft) 9.1 - 19.1 ft bgs 0.010 in. continuous wrap vee wire Sch 40 PVC
20-			Total depth of boring 20.	0 ft BG	S									— End Cap
- - 25—														
-														
30-														

	AI	FF AF Pr	Areas (Omaha District) FF Site Inspection oject# M2027.0003	Surface Elev (ft))*	- N : 05 : 05 : 67 : 12 : 31 : 25	//// 5/04/ 5/04/ 7019 2443 195.2 5.0	/18 /18 /18 /1.48 /93.7 21	PF	C01103	Site Nar Drilling (Drilling N Driller Logged Borehold Boring C Depth to Signatur	ne Company Aethod By e Diameter Completion o Water (ft) re	: AFFF Area 11 : Cascade Drilling : Mini-Sonic : Dennis Schweisthal : Justin Vojak : 6.0 in. : 2.0 in. PVC Monitoring Well : 16.0
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	Water Levels During Drilling DESCR	Measurements *North American Vertical Datum (NAVD88) feet **Below Ground Surface (bgs) feet	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SAMP	PLE ID	Well: MW1 Elev (TOC	8PFC01103): 3194.91
-0 - - -	1	100	(0.0-5.0) LEAN CLAY, me medium stiff, slightly mois brown	edium plasticity, st, 10 YR, 3/3, dark	0	CL			SS	ELS 011-003 Note: I 0.0 -	WH -SS-001 nterval 0.5 ft		Grout Mix Used: 0.0 - 6.0 ft bgs Portland Cement
5- - - -	2	40	(5.0-9.5) SAND, loose, fir sub-round to round, well moist, 10 YR, 5/3, brown	ne to coarse, graded, very slightly	0	sw	v						94 lb bags Sodium Bentonite (3bs) Water (7gallons) — Bentonite Seal 1/4 in. Uncoated Pellets
- 10 - - -	3	80	(9.5-10.0) CLAY with GR very stiff, dry, 10 YR, 5/3. fine to medium, sub-angu (10.0-13.0) SILTY SAND loose, fine to coarse, sub well graded, dry, 10 YR, 0 (13.0-15.0) SILT with GR non-plastic, dry, 10 YR, 7 brown, Gravel: (40%), fin	AVEL, low plasticity , brown, Gravel: ular to round with GRAVEL, p-round to round, 6/3, pale brown AVEL, soft, 7/3, very pale e to coarse,	0	<u>CL</u> SN	-						6.0 - 11.0 ft bgs Riser 2.0 in. Sch 40 PVC
15 - - - - -	4	80	sub-round to round (15.0-16.0) SILT, soft, no YR, 5/3, brown, (16.0-18.5) SANDY GRA fine to coarse, sub-round graded, wet, 10 YR, 4/3, (18.5-19.5) SAND, loose, sub-round to round, well 4/3, brown	on-plastic, dry, 10 VEL, (85%) Gravel, to round, well brown , fine to coarse, graded, wet, 10 YR,		ML GW SW	- V V	.	so	ELS 11-003- Note: Ii 15.0 to	WH SO-015 nterval 516.0 ft		 Filter Pack 20/40 Redflint Sand & Gravel 11.0 - 25.0 ft bgs Screen (10.0 ft) 13.5 - 23.5 ft bgs 0.010 in. continuous wrap vee wire Sch 40 DVC
20-	5	80	(19.5-20.0) CLAY with Gl plasticity, very stiff, moist brown, Gravel: (30%), fin sub-round to round (20.0-24.0) SAND with G to coarse, sub-round to ro wet, 10 YR, 5/3, brown, C to medium, sub-round to	RAVEL, low , 10 YR, 5/3, e to coarse, RAVEL, loose, fine ound, well graded, Gravel: (30%), fine round		SW	-						— End Cap
	-		(24.0-25.0) LEAN CLAY, YR, 4/1, dark gray, mottle grayish brown, and 10 YF yellow Total depth of boring 25.0	very stiff, dry, 10 ed, 10 YR, 6/2, light R, 6/6, brownish D ft BGS									_

	AF	FFF AF Pro	Areas (Omaha District) FF Site Inspection oject# M2027.0003	BORING LOC Start Date End Date Northing Easting Surface Elev. (ft)* Total Depth (ft)**	; 5/0 ; 5/0 ; 67 ; 12 ; 31 ; 15	SB 09/18 09/18 71243 24348 96.8 5.0	18 8 3.77 81.2	PF	C1	104	Site Name Drilling Compan Drilling Method Driller Borehole Diame Boring Completi Abandonment D DTW During Dril Logged by: Signature:	: AFFF Site 11 y : Cascade Drilling : Mini Sonic : Dennis Schweisthal ter : 6.0 on : Abandoned w/ Grout hate : 05/09/18 lling (ft) 13.0 : Justin Vojak
DEPTH IN FEET (bgs)	NTERVAL	% RECOVERY	Water Levels During Drilling DESCRIF	Measurements *North American Vertical Datum (NAVD88) feet (ft) **Below Ground Surface (bgs) feet (ft) PTION	(mqq) Ole	JSCS	Aunsell Soil Color	Depth to Water (DTW)	SAMPLE TYPE		SAMPLE ID	REMARKS
-0	1	100	(0.0 - 4.0) LEAN CLAY, mec slightly moist, 10 YR, 3/3, da	lium plasticity, stiff, ark brown,	0	CL			ss	ELS	WH-11-004-SS-001 Note: Interval 0.0 - 1.0 ft	Borehole
5			(4.0-5.0) LEAN CLAY, low p dry, 10 YR, 4/3, brown, mott white (5.0-7.0) CLAYEY SAND wit fine to coarse, sub-round to dry, 10 YR, 5/3, brown, Grav coarse, sub-round to round	lasticity, very stiff, led, 10 YR, 8/1, th GRAVEL, loose, round, well graded, vel: (30%), fine to	0	CL SC						
- - 10-	2	100	(10.0-13.0) FAT CLAY, high	plasticity, medium	• 0	SP	111					
	3	80	(13.0-14.0) CLAY with GRA density, medium stiff, wet, 1 Gravel: (40%), fine to coarse round	VEL, medium 0 YR, 5/3, brown, e, sub-round to		CH CL		•	SO	ELS	WH-11-004-SO-012 Note: Interval 12.0 - 13.0 ft	
15—			(14.0-15.0) CLAYEY SAND loose, fine to coarse, sub-ro graded, wet, 10 YR, 4/3, bro fine to coarse, sub-round to Total Depth of Boring 15.0 ft	with GRAVEL, und to round, well wm, Gravel: (40%), round t BGS	ļ	SC						

	AF	FFF AF	Areas (Omaha District) FFF Site Inspection oject# M2027.0003	BORING LOC Start Date End Date Northing Easting Surface Elev. (ft)* Total Depth (ft)**	5 - : 5/ : 5/ : 12 : 3 ⁷ : 15	SB 09/1 09/1 7070 2439 194.9 5.0	8 18 8 6.37 46.9	PF	C1	105	Site Name Drilling Compan Drilling Method Driller Borehole Diame Boring Completi Abandonment D DTW During Dri Logged by: Signature:	: AFFF Site 11 y : Cascade Drilling : Mini Sonic : Dennis Schweisthal ter : 6.0 on : Abandoned w/ Grout hate : 05/09/18 lling (ft) 14.0 : Justin Vojak
E			Water Levels ▲ During Drilling	Measurements *North American Vertical Datum (NAVD88) feet (ft)			lor	(DTW)				
H IN FEE	WAL	COVERY		**Below Ground Surface (bgs) feet (ft)	(md		II Soil Co	to Water	LE TYPE			
DEPTI (bg	INTER	% REC	DESCRI	PTION	PID (p	USCS	Munse	Depth	SAMP		SAMPLEID	REMARKS
0-			(0.0 - 2.0) LEAN CLAY, me slightly moist, 10 YR, 5/3, b	dium plasticity, stiff, rown,	0	CL			SS	ELS	WH-11-005-SS-001 Note: Interval 0.0 - 1.0 ft.	Borehole
-	1	100	(2.0-4.5) SANDY CLAY wit plasticity, medium stiff, sligi brown, Gravel: (30%), fine to round	n GRAVEL, medium ntly moist, 10 YR, 5/3, o coarse, sub-round		CL						
5-			(4.5-6.0) SILTY SAND with to coarse, sub-round to rou 10 YR, 6/3, pale brown, Gra coarse, sub-round to round	GRAVEL, loose, fine nd, well graded, dry, avel: (40%), fine to	0	SM						
-	2	80	(6.0-9.0) GRAVELLY SAND coarse, sub-round to round moist, 10 YR, 4/3, brown, G coarse, sub-round to round), loose, fine to , well graded, slightly iravel: (30%), fine to	-	sw	,					
- 10-			(9.0-10.0) CLAYEY SAND fine to coarse, sub-round to slightly moist, 10 YR, 4/3, b fine to coarse, sun-round to	with GRAVEL, loose, round, well graded, rown, Gravel: (40%), round	0	sc						
-	3	80	(10.0-11.0) SILT with GRA dry, 10 YR, 6/3, pale brown to medium, sub-angular to (11.0-14.0) CLAYEY SAND loose, fine to coarse, sub-ro graded, moist, 10 YR, 4/3, (40%), fine to coarse, sub-ro	/EL, soft, non-plastic, , Gravel: (15%), fine round with GRAVEL, bund to round, well brown, Gravel: ound to round		SC						
_							1	•	so	ELS	WH-11-005-SO-013 Note: Interval	
15—			(14.0-15.0) CLAYEY SAND loose, fine to coarse, sub-ro graded, wet, 10 YR, 4/3, br \fine to coarse, sub-round to	with GRAVEL, bund to round, well bwn, Gravel: (40%), round	ļ	sc					13.0 - 14.0 ft	
			Total Depth of Boring 15.0	't BGS								

	AI	FFF AF	Areas (Omaha District) FF Site Inspection oject# M2027.0003	Suc BORING LC Start Date End Date Northing Easting Surface Elev (ft Total Depth (ft))G	- : 04 : 04 : 67 : 12 : 33 : 35	4/19/ 4/19/ 7913 2410 327.7	V18 18 18 5.35 07.4 79	3PF	C1201	Site Nar Drilling Driller Logged Borehol Boring (Depth to Signatu	me Company Method e Diameter Completion o Water (ft) re	: AFFF Area 12 : Cascade Drilling : Mini-Sonic : Dennis Schweisthal : Justin Vojak : 6.0 in. : 2.0 in. PVC Monitoring Well : 24.0
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	Water Levels During Drilling DESCR	Measurements *North American Vertical Datum (NAVD88) feet **Below Ground Surface (bgs) feet	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SAMF	PLEID	Well: MW18 Elev (TOC):	SPFC1201 3330.51 Stickup 4 y4 in. Pro Top
-00	1	100	(0.0-4.0) FAT CLAY, high soft, moist, 10 YR, 2/2, ve	plasticity, very ery dark brown	0	CL			SS	ELS 12-001- Note: 0.0 -	SWH -SS-001 Interval -0.5 ft		2ftX2ftX4in. Pad
5-			(4.0-5.0) LEAN CLAY, ha brown (5.0-8.0) LEAN CLAY, stit light brownish gray, mottle YR, 1/1, white	rd, dry, 10 YR, 4/3, ff, dry, 10 YR, 6/2, ed with trace 10	0	CL							
- - 10-	2	70	(8.0-10.0) LEAN CLAY, m hard, dry, 10 YR, 5/2, gra mottling with 10 YR, 6/6, I (10.0-15.0) LEAN CLAY, YR, 5/2, grayish brown, tr	nedium plasticity, yish brown, trace brownish yellow, medium stiff, dry, 10 ace mottling, 10	- 0	CL							Grout Mix Used: 0.0 - 14.0 ft bgs Portland Cement 94 lb bags Sodium Bentonite (3lbs) Water (7 gallons)
-	3	80	YR, 6/6, drownish yellow			CL							Riser 2.0 in. Sch 40 PVC
15-	4	100	(15.0-20.0) LEAN CLAY, 4/1, dark gray, mottled, 10 yellow	hard, dry, 10 YR,) YR, 6/6, brownish	- 0	CL							— Bentonite Seal 1/4 in. Uncoated Pellets 14.0 - 19.0 ft bgs
20-	5		(20.0-24.0) LEAN CLAY, 4/1, dark gray, trace mott brownish yellow	hard, dry, 10 YR, ling, 10 YR, 6/6,	0	СГ							— Filter Pack 20/30 Redflint Sand & Gravel 19.0 - 35.0 ft bgs

	AF	FF AF Pr	Areas (Omaha District) FF Site Inspection oject# M2027.0003 worth Air Force Base	Surface Elev (ft) Total Depth (ft)*)* .*	- / : 04 : 04 : 67 : 12 : 33 : 35	//19/ //19/ /913: 2410: 327.7	/18 18 5.35 07.4 79	• P F	C1201	Site Nar Drilling I Driller Logged Borehol Boring C Depth to Signatu	ne Company Method By e Diameter Completion o Water (ft) re	: AFFF Area 12 : Cascade Drilling : Mini-Sonic : Dennis Schweisthal : Justin Vojak : 6.0 in. : 2.0 in. PVC Monitoring Well : 24.0
DEPTH IN FEET	INTERVAL	% RECOVERY	Water Levels During Drilling DESCR	Measurements *North American Vertical Datum (NAVD88) feet **Below Ground Surface (bgs) feet	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SAMF	PLE ID	Well: MW18 Elev (TOC):	3PFC1201 : 3330.51
-	5	80	(24.0-24.5) CLAY with G	RAVEL, hard, damp gray, mottled, 10 YR,		CL		•	so	ELS 12-001- Note: 1 23.0 I	SWH SO-023 Interval o 24 0 ft		
- 26 – -	6	90	4/3, brown, and 10 YR, 6 (24.5-25.0) LEAN CLAY, 4/1, dark gray, mottled, 1 yellow (25.0-32.0) LEAN CLAY, 4/1, dark gray,	/6, brownish yellow hard, dry, 10 YR, 0 YR, 6/6, brownish hard, dry, 10 YR,	0	CL				23.0 (244.0 H		- Riser 2.0 in. Sch 40 PVC - Filter Pack 20/30 Redflint Sand & Gravel 19.0 - 35.0 ft bgs
- 31 –					0								Screen (10.0 ft) 24.6 - 34.6 ft bgs 0.010 in. continuous wrap vee wire Sch 40 PVC
-	7	80	(32.0-33.0) LEAN CLAY, 7/3, pale brown (33.0-35.0) LEAN CLAY, 4/1, dark gray, trace moth 6/6, brownish yellow Total Depth of Boring 35.	hard, dry, 10 YR, hard, dry, 10 YR, ling with, 10 YR, 0 ft BGS	_	CL							— End Cap
36													
41 —													

	AF	FFF A AF Pro	Areas (Omaha District) FF Site Inspection bject# M2027.0003	Suc	BORING LC Start Date End Date Northing Easting Surface Elev (ft) Total Depth (ft)*)G	- : 04 : 04 : 67 : 12 : 33 : 50	MW 1/19/ ² 1/19/2 24117 24117 345.4	/18 18 2.02 77.0 9	PF	C1202	Site Nar Drilling Driller Logged Borehol Boring (Depth to Signatu	me : Company : Method : By : e Diameter : Completion : to Water (ft) : re :	AFFF Area 12 Cascade Drilling Mini-Sonic Dennis Schweisthal Justin Vojak 6.0 in. 2.0 in. PVC Monitoring Well 37
ET		۲۲	Water Levels ▼ During Drilling	Meas *North Datun	a American Vertical (NAVD88) feet		IOLOGY	L.	ter (DTW)	ЪЕ		I		
DEPTH IN F (bgs)	INTERVAL	% RECOVEI	DESCR	(bgs)) feet	PID (ppm)	USCS / LITH	Munsell Colo	Depth to Wa	SAMPLE TY	SAMF	PLE ID	Well: MW18F Elev (TOC): 3	PFC1202 3347.93 — Stickup 4x4 in Pro Top
0-		-	(0.0-7.0) CLAY with GRA plasticity, stiff, slightly mo brown, (25%) Gravel	VEL, n ist, 10	nedium YR, 4/3,	0				SS	ELS 12-002- Note: 0.0 -	SWH -SS-001 nterval 0.5 ft		Cover 2ftX2ftX4in. Pad
-	1	100					CL							
- 5	2	60	(7.0-15.0) LEAN CLAY, h	ard, dr	y, 10 YR, 5/1,									
- - 10-			gray, mottled, 10 YR, 6/6,	, browr	iish yellow	0								
-	3	60					CL							
- 15–			(15.0-22.0) LEAN CLAY,	hard, c	Iry, 10 YR,	0								— Grout Mix Used: 0.0 - 29.8 ft bgs Portland Cement 94 lb bacs
-	4	100	10 YR, 6/6, brownish yello	o m, c ow	, gray, and		СІ							Sodium Bentonite (3lbs) Water (7gallons)
- 20-						0								— Riser 2.0 in. Sch 40 PVC
-	5	90	(22.0-25.0) LEAN CLAY, dry, 10 YR, 4/1, dark gray 10 YR, 6/6, brownish yello	low pla v, mottl ow,	asticity, hard, ing in places,									
25-	6		(25.0-37.0) LEAN CLAY, 4/1, dark gray, trace mott dark gray	hard, c ling, 10	łry, 10 YR,) YR, 4/1,	0	CL							



	AI	A FF AF Pr	Areas (Omaha District) FF Site Inspection oject# M2027.0003	Suc	BORING LC Start Date End Date Northing Easting Surface Elev (ft))G	- 1 : 04 : 04 : 67 : 12 : 33	/20/ /20/ /20/ /20/ /20/ /20/ /20/ /20/	/18 18 7.65 04.8	5 5	C1203	Site Nar Drilling Driller Logged Borehol Boring (me Company Method By e Diameter Completion o Water (ft)	: AFFF Area 12 : Cascade Drilling : Mini-Sonic : Dennis Schweisthal : Justin Vojak : 6.0 in. : 2.0 in. PVC Monitoring Well : 7
	1	Ells\	worth Air Force Base		Total Depth (ft)*	*	: 55	1	-	1		Signatu	re	· · · · ·
DEPTH IN FEET (bgs)	INTERVAL	% RECOVERY	Water Levels During Drilling DESCR	Meas *North Datun **Belo (bgs)	American Vertical n (NAVD88) feet w Ground Surface) feet	PID (ppm)	USCS / LITHOLOGY	Munsell Color	Depth to Water (DTW)	SAMPLE TYPE	SAMF	PLE ID	Well: MW18 Elev (TOC):	PFC1203 3304.47 - 2.63 Stickup 4x4 in Pro Top Cover 2' X 2' X 4 in. Pad
-0 - - - -	1	100	(0.0-5.0) FAT CLAY, high stiff, slightly moist, 10 YR brown	n plastio , 2/2, v	city, medium ery dark	0	сн			SS	ELS 12-003- Note: I 0.0 -	WH SS-001 nterval 0.5 ft		Grout Mix Used: 0.0 - 1.0 ft bgs Portland Cement Bentonite Seal 1/4 in. Uncoated Pellets 1.0 - 2.0 ft bgs
5	2	70	(5.0-7.0) LEAN CLAY, ha light brownish gray (7.0-7.5) CLAY with GRA 10 YR, 6/2, light brownish Gravel (7.5-10.0) LEAN CLAY, h light brownish gray	VEL, h gray, ard, dr	, 10 YR, 6/2, ard, moist, (15%) y, 10 YR, 6/2,	0	CL CL CL		•	so	ELS 12-003- Note: I 6.0 to	WH SO-006 nterval 9 7.0 ft		 Riser 2.0 in. Sch 40 PVC Filter Pack 20/30 Redflint Sand & Gravel 2.0 - 16.0 ft bgs
- 10 - - - -	3	90	(10.0-20.0) LEAN CLAY, 4/1, dark gray, mottled, 1 brownish gray, and 10 YF yellow	hard, c 0 YR, 6 R, 6/6, I	Iry, 10 YR, 5/2, light orownish	- 0								— Screen (10.0 ft) 5.1 - 15.1 ft bgs 0.010 in. continuous wrap vee wire Sch 40 PVC
-	4	90												— End Cap
20-	5	90	(20.0-25.0) LEAN CLAY, dry, 10 YR, 4/1, dark gray 4/1, dark gray	low pla /, mottl	asticity, hard, ed, 10 YR,	0	CL							Bentonite 1/4 in. Uncoated Pellets 16.0 - 55.0 ft bgs
25	6	100	(25.0-36.5) LEAN CLAY, 4/1, dark gray, mottled, 1 brown gray, and trace 10 yellow	hard, c 0 YR, 6 YR, 6/	lry, 10 YR, 5/2, light 6, brownish	0	CL							
30-						₀		1h						

Aerostar SES...

	Project N	lame:	SI AFFF MUL	TIPLE SITES	6											
	ASL Proj	ect No:	M2027.0003									-				
	Installatio	חנ:	Ellsworth AF	в												
	Site:		1 (curr	and FT	A							_				
	Date:	5/17/	18-5/181	18 m -								_				
	Sample T	Fechnician:	Arek T	molsky	miles	Neï	Ison									
	Well ID N	lo.:	MW18	PFCOL	01							-				
				Initial Measurements												
	Well Tota	al Depth: 20	.35	ft BTOC	Water Le	usuren _{vel:} ≀	1ents 5.55		# BTOC]				
	WELL VO	OLUME PURGE: 1	WELL VOLUM	E = (TOTAL	WELL DE	PTH BT	OC - 3	STATIC D	EPTH TO	WATER)	X WELL CAPACIT	ŗ				
	(only fill c	out if applicable)	=	(20.35	Ft -15.55	Ft) x (0,163	gal/ft = 🕻	1.8	Gal						
	Calculate	d Well Volume:	0.8	Gallons			Well Dia	ameter:	2		inches					
		Calculations:	1" diameter =	0.041 gal/ft		2" diam	eter = 0,1	163 gal/ft		4" diamete	er = 0.653 gal/ft					
	-											-				
				We	ll Purgi	ng Act	tivites		(270	1					
	Purging N	Method (pump type):	heclar	her		. F	low rate (inci. units):		\mathcal{I}) ML MIN					
					6	0	Depth]				
	Time	Flow Rate	Turbidity	Temp	Cond.	- pH	to water	DO	ORP	Total Gal	Comments					
		(mi/min)	(NTUS)	(-C)	US CM		(BTOC	(mg/i)		Pumpea						
	1530		,				15.55		 	0.0	Bean Develop	nent				
	1535	5681,100	OR	12.5	828	7.30	+	7.13	-1.0	1.5	0,					
	1540	378	OR	12.1	1168	7.3		6.67	-0.7	2.0						
	1545	328	OK_		1397	7.36	***	6.06	-1.H	2.5	(MÁV)	Valdonine.				
Shaha	1000	210			1.101	1.00	15 512	5,10	-0.5	3.0	Pro parte to	Darent C)				
OLOLO	1435	378	nR	11.5	RHI	717	<u></u> ¥	5,98	-141	3.5	Kenne reveo					
	1440	378	ÖR	11.0	840	7.13	-¥	5.82	-28.6	4.0						
	1445	318	OR	110	845	7.15	∽ ¥	5.94	-33,5	4.5	End Releaping	ont				
					1.											
				NON		AA	\mathbf{y}^{\prime}	. 110								
						<u>a co</u>	3	19116	<u>}</u>							
			ļ,	<u> </u>							·					
] 	60 /	11 0	QHE	710		FOR	.776	ЧС		J				
	Results	At End Of Purging:			000	1.2	•	5.11	2930	1.5						
												1				
		ENTS: well p	al not ce	mplete.	Stick	up : C	0.88	۰ ۱								
	8.		1520	Y IN	aler Lev	lei Ma	eter o	in toP c	f UW	AP						
	1 Degr	, brudind (a)	1330 E. Dudp = 10 1445 on 5/18/18													
	3781	5 mL=1 gal	End Veverorment @ 1110 on 11010													
	OR:	= out of range	ye [vrbidity unable to stabilize over becology													
	E	all volumes ?	: 4 gad See Kote Log													
	1 2 ~	en villes -	· ۲			~~										

M2027.0003

P 05/1927



SerostarSES. WELL DEVELOPMENT LOG

Project Name:	SI AFFF MULTIPLE SITES
ASL Project No:	M2027.0003
Installation:	Elisworth AFB
Site:	MWISPFEOTOZAT5/18/18 1 (CURRENT FTA)
Date:	5/18/18
Sample Technician:	Arell Two Ishi / Miles Neilson
Well ID No.:	MWUS PECOLOT (ELSWHOL-003)

	Initial Measurements									
Well Total Depth:	40.39	ft BTOC	Water Level: 22,97 ft BTOC							
WELL VOLUME PURGE:	1 WELL VOLU	me = (total	WELL DEPTH BTOC - STATIC DEPTH TO WATER) X WELL CAPACIT							
(only fill out if applicable)		(40.39	$1 \text{ Ft} - 22.92 \text{ t} \times 0.163 \text{ gal/ft} = 2.85 \text{ Gal}$							
Calculated Well Volume:	2.85	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): Reclaimer Flow rate (incl. units): 845mL/man

2

Time	Flow Rate (mi/min)	Turbidity (NTUs)	Temp (°C)	Cond. (mStCfii) JUS/cm	рН	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gal Pumped	Comments
1530	510	OR	12.5	922	7.02	24,63	1.04	-53,4	1.5	
1540	380	ÖR	12.4	1641	6.07	25,15	1.22	-81.7	2.5	
1550	570	OR	12,5	2473	5.50	25,15	0.87	-100,3	4.0	
1600	945	6 R	12.2	2613	5.61	26,05	1.03	-97.5	6.5	
1610	1135	OR	12.3	2779	5,21	27.15	1,17	-97,1	9.5	
1620	1325	OR	12.2	2898	5,16	2.6.70	1.11	-90,9	13,0	
1625	1135	OR	12.2	3002	5.02	26.75	0,83	-86.9	14,5	
				Sec.						
		-								
		AL	1 0/18							
	_	- 5	(181.20							
Results	At End Of Purging:	OR	12.2	3002	5.02	26,7	0.83	-86.9	14.5	

COMMENTS: Well pad not complete, Stickup: 2.33' ags Begn purging @ 1520 OR = Owl of range 3785 ml = Igal 5 well volumes = 14,25 gal 倚

M2027.0003

A 65/19



Project Name:	SI AFFF MULTIPLE SITES
ASL Project No:	M2027.0003
Installation:	Ellsworth AFB
Site:	1 (current FTA)
Date:	5/17/18
Sample Technician:	Arek Turolski / Miles Neilson
Well ID No.:	MW18PFC 0103

Initial Measurements								
Well Total Depth:	20.36	ft BTOC	Water Levei:	13.02	fl BTÓC			
WELL VOLUME PURGE	: 1 WELL VOL	UME = (TOTAL	WELL DEPTH	BTOC - STATIC	DEPTH TO	WATER) X	WELL CAPACIT	
(only fill out if applicable)	=	(20,36	Ft - 13.0ZH)	$\times O.(63 \text{ gal/ft} =$	1.2	Gal		
Calculated Well Volume:	1.2	Gallons	I	Well Diameter:	2	inch	nes	
Calculations:	1" diamete	er = 0.041 gal/ft	2" d	iameter = 0.163 gal/	ft	4" diameter = (0,653 gal/ft	

Well Purging Activites

Purging Method (pump type): Reclamer Flow rate (incl. units):

	Time	Flow Rate	Turbidity (NTUs)	Temp (°C)	Cond.) рн	Depth to water	DO (mg/l)	ORP	Total Gal Pumped	Comments	
	1410 1420	757mm	inor	10.0	Uslem 	 7.27	(BIOC) 13.02 16.27	4.92	-33.6	0.0 2.0	13-gin Develoj	ment
1500	1435 1435 1440 1505	757 AP757 757	OR	10.5 10.9 10.9 10.9	445 495 1627	7.37	17.15 13.62 17.15	6.07 7.88 10.53	-34,4 -34,4 	9.0 5.0 7.0	WellRomited Dig Resume Deve	at 1435 10pment
	1510	767	_oK	8.9	1014	1. 55 /	17.15	10.57	-3.9	9.0	End Doveloping 1510, Rump	ed Pry
						MA		5/17	(18			
				-			· · · · · · · · · · · · · · · · · · ·					
	Results	At End Of Purging:	OK/	89	104	7.5	> 17.1	5 10.51	-39	9.0		

COMMENTS: Well pad not complete. Stickup: 0.75 Begin pursong @ 1410 End Dovelopment @ 1510 3785 ml = I gal 9.0 gallons Porged OR : out of range 5 well volumes = 6 gal

C-89/19

757 mu/m.n



Project Name:	SI AFFF MULTIPLE SITES
ASL Project No:	M2027.0003
Installation:	Ellsworth AFB
Site:	Current Fire Training Arm ((Site 1)) (AFFF ALEA 1)
Date:	4-18-18
Sample Technician:	A. Willis, M. Nilson
Well ID No.:	MN930107

Initial Measurements								
Well Total Depth: 37	,28	fl BTOC	Water Level:	31.79	ft BTOC			
WELL VOLUME PURGE:	1 WELL VOLU	JME = (Total	. WELL DEPTH	BTOC - STATIC	DEPTH TO	WATER) X WELL CAPACIT		
(only fill out if applicable)	=	(37.28	Ft - 31 .79Ft) x	Q · IY3 _{gal/ft} =	0.89	Gal		
Calculated Well Volume:	0.89	Gallons		Well Diameter:	٥. ٢	inches		
Calculations:	1" diameter	= 0.041 gai/ft	2" dia	meter = 0.163 gal/ft		4" diameter = 0.653 gal/ft		

Well Purging Activites

.

Flow rate (incl. units): [500 m L/min

Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C) (Gond. (mS/Cm)) ^{pH}	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gal Pumped	Comments	
1050	1500					31.95				Development in	inted
100	1500	472	11.4	3.34	7.24	31.90	2.46	360.7	1.60		
1105	1500	563	11,4	3.30	7.21	31.90	1.60	334.1	1.983.	Saraed@ 1100	¥
1110	1500	509	11.4	3.29	7.23	31.91	1.34	284.7	5.56	54rgeal @ 11/4 -	- 5 < vell volumes
1117	500	125	11,4	3.29	7.26	31.90	1.35	271.5	8.33		
1126	1500	DULY IGAGE	115	3.31	7.28	31.90	1.07	266.1	h.9	Surged @ 1125	1130
1133	1500	417	11.5	3.29	7-28	81.90	0.89	260.4	14.67	Surgel @ 113	7
11.40	1500	992	(), Ч	3.29	7.28	\$1.50	0.82	255.8	17.44		-
1143	1500	107	11.4	3.28	7.29	31,90	0.85	255-8	17.62		
1146	1500	59.4	11.3	3.27	7.29	31.90	D.88	255.1	19.8		
1150	1500	29.4	11.5	3.28	7.29	31.90	0.82	a53.7	21.32		
1153	1500	11.2	11,5	3.29	7.30	31.90	0.81	2539	22,51		
1155	1500	6.13	11.5	3.29	7.31	31.90	0.81	253.7	23.35	Developel	
										-F-	
					->+	0					
	na a a denna hannan 111 Alle dell'A 11 Al 1999 et la constructiva della della della della della della della del					<					
Results	At End Of Purging:	6.13	11.5	3.29	7.31	31.90	0.81	253.7	21.35		-

COMMENTS: X Teffor dedicated pump in well 4.45 = 5 well volumes

C-90

A 4/22/18



Project Name:	SI AFFF MULTIPLE SITES
ASL Project No:	M2027.0003
Installation:	Ellsworth AFB
Site:	Area 2 (poind 3)
Date:	5/3/18
Sample Technician:	Avelle Two likel / Multhen Butter Sworth.
Well ID No.:	MWISPFC0201

Initial Measurements								
Well Total Depth:	40.38	ft BTOC	Water Level:	15.43	ft BTOC			
WELL VOLUME PURG	E: 1 WELL VOL	.UME = (TOTAL	WELL DEPTH E	BTOC - STATIO	DEPTH TO WATER) X WELL CAPACIT		
(only fill out if applicable	e) =	(40,38	<u>Ft -15,43Ft) x</u>	19、16了 gal/ft :	= 4,1 Gal			
Calculated Well Volum	<u>. 4,1</u>	Gallons		Well Diameter	<u>2</u>	inches		
Calculations:	1" diamete	er = 0.041 gal/ft	2" dia	meter = 0.163 gai	/ft 4" diame	ter = 0.653 gal/ft		

Well Purging Activites

Purging Method (pump type): Redamer Flow rate (incl. units): 568 ml./min.

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									· · · · · · · · · · · · · · · · · · ·	
Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. (mS/Cm) MS/cm	рН	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gai Pumped	Comments
0855	379	OR	12.2	1498	7.60	17.81	4.01	157.0	0.5	
09,00	757	OR	12.0	1622	7.27	18.76	2.38	158.4	1.5	
0910	379	ÖR	12,1	2836	7.35	21.55	1.02	156.6	2.5	
0920	568	ÓR	12,3	3404	7.46	22.02	0.85	147.8	4.0	
0430	379	OR	11.6	3450	7.55	24,24	2.70	137.9	5.0	
0940	568	OR	11.7	3740	7.57	25.81	1.26	131.3	6.5	
0 150	757	OR	11.7	4106	7,62	25.96	1.00	111.2	8.5	
1000	757	OR	11.8	4248	7,66	26.0	51.42	96.0	10.5	
1010	379	OR	12.0	4109	7,62	25 7!	50,99	813	<i>ĭI</i> , 5	
1020	568	372	12,0	4300	7,64	25,56	0,97	66.6	13.0	
1030	379	446	(2.1	4276	7.63	25.85	0.94	54.2	14.0	
1040	568	OR	12.1	4326	7.63	24,45	0.87	40.4	15.5	
1050	568	408	12.0	4326	7.62	24.75	0.93	29.8	17.0	
1100	568	164	11.9	4357	7.63	25,19	1.01	17.5	18.5	
110	329	196	12.5	4447	7.64	22,80	091	41	19,5	
1120	190	OR	13.9	3603	7.84	22.30	6.97	7.2	20,0	Chin ponent ma
1130	1514	OR	11.1	3443	7.66	31.21	5,63	15,7	24.0	
Results	At End Of Purging:	OR	11.1	3493	7,60	31,21	5.63	15.7	24.0	

COMMENTS: well pud not complete, TOC is 0.41 ags 5 mell volumes = 20.5 gal Begin purging @ 0850 0R = out of range 3785 mL= 1 gal

5/07

3/6/19



Project Name:	SI AFFF MULTIPLE SITES								
ASL Project No:	M2027.0003								
Installation:	Ellsworth AFB								
Site:	2 (pond # 3)								
Date:	5/1/18 - 5/2/18								
Sample Technician:	Arek Twolshi								
Well ID No.:	mw18PFC.0202								

Initial Measurements								
Well Total Depth:	41.88	ft BTOC	Water Level:	16.4	ft BTOC			
WELL VOLUME PURGE:	1 WELL VOLUN	/IE = (TOTAL	WELL DEPTH	BTOC - STAT	C DEPTH TO	WATER) X WELL CAPACIT		
(only fill out if applicable)	=	(41.88	Ft - [6.4 Ft) x	0,163 gal/ft	<u> </u>	Gal		
Calculated Well Volume:	4.15	Gallons		Well Diamete	r: <u>2</u>	inches		
Calculations:	1" diameter =	0.041 gal/ft	2" dia	ameter = 0.163 ga	al/ft	4" diameter = 0.653 gal/ft		

Well Purging Activites

Purging Method (pump type): Reclaimer Flow rate (incl. units): 666 mL/m/h

Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. (mS/Ont) JuS/cm	_ рН	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gat Pumped	Comments	
1585	1514	oh	11.1	5906	7.77	26.75	1.87	24.6	2.0		
1600	1135	OR	11.1	6271	7.66	29.81	1.77	19.2	3.5		
1610	757	GR	1.1	6383	7.60	32.30	0.83	2,6	5.5		
1620	568	OR	u. 2	7527	7.52	34,40	1.43	6.4	7.0		
(630	946	OR	11.4	8401	7.47	35.85	1.94	11.0	9.5	*	
1640	378	OR	11.5	7207	7.44	*	2.36	254	10.5	DTW Confer on H	up of pump
1656	568	OR	11.8	7950	7.45		3.37	28.4	12.0	Well dry @ 10	51 on 5/1/18
1510	757	OR	12.3	11009	7.25	18.97	5.11	14.1	(3.0	5/2/18	_
1520	378	OR	11.4	11516	7.10	21,93	4.11	25,0	14.0		
1530	378	OR	11.3	10540	7.08	25.16	3,55	24.2	15.0	August 1 0000000 1 000000	
1540	378	OR	11,2	10581	7.08	26.75	3,05	21,2	16.0		
15 50	378	416	11.2	106/6	7,08	27.46	2.43	8.2	17.0		
1600	378	234	in	10557	7.10	29.96	2.71	-6.1	18.0		
1610	1514	OR	16.1	10738	7.05	39.24	4.49	-3.	22.0		
			•								
	đ										
	5/2/18	·		-							
Results	At End Of Purging:	OR	11.1	10738	7.05	39.24	4.49	-3.1	22.0		

COMMENTS: Begin purging @ 1550 on Stills well put not completed. TOC = 2.4' ags OR = out of range 5/2/18 - DTLJ = (7.42) 5 well volumes = 20.75 gal. Begin purging @ 1505 on 5/2/18 3785 mL = 1 gal.

C-92 0 907

3/6/19



Project Name:	SI AFFF MULTIPLE SITES
ASL Project No:	M2027.0003
Installation:	Ellsworth AFB
Site:	Area (site) 2
Date:	4/25/18
Sample Technician:	Arele Tuolski
Well ID No.:	NW18PFC0203

Initial Measurements ft BTOC Water Level: Well Total Depth: ft BTOC WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH BTOC -- STATIC DEPTH TO WATER) X WELL CAPACIT (18.2 Ft - 4,65Ft) x O, 163 gal/ft = 2,20 Gal (only fill out if applicable) 2.20 Well Diameter: Calculated Well Volume: Gailons inches 4" diameter = 0.653 gal/ft 1" diameter = 0.041 gal/ft 2" diameter = 0,163 gal/ft Calculations:

Well Purging Activites

Purging Method (pump type): Maga Monscoon

Flow rate (incl. units): 1385 mL/mm

Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. (mS/Cm)	рН	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gal Pumped	Comments
1345	1514	DR	7.7	4.64	7.15	4.87	1,34	-673	2.0	/
1350	1136	326	7.2	4.78	7,13	4.81	1.49	79,1	3,5	6 hr
1355	157	0R	7.4	4.85	7.16	4.60	1.43	-73,9	4,5	1 1510
1400	1136	OR	7.0	4,63	7,18	4,92	1,40	79,4	6.0	- Internet
1405	1893	OR	70	4.63	7.16	4.98	0,41	-88.7	8.5	
1410	1893	OR	69	4.74	7.17	4,95	1.57	-8D.2	11.0	
1413	1136	59	6.5	4.70	722	<u> </u>	0.39	-96.7	12.5	Stopped surging up
1418	757	24.8	6.5	4,70	7,21	5.03	0,41	-100.3	13.5	
1421	1136	9,61	6.3	4,69	7.23	5,08	0.44	-104.9	15,0	
										NY 18
				T						, 4 ⁵
	A.	11725/18								\v\
										/
Results	At End Of Purging:	9,61	6.3	4.69	7.23	5.08	0.44	-104,9	15,0	

COMMENTS: well not growted. Toe is 2.15' atre AT ags 5 mell volumes = 11 gal Begin purging @ 1340 OR = out of range 3785 mL=1 gal

M2027.0003

3/6/19



Project Name:	SI AFF multiple sites
ASL Project No:	M2027.0003
Installation:	Ellsworth AFB
Site:	2 (rows 70, 80, 90)
Date:	5/18/18.5/22/18
Sample Technician:	Arel Turoblai, Miles Neilson
Well ID No.:	MW18PFC 0204 (B1SWH02-005)

Initial Measurements 45.26 34.62 ft BTOC ft BTOC Water Level: Well Total Depth: WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH BTOC -- STATIC DEPTH TO WATER) X WELL CAPACITY $(45, 26 \text{ Ft} - 34.62 \text{Ft}) \times 0.163 \text{ gal/ft} = 1, 74$ Gal (only fill out if applicable) _ 1.74 Well Diameter: Gallons inches Calculated Well Volume: 4" diameter = 0.653 gal/ft 1" diameter = 0.041 gal/ft 2" diameter = 0.163 gal/ft Calculations:

Well Purging Activites

Purging Method (pump type): _____ Reclaimer

Flow rate (incl. units):

515 mL/min

	Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (^ª C)	Cond. (m 8/Cm) <i>J</i> AS/cm	pН	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gal Pumped	Comments	
5/18/18	1320	379	OR	13.5	581	7.29	37,66	1.80	- 48.8	0.5		
	1325	7 58 9 Shalls	OR	13.3	409	7,16	3570	1,47	-127,2	1.5		
	1330	758	OR	14.2	400.3	7,15	40,96	0.86	-156,0	2.5		
	1335	379	OR	15.1	404.8	7.16	-	0,64	-202,8	3,0	which on top of p	mp
	1340	379	OR	14.3	456.4	7,16		1,06	-222,	3.5	·	
	1345	279	OB	14,3	578	7,16	-	4.60	-135,4	4.0	well dry @ 1345	
5/22/18	0405	758	OR	13.4	444.7	7.72	37.38	5,14	92,6	5.0	resume dev, C	0900
- 1 - 1 - 0	0410	379	Ol	13,3	434,5	7.31	39,03	5,57	84,5	5.5		
	0915	158	OR	13.2	386.4	7.38	41.02	5,60	90,6	6.5		
	0990	379	OR	13.5	407.3	7.36)	5,46	21,6	7.0	WLM on top of P	ump
	0925	379	OR	14.0	461.8	7.34	1	6,20	89.9	7,5	well dry @ 09	25
	V V U U											
			AT_									
			51	22/18								
• •	Results	At End Of Purging:	OR	14.0	461.8	7.34	-	6.20	89.9	ר, 5		

COMMENTS: well put not complete, Strickup : 1,0' ags Begin purging @ 1315 on 5/18/18 Resume development on 5/22/18 3785 ml = 1 gal @ O900, DTW prior to dev. is \$5,08' bloc, well ang @ 0925 on 5/22/18, OA = out of varge Swell volumes: 8.7 gal well considered developed after purging 4.3 well volumes due to slow recharge & restricted access of well site.

20 5/24



Project Na	ame:	SI AFFF MULTIPLE SITES								
ASL Proje	ect No:	M2027,0003						-,-,-		
Installatio	n:	Elisworth AFE	3							
Site:		Aren	7							
Date:		05/02	. /1 8							
Sample T	echnician:	All Trokski / Mutting Butters								
Well ID N	o.:	Mwlst	PFC 02	66 5	1,000					*, *, *, *, *, *, *, *, *, *, *, *, *, *
				A)						
	Initial Measurements									
Weil Tota	Depth: 35,	35	ft BTOC	Water Lev	/el:	25.	55	ft BTOC		
WELL VO	LUME PURGE: 1	WELL VOLUME	= (TOTAL	WELL DE	ртн вт	00 - 90	STATIC D	ΕΡΤΗ ΤΟ	WATER)	X WELL CAPACIT
(only fill o	ut if applicable)	=	(35.35	Ft -25.55	i Ft) χ (0.163	gal/ft =	,6	Gal	
Calculated	d Well Volume:	L.G	Gallons			Well Dia	ameter:	2		inches
	atculations:	1ª diameter ⊭ 0	141 cal/ft		2ª diam	eter = 0 1	i63 gal/ft		4" diamete	ar = 0.653 gai/ft
			torr gaint		z alum		ioo guint		4 didifierd	, e.ooo guint
			We	li Purai	na Aci	ivites				
5 · 1		Δ ι		in a gi				8	65	11.
Purging W	ietnoa (pump type):	<u>Nevai</u>	hard			tow rate (i	inci. units):	0	0 7 "	it/min
						Depth				
	Flow Rate	Turbidity	Temp	Cond.		to	DO		Total Gal	
Time	(ml/min)	(NTUs)	(°C)	(mS/Gm)	рН	Water	(mg/i)	ORP	Pumped	Comments
				MS/CW	•)				
1300	379	OR	(3)	8010	7,21	25.58	4.58	-31,8	0.5	
1310	568	OR	12,3	7994	7,17	25.60	4.84	-22.7	2.0	* A & A. (1) A & A & A & A & A & A & A & A & A & A
1320	757	OR	12.2	7899	7,17	25,55	3,17	-20,4	4,0	
1325	1135	OL	11,9	7789	7,11	25,55	5,15	-19.0	5.5	
1336	1135	OR	11.8	7788	7.17	25.50	5,21	-17.7	7.0	
1335	1135	OR	11,7	7749	7,17	25,56	5.25	-17,7	8.5	
	11-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1									
	5/210									
					-					
Results	At End Of Purging:	OL	<u>น.</u> ๆ	7744	٦.١٦	25,56	5.25	-17.7	8.5	
COMMA	NTS.					<u>\</u>				1

COMMENTS: well pud not complete. TOC = 1.29° ags. 5 well volumes = 8 gal Begth punging @ 1255 3785 mL = Igal OR = out of number

M2027.0003

C-95 05/07

3/6/19



Project Name:	SI AFFF MULTIPLE SITES
ASL Project No:	M2027.0003
Installation:	Ellsworth AFB
Site:	Site 2 - Rows 70,60,90
Date:	5.8-18
Sample Technician:	Arek Turolski/ Matthew Buthrsworth
Well ID No.:	MW88PFC0206 (ELSWH02-007)

Initial Measurements

Well Total Depth:	20.34	ft BTOC	Water Leve	19.54	4	ft BTOC			
WELL VOLUME PURGE:	1 WELL VOLU	ME = (TOTAL	WELL DEP	гн втос –	STATIC D	ЕРТН ТО	WATER)	Х	WELL CAPACI
(only fill out if applicable)		(20.34	Ft - 19,54F	t) x D.163	gal/ft = 0	0.13	Gal		
Calculated Well Volume:	0.13	Gallons		Well D)iameter:	2.0	•	inche	95
Calculations:	1" diameter	= 0.041 gal/ft	2	" diameter = C).163 gal/ft		4" diamete	r = 0.	653 gal/ft

Well Purging Activites

Purging Method (pump type):	Monscon	Flow rate (incl. units):	N/A *

Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. (mS/Cm)	pН	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gal Pumped	Comments
)				· · · · · · · · · · · · · · · · · · ·	0076.0079.00.007.001.00.001.001.001.001.001.001.0
				X	-	SEE	COM	NENT	S AN	D
							GI	Rowi	WATE	R L06
									\sim	\sim
Results	At End Of Purging:									

XNOT able to develop due to lack of water / slow recharge / lack of a curs to restricted area. This well was sampled by a peristaltic pump. See GWLOG Sheet.

C 65/19 C-96



Project Name:	SI AFFF MULTIPLE SITES
ASL Project No:	M2027.0003
Installation:	Ellsworth AFB
Site:	2
Date:	5/8/18
Sample Technician:	Arel Twobsky /Matthew Buttersnorth
Well ID No .:	MW18PFC0207 (ELSWH02-008)

	33.93	FD Ini	tial Measur	rements			
Well Total Depth:	35.98	ft BTOC	Water Level:	21.23	ft BTOC		
WELL VOLUME PURGE:	1 WELL VC		WELL DEPTH	BTOC - ST	TATIC DEPTH TO	WATER) X WELL CAPA	ACIT
(only fill out if applicable)	= .	3-9.2 35.48	Ft -21,23Ft)	x 0.(63 g	al/ft = 2.4	Ga 2,0701	
Calculated Well Volume:	2.4	Gallons	<u> </u>	Well Dian	neter: 2	inches	
Calculations:	1" diame	ter = 0.041 gal/ft	2" di	iameter = 0,16	3 gal/ft	4" diameter = 0.653 gai/ft	

Well Purging Activites

			We	ell Purgi		(B)				
Purging M	ethod (pump type):	Mega	Monso	\$~~	. F	low rate (incl. units):	35	e al	<u>min (34 g</u>
Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. (mS/Gm) mS/Cm	рН	Depth to water (BTOC	DO (mg/l)	ORP	Total Gal Pumped	Comments
1043	378	OR	13.6	659	7.40	41-21	0-94	39-2	0.5	\
1048	757	OR	13.3	652	7.45	21.21	0.4	<u>-9.5</u>	1.5	
1053	1514	OL	13.0	666	7.50	21.21	0.18	-44,9	3.5	
1058	1135	OR	13.4	675	7.53	21.21	0.21	-62-3	5.0	
1103	1314	OR_	13.2	684	7.51	21.21	0.10	-706	7.0	X
1168	1892	OR	12.9	691	3-51	21.21	0.12	-799	9.5	
113	757	OR	13.4	695	7.53	21-21	0.65	-90.4	10.5	
1118	1135	OR	13.6	694	7.53	21-21	0.13	-928	12	
	•									
		1.411%*L								
			\square							
			$\langle A \rangle$							
			NY 152							
			Y-t-							WAR-11-1
		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	ļ					l		
	and the second			ļ						
	···							ļ		
Results A	At End Of Purging:	OR	13-6	1694	7.53	21.21	OR	8.00-	12	

COMMENTS: Surface well pad complete. TOC is 0.5' bgs 5 well volumes = 12 gol. 3785 mL =1 gol Begin purging @ 1038 OR = out of range



Project Name:	SI AFFF MULTIPLE SITES					
ASL Project No:	M2027.0003					
Installation:	Elisworth AFB					
Site:	3 (building 618)					
Date:	5/23/18					
Sample Technician:	Arel Twolski, Miles Neilson					
Well ID No.:	MW18PFC0301					

#### **Initial Measurements**

Well Total Depth: 9	0.38	ft BTOC	Water Level:	9.03	С # втос		
WELL VOLUME PURGE:	1 WELL VOL	JME = (TOTAL	WELL DEPTH	BTOC -	STATIC DEPTH TO	WATER) X	WELL CAPACIT
(only fill out if applicable)	=	(20.38	Ft - 9.0 L Ft)	x 0.163	gal/ft = 1.85	Gal	
Calculated Well Volume:	1.85	Gallons		Well Di	ameter: <u>2</u>	_ inc	hes
Calculations:	1" diamete	r = 0.041 gal/ft	2" 0	liameter = 0.	163 gal/ft	4" diameter =	0.653 gal/ft

#### **Well Purging Activites**

Purging Method (pump type): Mega Mon Soon	Flo
-------------------------------------------	-----

w rate (incl. units): 757 m L/mm

Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. ( <del>mS/CM</del> ) <i>JUSLC</i> M	рН	Depth to water (BTOC )	DO (mg/l)	ORP	Total Gal Pumped	Comments
1020	1 380 757	OK	11.1	444,5	7,04	10.42	2.15	73,5	1.0	
1025	5'70	OR	11.3	463,2	7.19	16.65	1.38	32,1	1,75	
1030	570	OR	119	479.0	7.36	10.42	0.47	-16,7	2.50	
1035	757	OR	10.7	446,1	7.55	11.44	0.50	-44,6	3,50	
1040	757	OR	10.4	4326	7,51	12.45	0.62	-47.9	4.50	
1045	1135	OR	10.4	432.5	7.51	13.95	2.17	-39.7	6.0	
1050	7.57	Ομ	10,7	434.8	7,49	14.60	2.77	-36,9	7.0	
1055	570	OR	11.0	440.	7.46	15.05	3.43	-45.1	7,75	
1100	945	OR	11.0	442.5	7.50	15.55	4,67	-43,0	9.0	
1105	757	OR	10.8	440,8	7.55	16.16	5.31	-37.5	10,0	
				1						
		4								
		AT	18	1						······
		57231	10							
										~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Results	At End Of Purging:	OR	10.8	440.8	7.55	16,16	5.31	-37.5	10,0	

COMMENTS: Well pud complete. 3785 mL = 1 gal Begin purging @ 1015 OR = out of ronge 5 well volumes = 9,25 gal

P 5/24



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WELL DEVELOPMENT LOG

Project Name:	SI AFFF MULTIPLE SITES
ASL Project No:	M2027.0003
Installation:	Ellsworth AFB
Site:	3 (buildour 618)
Date:	5/6/18
Sample Technician:	Arek Turolskil/Malthen Bullersnorth
Well ID No.:	MW18PFC0302

Initial Measurements

Well Total Depth: 2	0.35	ft BTOC	Water Level:	8.85	ft BTOC		
WELL VOLUME PURGE:	1 WELL VOLUN	IE = (TOTAL	WELL DEPTH	BTOC - S	TATIC DEPTH TO	OWATER) X	WELL CAPACIT
(only fill out if applicable)	=	(20.35	Ft -8.\$5 Ft)	x 0.163 g	gal/ft = 1.88	Gai	
Calculated Well Volume:	1.88	Gailons		Well Diar	neter: 2	inc	hes
Calculations:	1" diameter =	0.041 gal/ft	2" d	iameter = 0,16	53 gal/ft	4" diameter =	0.653 gai/ft

Well Purging Activites

Purging Method (pump type): Mega Mansoon Flow rate (incl. units): 720 nL/m/n

Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. (mS/Cnt) /US/cm	рН	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gai Pumped	Comments
1560	757	OR	17.2	429,6	7.56	10.65	6,63	ાવ.પ	1,0	ur
1505	757	OR	16.5	441.2	7.30	12,03	6,36	19.8	$\lambda_i O$	
1510	379	OR	16,1	508	7.28	13,25	4.46	14.3	2.5	
1515	<u>ר אר</u>	OR	16.6	500	7.37	13.93	497	3,9	3.5	
1520	379	_ OR _	16.5	480	7,38	14.52	5.05	~5.3	4.0	
1525	757	0r	15.3	509	7.41	15.05	પ & S	-5,3	5.0	
1530	257	OR	14.0	553	7,28	15,67	2,62	h.H	6,0	~~1AM/APP1918
1535	1136	OR	13,8	583	7,33	15,77	1,87	-7,4	7.5	
1540	757	OR	13.1	598	7.28	16.20	2.63	-9.8	8.5	
1545	757	OR	12.9	602	7.29	16.67	13.87	-11,4	9.5	
										The second s
							The second second	and the second	A DESCRIPTION OF THE OWNER OWNER OF THE OWNER OWNER OF THE OWNER	
			01717		-	NT-COLOR OF COLOR				
					and the second se					
	AT									
	V. (1/18								
	21	0(
Results	At End Of Puraina:	OB	12.9	602	7.29	16.6	3.87	~11,4	9.5	

COMMENTS: well pad not complete, TOC = 0.551 ass 5 rell volumes = 9.4 god Begin purging @ 1455 0 R=040f ronge 3785mL=1 god

05/07 3/6/19



Project Name:	SI AFFF MULTIPLE SITES
ASL Project No:	M2027.0003
Installation:	Ellsworth AFB
Site:	3 (Buildma 618)
Date:	5/6/18
Sample Technician:	Arek Twolski/ Matthew Buttersworth
Well ID No.:	MWL& PFCO 203

Initial Measurements

Well Total Depth:	20.37	ft BTOC	Water Level:	10.86	ft BTOC		
WELL VOLUME PURGE:	1 WELL VOLUN	IE = (TOTAL	WELL DEPTI	H BTOC STATIC	DEPTHTC	WATER) X	WELL CAPACIT
(only fill out if applicable)	=	(20.37	Ft -10-8(Ft)	x 0.163 gal/ft =	1,55	Gal	
Calculated Well Volume:	1:55	Gallons		Well Diameter:	2	inch	es
Calculations:	1" diameter =	0.041 gal/ft	2"	diameter = 0,163 gal/	ſŧ	4" diameter = 0).653 gal/ft

Well Purging Activites

Purging Method (pump type): Mega Monsoon Flow rate (incl. units): 757 m L/m/h

Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. (mS/Cm) WS/cm	рН	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gal Pumped	Comments
1615	757	OR	17.6	391,7	7,67	12.66	9.49	16,3	1.0	
1620	1136	OR	17.1	4163	7.51	13.82	8,04	15.1	2.5	
1625	757	OR	15.5	445.4	·-> 4/2	15.2	6.81	7.5	2.5	
1630	379	DR	15,3	418,4	7,31	16.00	8.22	11,5	4.0	
1635	757	OR	16.0	449.3	7.28	16.24	8.43	13.6	5.0	
1640	157	OL	14.9	479.4	7.38	17.18	8.05	16.7	6.0	
1645	757	OR	15.4	WERK	7.35	18.20	219	10.9	テロ	
1650	757	OR	16.1	500	7.44	19.39	8.50	8-9	8.0	
					_ _					
										en
		1.1	18 -							
	2	5/61	10					<u> </u>		
Results	At End Of Purging:	OR	16.1	500	7.44	19.85	8.5	89	8.0	Junio 1. Jun

COMMENTS: well pad not complete. Stickup: 1.15' ags 5 mell volumes: 7.75gal Beginpurging @ 1610 3785 ml= I gal 0, h= out of vange

05/07



Project Name:	SI AFFF MULTIPLE SITES
ASL Project No:	M2027.0003
Installation:	Ellsworth AFB
Site:	4 (former fre station)
Date:	5/23/18
Sample Technician:	Arell Turolski, Miles Neilson
Well ID No.:	MWISPFCOHOI

Initial Measurements

Well Total Depth:	35.4	ft BTOC	Water Level:	346		ft BTOC				
WELL VOLUME PURGE:	1 WELL VOLU	JME = (TOTAL	WELL DEPTH	BTOC -	STATIC D	ЕРТН ТО	WATER)	Х	WELL (CAPACIT
(only fill out if applicable)	=	(35.9	Ft -31.6 Ft)	x10.16	$3_{\text{gal/ft}} = 0$	ð,7 e	fal			
Calculated Well Volume:	0.7	Gallons		Well D	iameter:	2		inche)S	
Calculations:	1" diameter	= 0.041 gal/ft	2" d	iameter = 0	.163 gal/ft	4	" diamete	r = 0.	.653 gal/	ft

Well Purging Activites

Purging Method (pump type):	Nega Monsoon	80	Flow rate (incl. units):	400	mL.	Inth
					-	

	Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. (mS/CM) JuS/CM	рН	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gal Pumped	Comments	
5/23/18	1658	630	OR	17,4	1323	7.26	33,39	3,06	28.9	0.5		1
	1701	630	OR	15.4	1010	7.20		5,13	25,1	1.0	WLM aster of	ouno
	1702		\sim	ert	(Dr	\checkmark					14
5/24/18	0948	315	OR	18.2	1295	7.45	(33,3	3,53	127.5	1,25		
	0951	315	OR	16.4	1173	7,35	34.16	4.77	124.6	1,50		
	6954	315	OR	15,9	104	7.50	34.90	5,06	118.9	1.75		
	0957	315	OR	16,1	1135	7.49		6.56	116.1	2.0	Pumped well on	
					ļ		<u>-</u>					
			AT	1.9								
			5/201	10							**************************************	
												ļ
	Results A	At End Of Purging:	OR	16.1	1135	7.44		6.56	116.1	2.0		

COMMENTS: well pad not complete. Stickup: 1.6' ags 5 well volumes = 3.5 gal OR= out of range Begin purging @ 1655 on 5/23/18 hesune development @ 0945 on 5/24/18 DTw@ 32 pror poderetopment on 5/24/18 WLM=water levelmeter well considered developed after - 3 well volumes due to slow recharge and restricted access to well site. 3785 mL= 1 gal

5/24 C-101

3/6/19


Project Name:	SI AFFF MULTIPLE SITES
ASL Project No:	M2027.0003
Installation:	Elisworth AFB
Site:	4 (former fine station)
Date:	5/23/18
Sample Technician:	Arek Turolskil, Miles Neilson
Well ID No.:	MWISPFCOHO2

Initial Measurements

Well Total Depth:		ft BTOC	Water Level:		fl	втос				
WELL VOLUME PURGE:	1 WELL VOLUME	E = (TOTAL	WELL DEPTH	BTOC - S	STATIC DEF	тн тс	WATER)	Х	WELL C	CAPACIT
(only fill out if applicable)	=	(45,08	Ft -34.56Ft)	x 0.163	gal/ft =	71	Gal			
Calculated Well Volume:	1.71	Gallons		Well Dia	meter:	2		inche	es	
Calculations:	1" diameter = 0).041 gal/ft	2" 0	iameter = 0.1	63 gal/ft		4" diamete	ŕ = 0	.653 gal/i	ft

Well Purging Activites

Purging Method (pump type):	Rec	lamer	-
-----------------------------	-----	-------	---

Flow rate (incl. units): 345 mL/mm

	Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. (m8/Cm) M2/Cm	рН	Depth to water (BTOC)	DO (mg/i)	ORP	Total Gal Pumped	Comments	
5/23/18	1535	380	OR	17.7	1018	1.59	36.5	0.67	-16.4	6,5		
	1540	380	OR	18.2	1065	7,30	37.65	0,87	-29.7	1.0		
	1845	380	OR	14.9	1018	7,22	39.21	2,67	-31.1	1.5		
	1550	380	OR	14.4	996	7,18	40.40	3,03	-30,6	2.0		
	1555	380	OR	14,3	938	7.14		4.78	-26.5	2,5	WLM on top of	pump
	1600	380	OR	15.2	949	7,12	- ب	5,63	-20,2	3,0		
	1605	380	OR	15.4	974	7,15		6,56	-13,4	3,5	well pumped dry	
5/24/18	0845	380	OR	13. 9	954	7,31	41,47	398	169,1	4.0	· · · /	
	0850	190	OR	13,7	931	7.52		4,93	154,3	4.25		
	0855	190	OR	14.3	927	7,48		5,86	146.4	4.5		
	0900	380	OR	14.9	928	7,36	ŗ	7.38	136,4	5,0	well pumped o	17
											(m ₂)	
		WFW11_L	A 1									
			HI	18								
			5 (241	- (; (;)							n 1999 (1997) (1997 - 1997) - 1997	
	Results	At End Of Purging:	OR	14.9	928	7.36		7,38	136.4	5,0		

COMMENTS: well put not complete. Stretenp: 0.96' ags 5 well volumes = 8.55 gal. Begin purging @ 1530 on 5/23/18 OR = out of range hesune development @0840 on 5/24/18 hesune development @0840 on 5/24/18. DTW @ 39.66' btoe prior to dev. on 5/24/18; 3785mL = lgal well considered developed after ~ 3 mell volumes purged due to slow recharge and restricted access to well site.

A 5/2-162



		t No:	M2027 0002												
At	SL Projec	ST NO:	M2027,0003												
Ins	stallation	:													
SI	te:		4 (terther tire, station)												
Da	ale:		5/23/18												
Sa	ample Te	chnician:	Arell Turolski, Miles Neilson												
W	ell ID No	.:	· Arvortof	FCORD	3 6/1	<u>м</u>	W89	FCOU	103		·····				
				Ini	itial Mos	euron	ante								
w	ell Total	Depth: 4(1.6° ft BTOC Water Level: 32.26 ft BTOC												
w	ELL VOI	UME PURGE: 1	WELL VOLUME	ELL VOLUME = (TOTAL WELL DEPTH BTOC - STATIC DEPTH TO WATER) X WELL CA											
(0	niy fill ou	t if applicable)	=	(20,61	Ft -32.7	Ft) x C	0.163	gal/ft = 1	. 40	Gal					
Ca	alculated	Well Volume:	1.4	Gallons			Well Die	meter:		l	inches				
	~		40 P . 1.	0.044		01.11				411 -11					
	Ca	alculations:	1" diameter = t	0.041 gal/π		2° diam	eter = 0.1	63 gai/π		4" diamete	er = 0.653 gal/ft				
				We	ll Purai	na Aci	tivites								
D.			Queles	• /					Ц	(ch	4 / 5-				
Pu	arging we	einoa (pump type):	recció	mu		. г	iow rate (i	bU mL/mM							
	1						Depth								
	Timo	Flow Rate	Turbidity	Temp	Cond.	5 4	lo	DO		Total Gal	Comments				
		(ml/min)	(NTUs)	(°C)	(morcm) 14 Sicn	PII	(BTOC	(mg/l)		Pumped	Connorm				
3 10	620	380	DR	13.2	633	7.31	34.0	6.65	12.5	0,5					
+	1,25	ካፍና	81B	13.2	488.7	708	37,85	7,66	16.1	1.5					
116	1625 7	100	1 1213		V	1 1 2					r				
$\frac{1}{10}$	630	380	ÖR	13.0	521	6,98	~	7.33	20.4	2.0	WLM on top of				
	630	380	OR	13.0	521 558	6,98	-	7,33 7,78	20.4 23,6	2.0 3.0	WLM on top o'				
	630 635 640	380 755 380	OR OR OR	13.0 13.4 13.3	521 558 604	6,98 6,96 7,0	1 1 1	7,33 7,78 8,28	20.4 23,6 25,4	2.0 3,0 3,5	Well on top or				
1 1 1 1 1 1 0 5 5	630 635 640 920	380 755 380 380	OR OR OR OR	13.0 13.4 13.3 13.1	521 558 604 746	6,98 6,96 7,0 7,36		7,33 7,78 8.28 7,06	20.4 23,6 25,4 137,1	2.0 3,0 3,5 4,0	Well on top o' well dry WEM on top of				
100 100 100 100	630 635 640 920 92 5	380 755 380 380 190	OR OR OR OR OR	13.0 13,4 13,5 13,1 12,8	521 558 604 746 718	6,98 6,96 7,03 7,36 7,30		7,33 7,78 8,28 7,06 9,89	20.4 23,6 25,4 137,1 135,5	2.0 3.0 3.5 4.0 4.25	WLM on top or WLM on top or WLM on top or Well pumped d				
1 1 1 1 1 1 0 0	630 635 640 920 92 5	380 755 380 380 140	OR OR OR OR	13.0 13.4 13.3 13.1 12.8	521 558 604 746 718	6,98 6,96 7,0 7,36 7,30		7,33 7,78 8,28 7,06 9,89	20.4 23,6 25,4 137,1 135,5	2.0 3,0 3,5 4,0 4,25	WLM on top o' well dry wLM on top o' well pumped d.				
100 H	630 635 640 920 92 5	380 755 380 380 190	OR OR OR OR OR	13.0 13.4 13.3 13.1 12.8	521 558 604 746 718	6,98 6,96 7,0 7,36 7,30		7,33 7,78 8,28 7,06 9,89	20.4 23,6 25,4 137,1 135,5	2.0 3,0 3,5 4,0 4,25	WLM an top o' well dry WLM on top o' well pumped d				
8 0 0 1 1 1 0 0	630 635 640 920 925	380 755 380 380 190	OR OR OR OR OR	13. 0 13. 4 13. 4 13. 1 13. 1 12.8	521 558 604 746 718	6,98 6,96 7,03 7,36 7,30		7.33 7.78 8.28 7.06 9.89	20.4 23,6 25,4 137,1 135,5	2.0 3.0 3.5 4.0 4.25	WEM on top or well dry WEM on top or well pumped d				
8 00 11	630 635 640 920 925	380 755 380 380 190	OR OR OR OR	13. 0 13. 4 13. 4 13. 1 13. 1 12.8	521 558 604 746 718	6,98 6,46 7,0 7,36 7,30		7.33 7.78 8.28 7.06 9.89	20.4 23,6 25,4 137,1 135,5	2.0 3.0 3.5 4.0 4.25	WLM on top or well dry WLM on top or well pumped d				
14 14 14 00 11 14 14 00	630 635 640 920 925	380 755 380 380 190	OR OR OR OR OR	13. 0 13. 4 13. 4 13. 1 13. 1 12.8	521 558 604 746 718	6,98 6,46 7,0 7,36 7,30		7,33 7,78 8,28 7,06 9,89	20.4 23.6 25.4 137.1 135.5	2.0 3.0 3.5 4.0 4.25	WLM on top o' well dry WLM on top o' well punped d				
8 00	630 635 640 920 925	380 755 380 380 140	OR OR OR OR OR	13. 0 13. 4 13. 4 13. 1 13. 1 12.8	521 558 604 746 718	6,98 6,46 7,0 7,36 7,30		7,33 7,78 8,28 8,28 7,06 9,89	20.4 23,6 25,4 137,1 135,5	2.0 3.0 3.5 4.0 4.25	WLM on top or WLM on top or WLM on top or Well pumped d.				
8 00	630 635 640 920 925	380 755 380 380 190	OR OR OR OR OR	13. 0 13. 4 13. 4 13. 1 13. 1 12.8	521 558 604 746 718	6,98 6,46 7,0 7,30 7,30		7.33 7.78 8.28 7.06 9.89	20.4 23,6 25,4 137,1 135,5	2.0 3.0 3.5 4.0 4.25	WLM on top or WLM on top or WLM on top or Well pumped d.				
8 1 1 1 1 1 1 1 1 1 1 1 1 1	630 635 640 920 925	380 755 380 190	OR OR OR OR HT 512011	13. 0 13. 4 13. 4 13. 1 13. 1 12.8	521 558 604 746 718	6,98 6,46 7,0 7,36 7,30		7.33 7.78 8.28 7.06 9.89	20.4 23,6 25,4 137,1 135,5	2.0 3.0 3.5 4.0 4.25	WEM on top o' well dry WEM on top o' well pumped d,				
	630 635 640 920 925	380 755 380 140	OR OR OR OR OR AT 512111	13. 0 13. 4 13. 4 13. 1 13. 1 12.8	521 558 604 746 718	6,98 6,46 7,0 7,36 7,30		7,33 7,78 8,28 7,06 9,89	20.4 23,6 25,4 137,1 135,5	2.0 3.0 3.5 4.0 4.25	WLM on top of well dry WLM on top of well punped d.				
8 00	630 635 640 920 925 840 840 840 840 840 840 840 840 840 840	380 755 380 145	OR OR OR OR OR OR AT 512UTI	13. 0 13. 4 13. 4 13. 1 13. 1 12.8 8	521 558 604 746 718	6,98 6,46 7,0 7,30 7,30		7,33 7,78 8,28 7,06 9,89	20.4 23, c 25, 4 137,1 135,5	2.0 3.0 3.5 4.0 4.25	WLM an top o' well dry WLM on top o' well pumped d.				
8 00	630 635 640 920 925 Results A	3 8 0 7 5 5 3 8 0 3 8 0 1 4 5 1 4 5 M End Of Purging:	OR OR OR OR OR ST2NTI 572NTI	13. 0 13. 4 13. 4 13. 1 13. 1 12.8 8	521 558 604 746 718	6.98 6.46 7.0 7.30 7.30		7,33 7,78 8,28 7,06 9,89	20.4 23,6 25,4 137,1 135,5	2.0 3.0 3.5 4.0 4.25	WEM an top o'				

0-R = Dut ob venge 3785 mL = 1 gal WLM = water level metter Resume development @0415 on 5/24/18 Water Level below top of pump portor to development on 5/24/68 well considered developed after 3 well volumes due to slow recharge and restricted access to well site.

PC-103/24

5/24

3/6/19



Project Name:	SLAFFF MULTIPLE SITES
ASL Project No:	M2027.0003
Installation:	Ellsworth AFB
Site:	Site 5 (B-52 crush, 1970)
Date:	5/2/18
Sample Technician:	Arek Turdskil / Mult Bul
Well ID No.:	MWIRPFC0501

Initial Measurements

Well Total Depth:	35.47	ft BTOC	Water Level:	9.16	ft BTOC		
WELL VOLUME PURGE	: 1 WELL VO	LUME = (TOTAL	WELL DEPTH	BTOC - STATIC	DEPTH TO	WATER)	X WELL CAPACI
(only fill out if applicable)	=	(35.47	Ft -9,1(, Ft)	x 0163 gal/ft =	4.3	Gal	
Calculated Well Volume:	4.3	Gallons		Well Diameter:	2	in	ches
Calculations:	1" diame	er = 0.041 gai/ft	2" d	iameter = 0,163 gal/ft		4" diameter =	= 0.653 gai/ft

Well Purging Activites

Purging Method (pump type): Reclassing Flow rate (incl. units): 666 mL/m/m

	Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. <u>(mS/Cm)</u> MS/w	рН	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gal Pumped	Comments	
	1115	710	OR	14.5	7998	8.55	17.51	0,59	-35,2	1.5		
	1125	379	ÖR	14,1	5667	8,56	23,43	2.93	-36,0	2.5		
	1135	568	OR	14.7	5736	8,50	24,84	3,02	-30,6	4.0		
	1145	568	OR	14.3	5833	8,06	25.47	2.85	-25,3	5.5		
5/2/18	1155	946	OR	13.3	6967	7.55	26.75	1.58	-24.6	8.0	Stop development	for well growting
5/3/18	1340	379	OR	14.2	4022	7,61	23,72	0,85	-6,5	8,5	19411-744-	
	1350	757	OR	12.4	3451	7.32	25,70	2,22	-29.9	10.5		
	1400	257	OR	12.1	3267	7.23	28.09	2.61	-43,4	12.5		
	1410	946	OR	12.4	3361	7.20	31.17	1,33	-63.1	15.0		<u>م</u>
	1420	568	OR	13.2	3675	7,34		3,99	~58,0	16.5	water level meter.	an top of pump
	1430	379	361	13.1	3731	7.34	30.7	6.06	-43,9	17.5		
	1440	568	OR	12.9	4015	7.39	30.4	4,99	43,0	19.0		
	1450	379	135	12.8	3732	7.33	30,35	6.52	-319	20.0		
	1500	757	269	12.4	3653	7.31	31,40	6,61	-285	22.0		
											والتصفيد ومستابه والمواجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والم	
		A									- Limm	
			513/18									
	Results /	At End Of Purging:	269	c2.4	3653	7.31	31.4	6.61	-28,5	22.0		

COMMENTS: TOC = 1.14' ags (well pud not complete) Begin purging @ 1107 stop purging @ 1155 on 5/2/18 Resume development@ 1335 on 5/3/18 5 well volumes= 21.5 gal. 3785 mL = 1 ged

O 65/07

3/6/19



Project Name:	SI AFFF MULTIPLE SITES
ASL Project No:	M2027.0003
Installation:	Ellsworth AFB
Site:	Area 5 (B-52 crush 1970)
Date:	05/02/18
Sample Technician:	Areth Turplsky / Matthew Buttersmorth
Well ID No.:	MWISPFC0502

Initial Measurements

Well Total Depth: 30	0.05	fl BTOC	Water Level: 18,91	ft	втос		
WELL VOLUME PURGE:	1 WELL VOL	UME ≈ (TOTAL	WELL DEPTH BTOC -	STATIC DEP	тн то	WATER) X	WELL CAPACI
(only fill out if applicable)	=	(30.05	Ft - 15.9(Ft) x 0. (63	gal/ft = 🕻 🔹	82.	Gal	
Calculated Well Volume:	1.82	Gallons	Well D	iameter:	Z	inc	hes
Calculations:	1" diamete	er = 0.041 gai/ft	2" diameter = 0	.163 gal/ft		4" diameter ≂	0,653 gal/ft

Well Purging Activites

Purging Method (pump type): <u>Reclaimer</u> Flow rate (incl. units): <u>600 m L/m.h</u>

Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. (mS/Gm) JuS/cm	pН	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gal Pumped	Comments
0850	190	OR	12.6	3461	7.66	19.41	5,03	172.4	0.5	
0400	568	OR	11.7	3721	7,56	20.86	2.73	111.0	2.0	
0910	568	OR	11.6	4712	7.34	20.90	3.26	66.8	3.5	
0920	568	OR	11,4	5611	7.28	21.55	7.77	7,1	5.0	
0430	946	OR	11.4	6007	7,27	22, 15	2.33	-26,7	7.5	
0435	٦5٦	OR	11.4	6227	7.26	22.25	2,28	-33,9	8.5	
०१५०	757	OR	11.4	6 417	7.26	22.30	2,17	-431	9.5	
					· •.					
									:	
	AT		~~~~							
	512	118								
Results	At End Of Purging:	DR	11.4	6477	7.26	22.30	2.17	-43.1	9,5	

COMMENTS: Well put not complete. TOC = 009 ags 5 well volumes ! 9.1 gal 3785 mL = 1 gal Begin punging @ 0840

\$005/07 3/6/19



Project Name:	SI AFFF MULTIPLE SITES
ASL Project No:	M2027.0003
Installation:	Ellsworth AFB
Site:	6 (1988 B-1 grash)
Date:	5/6/18
Sample Technician:	A. Twolshi, M. Buttersworth
Well ID No.:	MWISPFC0601

Initial Measurements

Well Total Depth:	20.34	ft BTOC	Water Level:	15.50	ft BTO	3	
WELL VOLUME PURGE	E: 1 WELL VOLU	ME = (TOTAL	WELL DEPTH	BTOC - ST	TATIC DEPTH	TO WATER)	X WELL CAPACIT
(only fill out if applicable)	=	(20.34	Ft - 15.5 Ft)	x 0.163 g	al/ft = 0, 7	Gal	
Calculated Well Volume:	AL1.00	& Gallons		Well Diam	neter: 2	i	nches
	51414		<u> </u>				
Calculations:	1" diameter	= 0.041 gal/ft	2" d	iameter = 0.16	3 gal/ft	4" diameter	= 0.653 gal/ft

Well Purging Activites

Purging Method (pump type): Mega Man soon Flow rate (incl. units): [000 m//mh

Time	Flow Ratə (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. (m3/Cm) <i>JUSECM</i>	рН	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gal Pumped	Comments
1320	757	OR	14,4	374.6	7.53	16.24	9.46	28.7	1.0	
1325	257	OR	13.7	397,1	7.35	15.97	8.85	37.8	2,0	
1330	757	OR	13.4	406,7	7,36	16.55	9.08	40,0	3.6	
1535	757	OR	12.6	406.5	7.33	16,48	8.61	42.0	4.0	
1340	2271	OR	12.0	407.4	7.30	16.45	9.25	48.2	7.0	
a. <u></u>										and an include the second second
										New South State
	A.F.									
		8								
	5/01									
Resuits	At End Of Purging:	OR	12.0	4.07.4	7,36	16.45	9,25	43.2	7,0	

COMMENTS: well part not complete. TOC is 1.51' ags 5 well volumes = 4.0 Begin purging @ 1315 OR = out of range 3785 mL= l gal

C-106



AGC FIUEGO	No:	M2027.0003								
Installation:		Ellsworth AF	В							
Site:		6 (19	88 B-1	۱						
Date:		5/6/1	<u> </u>		/				··· · · · · · · · · · · · · · · · · ·	
Sample Tec	nnician:	Areh	Timostsk	1/M	Athen	- Bu	plers			
Weil ID No.:		MW18	PFCOG	52			~~~			
			Ín	ifial Mo:	euron	ients				
Well Total D	epth:	20.36	ft BTOC	Water Le	vel:	10.4	3	ft BTOC		
WELL VOLU	JME PURGE: 1	WELL VOLUM	E = (TOTAL	WELL DE	ртн вт	OC - 3	STATIC D	EPTH TO	WATER)	X WELL CAPAC
(only fill out	f applicable)	=	(20.36	Ft -10.4	3Ft) x C).163	gal/ft =	1.62	Gal	
Calculated V	Vell Volume:	1.62	Gallons			Well Dia	ameter:	2	1	inches
Cal	ulations:	1" diameter =	0.041 gal/ft		2" diam	əter = 0.1	163 aal/ft		4" diamet	er = 0.653 gal/ft
		, <u>, , , , , , , , , , , , , , , , , , </u>					g			
			We	ll Purgi	ng Act	ivites				
Purging Met	nod (pump type);	Rectar	NET		F	low rate (incl. units);	3	95 m	1 L /mm
					-					
			ļ			Depth				
Time	Flow Rate	Turbidity	Temp	Cond.	pН	water	DO (mg/li)	ORP	Total Gal	Comments
	(mvmn)	(NTUS)	('C)	Justin		(BTOC	(mga)		Fumpeu	
1150	568	OR	11.5	3465	741	18.45	9.73	34.0	1.5	
200	568	ØR	11.5	368.4	7.23	16,70	9.88	34.2	3.0	
12000	571	OR	12.1	382,5	1.32		9.00	31.4	4.0	WLM on top of
1215	379	OR	13,6	402.7	7,24		qic	28.6	4.5	well dry
1435	379	OR	12.1	624,7	7,10	-	6.67	2,9	5,6	WLM on top of
1440	379	OR	12.4	449.	7.06	~	8,71	14.0	5.5	
1456	189	OR	(3,0	441.4	τ_{ell}		9.62	23.1	6,0	
1455	189	ÖR	13.3	444	7.17		9,72	27,3	6.25	well dry @
		ļ								
		-								
	A	1	1							
	A				1		1			
	A									
Results At	End Of Purging:	OR	13,3	444.2	าแก	-	9.72	27,3	6,25	

Oh = Ond at range Begin purging @ 1140 Resume purging 785 ml = I gal stop jurging @ 1215 on 5/6/18 @ 1430 on 5/7/18 well volumes = 8,1 gal Due to restricted access to area of well and true constraints, well is considered developed after 6,25 gallons Oh = out of range 3785 mL = 1 gal 5 well volumes = 8,1 gal

to 05/07 3/6/19



Project Name:	SI AFFF MULTIPLE SITES
ASL Project No:	M2027.0003
Installation:	Ellsworth AFB
Site:	6 (1988 B-1 Grash)
Date:	5/5/18
Sample Technician:	Arek Turokski Motthen Buttersnorth
Well ID No.:	MULLERE OGO3

Initial Measurements

Well Total Depth:	60.40	ft BTOC	Water Level:	27.65	ft BTOC		
WELL VOLUME PURGE	: 1 WELL VOLU	ME = (TOTAL	WELL DEPTH	BTOC - STAT	IC DEPTH TO V	WATER) X WELLO	APACIT
(only fill out if applicable)	=	(60,h	Ft - 27,6Ft)	x 0,163 gai/ft	$= 5.34_{G}$	al	
Calculated Well Volume:	5.34	Gallons		Well Diamete	er: <u>2</u>	inches	
Calculations:	1" diameter	= 0.041 gal/ft	2" d	iameter = 0.163 g	al/ft 4	" diameter = 0,653 gal/f	it

Well Purging Activites

Purging Method (pump type): <u>Redamer</u> Flow rate (incl. units):____

520 ml/mm

											-
Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. .(mS/Gm) juS/cm	рН	Depth to water (BTOC)	DO (mg/i)	ORP	Total Gal Pumped	Comments	
1620	1893	UR	15.6	1192	7.23	32.8	7.78	2.1	5.0	5/5/18	
1630	1514	QR	15,2	1.037	2.91	50.9	18,00	5.8	ħО		
1640	1136	0R	14.7	23 55	6.90	54,38	5,27	7.3	12.0		
1650	7.57	OR	14.8	2637	6.77		6.54	14.0	14.0	well day @]	650
0815	568	OR	12.4	3827	6.860	34.60	2.95	84,4	15,5	5/6/18	
0830	505	OR	12.6	3811	6,83	44.30	2.78	40,7	17.5		
0843	379	55	12.6	3808	6.83	51,26	2.82	24.7	19.0		
0900	379	OR	12.8	3718	6.88	\$4.27	5,44	26,7	20.5		
0915	126	GR	13,5	3671	6.79	55.45	5,33	39.2	21.0		
30	252	OR	13.0	3624	6.76	56,88	4.62	44,4	22.0		
oghs	126	02	13.3	3690	6.76	~	6.39	46,5	22.5	When on the of p	ump
1000	126	OR	3.3	3761	6.92		10,33	32.N	23,0	well dry	r
1100	252	- ŐR	12.8	3768	7.15		11.46	62.8	24.0	welldry	
	TAI										
	5/61	18									
Results	At End Of Purging	(m)	12.8	3765	7.16		1.46	628	24.0		

COMMENTS: well put not complete. TOC 15 0.88' ags Resume pussing on 5/6/18 @ 0805 well rom dry @ 1000 on 5/6/18 Resume pursity @ 1050 on 5/6/18 Begin punging @ 1610 on 5/5/18 OR= out of ronge 3785mL= 1 gal 5 well volumes = 26,7 gal. Due to the constraints, well constand developed after 24 gallons. Restricted where

C-108

5/07



Project Name:	SI AFFF MULTIPLE SITES
ASL Project No:	M2027.0003
Installation:	Ellsworth AFB
Site:	7 (Taxima Delita 2000 mish)
Date:	5/2/18
Sample Technician:	Arel Turobhi/ Multhen Buttersworth
Well ID No .:	MWISPFC0701

Initial Measurements

Well Total Depth:	40.38	ft BTOC	Water Level:	13,66	ft BTOC	
WELL VOLUME PURGE	: 1 WELL VOLU	ME = (TOTAL	WELL DEPTH	BTOC - STATIC	DEPTH TO WATE	R) X WELL CAPACIT
(only fill out if applicable)	=	(40.38	Ft -13,66Ft)	x O,163 gal/ft =	4.4 Gal	
Calculated Well Volume:	4.4	Gallons		Well Diameter:	2	inches
Calculations:	1" diameter	= 0.041 gal/ft	2" d	iameter = 0.163 gal/	'ft 4'' diam	eter = 0.653 gal/ft

Well Purging Activites

Purging Method (pump type):

Reclaimer

Flow rate (Incl. units): 575 mL/mut

Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. (mS/Cm)	рН	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gal Pumped	Comments	
1435	379	OR	12.7	1581	7,06	19.05	1.99	-4.9	.0		
1445	757	OR	12.2	1564	7.03	28,00	2,62	-19.2	3.0		
1455	568	OR	12.4	1641	7.10	30.52	2.63	-20.1	4.5		
1505	757	00	13,0	1397	7.08	31.4	2.93	-21,6	6.5		
1515	568	OR	12.7	1602	6.97	34.04	2.99	-29,5	8.0		
1523	568	OR	13,1	1888	6.85	36.27	1,57	-40,4	9.5		
1535	379	OR	(3.7	2241	6.95	<i></i>	341	-30.3	10.5	WLM on top of,	himp
1545	568	OR	12.2	2153	7,04	~	7,46	-16.3	12.0	welldra @ 15	45
0820	757	OR	10.8	2712	6.88	23,79	1.87	58.9	14.0	7.5	-
0830	568	OR	10.8	2686	6,89	29.8.	12.40	37,2	15:5		
0840	757	OR	10.8	2538	6,90	33,84	3,08	24.5	17.5		
0850	568	GR	10.9	2566	6.81	36.29	3,62	22.6	19.0		
6400	568	OR	10.9	2619	6.84	ţ	3,18	21.2	20.5	White an tap of p	ump
0910	190	OR	11. Q	2678	6,90	I	6.00	25.7	21.0		•
0945	379	OR	10.4	2648	6.92		5,89	26.8	22,0	well dy ec	905
			6110								
	!	<u>vi 2/</u>	0110								
Results	At End Of Purging:	OR	10.9	2648	6.92	~~	5,89	26,8	22.0		

COMMENTS: well pool not completed. Stickup: 1.05° ags 5 well volumes = 22 gd. Begm Begin purging @ 1425 on 5/4/18 Resume purging @ 0810 on 5/10/18 DTW: 14.77 prior to purging on 5/10/18 Oh= out of rouge 3785 mL= 1gd WLM= water level meter

05/10 -6-



Project Name:	SI AFFF MULTIPLE SITES
ASL Project No:	M2027.0003
Installation:	Ellsworth AFB
Site:	7 (delto taxhacan mest
Date:	5/17/18
Sample Technician:	Arele Turolsky/Miles Neilson
Well ID No.:	MWISPFC0702

		Ini	tial Measure	ements		
Well Total Depth:	25.9	ft BTOC	Water Level:	15,74	ft BTOC	
WELL VOLUME PURG	E: 1 WELL VOLU	ME = (TOTAL	WELL DEPTH	BTOC - STATIC	DEPTH TO	WATER) X WELL CAPAC
(only fill out if applicable) =	(25,9	Ft -15.74 Ft) x	0.163 gal/ft =	1.66	Gal
Calculated Well Volume	: 1.66	Gallons		Well Diameter:	2	inches
Calculations:	1" diameter	= 0.041 gai/ft	2" dia	meter = 0.163 gal/	ft	4" diameter = 0.653 gal/ft

Well Purging Activites

Flow rate (incl. units):

568 m. m.n

Purging Method (pump type): Reclarine

Depth to Cond Temp Turbidity DO Total Gal Flow Rate pН ORP Comments Time water (ml/min) (NTUs) (°C) (mS/Cm) (mg/l) Pumped (BTOC US/cm) Begn Dovelopment 15.74 1125 0.0 368 568 757 OR ØR 16.70 1.95 35.3 1.5 00 12.65 2.09 24.7 3.03.5 0.7 2677 6.94 1135 568 568 568 568 10.3 10.2 9.8 1145 2517 6.97 2365 7.04 20.95 3.75 14.8 9.50 End Development ត្រៃភ្វ 1205 OR 1215 0.0 6R 10.3 568 568 Øβ 1220 1225 ØR 10.4 MAN 5117/18 10.4 2243 7.01 21.45 3.75 14.8 9.5 Results At End Of Purging: GR_

COMMENTS: well pud not complete. Stickup: 1.31 Begin pursing @ 1125 End Purging @ 1225 3765 mL = I gad Jurb: dity Not in Kangedie togeology OR = out of range Kop Forelog. see borelog. 5 well volumes = 8,3 gal

R-1185/19



Project Name:	SI AFFF MULTIPLE SITES
ASL Project No:	M2027.0003
Installation:	Ellsworth AFB
Site:	7 (delta taximas mest)
Date:	5/17/18 (MAN.
Sample Technician:	Arele Twolski / Miles Netron Neilson
Well ID No.:	MWISPFC0703

		In	itial Mea	sure	ments				
Well Total Depth: 2	5.91	ft BTOC	Water Le	vel:	17.38	ft BTOC			
WELL VOLUME PURGE:	1 WELL VOLU	JME ≈ (TOTAL	WELL DE	РТН В	TOC - STATIC	DEPTH TO	WATER)	X WELL C	APACIT
(only fill out if applicable)	=	(25.9)	Ft -	Ft) x	0.163 gal/ft =	140	Gal		
Calculated Well Volume:	1.40	Gallons			Well Diameter:	2		inches	
Calculations:	1" diameter	= 0.041 gal/ft		2" dian	neter = 0,163 gal/	ft	4" diameter	r = 0.653 gai/f	t

Well Purging Activites

Purging Method (pump type): ______

Depth to Temp Loond. Turbidity Flow Rate DO Total Gal Time pН water ORP Comments (mS/em) (ml/min) (NTUs) (°C) (mg/l) Pumped (BTOC -yslom) AR. 124.7 1. a TAN Bern Development 174 80 an OK 10.8 17,93 4.07 1015 7.18 725 7933.15 51.1 80 567 0 202.5 Inclease Rate اں م 1629 025 Ĭ 1035 1045 4.5 157 7:33 18.10 4.57 -26.4 Ot 1346 <u>ģ.</u>7 1474 7.35 18.14 5.83 -55.2 6.5 1480 7.36 1820 5.85 -58.2 7.5 1480 7.38 1830 5.89 -58.9 8.5 157 Ø 9.7 1050 157 \odot End Revelopment 8.5gallors OR 055 757 AT. 571778 9,6 1480 7,38 18.30 5.89 -58.9 8.5 Results At End Of Purging: OR

Flow rate (incl. units):

COMMENTS: Well pud not complete, Stickup: 1.58' Begin pursing @ 1005 Turbity did Not Stabilize due to grobyy See Bore Log 3785 mi = Lgad 8.5 gallons Purged OR= out of ronge 5 well volumes = 7 gal

@ 05/19c-111

380 mL -757 ml



Project Name:	SI AFFF MULTIPLE SITES
ASL Project No:	M2027.0003
Installation:	Ellsworth AFB
Site:	Site 8 - Martin (Rash
Date:	4-26-17
Sample Technician:	A. willis / A. Turolsky
Well ID No.:	NWISPFCOOI

Bottom of Screen = 51.28 Initial Measurements

Well Total Depth: 105	1.53	ft BTOC	Water Level:	15	.93	ft BTOC			
WELL VOLUME PURGE:	1 WELL VOLUN	/IE ≕ (TOTAL	WELL DEPTH	BTOC	STATIC	DEPTH TO	WATER)	х	WELL CAPACIT
(only fill out if applicable)	=	(51.28	Ft - 15.(3Ft) :	x 0.163	gal/ft =	576	Gal		
Calculated Well Volume:	5.76	Gallons		Well D)iameter:	2		inche	s
Calculations:	1" diameter =	• 0.041 gal/ft	2" di	ameter = 0	.163 gal/i	t ~	4" diamete	r = 0,6	653 gal/ft

Well Purging Activites

Purging Method (pump type): Briler Meya Mansson Flow rate (incl. units): 955 mL/mm

Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. (mS/Cm)	Hq	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gai Pumped	Comments
1010	946	OR	12.3	8.52	7.02	22.25	0.64	-78,4	1.25	1
1020	852	OR	12,4	12.81	6.91	29.95	0.22	-1057	3,50	
1030	757	OB	12.8	19.90	6,89	31.03	0.86	-94,6	5,50	
1040	157	OR	12.9	25.46	6.94	31,15	0.28	-130,9	7.50	
1050	757	or	12.7	26.47	6,98	32,57	0.21	-1343	4.50	
1100	751	OR	12.7	27.40	701	33.21	0.32	-1080	11.50	
1110	946	OR	12.5	27.84	7 04	34.78	0.19	-124.4	14.00	×
1120	757	OR	12.5	27.64	7.06	36,33	0.67	-991	16.06	y
1130	757	OR	12.5	27,90	γ_{o}	38.35	0.17	-116.3	18.00	
1140	1135	GR	12.5	27.61	7.08	39,20	0.20	-103,9	21.00	
1150	1135	DR	13,0	23,95	7.13	37.19	0.19	-119,7	24.00	
1200	1892	O R	12.6	19.73	7.67	43.75	0.44	-82.9	29.00	
		0								
	17									
	AL									
Results	At End Of Purging:	oh	12.6	19.73	7.07	42. TE	0.44	-829	29.00	,

COMMENTS: Begin furging @ 1005 Well pad not complete. TOC is Off = out of range 0.43' ags. 3785ml = 1 gad 5 well vol. = 28,8 gad.

C-112

Serostar SES __ WELL DEVELOPMENT LOG Project Name: SI AFFF MULTIPLE SITES ASL Project No: M2027.0003 Installation: Ellsworth AFB Site: 8- Marton (rash Date: 4123 2019 Sample Technician: Ne:15m TUWOISKI Well ID No.: PFC 0802 Initial Measurements Well Total Depth: 49. 63 ft BTOC Water Level: RBTOC WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELDBEPTH BTOC - STATIC DEPTH TO WATER) (only fill out if applicable) = (49.63 Ft 20.301) × 0.163 gal/ft = 25.1 Gal 5.0 WELL CAPACIT Х Gal 5.07 (only fill out if applicable) Calculated Well Volume: Gailons Well Diameter: inches Calculations: 1" diameter = 0.041 gal/ft 2" diameter = 0.163 gal/ft 4" diameter = 0.653 gal/ft **Well Purging Activites** $\sqrt{2}$ 700-3000AL/Min Purging Method (pump type): Mar Montscon Flow rate (incl. units); Depth to Flow Rate Turbidity Temp Cond. DO Total Gal pН ORP Comments Time water

(mS/Cm)

10.94

17.88

18.91

17.44

7.70

17.63 1.64 45.12 1.00

27.64 7.47 78.7 2.97

75 7ab

18

(°C)

14.4

15.0

4.4

<u>13.9</u>

12.6

12.7

(mg/i)

ወ ወብን

20

2.15

222

(BTOC

18.85

7-80 29.30 0.90

44013

44.95

7.65 45.52 1.05

7.67 46.70 0.72

Pumped

3.70

10.00

10,40

6.20

20.20

3 MAN 8. T

14.07 X Siged @ 1411

-22.9 27.46 End Davelormen

-68,1

-65.5

60.9

-43.3

-33.6

-183

-2481

-51.8 15,89

-252 22.66

-28.625.06

Beyn Davdorment

RUMPED DIACO 1416

Resure development

4 24 1800

415

27,74 7,45 38.7 2.97 28,10 7.44 43,3322.75 1308 3,000 OR 3,000 ōğ 120 611 26.64 7.42 41.11 3.26 OK 3,000 120 214 Q.H 26.69 7.424.11 7.26 -22.9 27.46 Results At End Of Purging: われ

(NTUs)

OK

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OK

Of

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OĽ

ØF

(ml/min)

1000 1400

(MN)

400

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1000

<u>700</u>

000

400

<u>3,000</u>

100 zee OR

<u>320</u>

30

50

355

100

05

10

1415

1550

1905

Ö

COMMENTS: 5 Weil Volumes: 25.1 gallon5 OR: Over Range 27.46 Gallons Purgel

C-113

AerostarSES...

Project Name:	SI AFFF MULTIPLE SITES
ASL Project No:	M2027.0003
Installation:	Ellsworth AFB
Site:	SIFE 8- MARTEN CRASH
Date:	4-22-18
Sample Technician:	A. willis / M. peilson /
Well ID No.:	MWISPECOS03
Screen -	So B Initial Measurements
Well Total Depth: 5 c	t BTOC Water Level: 15.93 ft BTOC
WELL VOLUME PURGE	: 1 WELL VOLUME = (TOTAL WELL DEPTH BTOC STATIC DEPTH TO WATER) X WELL CAPACIT
(only fill out if applicable)	= $(50.13 \text{ Ft} - 15.98 \text{ Ft}) \times 0.163 \text{ gal/ft} = 5.57 \text{ Gal}$
Calculated Well Volume:	Gallons Well Diameter: 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): Monstern

Flow rate (incl. units): 1400 - 2000mL/min

											-)		
st log	Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C) C	Cond. (mS/Om)	⊃° ^H	Depth to water (BTOC)	DO (mg/i)	ORP	Total Gai Pumped	Comments		
412L	1751	1 1100			~	ļ	15.9/3		-		Development i	hitiated	
,	1801	T 400	OR	14.5	32.22).HI	34.78	2.09	22.2	3.7	* Suge & The Pase H	at @1806	
	1896	7,570	OR	1602	26.93	7.37	34260	4.84	129	5.55	* Dry ut 1809		
4/73 MAN	186805	1,600	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			·	16.90			8.55	Resime Develo	Pmerit	
	0804	1, 600 MAN	OK_	12.3	16.78	7,27	25.5	2.44	224.6	7.46			
	0813	100900	<u>or</u>	12.4	16.91	1.30	295	6.04	1/5.8	11.5 +	· ·		
-	00 17	1,400	01	16.4	16,45	7.01	50,5 24 N	1.61	/[.]	16:53			
c.	0861	2 200	152	15-1	1601	7.77	2160 400	2010	120	15.01			•
	2825	2,000	<u> </u>	12 7	13 79	7.47	47 5	4.81	11 0	Nat	KS med Par	Dead Drag	sβ3
MAN MAN	~P37	1.2.00		1601		(11.8			72.49	Rosimo Da	100 Pinovit	<u>с</u> ,
	0940	1.400	OR	12.9	18,10	7.54	31.0	1.53	-20,+1	22.81	MAN 25.66		
Ē	0945	1.400	OR	12.9	18,40	7.60	37.9	1.48	-421	27.51			
. [0950	2,000	OR	12.8	17.99	7.61	41.0	2.04	-38,5	29.36			-
	0955	2,000	OR	12.8	6.37	7.60	45.0	4,99	-8.6	31.21			÷.
÷.	0958	2,000 mAN	oR	12.B	16.31	7.59	46.05	4.92	~ le O	53,00			
Į.	100	20001,20	OK	12,9	16.29	7.58	46.55	4.90	-0,5	33.94	End Develop	iment XX	
	Results /	At End Of Purging: [OK	7.9	6-29	7.58	46,65	7.90	-05	5581		•	

COMMENTS: 27.83 ~ Swell volumes 5 Well Volumes = 27.85 gallons ## End Development, Turbidity notable to leach lange due to geology

4/24/10

C-114



Project Name:	SI AFFF MULTIPLE SITES
ASL Project No:	M2027.0003
Installation:	Ellsworth AFB
Site:	9 (crush 4, 2006)
Date:	5/24/18
Sample Technician:	Are Timo Istai Miles - Nethorn @ A.willis w/ Escort
Well ID No.:	MW18 PFC OQUIA

Initial Measurements								
Well Total Depth: 35.	38	ft BTOC	Water Level: 27.81	¢.	ft BTOC			
WELL VOLUME PURGE:	1 WELL VOLU	JME = (TOTAL	WELL DEPTH BTOC -	STATIC D	EPTH TO WATER) X WELL CAPACIT		
(only fill out if applicable)	=	(35-33	Ft - 7.8 (Ft) x 0.143	_{gal/ft} =1.7	L3 _{Gal}			
Calculated Well Volume:	1.23	Gallons	Weli	Diameter:	2.0	inches		
Caiculations:	1" diameter	= 0.041 gal/ft	2* diameter =	0,163 gai/ft	4" diame	ter = 0.653 gal/ft		

Well Purging Activites

Purging Method (pump type): <u>fectainer PMonsoon</u> Flow rate (incl. units): <u>300-1200 m L/min</u>

Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. (mS/Cm) Us/cn	рН	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gal Pumped	Comments	
1510	800			_	-	27.62	-	-	<u> </u>	Development in	hicked
1514	860	OR	13.2	3593	691	29.23	2.90	-24.7	0.85		
1520	800	OR	1d.3	3275	6-92	30.2	3.26	-33.0	2.12		
(524	1200	672	12.6	3348	6.89	×	3.19	-51.3	3.38	Dovelan Rann	eldry to 2" war
15	æ.										TD.
	- DWE	to su	WRE	CHAR	6E,	FUE	2/17	UNE	, AN,	DESLORF	
125							~		-		
	KESTRI	LTONI	TLSO 1	INE	てて	EC	Côn	SIDE	REN J	DEVELOPED	
	IT FT 600	e purgin	f ~ 3	well	vol	hme	s @	155	0		
	······			and the second se							
					and the second second	Contraction of the local division of the loc					
						-0		Contraction Contraction Contraction			
					•	Succession of the second s					
Results /	At End Of Puraina:	DR	12.6	3342	6-84	X	3.19	-51.3	232		

COMMENTS: 5well volumes X NL neter hitting top of monsoon - anable to record w & realing.

Tw 05/30 C-115



		Project Na	ame:	SI AFFF MUL	TIPLE SITES	3							
		ASL Proje	ect No:	M2027,0003									
		Installatio	n:	Elisworth AF	В								-
		Site:		9.64	ush 4,	2006)						-
		Date:		5/24/	18 '								-
		Sample T	echnician:	Arek T	holski	mil	es N	reilso	~ 1				_
		Well ID N	o.:	MW18	~								
					Ini	tial Mos	euron	nonte					
		Well Total	l Depth:	35.11	ft BTOC	Water Le	vel:	29.4	16	ft BTOC]
		WELL VO	LUME PURGE: 1	WELL VOLUME	E = (TOTAL	WELL DE	PTH B	FOC - 8	STATIC D	EPTH TO	WATER)	X WELL CAPACI	r <u> </u>
		(only fill o	ut if applicable)	#	3486,4	Ft - 29.9	lifet) × (<u> 2.163</u>	gal/ft = (9.84	Gal		
		Calculated	d Well Volume:	0.84	Galions			Well Dia	imeter:	<u>2</u>	•	inches	
		c	alculations:	1" diameter =	0.041 gal/ft		2" diam	eter = 0.1	63 gal/ft		4" diamete	er = 0.653 gal/ft	
		<u> </u>	· · · · · · · · · · · · · · · · · · ·				1				<u>،</u>		-
					Wę	li Purgi	ng Ac	tivites			6	ଜ	
		Purging M	lethod (pump type)	: Rectai	mer /h	Nonsous	. Γ	·low rate (i	ncl. units):	300-	1200 7	1/Min	
							• •						-
								Depth					
		Time	Flow Rate	Turbidity	Temp	Cond.	pН	water	DO (mail)	ORP	Total Gal	Comments	
				(1105)		hSico		(BTOC	(mg/i)		rumpeu		
	5/24/18	1515	X N/A	OR	14.4	860	7.38	-	7.50	25.3	0.5	W/M so the of	-
	. , .	1520	4 N/A	OR	14.2	721	7.3	4-	9.03	23,6	1.5	<u> </u>	
		1525	4 NA	OR	15,4	787	7.33	· - ·	8.34	25,3	1,75	well primped of	ry
Awilly	5130/18	138	800	OR				27.2			1.75	Well develo	pratice mad
9.00Jvr		1146	1200	De	12.7	1034	6.95	29.5	3.08	129.5	4.27		
		1153	1200	or	12.7	1051	7.05	30.6	6.76	201	8.04	0 1	
		1202	1900	OR	14.~~	1035	7.04	Jør - 4 P	1.02	17.3	1.07	Developed	
												1177 San Carlos Constant Constant State San	-
								·					-
							B	\leq					
							<u> </u>		\leq				-
											and the state of the		-
												COMPANY STORE ST	-
											n.		
		Results	At End Of Puraina:	OR	12.9	1055	7.04	32.37	202	74.5	9.34		
			er i urgilig.	·····			1 7.01	r w 1				1	
		0000000		·									1
			INTS: well	Loudnot complete Stickup 1 0 74									
		-	۲, ۲			r,	.,	Ψ	, 0,	* 1			
		OKE	out otra	ખ્યુષ	Be	lein o	urail	u@	1505	sr 1	5/24/1	8	
		X 178	5-1 wal			o ` {	ر	$j \in I$		~	<i></i>		

X3 785 = l gal 5 well volumes = 4,2 gal WLM = water level meder

M2027.0003

Q 5/30



			SI AFFF MUL									_		
	ASL Proje	ct No:	M2027,0003											
	Installation	n:	Ellsworth AF	Ellsworth AFB										
	Site:		10 Cu	MTP	<u> </u>					<u> </u>				
	Date:	e.	5/5/18,	5/5/18, 5/8/18, 5/9/18										
	Sample Te	echnician:	Arek Fi	rolski,	(matt	hen	Butt	ersmo	r 12			_		
	Well ID No	o,:	MWIS	PFCLOO	7 {							-		
				Ini	itial Mea	asuren	nents							
	Weli Total	Depth: 5	<i>0.39</i>	ft BTOC	Water Le	vel:	13.9	17	ft BTOC]		
	WELL VO	LUME PURGE:	1 WELL VOLUM	E = (TOTAL	WELL DE	РТН ВТ	TOC 3	STATIC D	EPTH TO	WATER)	X WELL CAPACI	Г		
	(only fill ou	it if applicable)	=	(50,39	Ft 13,9	7Ft) x (0,163	$gal/ft = \frac{l}{k}$	5,93	Gal				
	Calculated	Well Volume:	5,93	Gallons			Well Dia	ameter:		2.	inches	1		
		alculations:	1" diameter ⇔	0.041 cal/#		2" diam	eter = 0	163 col/#		4" diamet	$a_{r} = 0.653$ galfft]		
		acciations.		0.04 i yawit		z ulam		।ତତ୍ର ପ୍ରଥାମ ।			ar = 0.653 gai/it]		
				We	ll Puroi	na Aci	tivites							
	D		Deel.	1 90	n i uigi	19710			L	14.	11.			
	Purging M	ethod (pump type)	: <u>necha</u>	mer		. F	iow rate (incl. units):		11 m	L/mm	-		
							Depth	1]		
	 ,	Flow Rate	Turbidity	Temp	Cond.		to	DO		Total Gal	0			
	lime	(ml/min)	(NTUs)	(°C)	(mS/Cm)	рН	Water (BTOC	(mg/l)	ORP	Pumped	Comments			
)							
15/18	0430	946	OR	12.9	3884	7,20	27.27	0,16	L03,4	2.5				
	9950	757	OR	13.7	3835	7.19	42,7	3 1.24	רו.8	6,5				
	1010	284	OR	14.9	3783	7,04	46,12	0,54	2.8	8.0				
	1030	189	OR	17.9	4362	7.07		0.72	6,3	9,0	WLM on top of p	limp		
	1050	95	OK	16.2	4308	7,18	-	5.76	Ļ5, 7	4,5	well ony			
8/18	1255	284	OR	15,6	4876	7,40	24.45	1,02	43.7	_11	resure purghy	onsta		
	1315	284	362	15,7	4855	7.41	31,40	1,16	40,0	12.5	• • •			
	1335	379	142	14.9	5832	7,42	40.47	2.70	35,4	14.5				
	1355	379	990	15.1	4581	7.32	44.27	171	30,9	16,5	·····			
	1415	284	OR	15.4	4744	7.26		2.61	39,1	18.0	WLM on top of	pump		
	1430	379	OR	15,1	4640	7.35		6.50	43.3	18.5	well dry	.		
	0.900	568	$\mid \circ R$	12.9	4721	7.42	39.04	1,35	34,4	22,5	5/9/18, resure pr	ging		
5/9/18	0910	757	OR	12.7	4660	7.43	44.88	2.99	27.2	24.5	,	ر "		
5/9/18		~~ c ~1	OR	12.9	4627	7.32		6,37	45.2	26.5	when on top of	pump		
5/9/18	0920			1.7 7	4563	7.33	-	7,65	47.4	27.0	wellday	ſ		
5/1/18	0920	946	OR	16.1	<u> </u>				-		-	•		
5/9/18	0920	946	GR											
5/1/18	0920	946 	574118											

COMMENTS:

well pad not complete. TOC = 1.3' ags 5 well volumes = 29.7 gal 3785mL= lgal OR = out of range WLM = noter level meter

Besn pursing @ 220, Stop @ LO 50 on 5/5/18 Resume development @ 1235. Stop @ 1430 on 5/8/18. Well day. Resume development @ 0840, well rondy C 0922 on 5/4/18,

ſ p 05/10



Project Name:	SI AFFF MULTIPLE SITES
ASL Project No:	M2027.0003
Installation:	Ellsworth AFB
Site:	10 (WWTP)
Date:	5/5/18 - 5/9/18
Sample Technician:	Arek Twolski / Matthen Buttersworth
Well ID No.:	MWISPFC1002

Initial Measurements

Well Total Depth:	40.4	ft BTOC	Water Level:	6.43	5	ft BTOC			
WELL VOLUME PURGE	: 1 WELL VOLU	JME = (TOTAL	WELL DEPTH	BTOC - S	STATIC DE	ЕРТН ТС	WATER)	хw	ELL CAPACIT
(only fill out if applicable)	=	(40.4	Ft - 6145Ft)	x 0,163	gal/ft = <u>5</u>	.54	Gal		
Calculated Well Volume:	5,54	Gallons		Well Dia	ameter:	2	j	inches	
Calculations:	1" diameter	= 0.041 gal/ft	2" d	iameter = 0,1	63 gal/ft		4" diameter	= 0.65	3 gal/ft

Well Purging Activites

Flow rate (incl. units):

Purging Method (pump type): Non306~

												-
	Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. (mS/CTh) JuSecon	рН	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gal Pumped	Comments	
·	1150	568	OR	17.4	3447	7,62	17,22	1.16	-47,3	1.5		
	1200	568	OR	15.8	3351	7,19	22,80	0,79	-70,1	3,6		
	1215	252	OR	17.1	3596	7.14	26,09	0.69	- 86,4	4.0		
	1230	1009	OK	15.)	3,950	7.10	33.80	1-52	-96.3	8.0	A	
	1245	<u> </u>	OK	15.2	3,037	6.89	36.30	0.52	- 81-7	10.0		
	1300	379	<u>OR</u>	15,8	3'560	7,12	37.81	2.00	-76,3	11.5	well dry @ 1302	4, 5 <i>1 5/</i> 18
5/8/6	1520	946	DR	13,1	4130	2.23	21.45	2.43	7.3	14.0	3/8/18	
	1530	757	OR	13.4	4033	7.24	30.6	2,05	-5.3	16.0		
	545	<u> </u>	OR	13,9	4262	7.16	34.85	2.07	-1,1	19.0		
	1600	253	OK	14-7	2444	7.09		2,15	7.7	20.0	WLM on top of	pump
	1610	757	OR	1/5.1	3952	7.43	·	3.37	11.3	22.0	Welldry Ol	610
5/9/18	1300	<u> 63(</u>	OR	13.2	4345	7.30	22.97	3,81	28.1	24.5	5/4/181	
	1515	257	412	13.6	4344	7.33	51.59	2.48	40.3	27.5		
	1330	883	860	13.1	4797	7,19	30.73	3,20	32,2	31,0		
			·			·····						,
					┝────				[-
					1.50-	B 1.4	20.50]
	Results /	At End Of Purging:	860	13.1	14797	1.19	128,14	> 3.40	32.L	360		

COMMENTS: well pud not complete. TOC = 0.86 ags. Begin purging @ 1140 on 5/5/18 5 well volumes = 27.7 gol. OR=out of range Resume purging @ 1510 on 5/8/18 DTw prior to pursing: 10.85 Pesume purging @ 1245 on 5/9/18 DTur pror to Tunging ; 11,05 3785mL= 1 gd

(05/ 10

635 mL/mm

C-118



Project Name:	SI AFFF MULTIPLE SITES X Well Completed
ASL Project No:	M2027.0003
Installation:	HINTAFB ELLWORTH AFB
Site:	Site 10 - WWIP
Date:	6-2-18
Sample Technician:	A willis, Justin Voints
Well ID No .:	MW 18 PFC1603
	Initial Measurements ~ Drillers where (?)

					—		
Well Total Depth:	59.53	ft BTOC	Water Level:	* 7.67	ft BTOC		
WELL VOLUME PURGE:	1 WELL VOL	UME = (TOTAL	WELL DEPTH	BTOC - STA	IC DEPTH TO WA	TER) X WELL CAPAC	ит
(only fill out if applicable)	=	59.53	Ft -].67 Ft)	x 0.163 gal/f	t = 7.45 Gal	(suspect - driller	rasel water during
Calculated Well Volume:	\$.45	Gallons		Well Diamet	er: २.०'	inches	Installation) O
Calculations:	1" diamete	r = 0.041 gal/ft	2" d	liameter = 0.163 ç	jal/ft 4" di	ameter = 0.653 gal/ft	

Well Purging Activites

Purging Method (pump type): Reclaimer

Flow rate (incl. units): 750 - 1350 mL/m ~

											7
Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond (mS/G m) AS/Lm	₽ pH	Depth to water (BTOC	DO (mg/l)	ORP	Total Gai Pumped	Comments	
1605	750					04.93		-	-	Development init	reled
1610	750	OR	12.7	44.04	7.64	9.30	0.43	-3.4	0.99		
1614	1000	OR	13.6	996	7.81	1878	0.22	-30.4	2.04		
1222	1350	OR	11.6	502	7.16	37.0	1.86	50.0	4.39		
1632	1350	OR	11.5	478.7	8.15	62.36	3.86	ि। स	8.46		
1634	1356	OR	11.4	754	7.01	54.15	1.27	-5.5	9.17		·
1632	1350	UR	12.0	855	7.94	56.05	3.14	1.6	10.59		
1644	7,50	OR	12.9	859	7.93	××	221	5.4	11.77		
1643	750	OR	12.9	860	7.93	**	1.38	- 81	12.49	Shipped develop	mt/pry well
1724	750	OR		~	-	56.15	-		12.749	Shoted pump a	seln' d
1728	ט 5 ך	OR	13.0	1006	8-00	××	1-61	53.0	12.89		
1735	750	OR	13.1	1013	8.02	××	0.17	-49.4	14.28	Well DRY	
·	and the second secon								ļ		
			and the state of t		ER_	} }*					
		-						-			
										Concession and the concession of the concession	
		1								The second s	
		n Ø	1111	1012	2 43	1	0.17	- 116 11	11/100		

151 1013 802 88 011-47414.24

COMMENTS: ITS: X hich WL may be due to water used during dullig/installation ** WLM on top of Reclaimer - no water level reading available

AX & Dhe to show reacharge (160+/35min) and time constraint - could not start developing intil 1 1530 due to growt find timing we had to return carts by 1300. Purged over 12 well volumes.

R 6/63



Project Name:	SI AFFF MULTIPLE SITES	
ASL Project No:	M2027.0003	
Installation:	Ellsworth AFB	
Site:	11- SPRAY NOZZLE TEST AREA	<u> </u>
Date:	5-19-18	
Sample Technician:	A.willis, n. Neilson	· · · ·
Well ID No.	MWITPFCIIO	
	Initial Massuramants	

			แล้า เพื่อสวนเ	emenita			4	and the second sec
Well Total Depth:	20.2	ft BTOC	Water Level:	3.99	ft BTOC	<u> </u>		
WELL VOLUME PURGE	: 1 WELL VOLU	ime = (total	WELL DEPTH	BTOC - STATIC D	EPTH TO	WATER)	WELL C	PACIT
(only fill out if applicable)	=	(20.2	Ft - (3.99 Ft) :	$\times 0.163$ gal/ft = 1	1.0/	Gal		
Calculated Well Volume:	1.01	Gallons		Well Diameter:	J. 0) inc	ches	
Calculations:	1" diameter	= 0.041 gal/ft	2'' di	iameter = 0.163 gal/ft		4" diameter =	: 0.653 gal/ft	

Well Purging Activites

Purging Method (pump type): Reclainer Flow rate (incl. units): 946mL/min

Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C) 🔨	Cond (mS/Cm)	⊳рн	Depth to water (BTOC)	DO (mg/l)	ORP	Total∘Gal Pumped	Comments	A A
1310	966m4min				-	13.20				Development	alfundel
1815	94 UML/Min	Over Rayge	3.6	0.82	7.16	\star	5.20	19.3	1.25	•	
1720	944 ml/min	Oscrange.	ን. ኛ	0.35	7.20	¥	3.92	19.2	2.5	Stopped to a	llowredarge
1226	946mL/min	Over rar m		-	-	16.4	Ŭ	-	2.80	Resummed /	2-25gal betre
1236	946mL/min	Ourrany				16.4	<u> </u>		2,80	Resummed	ruhning dry
1838	946mL/min	Quirrange	9.1	0.76	7.21	10.9	3.95	29.1	3.3	Developed **	
	-	•		L						•	
		NAME AND DESCRIPTION OF THE OWNER									
	·										
				A REAL PROPERTY AND A REAL		-					
					Š))	>				
·····						\vdash	-				
								Street and the street of the s			
									Contraction of the local division of the loc		
										State of the state	
			_				<u> </u>				
Reculte	At End Of Purgingr	A. Wren	9.1	076	7.51	169	1 5.95	19.1	79		

C 5/19

COMMENTS: * WL Wetce is on top meter Preclainon-unable to guge WL. * * Developed after puring 3 well volume due to Flight Line, tring, and escort restrictions.

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Project Name:	SI AFFF MULTIPLE SITES							
ASL Project No:	M2027.0003							
Installation:	Elisworth AFB							
Site:	Site 11- SPRAY NOTLE TEST AREA							
Date:	5-19-18							
Sample Technician:	A. Willis 1 m. Nailson							
Well ID No.:	MW18PFC1102							

Initial Measurements

Well Total Depth: K	20.3	fl BTOC	Water Level: *	15:95	ft BTOC	
WELL VOLUME PURGE:	1 WELL VOLUME	= (TOTAL	WELL DEPTH E	TOC - STATIC	DEPTH TO WATE	R) X WELL CAPACIT
(only fill out if applicable)	=	(20.3	Ft - 5.95Ft) ×	0,167 gal/ft =	0,71 _{Gal}	
Calculated Well Volume:	0.71	Gallons		Well Diameter:	2.0	inches
Calculations:	1" diameter = 0.	.041 gal/ft	2" diar	neter = 0.163 gal/i	t 4" diam	eter = 0.653 gal/ft

Well Purging Activites

Purging Method (pump type): Monsoon Flow rate (incl. units): 1400-1800m//min

Time	Flow Rate (mł/min)	Turbidity (NTUs)	Temp (°C)	Cond. (mS/Cm)	⊳рн	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gal Pumped	Comments	
1550	1400			-		15.99				Developmentini	Filed
1605	1400	OR	8.60	0.280	6.02	16.02	6.36	267.7	0.55		
1615	1400	482	7.33	0.380	6.94	16.03	1.17	160.4	0.870	4.25	
1625	1800	494	8.34	0.401	7.00	16.04	1,65	129.5	9.0		
1630	1900	169	8.34	0.423	7.03	16.04	1.38	98.4	11.37		
1633	1800	45.1	8.34	0.422	7.021	16.04	1.32	97.0	13,74		
1645	1800	119	8.35	0.425	7. 05	16.05	1.30	96.0	18.49	Denloped	
<u> </u>											
					1						
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		ļ		-					······		
				\vdash	-	2-					
						EZ-	b	2			
							r >				
					a						
Results	At End Of Purging	179	8.35	0.42	107.05	16.05	1.30)	96.0	18.49		

COMMENTS: 5 well volume = 3,54 Developed after purging over 5 well volumes w/ stable parameter X well not completed.

5/19 c-121



Project Name:	SI AFFF MULTIPLE SITES
ASL Project No:	M2027.0003
Installation:	Ellsworth AFB
Site:	SITCIL- SPRAY NOILLE TEST AREA
Date:	519112
Sample Technician:	Miles Neilson (ASL)
Well ID No.:	MWISPEC 1103

Initial Measurements

Well Total Depth: 15	5. Ц <u>ft втос</u>	Water Level: 15.6	2 ft втос	
WELL VOLUME PURGE:	1 WELL VOLUME = (TOT	AL WELL DEPTH BTOC	STATIC DEPTH TO	OWATER) X WELL CAPACIT
(only fill out if applicable)	= (25.4	Ft - 15.62Ft) x 0.163	gal/ft = 1, 59	Gal
Calculated Well Volume:	/,59 Gallons	Well D	ameter: 2.0	inches
Calculations:	1" diameter = 0.041 gal/	t 2" diameter = 0.	163 gai/ft	4" diameter = 0.653 gal/ft

				We	ll Purgi	ng Ac	tivites		. 1	~~ I		
	Purging N	lethod (pump type):	Reclaim	eK.		. F	low rate (i	incl. units):	<u> </u>	92 mbl	min	
	Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (⁰C)	Cond. (mS/Cm)	рН	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gal Pumped	Comments	
545	1530	492	OR	9.9	0.83	8,11	15.62 15.62	- 3.79		0.0	Bgin Delleph	heri
	1600	H97 H97	0R 0R	10.0	0.82	7.95	15,80	5.67	10.8 10.8	4.0		
	1625	492 492 492	OR	10.0	0.83	7.81	15.75	5.90	11.2	7.34	Ful DavidoDa	lovit
						1 64 1-				0.00	~~ <u>~~</u> ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	12.11
											, , , , , , , , , , , , , , , , , , ,	
				· · · · ·		<i>[</i>						
•												
	Results	At End Of Purging:	OR	10.0	0.82	7.82	15,85	5,99	11.5	8.00		\sum

Results At End Of Purpurp. COMMENTS: Well Pad Not Comitatore 8.0 1 Well Volume: 1.59gallons 8.0 5 Well Volumes: 7.95 gallons Bagin Development @ 1530 End Development @ 1630 End Development @ 1630 Int Didty unable to reach 2.20 NTU int Didty unable to reach 2.20 NTU int Didty unable to reach 2.20 NTU 8.0 gallons Purged

Ce-122 5/22

Aerostar SES...

Bailing

WELL DEVELOPMENT LOG

► Q

	Project Na	ame:	SI AFFF MUL	TIPLE SITE	S								
	ASL Proje	ct No:	M2027.0003				· · · ·	·			¢		
	Installation	ו:	Elisworth AF	В			<u> </u>					—	
	Site:		Bildio	1 221	UN- (: 41	21A	CCE	AWEN			· · ·	
	Date:		4-20-19	0	· <u>·</u> ··)	160	<u>- נין</u>	77		(2)			
	Sample Te	echnician:		<u>}~</u>	Nates	n						_	
	Well ID No	D.:	A will?	PECIA	101	,					·····		
			11/10.0		, v ,					、			0
				In	itial Me	asuren	nents (Ron	dryto	112.3	Differ running	ydry an	'ge v
	Weli Total	Depth: 3	7.30	ft BTOC	Water Le	ivel: †	3.89		ft BTOC	×		reman	se .
	WELL VO	LUME PURGE: 1	WELL VOLUM	e = (total	WELL DE	ертн вт	OC - 3	static e	DEPTH TO	D WATER)	X WELL CAPAC	I duni	75 LEHCC.\ ~E. 1456el (
	(only fill ou	it if applicable)	, <u> </u>	(37.30	_Ft -3.81	Ft) x	0.163	gal/ft = 🖌	<u>4.1</u>	Gal		. ,	r
	Calculated	l Well Volume:	0	Gallons	10.	3	Well Dia	meter:	2		inches		
,	C	alculations:	1" diameter =	0.041 gal/ft		2" diame	eter = 0,1	i63 gal/ft		4" diamete	er = 0.653 gal/ft		
				147.									
	`.			We An N	en Purgi	ing Act	ivites		204			٥	
	Purging M	ethod (pump type):	Monsoon/	Bailer_		_ F	low rate (i	incl. units):	380	-3,400	S ML/MIN		
۵							Depth		1			7	
Ŷ	Time	Flow Rate	Turbidity	Temp	Cond.	_ nH	to water	DO		Total Gal	Commonte		
		(ml/min)	(NTUs)	(°C)	(mS/Cm)	ا "گر	(BTOC	(mg/l)		Pumped	Comments		
	1100	1700		3)				October 1		
	100	1800	A. A.C. Canto	11) a	. 02	2 011	a. 2.) 2.2 h	497	219 2	1 70	Developments	ati-hed	
	1120	<u> </u>	Dist Com	10.1	0.70	7.77 Ø ~?	37.0	562	0.179	3.10	well arg	- 1 here	1 NIIG
4/22/12	1456	toat	Sedimond	and t	hein	0.90	x / O	<u>, , , , , , , , , , , , , , , , , , , </u>	210.0	407	Bala Ban	WIN Jr	1 @ 117J
4/24/18	DIIO	·- p	<u> </u>				12H	~	 	12.50	Res man il water	Manson	Lenner a
	1115	380	148	8.3	5.70	8.41	18.2	\$.32	1205	13.0	1 201-11 MEALON	Werlet w	Bailer
	1130	380	169	4.3	6.11	7.60	23.45	8.34	118.]	15.0			
	1140	380	26	li.	6.27	7.62	27.82	872	114.9	16.0			
	1150	380	OR	4.5	6,53	7.60	30.38	8.74	14,7	17.0	250		
	1200	380	UR	-17	7.09	7,57	32,32	8.29	114.6	18,0			
¢ .	1210	300	62	9.5	7,37	7.58	<u>34.</u> B	<u> </u>	115.3	19.0			
	1220	-380	OR	<u> </u>	7.20	7.65	35,88	3,34	117,5	14.75	well dry	° -	_
	1310			1.6	7.33	7.66	<u>35, 3</u> 1	18,03	122.3	20.50	Resume beilin	@ 1300,1	Dyeisz
				and the second	and the second division of the second							En Dowle	Pimpnt
						-0	<u> </u>	Contractory of the local division of the loc				-	
						- Carlinger				Contraction of the local division of the loc	Contractory of the Contractory o	-	
:	Results A	t End Of Puraina:	OR	9.1	7.22	7.No	35.37	6.12	172:3	2050		Research Contraction of the Indian	
		00								1400.00			
												-	
	COWME	NIS: Y WL S	ispect	d	riler's	~ cler	rolder	dur.	zdril	ling ~	Run		,
19 (B)	Ċ	iry and let	- recharge	• •			١		Ŭ	·			
		x12044	Seell's	alunos									
			. 7		DAG	1000	1						
	ENT	levelopmen	t: 10.5	o Ban	NID F	vigee	V						
	-												
												1	

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SerostarSES...

WELL DEVELOPMENT LOG

	Project N	ame:	SI AFFF MUL	TIPLE SITE	3									
	ASL Proj	ect No:	M2027.0003										-	
	Installatio	n:	Elisworth AF	в									-	
	Site:		Buildin	5 882	4 - 51	k li	2 (A	FFFI	ACT	(2)			-	
	Date:		4-19-	12 14	1-20-11	7							-	
	Sample T	echnician:	A. will'is	/m.	مدانهم	^							-	
	Well ID N	o.:	MNIS	PFC 12	021							_		
				Ini	tial Mea	asuren	nents	1						
	Well Tota WELL VC	I Depth: 50.	37 WELL VOLUMI	ft BTOC E = (TOTAL	Water Le	vel: C	ר.ז אין ז .ז רוסכ –	STATIC D	R BTOC		X WELL	CAPACIT	-	ģ.
	(only fill o	ut if applicable)	=	(50.37	Ft -9.73	Ft)×00	.163	gal/ft = (0.62	Gal				
	Calculate	d Weli Volume:		Gallons			Well Dia	ameter:		-	inches			
		alculations;	1" diameter = (0.041 gal/ft		2" diam	eter = 0, •	163 gai/ft		4" diamet	er = 0.653 gal/	/ft		
				Ŵe	il Purai	na Ac	tivitos							2
	Duracia a A	4 - 6 - 1 7 - 1 1 1 1 1 1 1 1 1 1	MAAS		in urgi	ng Ac	LIVILES		(1.00	. 3.,	ND on La			
	Purging N	ietnoa (pump type);		201		- F	flow rate (incl. units):) - 714		161		
							Depth		Λ					
	Time	Flow Rate (ml/min)	Turbidity (NTUs)	(°C)	Cond. (mS/Cm)	D ^{pH}	water (BTOC	DO (mg/l)	ORP	Total Gal Pumped	Comme	ents '	**	
4/19	1534	3,400				·	9. 75		·		Developme	int ini	Hatel	а.
	1540	3,400	OR	13.2	0.348	7.94	34.1	8,91	196.9	4.50				
	1550	3,400	0K	13.9	0.402	7.7[<u>46.8</u>	8.06	214.6	12.00				
	1600	1,000	og	14°_/	0,458	7.72	49.04	6.64	19463	14.20	61 1	1. 1		12"
	1010	1,000	0	15.1	0.590	16.11	77.59	6.20	1/5.5	100	5 - 22.11	SEAN A		, Giş
	1075	600	<u>n</u> R	15.1	0. LVID	1.90	49 40	521	1128	1650	Diaphed for	chun	IC (CSUN	R
	1145	600	OR	14.6	067	1.84	49,42	4.50	152.0	20 70				
	1155	600	ÓR	14.9	0.68	7.91	49.6	4.16	150.0	22.30	Well Ran	Drura	1710	
	1930	1,000					44.37			24,70	Resume	TO M	Palory	1735
	1745	1,000			1.720000	****	46.90) -	-	28.60	Roume,	RUW	Pol Dry	1746
4120	0840	350				<u> </u>	3Z,56			28.86	Resume		P.	10
	0900	1300	831	11.4	J.M.7	8.12	41.oZ	5.24	2335	3071	surged @	0918	Pi	
	0420	700	overrang,	11.7	1.46	8.25	44.0	3.94	201.9	34.73				
	1999	<u> </u>		<u> (100)</u>	1021	<u>p-17</u>	12,40	7.06	184.	20:55				
	1940	<u> </u>	00	1160	137	0.10	76-10	<u>1,00</u> 4_7	1020 1	26, 12	KX E IV	V. J. J.		No.
	Results	At End Of Purging:	DR	11.3	1.37	7 22	-160L1 46.21	4.07	182.6	39.17	TA L- NOL	<u></u>	WATT	44
														
e	COMME	INTS: Y WL	suspect -	drillers	usel	150 g	wl 420	when	inst	alling	vell.			
.*		33.1	a s Svell	volume)	v				0				
	¥¥	End Develop	ment after	· Pusan	д 6 Wc.	N Volur	こう					,		
	144	NTUS Remain	net Over F	Vange, 3	wyzarta	A Car	6e 15	ean	(lay]	thology	1. See bin	y log		
				0)	- (U	~)	ןט יי		
														٥ (:
							\subset	In	L]	6211	7			
Ν	A2027.000)3			(C-124	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	P	- //	1/1	Γ_{1}	3	8/6/19	

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WELL DEVELOPMENT LOG

	Project Name:	SI AFFF MULTIPLE SITES	;				
	ASL Project No:	M2027.0003					
	Installation:	Ellsworth AFB		· · · ·			
	Site:	Building 882	10 - 5	ite 12 (MFFF.	Area (2)	
	Date:	4-21-17					
	Sample Technician:	A. willis / M. 1	Veilson	ι			
	Well ID No.:	MINIS PFC 15	103		· . ·		
\sim	Bott	on of screen Init	tial Mea	surements			
(\mathcal{A})	Well-Total-Depth: [7.8	OK ft BTOC	Water Lev	vel: 9.52	ft BTOC		
	WELL VOLUME PURGE: 11	WELL VOLUME ≃ (TOTAL	WELL DE	РТН ВТОС – STATIC	DEPTHTC	WATER) X	WELL CAPACIT
	(only fill out if applicable)	= ([7.80	Ft - 952	Ft) x 0 //63 gal/ft =	1.30	Gal	
	Calculated Well Volume:	Gallons		Well Diameter:		inch	nes
	Calculations:	1" diameter = 0.041 gal/ft		2" diameter = 0.163 gal/	ft	4" diameter = I	0.653 gal/ft

Well Purging Activites

Purging Method (pump type): Monsoon

Flow rate (incl. units): 600 - 2400 ml -

	Time	Flow Rate (ml/min)	Turbidity (NTUs)	Тетр (°С) (Cond (mS/Cm)	рН	Depth to water (BTOC)	DO (mg/l)	ORP	Total Gal Pumped	Comments	
	1147	2000	<u> </u>		~	/	9.52		·		Quelopnent in	theled
	1450-			13.4	0-006	6.64	11.76	12.75	711.2			AW. USTWEENT
	1152	2000	DULL Funge	7.2	0.52	7.79	14.2	11.87	235.8	2.08		working
	1202	000	over range	10.01	0.79	7.59	17.3	9.65	2435	4.67	DRY - waiting for	recharge/surged
	1355	_600	`		<u> </u>		14.52			4.68	Resume	
	1400	<u>600</u>	overrange	10.01	¦ું-⊋5	7.70	15.8	8.25	267.1	5,48	Well Rumped Day 1	01405
	1436	2400	OVER Farme	10.08	1.15	7.72	17.0	3.30	2650	11.78	resumed. n	on ORY 1437
Lase met	1554	2400	Over rande	10.08	1.17	7.30	15.4	7.43	118.0	18.08	Assumed, Rando	5 S Well Volumen
- C176 ->	1718	1400	Over range	10.02	1.37	7.00	15.19	7.90	194.8	17.88	Resured. Randrig	11555
			V								<u> </u>	1120
					ļ							> bevelopet
					\frown		-)					
						1	\geq		~			
	MIN.com								CONTRACTOR OF THE OWNER.	weitigen.		
										and the second s		
	Results /	At End Of Purging:	over range	10.02	1.78	8.00	15.19	7.90	194.8	18.80		

COMMENTS: 6.75 2 Swell volumes 1720 Developed after purging n/4 well volumes w/ skuble parameters. Screen is in lean clean - NTUS hish due lo neutrinal turbidity in well. (An), 4/2/18

M2027.0003

3/6/19

statation: Elfsworth	AFB M20	27.0003				Site	Sile 1	1- 1		-6 4	ire.	Teri				
	17061	0101			s	AMPLE ID:	SINHOL	- 601 -	VIII.	- n/ 5	πς	DA	7	- 71-1	17	
7. (14)	1110	0701				<u>P(</u>	JRGING DA	TA	60-	<u> </u>				201	0	•
/ELL	2 11	1	UBING	v	WE	LL SCREEN INT	ERVAL DEPTH:	STA	TIC DEPT	H	10-11	1.	PU	RGE PUMP TYP	Ē	
NAMETER (inches):			NAMETER (inc	hes):		STATIC DE		TC '	WATER (fe	Set BTOC):	רי כו י	Υ	OR	BAILER:	9P	
fonly filout if an		. VOLUME ~ (Ft - 15		0 167	 	. ^	79	cal					
()	,,,,,,		20.	ら			U 1 43	•	0.	' (-					
QUIPMENT VOLU	ME PURGE: 1	EQUIPMENT	VOL. = PU	MP VOLI	JME + (ТОВІ	NG CAPACI	гү х	tubing le	NGTH) +	FLOW CE	LL VOLU	ME		•		
(only NI out if ap	pScable)	14 -			<u></u>	×	——————————————————————————————————————		<u>tal</u>		<u>-</u>	-77			1	0
ITIAL PUMP OR TUBIN	G	5	FINAL P	IMP OR T		5	PUR	SING	n Q C	\sim	PI		413	TOTAL VOLUN	E ()	NO AS
EPTH IN WELL (feet):	1/01.1016			PURGE	DEPTH	 PH	TEMP.	CON		DISSOL	VED	ORP	1 <u>7</u> 7	URBIDITY	COLOR	ODOR
TIME	PURGED (gallons)	VOLUA	le l	RATE	TO	(slandarð units)	(°c)	Allen	Tras.	OXYG	ÉN	(mV)		(NTUS)	(describe)	(describe)
<u> </u>	N 12-	(gation	si	(gpm)	Ifeet BTOCI	110			70.00	1 mgn			26	6	10	
<u>9402</u>	0,0	10.15	2.34	<u>62</u>	15,00	7.90	08	11	<u>L</u>	201		1441	<u>っ</u> し うし	<u>5</u>		None
<u>2408</u>	007-1	MA T	1.41	<u>0</u> 2	1005	1.70	100	101		3.0	<u>ч [</u>	210	20	<u>)</u>] 2	12	1 low
<u>мі </u>		MO ~	1 .51	200 2	12:00	120	103	010	$\frac{1}{2}$	700	5 1	<u>אגין</u> זאו	$\frac{c}{2}$	<u>ส7</u> วัน		Numa
h012	.00	A A		02 02	1000	1.00 1 iu	10.0		5	2,7	2 0	12	2	<u>.</u> 7	Ť	Alana
$\frac{1}{0}$		0.60		$\frac{0}{2}$	16 92	1.6	10.0	11	1	2.10) 	PAG.	20	3. R	ĨČ	Now
973	.19	0.29	A.J.	10 J	1591	1.75	10.8		2	2.7	Ĺ	20.7	19	.7	Ċ	Non
		1200	<u></u>	<u>, </u>		1.63(5)	100.0	101				1000	- + •			
										×						
								1.	1.	/						
								M	A:X							
																L
								\square							ļ	
									\searrow	······						
							<u> </u>			<u> </u>					<u> </u>	
							21 - 0.97	4 - 0.05	61 - 1			401-6.00				
VELL CAPACITY (G 'UBING INSIDE DIA	ations Per Foo	n): 0.75°≖0.0 Gal/Fi.): 1/8")2; 1" = 0 = 0.0006;	.04; 1 3/16" =	.25° = 0.06; 0.0014; 1	2" = 0.16; /4" ≈ 0.0026;	3" = 0.37; 5/16" = 0.	4° ≈ 0,65; 004; 3/8'	5" = 1 0.006 = "	: 1/2" =	* 1.47; 0.010;	12 = 5.60 5/8" = 0.0)16			
URGING EQUIPME	NT CODES:	B = Baller	BP = 8	adder P	ump; ES	P = Electric	Submersible P	Pump; F	PP = Peri	staltic Pum	p; O	= Other (S	pecify)			
	A-	villo		CAN							SAMPLIN	° ന47	25	SAMPLING	-0.2	2
	M.	Neilson		77 10 10		une(s):	<u>k</u>)	E EIELE		INITIATED			ENDED AT:	010	<u> </u>
EPTH IN WELL (feet):	15			MATE	ig Rial code: Pe				FIELD	-itration Equip	r ment Type:	\subseteq		PDLA SIZA		mm.
	FIELD	DECONTAMINATI	on: Pun	IP Y	\bigcirc	TUBING	Y (N (replac	edj			DUPLICA	ГЕ: (Ÿ	N C			
SAJÆP	LE CONTAINER S	PECIFICATION	1			SA	IPLE PRESERVA	ITION I			INTENDE	D ANALYSIS	AND/OR	SAMPLING EQ	sa Uipment fl	.Mple pump .ow rate (m)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (m	ω, ^γ	USED	4		N FI	NAL pH (S	tanard Units)		METHOD		CODE		per minute)
COWH01-001-	<u> </u>		nr.	+			in neud (n				1			6.0 0		<u></u>
w-015		PC	Pach	•	\sim							EPA 537M		APP	!	125
=(SWH6/-60/-	<u>_</u>	PO	(ASAC								Co	ACK	M	NDD	t	75
w-915	×	ļ	Pach			<	×m				17	1/05		INT I	\	60
45/M50	2/	16	12500					\rightarrow			EPA	531	μ١	APP		25
<u> </u>									\geq		ļ					
		\square		-												
EMARKS:																
	AC - 4-	abor Ginnat	CC = Class	Glass	DE - Dato	thulano:	DD - Dahar	viene: C.	• Silian	x• T = T∧	floor O	= Olber (Specific			··
MIENIAL CODES:		1001 01858,		Dump	P = Polye	anyiene,	Diadator Duma		- Gincorie	·· · - ··e	1.01 U	Contras fe	(kanak			

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% saturation; optionally, ±0.2 mg/L or ± 10% (whichever is greater) NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: March 14, 2016

M2027.0003

The 05/20/18

Aerostar SES...

GROUNDWATER SAMPLING LOG

1						C 2-1	17		e+	ET AL						
Installation: Ellsworth	AFB M2027	.0003				SNA:	10	unr	ens .	$\frac{(1)}{2}$			5/21	he		
	81FC0	07			SA		LSWHC	<u>9-0</u>	03~0	$c_{\mathbf{r}} w = c$	55 0	- 0	5121	118		
						PUE	RGING DAT	A				DURC				1
WELL	2	TUB	NG /	in :	0D WELL	SCREEN INTE		ST. TO	WATER (fe	† et втос): 2	2.76	OR B/	VLER:	PP		
DIAMETER (inches):	GE: 1 WELL	OLUME = (TO	TAL WELL	DEPT	н втос -	STATIC DEP	TH TO WATE	R) X V	VELL CAF	PACITY						
(only fill of if and	vicable)	= (40	२ ५	n 2.2	76=1) ×	5.162	gal/ft	- 2.	4 gal	I					
found in each app		·	ι-1,	~ (~							
EQUIPMENT VOLUM	E PURGE: 1 E	QUIPMENT VC	L. = PUMP	VOLL	IME + (TUBIN	IG CAPACIT	<u> у х</u> т	JBING LE	ENGTH) +	FLOW CELL	VOLUME				17	-
(only fill out if app	steatte)				-gal(· *···	Et)	t	<u>g</u> al	=	OA(······································	б	11/2	5
	· · · · ·	-	FINAL PUMP	ORT	JBING	25	PURG	NG	<u></u>	٢	PURGING	INT	OTAL VOLUME	mL 1	1400	,
DEPTH IN WELL (feet):	35)	DEPTH IN W	/ELL (fa	iet):	<u>رد</u>	INITIAT	ED AT:	014	, J DISSOLVED	ENDED AT:		URGED (galleri BIDITY	SF. COLOR	ODC	
	VOLUME	CUMUL,	PU	RGE	БЕРТЯ ТО	pम (standard	(°C)	μ5	lícm	OXYGEN	(Vm)	(8	ITUs)	(describ e)	{descr	ibe)
TIME	(gallens)-	PURGED.	กเ		WATER	units)	(- <i>1</i>			nsg/L,						
OFEC	750	750	15	<u>ה</u>	23 11	5.82	14.3	28	808	0.80	152.5	Ч	1.2	des	no	nl
2455	750	1500	15	<u>.</u>	28.21	5.81	14.1	2.8	734	0.5	117.4	6	4,7	ſ		1
IDDE	100	2010		0	23.01	5 69	14.5	2.9	33	0.37	2 56.8	3	3.8			
1005	7500	2750	11	0	22 194	5,66	14.5	7.9	70	0.31	20,6	j	9.7			
	120	<u> > ()(</u>		<u></u>	92.04	5 61	14.7	20	14	0.30	-u.1	1	6.3			
	120	0300		0	23.04	2,21 6 [[15.1	20	55	0.27	-327	12	1.4	\square	Γ	
1020	150	5 0 00		0	27.04	5,55	149	20	74	0.30	-57.4	ii	2.5			
1025	150			20	27.04	5,00	151	21	07	0.28	5 -78.2	8	26			
1030	150				07.04	5,64	157	21	14	0.24	-94.7	~7	.28		1	
1055	-150	150		0	25,00	514	15.2	2	$\frac{1}{70}$	0.30	1-1183	6	82	\mathbf{H}		
1045	1500	400		50	23,09	5,96	10,0	27	$\frac{10}{11}$	0.7	9 1263	5	74		11	
1055	1500	1050		<u>20</u>	23.04	5,45	156	30	<u>ກ.</u> ພ	0.0	-1374	5	37			
1058	450	1015	0 13	<u>~</u>	3,7,00	7,200	15.4	20	10		1-140.2	Ţ	18		1-1	
1101	n50	11 40	12	0	25.04	5,46	1212	1 2 2		0.5		<u> </u>				
												╞━━━			1	
			<u> </u>	F	-										-	
			<u> </u>	1	TET	1718										
e						070.40	0.0.07	<u> </u>	6 5° =	1.02: 8"=1	<u>47</u> · 12" = 5.8	L				
WELL CAPACITY (C	Gallons Per Foo	l): 0.75" = 0.02	; 1 ⁻ = 0.0	14; 3/16" :	1.25" = 0.06; = 0.0014: 1	Z = 0.16; 1/4" = 0.0026:	5/16" = 0.07,	-4 - 0.0 004; 3	/8" = 0.00	6; 1/2" ≈ 0.	010; 5/8" = 0	.016				
PURGING EQUIPM	ENT CODES:	B = Bailer;	BP = Bla	dder P	Pump; ES	SP = Electric	Submersible P	ump;	PP = Pe	ristaltic Pump;	O = Other {	Specify)				
				1		SA	MPLING DA		,	/		67	SAMPLING	117	17	
SAMPLED BY (PRINT)		hele Turi	15kl	SAMI	PLER(S) SIGNAT	URE(S):	sek_	14	<u> 18</u>	a	NITIATED AT:	~	ENDED AT:		<u> </u>	
PUMP OR TUBING	2	ς		TUBI	NG				FIEL	D-FILTERED:	Y (Ľ	Filter Size		anu;	-
DEPTH IN WELL (feel):	550	SCONTANINATIO		MAT	ERIAL CODE: PE	TUBING	Y (reping	cci l		1000010404	DUPLICATE:	r (N	5			
SAMI	PLE CONTAINER S	PECIFICATION		T	<u> </u>	SAJ	IPLE PRESERVA	TION							SAMPLE P	(UMP
					PRESERVATIVE	ž	TOTAL VOL		FINAL pH (Stanard Units)	INTENDED ANALYS METHOD	IS AND/OR	SAMPLING EC COD	E	per min	ule)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (mL	ή	USED	A	DED IN FIELD (r	nL)								
BLSWHOI-	. n	DE	125								EPA 637	w	APP		150	Ċ
003-6-W-0	35 2	TD .	105			\searrow										
							Son)			
				_		`	\sim	$ \rightarrow $				\rightarrow				
		۳ 🔪	~	_				\rightarrow								
L				┢										\rightarrow	-	
		<u> </u>]					L			
<u>ا</u> ل	Jell pom	d comp	lete,													
REMARKS:		•														
				- >			OD a Datua	ndoret	S = Silico	ne T≖Teñ	$on: \mathbf{O} = Other$	(Specify)				
SAMPLING FOUR	S: AG = Ar	nber Glass; (APP = Afle	:G = Clear (r Peristaltic	alass; Pump	PE = Pol B = Ba	iler; BP =	Bladder Pum	p; ES	P = Electr	ic Submersible	e Pump;	,,				
		RFPP = Re	verse Flow	Perista	altic Pump; Stabilization C	SM = Straw	Melhod (Tubi	ng Gravit	y Drain); consecutive	O = Other (e_readings_	specify)					

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

M2027.0003

(N) 05/24

C-127

GROUNDWATER SAMPLING LOG 🖀 Aerostar SES ... current FTA atalian: Ellsworth AFB M2027,0003 ELSWHO1-004-GW-018ATE 5/21/18 SAMPLE ID: ELW MWLEPFCOIDS NELL NO: PURGING DATA 14 MOD WELL SCREEN INTERVAL DEPTH: 15.02 DIAMETER (Inches): UBING WELL TO WATER (feet BTOC): 20,11 Ft - 10,11 Ft DIAMETER (inches) WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH BTOC - STATIC DEPTH TO WATER) X WELL CAPACITY = 20.36 FI-15,02FI × 0.163 BM = 0.87 BM (only fill out if appScable) EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL ≔ PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME ΛĨ gal 5/21/18 (only fill out if applicable TOTAL VOLUME ML URGING INAL PUMP OR TUBING PURGING 4000 1450 1510 INITIAL PUMP OR TUBING 18 18 ENDED AT: PURGED (pa INITIATED AT: DEPTH IN WELL (feel) EPTH IN WELL (feet) ODOR COND DISSOLVED ORP TURBIDITY COLOR CUMUL PURGE DEPTH вН темр. (describe) VOLUME (standard un(ls) (mV) (NTUs) ídescribe uS/cm OXYGEN RATE то (°C) VOLUME TIME AUNOED AUNIONS) ma/L WATER PURGED IN nETTU 9.0 7.22 746 8.51 14.6 cle* none 13.2 15.2 1455 200 1000 1000 12.7 725 4.2 14. 8,10 15.2 7,37 1500 200 000 2000 14.3 718 -1.5 8,89 15.2 7,39 12.4 200 1505 3000 1000 -3,9 9.74 דוך 7,42 12.4 8,45 15.2 4000 200 1510 1000 A July WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.08; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.888" = 0.006; 1/2" = 0.010; 5/8" = 0.016 PP = Peristaltic Pump; O = Other (Specify) 3/8" = 0,006; TUBING INSIDE DIA. CAPACITY (Gal./Fl.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; PURGING EQUIPMENT CODES: 8P = Bladder Pump; ESP = Electric Submersible Pump; B = Baller; SAMPLING DATA SAMPLING Tubled 1512 Brek SAMPLER(S) SIGNATURE(S): SAMPLED BY (PRINT) / AFFILIATION: 10/5/00 ENDED AT: full Tu FIELD-FILTERED ℗ Filter Size mm UBING PUMP OR TUBING 18 Fibration Equipment Type: MATERIAL ODE: PE DEPTH IN WELL (feel) Y (N (replaced) OUPLICATE: Y Ы FIELD DECONTAMINATION: PUMP Y 6) TUBING SAMPLE PUMP SAMPLE PRESERVATION SAMPLE CONTAINER SPECIFICATION SAMPLING EQUIPMEN CODE ELOW RATE (m) INTENDED ANALYSIS AND/OF METHOD TOTAL VOL per minute) PRESERVATIVE FINAL pH (Stanard Units) MATERIAL CODE VOLUME (mC SAMPLE 1D CODE # CONTAINERS ADDED IN FIELD (mL) USED ELSWHOI-200 EPA 537M APP 2 125 PE 004-6-018 An well pud complete. REMARKS: AG = Amber Glass; CG = Clear Glass; PE = Polyethylena; PP = Polypropylene; S = Silicone; T = Tellon; O = Other (Specify) MATERIAL CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); RFPP = Reverse Flow Peristallic Pump; 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

C-128

10-5/24

Aerostar SES...

GROUNDWATER SAMPLING LOG

		-															1
insta®ation: Ellsworth	AFB M202	7.0003				Site:	Sife	1-	Cui	ant	/	<u>-177</u>		-			-
WELL NO: MW	93010	7			SA		SWH 01-A	NW9	50107	- 664-	٥34	DAT	'E: 🛫	-15	12	AN_	<u>↓</u>
	•					PU	RGING DA	TA Ta					laua	GE DINAD TYPE			1
WELL DIAMETER (inches):	30	TU DU	IBING AMETER (İ	nches): 3 /	8" 34	5 Ft -	24.5 FL	с т	O WATER (N	n het BTOC):	31.	81	ORI	BAILER: M	0150	<i>b</i> on	-
WELL VOLUME PUR	RGE: 1 WELL	VOLUME = (T	OTAL W	ELL DEPT	Н ВТОС -	STATIC DEF	가 H TO WATE	R) X	WELL CA	PACITY							
(only f团 out if app	oficable)	2	· 31	1.5	^{fi} - 31,	81 FD X	0.16	galifi	⁻ 0 ·	43	gal						-
EQUIPMENT VOLUN (only fill out, if app	ME PURGE: 1		70L.=P 7 =	UMP VOLL	JME + (TUBI gal = (Υ Χ Τ 	UBING L	ENGTH) +	FLOW CELL		에든 레					
INITIAL PUMP OR TUBING	3	30	FINAL	PUMP OR TU	JBING -	ر ک	PURG INITIA	NG TED AT:	15	<u> </u>	P	URGING INDED AT:	55	TOTAL VOLUME PURGED (gallon	s): \ .	44	
DEPTITIE VILLE (1984).	VOLUME	CUMUL	·	PURGE	DEPTH	pH /standard	TEMP.	0	OND.	DISSOLVE	ED	ORP	τu	REIDITY	COLOR		
TIME	PURGED (gallons)	VOLUME PURGEE	E)	RATE (gpm)	TO WATER	units)	(°C)		Sicm		,	(mv)	,	NTUS)	laescius	ey (describe)	
1524		feations	<u> </u>	0.06	31.9		-								Tuth	ic/	
1538	0.44	0.4	7	0.06	3(87	8.21	17.7	- O.I	28	3.38	?	68.9	3	79	1		
1540	0.12	0.6	Ď	0.06	31:86	8.24	16.9	0.7	24	3.13	3.	55,7	_ 2	.28			4
1542	0.12	0.7	2	0.00	31.88	8.25	16.7	D	19	3.00	2	53.7		143	\square	<u> </u>	4
1545	0.18	0,9	0	0.06	31.9	8.23	16.6	0.	115	2,8	19	52.1	8	3.5	<u> </u>		4
1550	0.30	1.2	U	0.06	32.5	8.24	163	0.	114	2.8	5	51.0	5	7.2	Clare	y	-
1554	6.24	1.4	4	0.06	31.90	3.21	16.1	<u>v.</u>	10	2.7	79	<u>49.7</u>	4	<u>,</u> Ч	CIA.	1001	-
	- Charles																-
		Non-	water -		<u> </u>						-+						1
			and the second	No. of Concession, Name	-					[1
						COLORDON DO NO.									1	•	
							2	2									
									Contraction of the local division of the loc	and the second second	-						
													State Contraction of the local diversion of t				_
								<u> </u>						- COMPANY NO.	<u> </u>		- 11.00
							<u> </u>				4.47	405 - 5.9				<u> </u>	-
WELL CAPACITY (G	Sallons Per Foo	ot): 0.75" = 0.0	i2; 1*÷ ≂ 0.0006	= 0,04; 1 ·	1.25" = 0.06; = 0.0014:	2" = 0.16; 1/4" = 0.0026;	3" = 0.37; 5/16" = 0.0	4" = 0,1 004: ;	i5; 5°≂ 3/8°=0,00	1.02; 6≕ 6; 1/2*=(0.010;	12 = 5.64 5/8" ≈ 0,4	o 016				
PURGING EQUIPMI	ENT CODES:	B = Bailer;	BP =	Bladder P	ump; ES	SP = Electric	Submersible P	ump;	PP = Pe	ristallic Pump); () = Other (Specify)]
[·		CALL			MPLING DF				SAMPLI	NG J	χu	SAMPLING	15	56	1
SAMPLED BY (PRINT) / A	AFFILIATION: H	willis/a	n <u>neil</u>	Den Tron	LER(S) SIGNA		the states	<u></u>	FIFI	D-FILTERED:	INITIATI		7	ENDED AT: Filter Size	10	mm	-
DEPTH IN WELL (feet):	29	,		MATE	RIAL CODE: PE	:	_	~		Filtration Equipr	nent Type	с	$\overset{\odot}{\longrightarrow}$	s			_
	FIELD	DECONTAMINATI	ON: I	PUMP Y	()	TUBING	Y N (replac	ed)			OUPLIC	ATE: Y	<u>(</u> N	┢───		SAMPLE PUMP	-
SAMP	LE CONTAINER	SPECIFICATION	r		PRESERVATIVE	54	TOTAL VOL				INTENC	ED ANALYSI	S AND/OR	SAMPLING EQ	UIPMENT	FLOW RATE (m	L
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	5 (mL)	USED	A	DDED IN FIELD (n	nL)	FINAL pH (Stanard Units)		MEINUU		0000		pot neitewy	
ELSNHOI-		0-	1,25	~ \						-		EPA 537M		* 0		n N.	1.0~250.1
MW930107-6W	034 2	PE	rat	<u>h</u>												0.00	4
						\rightarrow	An				`						
<u> </u>			ļ			`		$ \rightarrow$						>			-
		8							~					0	}	2	1
				<u> </u>												and the second s	1
	L	1	<u> </u>	<u> </u>							<u>i</u>			L			1
REMARKS:	* (Lontoon	. der	eto c	depn.	g web	er										
					•	-						i.					
MATERIAL CODES	; AG = A	mber Giass;	CG = Cl	ear Glass;	PE = Poly	rethylene;	PP = Polyprop	oylene;	S = Silico	ne; T≓îel	flon;	O = Other	(Specify)				-
SAMPLING EQUIP	MENT CODES	: APP = Aft RFPP = Re	er Perist everse F	altic Pump; low Perista	B = Bai Itic Pump;	ier; BP = SM = Straw	Method (Tubir	o, Es ng Gravit	vr≕ ciecir y Drain);	o submersio O = Other	Specif	y)					_
					Stabilization C	ileria for rang	e of variation of	fast three	consecutive	readings							

pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% safuration; 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

M2027.0003

C-129 05/16

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AerostarSES...

GROUNDWATER SAMPLING LOG

Installation: Ellsworth	hAFB M202	27,0003			r	Site	2 (pon	L #	3)							
	V& PFC.	0201			s,	AMPLE ID: E	LSWHO	2 - 0	οoι-	- G-W -	035	DA	15: 5	14/18			
L	<u></u>					PL	RGING DA	TA		-							
WELL	2	יז	UBING	Yu iv	NOD WE	LL SCREEN INT	ERVAL DEPTH:	S	TATIC DEPT	н	15.4	9	PU	RGE PUMP TYPE	PP		
WELL VOLUME PUI	RGE: 1 WELL	VOLUME ≈ (TOTAL WEL	s): L DEPT	н втос –	STATIC DE	PTH TO WATE		WELL CA	PACITY	1010	γų.	OR	BAILER:			
(only fill out if ap	pīcable)	-	(Un.	रप्र	R - 15	LA FO X	A1/2	gal/nt	- 44	94	gal						
				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	·· ()	∿• 1 · · · ·	0.105	•	-1.	00	5						
EQUIPMENT VOLU	ME PURGE: 1	EQUIPMENT	VOL. = PUM	P VOLL	JME + (ТV8I	NG CAPACI	гүх т	UBING LI	ENGTH) +	FLOW CE	L VOLU	ME				AT	r -
(only fil out if ap	picable)				.gal = (<u> </u>	ة		goi		<u>9</u>	1			51	4/18	\$
INITIAL PUMP OR TUBIN	G 3 ا	ັ້	FINAL PUN	IP OR TU	IBING	25	PURG	NG	112	6	PL	JRGING	230	TOTAL VOLUM	mL	21,0	000
DEPTH IN WELL (feel):		CUMUL	DEP\$HIN P	URGE	et): DEPTH	рн	TEMP.	CO	14 2 ND.	DISSOLV	ED ET	ORP	- TL	PURGED (gallan JIRBIDITY	o). COLOR	0	DOR
тіме	PURGED	VOLUM		RATE	TO	(standarð units)	(⁰ C)	щ	\$/cm	OXYGE	N	(m¥)	I	(NTUs)	(describe)	(des	scribe)
3 (1)	mi	PURGE Intelligents	mh #	httm i	WATER			0.0	- 4	mg/L		<u>a (j. j.</u>		26			
1190	3500	550		50	18.18	1.30	2.4	24	34	0.8	<u>~</u>	~1,1 0,0 0	<u></u>	12	Cloudy	- ^	me
1150	2500	100		500 250	19 05	720	122	3) 3)	20	0,4	2	10-7	- 10	$\frac{1}{2}$	Clea		+
12.0	3500	16 4	90 7	570	20.61	769	12.6	22	20	0.3		66	_ <u></u>	$\frac{2}{2.9}$	\vdash	\vdash	\vdash
1215	17 50	15 71	$\frac{1}{50}$ 3	50	20.30	7.55	(3.5	346	58	0.2	8 1	4.0	3	1.4		⊢∱	
1220	1750	17.54	-0 3	50	20.21	7.57	13.8	35	37	0.3	2 1	2.1	 X	.45	\vdash	\vdash	
1225	1750	19.25	0 3	56	20,12	in.57	13.7	35	78	0.2	C	10.0	<u>lo</u>	<u>. 4</u>		1	
1230	1750	21,00	20 3	50	20,07	7.58	13.5	35	65	0.1	8	7.1	5.	57			
				•			L										
	<u>A</u>	<u> </u>															
		118-															
	- 2																
WELL CAPACITY (G	allons Per Foo	b: 0.75° = 0.0	2: 1" ≠ 0.0	M: 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 (C	Gal./Ft.): 1/8" =	= 0.0006;	3/16" =	0.0014; 1	/4" = 0.0026;	5/16" = 0.0	04; 3/	8" = 0.006	; 1/2" =	0.010;	5/8" = 0.0	016				
PURGING EQUIPME	ENT CODES:	B = Bailer;	BP = Bla	dder Pu	mp; ES	P = Electric SAI	Submersible Pu	imp; TA	PP ≃ Peri	stallic Pump	o; O	= Other (S	pecify)]
SAMPLED BY (PRINT) / A	FFILIATION: D	al T	.)	SAMPL	ER(S) SIGNAT	JRE(S):	2110	T la	1		SAMPLING	123	1	SAMPLING	173	2	
PUMP or Tubing	<u> </u>	rue Iu	NISKI	TUBING	3	V	nar	uper	I FIELD	-FILTERED:	INITIATED	AT:**~	2	ENDED AT:			
DEPTH IN WELL (feet):	-	55		MATER	HAL CODE: PE				F	itration Equips	neni Type:						
SAMPI	FIELD D		DN: PUMP	Y	Ø	TUBING		а) 10N			DUPLICAT	Έ: Υ	<u> </u>	3	SA		ANI
	Le communer c			PI	RESERVATIVE		TOTAL VOL				INTENDEI	D ANALYSIS	AND/OR	SAMPLING EQU	IPMENT FL	OW RA	ATE (mL
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (mL)		USEO	AD	DED IN FIELD (m)	.)	FINAL pH (SI	tanard Units)		METHOD		CODE		per nar	india)
ELSWH02.	2	PE	125	$\left \right $	$\overline{\}$						I	EPA 537M		APP		35	50
						\rightarrow	(m)							1			
$ \longrightarrow $							<u>~</u>						\searrow	<u> </u>			
	710							\rightarrow	_						+		
								_							\rightarrow	and the second se	\neg
<u>}</u>		I	<u> </u>	<u> </u>	TAC	<u>م ن</u>	1.5	1									_
REMARKS:	ci pro	rat C	omple	<i>τ</i> ε.	IUC.	יס צי	et ag	22°									
MATERIAL CODES.	AG = Am	ber Glass: C	G = Clear G	lass:	PE = Polve	thviene: 4	PP = Polyprom	lene: S	= Silicone	: T=Tef	on: O	= Other /5	ipecify)				
SAMPLING EQUIPM	ENT CODES:	APP = Afte	r Peristaliic P	^v ump;	B = Baile	ar; BP≃l	Bladder Pump;	ESP	= Electric	Suomersibl	e Pump;						
		KEA5 = Ke	verse How P	enstalli Sti	c Pump; abilization Crit	eria for range	vietnoc (Tubinç of variation of la	sl three co	urain); nsecutive r	eadings	(specify)						

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

05/67 C-130

M2027.0003

AerostarSES...

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GROUNDWATER SAMPLING LOG

						T_		~ /	6							
Installation: ElisWort	n APB M202	27,0003			1	S	<u>~ 17 re.</u>	<u>2C</u> P	one	<u># 5)</u>				<u> </u>		
WELL NO: MW(8 PFCC	<u>202</u>			S.	AMPLE ID:	LSWH	<u> 2</u> ~	002	~ Gu	/ 03	35 □^	(TE: C	<u>51041</u>	(8	
						P	URGING DA									
WELL DIAMETER (Inches):	2	T D	UBING 📈	4 in **}:	OD WE	LL SCREEN II) . (l e ft		T	TATIC DEPT O WATER (reet BTOC):	6.4	19	OR	BAILER:	pρ	
WELL VOLUME PU	RGE: 1 WELL	. VOLUME = (TOTAL WEL	L DEPT	Н втос -	STATIC D	EPTH TO WAT	ER) X	WELL CA	PACITY						
{only fill out if ap	plicable)		c 40, 1	39	Ft - 16	ά Ψ (^{Ft})	× 0,163	gəVit	- 3,0	ર	gal					
EQUIPMENT VOLU	ME PURGE: 1	EQUIPMENT	VOL. = PUM	P VOLI	JME + (TUBI	NG CAPAC	лтү х т	TUBING L	ENGTH)	+ FLOW CEI	L VOLU	ME				15
y <u>(only fill out if s</u> e	расарів)		#		gal = (x Ft)	+	gal						C.	14/18
INITIAL PUMP OR TUBIN	ه 2 ۲		FINAL PU	AP OR TI	JEING	26	PURG	BING	19.91	U T	РІ		0830	TOTAL VOLUM	أراساً	5 750
DEPTH IN WELL (feat):	ر د	сими	DEPTH IN	WELL (fe	el): DEPTH	ر ر الا	TEMP.	TED AT:		DISSOLV	ED EI	NDED AT:	П	PURGEO (caller	COLOR	
TIME	VOLUME PURGED (pallens)	VOLUM		RATE	TO WATER	(standard units)	(°C)	μ	S/cm	OXYGE mgA.	N	(m¥)		(NTUs)	(đescribe) (describe)
0850	Interpland															
0806	Teachadol -(°Q, X = n + [(x, 1/1 n > 4, 0, 1/6, y = m + 2, 1/2, q) ad IMME FURCE: I BOUPMENT VOL: = PURP VOLUME (UDMING GAMOTTY X TUBHO ELSTICH) = FLOW CELL VOLUME AP IMME FURCE: I BOUPMENT VOL: = PURP VOLUME (UDMING GAMOTTY X TUBHO ELSTICH) = FLOW CELL VOLUME AP IMME FURCE: I BOUPMENT VOL: = PURP VOLUME (UDMING GAMOTTY X TUBHO ELSTICH) = FLOW CELL VOLUME AP IMME FURCE: I BOUPMENT VOL: = PURP VOLUME (UDMING GAMOTTY X TUBHO ELSTICH) = FLOW CELL VOLUME AP IMME FURCE: I BOUPMENT VOL: = PURP VOLUME (UDMING GAMOTTY X TUBHO ELSTICH) = FLOW CELL VOLUME AP IMME FURCE: I BOUPMENT VOL: = PURP VOLUME (UDMING GAMOTTY X TUBHO ELSTICH) = FLOW CELL VOLUME AP IMME FURCE: I BOUPMENT VOL: = PURP VOLUME (UDMING GAMOTTY X TUBHO ELSTICH) = FLOW CELL VOLUME (FLOW FURCE VOLUME (TOMING GAMOTTY X TUBHO ELSTICH) = FLOW CELL VOLUME (FLOW FURCE VOLUME (TOMING GAMOTTY X TUBHO ELSTICH) = FLOW CELL VOLUME (FLOW FURCE VOLUME (TOMING GAMOTTY X TUBHO ELSTICH) = FLOW CELL VOLUME (TOMING GAMOTTY X TUBHO ELSTICH) = FLOW CELL VOLUME (TOMING GAMOTTY X TUBHO ELSTICH) = FLOW CELL VOLUME (TOMING GAMOTTY X TUBHO ELSTICH) = FLOW CELL VOLUME (TOMING GAMOTTY X TUBHO ELSTICH) = FLOW CELL VOLUME (TOMING GAMOTTY X TUBHO ELSTICH) = FLOW CELL VOLUME (TOMING GAMOTTY X TUBHO ELSTICH) = FLOW CELL VOLUME (TOMING GAMOTTY X TUBHO ELSTICH) = FLOW CELL VOLUME (TOMING GAMOTTY X TUBHO ELSTICH) = FLOW CELL VOLUME (TOMING GAMOTTY X TUBHO ELSTICH) = FLOW CELL VOLUME (TOMING GAMOTTY X TUBHO ELSTICH) = FLOW CELL VOLUME (TOMING GAMOTTY X TUBHO ELSTICH) = FLOW CELL VOLUME (TOMING GAMOTTY X TUBHO ELSTICH) = FLOW CELL VOLUME (TOMING GAMOTTY X TUBHO ELSTICH) = FLOW CELL V															
0910	HART PURCIE: LEGUIPHIENT VOL. + PUMP VOLUME + (TUBING CAPACITY X TUBING LENDTR) PARTY A Mark 3.5 [OPTIN HALL NOT 3.5 [OPTIN HALL NOT 64 57.47.03 Mark 3.5 [OPTIN HALL NOT 3.5 [OPTIN HALL NOT 64.5 [NICODE OF 3020 67.50 [DIVIN HALL NOT 64.5 [NICODE OF 3020 67.50 [DIVIN HALL NOT 64.5 [NICODE OF 3020 [DIVIN HALL NOT 66.60 0000 [NICODE OF 3020 [DIVIN HALL NOT 66.60 0000 [NICODE OF 3020 17.50 15.50 17.50 1															
0920	3500	12,25	50 3	350	23.42	7.08	12.7	38	01	3.0	7 (30,6	11	.6		
0930	3500	15,79	50 3	50	24,15	7.00	13,1	38	36	2.9	01	08,1	13	,0		\ \
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					-			<u> </u>		<u> </u>						
			-					 							 	
2 ^																
	F.8															
WELL CAPACITY (G	allons Per Foo	t): 0.75" = 0.0	2; 1" = 0.0	04; 1	.25* = 0.06;	2* ≕ 0,16	; 3" = 0.37;	4" = 0.6	5; 5"=	1.02; 6" =	1.47;	12" = 5.8	8		1	<u> </u>
TUBING INSIDE DIA	CAPACITY (C	Gal./Fl.): 1/8"	= 0.0006;	3/15" =	0,0014; 1	/4" = 0.0020	6; 5/16" = 0.0 Submarsible R	004; 3	/8" = 0.000	6; 1/2" = I	0.010;	5/8" = 0,1	016 Specifi/			
PORGING EQUIPME	INT CODES.	D - Daliel,	0F - 01a	uuer Fu	апр, до	S/	AMPLING DA	unip, ∖TA	11-10	nstando F ump	, v	- Otto (c	ipadity)			
SAMPLED BY (PRINT) / A		al Tu	19/14	SAMPI	ER(S) SIGNAT	URE(S):	Julk_	an	land		SAMPLING	G O 9	131	SAMPLING	01	32
PUMP OR TUBING	হ	5		TUBIN	G		/• -•		FIEL	D-FILTERED;	Y	(Ŋ	Filter Size		ņ п
DEPTH IN WELL (feet):	CAR Name 3.5 Induction No. 0845 Induction Induction No. 0845 Induction Induction No. 0845 Induction Induction <thinductio< td=""></thinductio<>															
SAMP	FIELD E	PECIFICATION	ON: POMP	, , T	<u>(</u> *)	UBING \$/	MPLE PRESERVA				DUPLICA	(E; T	(>	s	AMPLE PUMP
A.1101 P.1. A.4.5.	40017			P	RESERVATIVE		TOTAL VOL	Τ			INTENDE	D ANALYSIS METHOD	AND/OR	SAMPLING EQU CODE	IPMENT F	LOW RATE (mi. perminute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (mu)	USED	,	VDED IN FIELD (m	iL)	CINCAL PLA (S	stanziu ontre)						
BLSW HD 2- 602-GW-035	2	PE	125									EPA 537M		APP		350
							And									
	A			1										OK		
								T	$\overline{}$							
REMARKS:	hjud	not co	mplet	2, 1	roc =	2.4	ags									
MATERIAL CODES:	AG = An	iber Glass; (CG = Clear G	lass;	PE = Polye	ihylane;	PP = Polyprop	ylene;	S = Silicon	ie; T=Tef	ion; O	= Other (Specify)			
SAMPLING EQUIPM	ENT CODES:	APP = Afte RFPP = Re	er Peristaltic I verse Flow F	Pump; Peristall	B = Balle ic Pump;	er; BP = SM = Strav	Bladder Pump Method (Tubin Stursen)	; ESF g Gravity	r = ⊨lectric Drain);	O = Olher	e Pump; (Specify)					

pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissoftved 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)

C-131

Revision Date: March 14, 2016

9005/07

3/6/19

Serostar SES...

5

GROUNDWATER SAMPLING LOG

staliation: Eliswor	th AFB M202	7.0003			Site:	2								
	18200	(77 6 3			SAMPLE ID: EL	-SWH	.02	-00	3-64	13 DA	TE: U	1261	18	
		0200			PU	RGING DA	TA				¥	<u>v = 0</u>		
/ELL	2	T	JBING	14 in OD W	ELL SCREEN INTE	RVAL DEPTH:		STATIC DEPT	H tet BTOCh	4.70	PUR	RGE PUMP TYP	APF).
VELL VOLUME PL	JRGE: 1 WELL	.VOLUME ≈ (1	TOTAL WELL	DEPTH BTOC -	- STATIC DEP	TH TO WATE	R) X	WELL CA	PACITY	<u>vi i v</u>		,		
(only fill out if a	epp8cable)	=	18.	20 = -4	,7じFt) x	0,163	gal/ft	- 2,	.2	gal				
	JME PURGE: 1 applicable)	EQUIPMENT	VOE. = PUMF =	VOLUME±(TU gal ⇒ (BING CAPACIT	ΥХ 1 ——	UBING	LENGTH) +	FLOW CEL	L VOLUME				11-1 A/26/15
TIAL PUMP OR TUB	NG		FINAL PUM	P OR TUBING	12	PURG	ING			PURGING	540	TOTAL VOLUM	E	8 760
PTH IN WELL (feet):	13	CUMUI	DEPTH IN V	VELL (feet):		INITA TEMP.	TED AT:	COND.	Dissolvi	ENDED AT:	<u>אריכ</u>	PURGED <u>(online</u> RBIDITY	COLOF	ODOR
тіме	VOLUME PURGED Kynitoms)	VOLUMI PURGEI	E F	ATE TO WATER	(standard units)	(°୯)		µS/cm	OXYGE: mg/L	i (mV)		(NTUS)	(describ	e) (describe)
1520	1750	175	0 3	50 4.78	7.02	8.5	4	178	1.60	-106	2	4.2	cle	whone
1525	1750	350	03	50 4.80	10.01	8,1	41	117	0.9	1-106.1	ŀ	0.6	\square	11-
1530	1750	525	0 3	50 4.80	7.06	7.8	4	277	0.2	6 -109.8	1	0.7	┢╌┡	
1535	1750	700	$\frac{0}{2}$	50 4.80	1.05	8.0	4	301	0.20	2 -1150	, , , , , , , , , , , , , , , , , , ,	<u>7.57</u>	_↓	+
1540	1750	187	<u>50 3</u>	50 4.80	7.67	7.80	42	× I	0.14	1 -1(9,2	11	.0		
······································														
													_	
										and the second s			<u> </u>	
													-	
	. 0.55													
		11/261	10											
Same Manager and Street		L						or. rt	1.00: 07:0	4.175 401-6.9			1	
ELL CAPACITY (BING INSIDE DI	Gailons Per Foo IA. CAPACITY (0	it): 0.75° ≈ 0.0 GaL/Ft.): 1/8″ :	12; 1°≈0.0 ≈0.0006; ;	4; 1.25" = 0.06 3/16" = 0.0014;	; 2" = 0.16; 1/4" = 0.0026;	3" = 0.37; 5/16" = 0.1	4 = 0 004;	.65; 5 = 3/8" = 0.006	1.02; 6 = 6; 1/2"=0	1.47; 12 ≈ 5.6 0.010; 5/8" = 0.	016			
RGING EQUIPM	IENT CODES:	8 = Bailer;	BP = Bla	dder Pump; E	SP = Electric S	Submersible P	ump;	PP ≕ Pe	tistaltic Pump	; O = Other (Specify)			
	4558 11 701				UNIDE (O)	$\eta \sim $	\overline{C}	- 6.1.	1	SAMPLING		SAMPLING	1 5	11.2
MPLED BY (PRINT) /	AFFICIATION:	rek Tu	rolski	TURNO		<u>my</u>	10			INITIATED AT:	<u>57</u>	ENDED AT:	15	92
MP OR TUBING PTH IN WELL (feet):	11	3		MATERIAL CODE: F	۰ ۴	\sim		FIEL	Fibration Equipm	ient Type;	<u>v</u>			
	FIELD	DECONTAMINATIO	on: Pulmp	Y (N)	TUBING	Y (N (replac	ed)			DUPLICATE: Y	Ć	>		
SAM	PLE CONTAINER S	SPECIFICATION	1	PRESODUAT	SAM Æ					INTENDED ANALYSI	AND/OR	SAMPLING EQ	UIPMENT	FLOW RATE (m
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (mL)	USED	AD	DED (N FIELD (n	nL)	FINAL pH (Stanard Units)	METHOD		CODE		per minute)
25WH02-	2	PE	125	\sim						EPA 537M		APF	,	350
<u> </u>			-							~				
	+				ح	Xen						\prec		
		\mathbb{A}	e ·		-12		\leq					\sim	2	
			\geq					\geq						~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
				<u> </u>										
MARKS:	DIPY (PRINT) / AFFILIATION: AVEL TWOISSM SAMPLER(S) SIGNATURE(S): MALL With the second state of the second sta													
ATERIAL CORT	o	nher Claret	CG = Close C		valhulana (vlena	S = Silicor	na: T = Tof	an: O = Other (Specify)			

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)

C-132 05/10

Aerostar SES...

GROUNDWATER SAMPLING LOG

											-						
Instalation: Ellisworth AFB M2027.0003 Stat: 2 (row 70, 80, 90)																	
	XPFC	0204			SAI		10: ELSWHO2-005-GW-040 DATE 5/23/18										
11001						PU	RGING DAT	A									
WELL	2	TUB		zih	OD WELL	L SCREEN INT	erval depth:	ST	ATIC DEPTH	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	5114	PURG	еримртүре шер. Мо	oa Ma	15000		
DIAMETER (Inches):	<u> </u>	DIA	IETER (inches)	;	45	0 (FI -	35.01 Ft		WATER (fee	ACITY	5611		ULER: 1 (4	54 1.00	1000		
WELL VOLUME PUR	GE: 1 WELL V	/OLUME = (TO	TAL WELL		- BIOC		co 1(2	7		/ Г "							
(only fill out if app	(icable)	= (42.	16	п • > 5	, (Ч ғо) х	0,00	S gant	- I.	6.7 "							
COLUMN CUT VOLUM			- ⊐ PLIMP	VOLU	ME + (TUBIN	IG CAPACI	ry x T	UBING LI	ENGTH) +	FLOW CELL	VOLUME			k	15		
COLOMENT VOLUM	icable)		=		yst(<u>rt</u> ;				g¢i			5 12	2/10		
							Dipo	NG			FURGING	T	OTAL VOLUME	512.	118		
INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	40	40 FINAL PUMP OR TUBING 40					INITIA	ED AT:	140	0	ENDED AT:	<u>434 p</u>		5400			
			PU	RGE	DEPTH	ा Mq (standard	TEMP.	co	ND.	DISSOLVED) ORP	TUR	(BIDITY ITUs)	COLOR (describe)	ODOR (describe)		
TIME	PURGED (gallons)	VOLUME	רא שע ו	NTE DTD	TO WATER	units)	(°¢}	μ	S/Cm	mg/L	(1114)		,		,,		
	ml		<u>nl</u> m	Zhul	1 C O S	* 7 < 7	101	42	57	576	271	11	13	der	none		
1410	1500	150		0	33,13	1.22	1.10	1.2	87	0 41	24	10	<u>יי</u>	ł	1		
1445	150	225	<u>o 115</u>	0	26.15	1021	20.3	11	··· [<u></u> /	2.97	11	18				
1420	750	500	0 12	0	56.45	1.33	10.5	71		0,00	> 71 7	+	\overline{D}	\vdash			
1425	770	<u> </u>	0 1	<u>50</u>	37.00	7.5	117.0	5	14.2	<u> </u>		10		\vdash	\vdash		
1428	150	450	001	20	51,14	1,38	11114	3'	1.4	<u> 1.16</u> E E 6		0	06		$\vdash \vdash \dashv$		
1431	450	495	0 12	0	37.65	7.31	1813	40	411	5120	30,0	1 3	22	┝─┼			
1434	450	540	20 12	<u>50</u>	37,30	7.38	18,6	40	,1,2	4.46	30.2	<u> </u>	<u> </u>	<u> </u>			
								ļ									
											_						
					-												
, ,		Ĥ															
 			12.31	8			1	1									
		-5					-	1									
	F							1									
	allone Per Foo	N: 0.75' = 0.00	2: 1" = 0.0	4:	1.25* = 0.06:	2" = 0.16	3" = 0,37;	4" = 0.6	35; 5° =	1.02; 6'=	1.47: 12 = 5	88					
TUBING INSIDE DIA			= 0.0006;		= 0,0014;	1/4" = 0.0020	5; 5/16" = 0.	004; 3	3/8" = 0.000	3; <u>1/2" = 0</u>	.010; 5/8" =	0.016					
PURGING EQUIPM	ENT CODES:	B ≈ Bailer,	BP = Bla	dder P	'ump; ES	SP = Electric	Submersible F	ump;	PP = Per	istallic Pump	O = Other	(Specity)					
									. 7			125	SAMPLING	143	27		
SAMPLED BY (PRINT) / /	AFFILIATION:	rek 11	<i>crolsk</i>	SAME	PLER(S) SIGNAT	TURE(S).	help "	1 un	E ON		INITIATED AT:	(3-) (3-)	ENDED AT:	1.1.	<u> </u>		
PUMP OR TUBING	LA (יז יז		TUBI	NG	-			FIEL	D-FILTERED:	Y ent Type:	C.	12161 3126		1040		
DEPTH IN WELL (feet):	-L (N: PUMP		N N	TUBING	Y N (repla	ied)			DUPLICATE:	Y (N	>				
SAM	PLE CONTAINER \$	PECIFICATION		Ť	<u></u>	S.	AMPLE PRESERV	ATION						S			
	1			1	PRESERVATIV	E	TOTAL VOL		FINAL oH (Stanard Units)	INTENDED ANALY METHO	sis and/or D	SAMPLING EC COD	E	perminute)		
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (mu	}	USED		Added in Field (mL)									
ELSWHO2-	6	<u> </u>	100	$ \land$				T			EPA 53	м	ĒS	ρl	150		
005-6-04	b 2	10	125										ļ	<u>'</u>			
							\sim										
		b .					×cw	-				\geq	<u> </u>	47			
		1		Г				\geq						24	-		
	1	ľ												\rightarrow			
		<u> </u>		\top													
		l L		1.	<u>не с.</u>		<u></u>	$\sum_{i=1}^{n}$	۶ م				_				
REHARKS:	un pa	~ N6T	com	r w	ייי	11 CK U		, u,	، ک	1	4-10.0	t					
To	ook son	npie du	e to	ne	reagin	e turi	bidity	and	ကားသမ္န	ing w		` 1					
MATERIAL CODES	γ ΔG = Δ	mber Glass:	CG = Clear	Glass:	PE = Pol	yəthylene;	PP = Polypro	pylene;	S ≈ Silico	ne; T=Tel	lon; O = Othe	er (Specify)		·····			
SAMPLING EQUIP	MENT CODES	: APP = Afl	er Peristaltic	Pump	; B = 8a	ilier; BP	= Bladder Pum	ip; Es	SP = Electr	ic Submersib	le Pump; (Specify)	_					
<u> </u>		RFPP = Re	everse Flow	Perista	anic Pump; Stabilization C	SM = SI/a	w Meulou (100 ige of variation o	f last three	consecutive	e 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)

M2027.0003

5/24

AerostarSES...

GROUNDWATER SAMPLING LOG

Installation: EllSwort	hAFB M202	27.0003	R			Site:	2	Croi	~ 7	6)							
WELL NO: MU	JL8PFC	020/	5		\$/		LSWHO	2-00	- 3 (Gw-1	236	DATE:	5/4/1	8			
1						PU	RGING DA	TA									
WELL DIAMETER (Inches):	2	T D		i M	OD WEI	LL SCREEN INTI	ERVAL DEPTH:	ST. TO	ATIC DEPT	H eet BTOC): S	25.54	PU	IRGE PUMP TYPI R BAILER:	PP			
WELL VOLUME PUI	RGE: 1 WELL	.VOLUME≍ (TOTAL WELL	DEPT	H BTOC -	STATIC DEF	TH TO WATE	R) X V	VELL CA	PACITY							
(only 10) out if ap	plicable)	-	< 35 , 3 1	5	r -25	54.Ft) ×	0.163	gal/ft	- i.	6	gal						
EQUIPMENT VOLU	ME PURGE: 1	EQUIPMENT	Vol. ≈ Pump	VOLL	ime + (tubi	NG CAPACIT	Y <u>X</u> I	UBING LE	NGTH) +	FLOW CEL	L VOLUME				AT		
(only fill out if ap	plicable)		-		gal ≑ (×	Ft)	+	gal	-	gal			5	14/18		
INITIAL PUMP OR TUBIN DEPTH IN WELL (feet):	3	0	FINAL PUM DEPTH IN V	P OR TU VELL (fe	at):	30	PURG	ING TED AT:	325	bibapitu					54 00		
TIME	VOLUME PURGEO (gations)	VOLUM		ATE	TO WATER	ुश्म (standard धर्मारेड)	(°C)	μS.	no. Icm	OXYGE Rg/L	N (mV)		(NTUs)	(describe)	(describe)		
1330	1750	175	0 3	\$	25,55	7.30	15.8	3(1	3	5.0	1 8.2	ľ	46	Jear	none		
1340	3500	525	6 3	50	25,54	7.2.0	14.9	297	19	5.1	7 2.5	- i	2.8		1		
1343	1050	630	0 3	50	25,55	7,20	14.9	29	76	4.98	3 3.2		8.89				
1346	1050	735	03	50	25,55	7,19	14.6	29!	59	5,4	3 4,4	E	.01				
1349	1050	840	03	50	25.53	7,19	14,6	29	52	5.7	4 5,4	ĩ	1.72				
															Į		
			·····									_					
												-					
	P.0	/															
	<u> </u>	118															
	- 70													ļ			
WELL CAPACITY (G TUBING INSIDE DIA	iallons Per Foo CAPACITY ((1): 0.75" = 0.0 Gal./FL): 1/8"	12; 1″ = 0,0 = 0,0006; 3	9; 1. /16" =	.25' = 0.06; 0.0014; 1.	2" = 0.16; /4" = 0.0026;	3' = 0.37; 5/16" = 0.0	4' = 0.65 104; 3/8	; 5'=' 3" = 0.006	1.02; 6°≖); 1/2"={	1.47; 12"=:).010; 5/8"=	0.016					
PURGING EQUIPME	NT CODES:	B ≈ Bailer;	BP = Blac	der Pu	mp; ES	P = Electric S	Submersible Pe	ump; ΥΔ	PP ≃ Pen	istaltic Pump	r; O≃Olhe	r (Specify)					
SAMPLED BY (PRINT) / A		· · · · · · · ·		SAMPL	ERIS) SIGNATI		D. 1	T 1	1		SAMPLING	2677	SAMPUNG	176	` }		
PUMP OR TUBING	F	rek I	welow	TUBING	3		mla.	ma	FIELD	D-FILTERED:	INITIATED AT:	650	ENDED AT:	137	mme		
DEPTH IN WELL (feet):	30	5		MATER	HAL CODE: PE					Filtration Equipm	nent Type:	9					
CANO		DECONTAMINATION	on: Pump	Y	\bigcirc	TUBING	Y N (replace				DUPLICATE:	<u> </u>	い 1	sa	MPLE PLIMP		
o/var	LE BOILTAINER G	PEGRICATION		P	RESERVATIVE		TOTAL VOL		,		INTENDED ANAL	(SIS AND/OR	SAMPLING EQU	JIPMENT FL	OW RATE (mL		
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (mL)		USED	AD	DED IN FIELD (m	L) F	F(NAL pH (S	itanard Units)	METR		0002		por minuto)		
ELSWHO'L- 006-GW-030	2	PE	125	/							EPA 53	7M	APG	2.	350		
\sim						$\overline{}$	(In)				$\overline{\}$						
		/					~					<u>></u> ₄	ļ				
	2							\rightarrow	_			<u> </u>	\vdash				
			$ \rightarrow $											$ \rightarrow $			
1			 ۱ ۲۲۵۵-		1.2	<u>a`</u>		l					J	<u> </u>			
REMARKS:	Anor c	mpier		- 0	s lik	ه د.چ	5										
HATEDIAL CODES	AC - 1-	abor Closer -				diadone: 5	D - Dahmara	dane: C	- Gilleo-	ο· Τ Τ∧Ω		r (Snacif A					
SAMPLING EQUIPM	AG = An ENT CODES:	APP = Afte	er Peristaltic P	ump;	B = Baile	sonyaenne; i sr; BP≃l	Bladder Pump	ESP	= Electric	Submersibl	e Pump;	a (opecity)					
		RFPP = Re	varse Flow Pe	ristalti	c Pump;	SM = Straw I	Method (Tubing	g Gravity D)rain);	O = Other	(Specify)						

pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation; optionally. ± 0.2 rng/L or ± 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

05/07- 3/6/19

AerostarSES...

GROUNDWATER SAMPLING LOG

	APD 1000-	7 0002				sa	<u> </u>		1.0	10 00	1 90)				
Installation: Ellsworth	AFB M202	.0003			SAMELEIN RESULT 2 (2) (1) (1) (1) (1)										
WELL NO: MW18	OFCO	206													
							RGING DAT	A Ist/	TIC DEPTH	4		PURG	SE PUMP TYPE	~ ~	
WELL DIAMETER (inches):	2	DIA	METER (inches	≬ m ≬	00,19	, 21F1 - 4	1.24 FI	TO	WATER (fe	at BTOC):	16.20	OR B	AILER:	<u>PP</u>	
WELL VOLUME PUR	GE: 1 WELL	VOLUME = (TO	OTAL WELL	DEPT	н втос -	STATIC DEF	TH TO WATE	R) X V	ELL CAF	PACITY					l
(only fill out if app	(cable)	= (19.49	L	Ft - 16	20Ft) ×	0.163	galifi, •	Ο,	54 °	al				
									NOTIN	ELOW/CEN	VOLUME				
EQUIPMENT VOLUM	E PURGE: 11	EQUIPMENT V	OL. = PUMF	VOLL	JME + (TUBII	IG CAPACIT	Y X I		NGIHJ+			·			
(only in out it app															
INITIAL PUMP OR TUBING	۲ ۲	8	FINAL PUM	P OR TU VELL (le	JSING ett:	18	PURG	NG TED AT:	111	2	ENDED AT:	126	URGED (geban	mr I	400
DEPTITION WELL (lead).	VOLUME	CUMUL,	P	RGE	DEPTH	pH	TEMP.	CO	ND.	DISSOLVE	D ORP	TUI	ABIDITY ATTIAL	COLOR	GDOR (describe)
TIME	PURGED	VOLUME	P	ATE	TO WATER	(stantiand units)	(°C)	20X1		OXYGEN mg/L	(mv)	U.	4103)	(desenacy	fascure)
	mL	Traditional	<u>_n</u>	<u>El n</u>	Mieet BTOCI	\$ 27	14.0			8.71	5 -8.6	5	84	clan	none
	200	200	$\frac{1}{1}$	<u>90</u>	17.2	0101	12 5	20	1.1	8.41	1.8	10	Del I		
1120	200	500			1.5	7 45	12.2	18	9.0	7.1~	7 lo.y	8	.51		
1125	300	1100		20 (94	1776	7 67	12 7	18	7.7	77	8 6 9	Ĭ	0.00		
11.6	- 200	1200		/0	1612	7.10			11 6	<u> </u>	<u> </u>				
		i													
						<u> </u>									
				_	1			<u> </u>							
	<u>^</u>	5	18			l									
		Fil Vo	<u> </u>		1		1								
							1								
					1										
WELL CAPACITY (G	alions Per Foo	t): 0.75" = 0.0	2; 1" = 0.	D4;	1.25" = 0.06;	2" = 0,16;	3" = 0.37;	4° ≈ 0.6	5; 5"≃	1.02; 6" =	1.47; 12* = 5.8	8			-
TUBING INSIDE DIA	CAPACITY (Gai./Ft.): 1/8" -	= 0.0006;	3/16" =	= 0.0014;	1/4" = 0,0026	5/16" = 0. Submersible F	004; 3/	8" = 0.00 PP = Per	6; 1/2" = 0 ristatic Pumo).010; 5/8" = 0 ; O = Other (.016 Specify)			
PURGING EQUIPME	NI CODES:	B = Baller,	BP = OR		ump, c.	SA	MPLING DA	ATA					1		
SAMPLED BY (PRINT) / A	FFILIATION: A	al T	elete '	SAMI	LER(S) SIGNAT	TURE(S):	Rell	Tu	mbl	kr	SAMPLING	27 ENDED AT: 12			٩
PUMP OF TUBING	///	-OK IM	OSGA	TUBR	NG				FIEL	D-FILTERED:	Y	(N)	Filter Size		mn
DEPTH IN WELL (feat):		18		MATE	RIAL CODE: PE	:				Fitration Equips	nent Type:				
	FIELD	DECONTAMINATIO	DN: PUM	γ 1	Ø	TUBING	Y N (replac				DUPLICATE:			5	AMPLE PUMP
SAMP	LE CONTAINER S	SPECIFICATION		+	OVESTOVATIO		TOTAL VOL				INTENDED ANALYS	IS AND/OR	SAMPLING EQI	JIPMENT F	LOW RATE (mL
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (ml	.)	USED		DDED IN FIELD (r	nL)	final phi (Stanard Units)	METHOD		5006		per canoni,
F1C 14+2.				+			· · · · · ·				EBA 627		A DI	,	100
007-GW-018	2	PE	125								EFROST	n 	<u>/+1</u> 1		100
							\sim								
						<	Xew					\geq			
	>		·····				-	\geq					-20-	_	
	ح	\sim							\geq	<u> </u>				<u> </u>	<u> </u>
h.~4	U out	r con at	, te	Sim	notel .	nell n	trout,	denel	יאיין ס	ble ;	twos dr	y on	518/18	. Lat	fer
REMARKS:	· • •	- my		ler	el arose	el qui	Ully tool	my en	rmy s	ompling \$	i hapt drop	pmy a	ther wo	15. V	ell site
				130	Low no	15tricted	loven z	هدوديج	15 14	nited.		10			
MATERIAL CODES		mber Glass;	CG = Clear	Glass;	PE = Pol	yethylene; iler: BP :	PP ~ Polypro Bladder Pum	pylene; p; ESI	S = Silico P = Electr	ne; T ≈ Tei ic Submersib	ion; O = Other le Pump;	(Specity)			
SAMPLING EQUIP	ALMI CODES	RFPP = Re	averse Flow	Perista	itic Pump;	SM = Straw	/ Method (Tubi	ng Gravily	Drain);	O = Other	(Specify)				

Stabilization Criteria for range of variation of last three consecutive read

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)

M2027.0003

C-135 05/19

Aerostar SES...

GROUNDWATER SAMPLING LOG

L															
Installation: Ellsworth	AFB M202	7.0003				Sita;	STHE 2	<u> </u>	now '	10,80	,90)				
WELL NO: MILLI	XDEI M	 ງ ດ]			SA		LSWHO2	- 008	3 - G	w-0	29 🗖	те: <u>(</u>	15/18	118	
,					.	PU	RGING DA	ſΑ							
WELL	0	TUI	BING	Vy in	OD WEL	L SCREEN INTE	RVAL DEPTH:	ST	TATIC DEPTI	H A	0.97	PUR OR B	BE PUMP TYP	" P P	
DIAMETER (Inches):	CE: 1WELL		METER (Incl	hes): LL DEPT	<u>کر</u> – H BTOC	STATIC DEF	25,60 Ft TH TO WATE	R) X 1	WELL CA	PACITY		0110			
(only fill out if app	écable)	= (22	92	Ft 20	97 Ft) ×	0.163	gaVit	- 2:	11	gal				
			0.77	^v						·					
EQUIPMENT VOLUN	e purge: 11	EQUIPMENT V	'OL, ¤ PUN	NP VOLU	IME + (TUBI	NG CAPACIT	<u>үх</u> т	UBING L	ENGTH) +	FLOW CELL	. VOLUME			A	Τ
(only fill out if app	Acable)		<u>=</u>		. <u>(1</u>	x	<i>r</i> ()	•	gei -				_	5/12	118
INITIAL PUMP OR TUBING	' 9 9 '		FINAL PL	IMP OR TU	IBING	2.9	PURG	ING TED AT:	090	PURGING ENDED AT:	^E mL	1000			
DEPTH IN WELL (feet):	WELL (feet): CUMUL PURC		PURGE	DEPTH	рН	темр.	GC	סאס,	DISSOLVE	D 0RP TI		JR8IDITY COLOR		ODOR	
TIME	PURCED	VOLUME		RATE	TO	(standard units)	(°c)	μ	S/cm	OX¥GEN mg/L	(mV)	(NTUs)		(describe)	(describe)
	mĽ	PURGED	mL	mi/m	Intert BIOCI		12 1	1 011		[]	979	×	8 9 cle		
0945	1000	(000		100	10.93	1.34	12.1	6	<u>11</u> 01	1.01	0 541	<u> </u>	0 7 7	1	none
6950	1000	2000	2 2	100	20.95	7.40	12.0	6	<u>DL</u> 10	0.4	x m 7	0	<u>501</u>	++	
6455	1000	2000	/ 2	200	20,93	7 64	12.9	6-		0.2	a -240	2	7.3		
1000	1006	7000	- 14	200	0.93	7 68	12 0		<u>ະເ</u> ວ່າ	0.2	7 -511	1	7.4		
1005	1000	6000		100	20.3	7/0	121	6-	12	0.2	3 -48.8	V	5. 7	+-	
	1000	700		000	20.43	710	13.1	6-	73	0.2	6-84.9	13	3.2	\square	
1015	1000				<u> </u>	1.60	<u> • 211</u>			<u> </u>					
							1						_		
	•														
		N													l
		JE:	18/18	<u> </u>				ļ				ļ			
						ļ				ļ					:
							l	<u> </u>			1 (7) 100 - 61	L			ļ
WELL CAPACITY (G	altons Per Foo	t): 0.75° = 0.0	2; 1"≕I -0.0006:	0.04; 1 3/18" =	1.25" = 0.06; • 0.0014:	$2^* = 0.16;$ $1/4^* = 0.0026;$	3" = 0.37; 5/16" = 0.	4" = 0.6 004: 3	55; 5 = 3/8" = 0.00	1.02; 6 = 6; 1/2" = (1.47; 12 = 5.0),010; 5/8″ = 0	,016			1
PURGING EQUIPME	INT CODES;	B ≕ Bailer;	= 0.0000, BP ≈ E	Bladder P	ump; ES	SP = Electric	Submersible F	ump;	PP = Pe	ristallic Pump	; O = Other	Specify)			
						SA			14		SAMPLING		SAMPLING	10	
SAMPLED BY (PRINT) / A	FFILIATION: A	rele'in	05h	SAMP	LER(S) SIGNA	rure(s):	mell.	1h	NSK		INITIATED AT: 1	216	ENDED AT:	10	· /
PUMP OR TUBING	9	9		TUBIA	ig Rial code: Pr	-			FIEL	_D-FILTERED: Fibration Equips	Y nent Type:	B	FINE SIZE		rturis.
DEP 171 IN WELL (leas).	FIELD	DECONTAMINATIO	DN: PU	MP Y	Ø	TUBING	Y N (replac	ced)			DUPLICATE:	У N			
SAMP	LE CONTAINER &	PECIFICATION				SA	MPLE PRESERVA	ATION			INTENDED ANALYS	S AND/OR	SAMPLING E	SUIPMENT F	AMPLE PUMP LOW RATE (mL
SAVPLE ID CODE	# CONTAINERS	NATERIAL CODE	VOLUME (I	mL)	PRESERVATIV	≞	TOTAL VOL		FINAL pH (Stanard Units)	METHOD		COD	E	per minute)
	ļ		ļ		USED	A	dded in Field (πL)							
508-0W-02	2	Pê	125								EPA 537	a	AP.	ρΙ	200
FSWH02-						\rightarrow							4.0	~	0.00
008-GW-92	2	PĒ	125			5	Sen				EPA 5	37 M	AP	/	200
		/													
	R C	6-								<u> </u>				5	
				~								$- \subset$			
1.10	U pud	cons	ek.									-			
REMARKS:	1	۲.													
												10 11			
MATERIAL CODES	AG = A	nber Glass;	CG = Clea	ir Glass;	PE = Poh	vethylene;	PP = Polypro Bladder Pum	pylene; p: ES	S = Silico SP = Electr	ne; T = Tel ic Submersib	lion; O = Other le Pump;	(Specify)			
SAMPLING EQUIPM	ACIAL CODES:	APP = AR 9500 → 86	uni ensiali Moreo Flov	⊪oroanµ; ⊮Perista	iic Pummr	SM = Straw	Method (Tubi	ng Gravit	y Orain):	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)

M2027.0003

C-13600 05/19

AerostarSES...

GROUNDWATER SAMPLING LOG

5																	
installation: Ellsworth	AFB M2027	.0003				Silo;	<u>3 (1</u>	suit	Im	611	5)			, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			_
	SPEC	0301			SA	MPLE ID: EL	SWH0.	3-00	1- 6	~-01	5	DAT	<u>™ 5,</u>	124/18	5		
					, A	PU	RGING DAT	A									
WELL	$V_{c} \sim c$	AT TUI		in o	D WEL	L SCREEN INTE	RVAL DEPTH:	STA	TIC DEPTH	' C	A I	1	PURC	SE PUMP TYPE	PD		
DIAMETER (Inches):		5/24/0 DIA	METER (inc	hes):	20	OTATIO DEC		TO TO	WATER (fe	ACITY	1,0	1	OR B	ALER	<u>† 1</u>		\neg
WELL VOLUME PUR	GE: 1 WELLY	Volume = (T	OTAL WE		H BIOC -	STATIC DEF		K} A W		× C							
(only fill out if app	licable)	= (20.	38	Fi - 4.() (Ft) ×	0.63	ฐองณ ≖		55	gai						
CONTRACTOR		OUIDMENT				IG CAPACIT	γχτ	UBING LE	NGTH) +	FLOW CEL	LVOLU	IME				<u>م</u> ر	1
EQUIPMENT VOLUM	E PURGE: TI	EQUIPMENT	UL,		ast		FT)	+	gol			ei				AP.V	_
														CARL MOUTH	ر س	124/1	18
INITIAL PUMP OR TUBING	1 4	-	FINAL PU	UMP OR TU N WELL (fee		5	PURGI		14	5	1	NDED AT:	208	URGED (galon	m - 32	50	
DEPTHIN WELL (reet):		CUMUL.		PURGE	DEPTH	рн	TEMP.	CON	łD.	DISSOLVI	ED	ORP	τUI	RBIDITY	COLOR	ODOF	R
TIMÉ	PURGED	VOLUME		RATE	το	(slandard units)	(°୦)	μ\$/	'cm	DXYGEN	u I	(Win)	Ø	YTUs}	(describe)	(descril	be)
	ml	PURGED	1	ttom	WATER Mreet BTOCL					ingr.		1		200		<u> </u>	
1150	750	- 750	<u> </u>	150	9,39	7.71	14,5	46	21.6	1,81	1	-18-1			cien	r nor	<u>n</u> l
1153	450	1200	0	150	9.45	7,54	14.2	45	8,6	1.0		-17,5	<u>3</u>	5,7			
1156	h50	1650	0	150	9.51	7.52	13.8	Чч	9.3	0.80	2	-20,1	5	5.2		\square	
1159	450	2100	>	150	9.55	7,63	13,6	५५	2,4	0,7	7	-24.4	3	6.0	1-		
12.07	450	2550	0	150	957	7.84	13.2	43	9.2	0,71	6	-27.9	13	9.0			
12.05	n50	300	0	150	1,60	7,73	13,2	439	8.0	0.8	3	-40.5	19	5			
12 08	h50	3 h 5	6	150	9,60	7.81	13.1	43	7,5	0,8	3	-37.9	2	15			
1200																\square	
																	\neg
					17-		T										
					241	8											
				-5-		<u> </u>					-+				İ —		
				-							-						
																	-
		- 0.7E ¹ - 0.0	0. št - 1	0.04: 4	26" - 0.08:	2" = 0.16:	3* = 0.37:	4" = 0.65	: 5° =	1.02: 6" =	1.47:	12" = 5.8	8		I		
WELL CAPACITY (G	CAPACITY ((t): 0.75" = 0.0: ≥a!/Et): 1/8" :	2; ; = ' = 0.0006:	0.04; i 3/16" ≍	0.0014: 1	z = 0,10, 1/4" = 0.0026;	5/16" = 0.07		8" = 0.006	u=, e δ; 1/2"≈≉	0.010;	5/8" = 0,	016				
PURGING EQUIPME	INT CODES:	B = Bailer;	8P = 1	Bladder P	ump; ES	SP = Electric	Submersible P	ump;	PP = Per	istaltic Pump	3 ;	O ≍ Olher (Specify)				
						SA					SAMPL	ING)		SAMPLING	10	10.	
SAMPLED BY (PRINT) / A	ffiliation: A	rek Tu	rolsin	/ SAMP	LER(S) SIGNAT	URE(S):	Sik	1 lu	Sh	N	INITIAT	TTATED AT: 1209 ENDED AT:			1210		
PUMP OR TUBING	1.6-			TUBIN	10				FIEL	D-FILTERED:		Y I	(\mathbb{P})	Filter Size		mm	
DEPTH IN WELL (feet):	<u></u>	CONTAINING T	1N: D'		RIAL CODE: PE	TURINO	Y NIR	90)		Legistic science		ATE: Y	Ń.	>			
SAND	FIELD I	PECIFICATION	on: Pu	ANT T	<u>v</u>	SA	MPLE PRESERVA	TION							s	AMPLE PU	IMP
					PRESERVATIVE	<u>. </u>	TOTAL VOL		EIMAL	Stanard ->>	INTEN	DED ANALYSI METHOD	S AND/OR	SAMPLING EQ CODE	JIPMENT F	LOW RATI	E (mL to)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME ((mL)	USED	A	DDED IN FIELD (m	aL)	FINAL PH (stanard Units)							
ELSWHO3-		05	105		<hr/>							EPA 537	4	And	,	1 -	
001-6-01	2	YE	125									2		ATT		120	\mathbf{S}
											-	-					
						<	Xm				<u> </u>						
		7~~						\leq			1			X	$ \rightarrow \downarrow $		
		1							<u> </u>								
1.10	11 pad	comple	H.														
REMARKS:	~~ 1	Y	•				1										
। १	ook s	ample	dre s	to M	crea 5 A	ng tu	rbidity	,									
MATERIAL CODES	AG = Ar	nber Glass;	CG = Clea	ar Glass;	PE ≈ Poly	/ethylene;	PP = Polyprop	oylene; S	s = Silico	ne; T=Te	flon;	O = Other	(Specify)				
SAMPLING EQUIPA	IENT CODES:	APP = Aft	er Peristal	tic Pump;	B = Bai Nic Pumo:	iler; BP = SM = Strew	Bladder Pump Method (Tubic	o; ESP na Gravitv	P = Electri Drain):	ic Submersit O = Olhei	pie Purr r (Speci	ip; ify)					
		NET - 15						Land than a re-		madinas							

pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation; optionally, ± 0.2 rng/L or ± 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: March 14, 2016

M2027.0003

5/24 C-137

3/6/19
AerostarSES.

GROUNDWATER SAMPLING LOG

Installation: Ellswort	hAFB M202	27.0003				Site:	Sit	٤3	Cbv	ildan	618)				
WELL NO: MW	118PF	C030	2	•••=••••••	5/		LSWH	93-	002	- GW	-017	DATE:	5/10/	ı8	
						PU	RGING DA	TA							
WELL DIAMETER (inches):	2	TUE DIAJ	IING (METER (inches)	lu i	N UD WEL	L SCREEN INTE	D. 0% Ft	1	STATIC DEPT	H eet BTOC):	12.8	ין ^{או}	urge pump typi R Bailer:	"PP	
WELL VOLUME PU	RGE: 1 WELL	VOLUME = (TO	TAL WELL	DEPT	H BTOC -	STATIC DEF	PTH TO WATE	R) X	WELL CA	PACITY		1			
(only KI out if ap	opžcable)	= (20.3	3	rt - \2	έ\$ ₽τ) ×	0.163	gai/fi	-),	22	gal				
EQUIPMENT VOLU	ME PURGE: 1 apscable)	EQUIPMENT V	01. = PUMP =	VOLU	ME + (TUB)	NG CAPACIT	ҮХ Т ————————————————————————————————————	UBING I	ENGTH) +	FLOW CEL	L VOLUME				
INITIAL PUMP OR TUBIN	G		FINAL PUMP	OR TU	BING		PURG	ING	1.21		PURGING		TOTAL VOLUM		CLE OA
DEPTH IN WELL (feet):	<u> </u>	1	DEPTH IN W	/ELL (fe	et):	1	INITIA	TED AT:	150	15	ENDED A	<u>ти 20</u>	PURGED (geller		500
тіме	VOLUME PURGED	VOLUME	ML M		TO WATER	pri (slandard units)	(°C)		isiem	OXYGE mg/L	N (mV)		(NTUs)	(describe) (describe)
1350	1500	1500	30	20	13.42	7.34	10.4	6	22	1.0	0 22.0	4	187	dou	fron
13 55	1500	3000	30	ا ن ا	B. 65	7,19	10.3	6	21	0, 4	4 14.	5	423		
1,400	1500	2500	30	6e	13,61	7,19	10.2	6	23	0,6	4 5.1	,	551		
1405	1000	5 500) 20	20	13.56	7,18	10,2	6	22	0.5	8 -2.8		325		\square
1410	1000	6500	20	20	13.54	7.13	10.1	6	<u>21</u>	0.4	$\frac{7}{1}$ -(2	1 0	06	cleo	
1415	1000	1500 855.00	$\frac{1}{2}$	30	13,54	5 17	10.0	6 6	<u>. ()</u>	0.5	4 -47		1.1	┟─┧─	┼╌┼─┤
1420	1000	5 900	<u>, 1</u>	2	15004	1.01	10.0	v	()	0.0	1 -13.	. L	9.6	- -	
												\downarrow			
					\square							_			
	<u> </u>	10	4	_								_			 ,
	5	10/15		_								_			
WELL CAPACITY (G	Salions Per Foo	t): 0.75" = 0.02;	1" = 0.04	; 1.	25" = 0.06;	2* = 0,16;	3" = 0.37;	4" = 0.8	5; 5°=	1.02; 6* =	1.47; 12'=	5.88		I	1
TUBING INSIDE DIA	CAPACITY (C	Gal./Ft.): 1/8" = 1	0.0006; 3/	/16" ≃	0.0014; 1	/4" = 0.0026;	5/16" = 0.0	04; 3	/8" = 0.006	1/2" =	0.010; 5/8"	= 0.016			
PURGING EQUIPMI	ENT CODES:	B = Baller,	BP = Blade	der Pu	mp; ES	P = Electric S	VPLING DA	imp; TA	PP = Pen	istattic Pump); O≈Oth	er (Specity)			
SAMPLED BY (PRINT) / A	AFFILIATION:	Ark T		SAMPL	er(s) signati	JRE(S):	Frek	V	kk	A	SAMPLING	421	SAMPLING	14	22
PUMP OR TUBING	·	<u>,</u> 1	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	N TUBING	3	~ ~ ~	<u> </u>	10	FIEL	D-FILTERED;	Y	\odot	Filter Size		ការវា
DEPTH IN WELL (feet):	circi D G		DUNIO	MATER	IAL CODE: PE	TURING	Y (N (region			Filtration Equips	nent Type:	× 7	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		
SAMP	LE CONTAINER S	PECIFICATION	. Ponr	·	<u>v</u>	SAM	PLE PRESERVAT					<u> </u>	Í	s.	AMPLE PUMP
SAMPLE 10 CODE	# CONTAINERS	MATERIAL CODE	/OLUME (mL)	Pi	RESERVATIVE USED	AD	TOTAL VOL	ı.)	FINAL pH (S	ibanard Units)	INTENDED ANAL METH	ysis and/of od	Sampling Equ Code	IPMENT F	LOW RATE (ml. per minute)
BLSWHO3-	2	PÉ	125		$\overline{}$						EPA 5	37M	٨٢	P	200
							Sen								
	<u> </u>	+						$ \rightarrow $					The last		
								\rightarrow							
														–∱	
REMARKS:	Ni pund	not co	npiete	, S	+1 C.K.	r = 1•!	51° ag	S							
MATERIAL CODES	AG = Am	iber Glass: CG	G = Clear Gfa	155:	PE = Polve	thylene: F	P = Polyprop	lene:	S = Silicon	e; T≖Tef	on; O = Olh	er (Specify)		
SAMPLING EQUIPM	IENT CODES:	APP = After	Peristallic Pu	imp;	B = Balle	SM = Street	Bladder Pump	ES I Gravite	P = Electric	Submersibl	e Pump; (Specify)				
		NELL = KGAG	nse riow Pe	131810	- Funp,	one - Ollaw N	nousou (i upiñ) of variation of k	g Gravity	oneerithie		(obecut)				

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)

JU 05/10 3/6/19

AerostarSES...

GROUNDWATER SAMPLING LOG

						<u></u>		7.0							
Installation: Ellisworth	AFB M202	7.0003			Site:	>,4	<u>e s</u>	(Bu	Jedn	6	18)				
WELL NO: Mu	18PF1	0303		S	AMPLE ID: EI	LSWHO	<u>23-6</u>	-201	6w	<u>010</u>	DA	VTE: 5	10/1	<u> </u>	
					PU	RGING DA	TA								
WELL DIAMETER (inches):	2	TUBING	H M M	OD 9	LL SCREEN INTI 0.11 FI	ERVAL DEPTH:	5	STATIC DEPT	H eet BTOC):	11	7	PUF	RGE PUMP TYP BAILER:	PΡ	
WELL VOLUME PUP	RGE: 1 WELL	VOLUME = (TOT/	L WELL DEF	TH BTOC -	STATIC DEI	TH TO WAT	R) X	WELL CA	PACITY						
(only fill out if ap	p[icable]	= (90.37	R - 11.	7) Fi) ×	0,163	gai/R	- 1.4	47	gai					
					-				• •						
EQUIPMENT VOLUM	IE PURGE: 1	EQUIPMENT VOL.	= PUMP VOI	_UME + (T'UB)	NG CAPACIT	YXI	fubing l	.ENGTH) +	FLOW CE	LVOL	JME				
(orly fil out if ap	picable)			_gal ≍ (×	<u></u> <u>FL</u>).		<u> </u>	<u> </u>		<u> </u>				
INITIAL FUMP OR TUBING	° 16	F	NAL PUMP OR	TUBING	6	PURG	SING	12.7		ľ	PURGING	270	TOTAL VOLUM	mL	6.506
DEPTH IN WELL (feet):	• 0	CUMUL	PURGE	(feol): CEPTH	рн	TEMP.	C	OND.	DISSOLV	/ED	ORP	<u>ле т</u>	RBIDITY	COLOR	ODOR
TIME	VOLUME	VOLUME	RATE	TO	(standard units)	(°c)	P	.S/cm	OXYGE	EN .	(WM)		(NTUs)	(describe)	(describe)
	ML	PURGED	- meter	WATER Heet BIOCI					mg/L	_				ļ	ļ
1230	1500	1500	300	12.42	7.44	4.8	40	11.2	5,4	2	39.5	ļ	38	clear	none
1235	1500		300	12.69	116	9.6	41	54.0	5.5	8	25.	5	88_	cleady	
1240	1500	4500	300	112.98	7,13	9,4	4	56.1	4.8	3	-3.2	0	<u>R</u>		┞
1245	1500	6600	506	13.3(7,14	11	4	540	4.16	<u> </u>	56.6	0	<u>R</u>	$\left \right $	\square
1250	1500	7500	300	13,69	1,16	9.1	<u> </u>	<u>94.3</u>	3.8	2	<u> 755.1</u>	0	K	┟╌┠╴	+
1255	1500	4000	1 200	14.02	7.19	4	145	14.1	<u> </u>	<u> </u>	~22%		202	┼	
1300	1,500	10,00	300	117.4		1,0		<u>, ۲</u>	- 1.3 E- 2	<u>ン</u> て	-74.(1	16	$\left \right $	+
1305	1500	12000	300	19,16	7,19	1.0	-07	$\frac{2}{1}$	5,0	2	- 20,5		<u>~~</u>		┝╌┦──
1310	1500	13500	300	15.12	7.12	1,1	43	<u>ግ.ዓ</u> ረክ ታን	7.1	<u> </u>	-740 -740	60	<u> </u>		$\left \right $
1315	1500	13000	300	15,48	1.11	47	40	$\frac{y(1,0)}{y(1,0)}$	<u> </u>	6	-241 -21 c	2	<u>55</u>	$\left \cdot \right $	$\left \right $
1320	1 200	16200	300	11282	414	1.2	122	14.1	-1.0	۲	~~~	6	5		╞╼═┻┷╾
						1								F	
														<u> </u>	
		<u>A</u>	1 110	18										<u> </u>	
			<u> 31.</u>	, -											
WELL CAPACITY (G	allons Per Foo); 0, 75' = 0.02;	1" = 0.04;	1.25" = 0.06;	2 = 0,18;	3* = 0.37;	4" = 0.6	i5; 5" = ·	1.02; 6" =	1.47;	12" = 5.8	8			
TUBING INSIDE DIA	CAPACITY (Gal/Ft.): 1/8" = 0.0	006; 3/16"	= 0.0014; 1	/4" = 0,0026;	5/16" = 0.0	004; 3	/8" = 0.000	; 1/2" =	0.010;	5/8" = 0.	016 Receibed			
PURGING EQUIPME	NI CODES:	B = Baller; E	P = Bladder (rump; Es	SA	MPLING DA	Ump: TA	PF = rei	Istance Pullis	J, (sharata)			
SAMPLED BY (PRINT) / A	FFILIATION: A	all Ti	STAL SAM	PLER(S) SIGNAT	URE(S):	Lali	T	Turbal	4.1	SAMPLI	NG 13	21	SAMPLING	132	7
PUMP OR TUBING		1		NG	/	10m		FIEL	D-FILTERED;		(6	Filter Size		 mm
DEPTH IN WELL (feet):	<u> </u>	6	мат	ERIAL CODE: PE					Fibration Equip	nent Type	(
PAND	FIELD D	ECONTAMINATION:	PUMP Y		TUBING	Y (N (replac	9 2) TION			DUPLIC	ATE: Y		}	SA	MPIE PUMP
own	GONTAINER S			PRESERVATIVE	GAR	TOTAL VOL				INTEND	ED ANALYSIS	S AND/OR	SAMPLING EQ	APMENT FL	OW RATE (mL
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE VOL	JME (mL)	USED	AD	DED IN FIELD (m	L)	FINAL pH (S	lahard Units)		METHOD		CODE		per malute)
ELSWHOS-	5	0,-		<u> </u>		·····					EDA 527M		4.0		200
003-GW-00	L		25								CF7.037M		<u>_/F_F</u>	Γ	300
					\rightarrow	(In)									
										ļ		\sim			
		<u>~</u>					\rightarrow	<u> </u>			·····		_72	$\rightarrow \downarrow$	
		<u> </u>	\searrow						~						
	14 4	<u> </u>	<u> </u>		<u> </u>	- 1	<u> </u>			L		1			
We	u puð	nut comp	lefe. S	ittehnp	9.11	5 . 49	5.								
	il not i	ileenhy w	P. Tou	ik sam	nple ad	ter 3.	nell	l vol	mez ,	de se	ite h	Agh 1	turbsol	Fty,	
MATERIAL CODES	$\Delta G = \Delta m$	ber Glass: CG =	Clear Glass:	PF = Polue	athylena:	P = Polynron	vlene:	S = Silicon	e; T≕Tef	lon:	0 ≈ Other (Specify)		V	
SAMPLING EQUIPM	ENT CODES:	APP = After Per	istaltic Pump	B = Ball	er; BP = I	Bladder Pump	ESI	P = Electric	Submersio	e Pump	(
		KHPP = Reverse	riow Perista	nic Pump;	SM = Straw I	nethod (Tubin	g Gravity	Drain);	U = Other	(specify	0				

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



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Aeros	star SE	Suc			GROI	JNDWA	TER SAN	IPLIN	ig lo	G [#] ∠	Ċl	corp	t k of	/		
installation: Ellsworth	AFB M202	7.0003				Site:	Sile	4-	FOR	mer	[-]	A				
WELL NO: MWI	8PFC	0401			SA		SWHO4	/- o	01-6	w-0	32	DA	TE: (5-31	-18	7
						PU	RGING DA	ΓA							-	·
WELL DIAMETER (inches):	2.0		JBING AMETER (inchi	»): Ye	YOD WEL	L SCREEN INTI Ft -	ERVAL DEPTH: Ft	5	TATIC DEP O WATER (TH feet BTOC):	26	37	OR	RGE PUMP TYP BAILER:	P	
WELL VOLUME PUR	GE: 1 WELL	VOLUME = (TOTAL WEL	L DEPT	н втос -	STATIC DEF	TH TO WATE	R) X	WELL CA	PACITY	-					
(only 15) out if app	oūcabie)	. =	: 34.0	6	r 26.	37-F1) ×	0./(3	gal/ft	= 1,	25	යුත්					
EQUIPMENT VOLUN (only f8 out if ap)	AE PURGE: 1 Dicable)		VOL. = PUM	P VOLU	ME + (TUBIN aal = (NG CAPACIT	Y X T Ft)	UBING I +	ENGTH) gal	+ FLOW CEL	.L. VOL		n)		
INITIAL PUMP OR TUBING DEPTH IN WELL (feel):	32	?	FINAL PUI DEPTH IN	VP OR TU WELL (fe	BING et):	32	PURG INITIA	ING FED AT:	17	20		PURGING ENDED AT:	1744	TOTAL VOLUM PURGED (gaBo	E 1s):	1.3
	VOLUME	CUMUL	. P	URGE	DEPTH	p위 (slandarđ	TEMP.	°	OND.	DISSOLV	'ED	ORP	ŢĹ	REDITY	COLUR	ODOR
TIME	PURGED (gallons)	VOLUM PURGE		RATE (gpm)	TO WATER	units)	(°C)			mg/L	F4	(mv)		(ni os)	(describe)	feezennel
1720	1			.05	24.4			-		-		-	P		Ucar	none
724	0.2	0, 🛠	0 2.0	.05	26.8	7.81	18.7	6	37	3.90	7	72.2	2	07	Clark	
1728	0.2	0.4	0	.05,	27.03	7,79	18.2	15	99	3.9	8	775	2	56	10	1
1732	0.2	0.4	C	20.0	27.2	7.69	12.0	19	539	3.8	6	84.6		81	_	$\downarrow \downarrow$
1736	0.2	0.8	<u> </u> 0	<u>ده،</u>	27.44	7.53	18.3	15	597	3.7	2	90.4	!	70	\downarrow	$\left \right $
1740	0.2	(,)	0	.85	27,40	1.50	18.4		070	3.6	0	74.8	<u>\</u>	<u>36</u> Co		╄┣──
1144	0.2	1.2	0	.02 05	21.82	7.91	18.3	1.	517	3.5	7	971		<u> </u>		
1/40	0.1	1.2		<u></u>	gi (• / J	1.17	18.5	• • •	<u>, , , , , , , , , , , , , , , , , , , </u>	- 3.3	0	11-				
		Wards - Constant of Constant of Constant														
					The second second second second second second second second second second second second second second second s	Charles and the second s										
							~*									
															ļ	
				•									No. of Concession, Name	The state of the s		<u> </u>
										_						
WELL CAPACITY (G	allons Per Foo	n: 0.75' ≈ 0.0	2: 1 = 0.1	04: 1	.25" = 0.06:	2' = 0.16;	3° = 0.37:	4" = 0.6	35: 5* ≠	1.02; 6' =	1.47;	12⁼ ≕ 5.8	3			
TUBING INSIDE DIA	CAPACITY (C	Gai./Ft.): 1/8"	= 0.0006;	3/16" =	0.0014; 1	/4" = 0.0026;	5/16" = 0.0	04;	3/8" = 0.00	6; 1/2" =	0.010;	5/8" = 0 ,	016			
PURGING EQUIPME	NT CODES:	B = Bailer,	8P = Bia	adder Pu	imp; ES	P = Electric SAI	Submersible Period DA	ump; .TA	PP ≈ Pe	rislatic Pump	o;	O = Other (S	Specily)			
SAMPLED BY (PRINT) / A		1 Cff.s	(MI)	SAMPI	.ER(S) SIGNATI	JRE(S):	\sim				SAMPL		46	SAMPLING	17	52
PUMP OR TUBING		2	(10-/	TUBIN	G	-4262			FIE	LD-FILTERED:	<u></u>	Y (Filter Size		mm
DEPTH IN WELL (feel):		لح		MATE	RIAL CODE: PE	TIMUC	Y CHI I	di S		Fitration Equips	ment Typ			<u> </u>		
SAMP	LE CONTAINER S	PECIFICATION	JN: POM	<u> </u>	<u> </u>	SAN	IPLE PRESERVA				Dort				S,	AMPLE PUMP
SAMPLE ID CODE	# CONTARERS	NATERIAL CODE	VOLUNE (mt	.) P	RESERVATIVE	A	TOTAL VOL	u.	FINAL pH ((Stanard Units)	INTEN	DED ANALYSIS METHOD	AND/OR	SAMPLING EQ CODE	uipment f	LOW RATE (ml. per minute)
ELSWH04-00)-			IZSML									EDA 63714		/		0h
6W-032	_2⁄	PE	each		\geq						ļ	LEAVOIN		mp	P	9,00
						\sum	Sou									
{	\searrow					<u> </u>										
	&		<u> </u>					\rightarrow					\mathbf{i}	de		
		<u> </u>	2	+											$\overline{}$	
			L			I					4			L		`
REMARKS:																
MATERIAL CODES	AG = An	ber Glass	CG = Clear f	Glass	PE = Polve	thylene:	PP = Polyaroo	vlene:	S = Silico	ne; T≃Tel	fon:	O = Other (Specify)			
SAMPLING EQUIPM	ENT CODES:	APP = Afte	r Peristallic	Pump;	B = Ballo	er; BP =	Bladder Pump	ES	P = Electri	ic Submersib	le Pun	1p;				
		RFPP = Re	verse Flow i	renstalt	ic Pump; abligation Crit	om = Straw	Method (Tubing of variation of it	y Gravity	· UFAIN); consecutive	u = Ulher	(Speci	чу)				

pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation; optionally, ± 0.2 rng/L or ± 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: March 14, 2016

E-140 06/03

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AerostarSES,,

GROUNDWATER SAMPLING LOG

instaliation; eHELA FB M20	27.0003 E(swoer	H A	fß		Site	Sile	4-	fire	in P	TR	E ST.	ation	~			
	SPFCOL	102			S.	AMPLE ID:	SWHO	4- 00	2.6	św - 0	38	DA	ITE:	5-31	-18		
					<u>~~</u>	PU	IRGING DA	ТА									
WELL DIAMETER (inches):	2.0	<i>п</i> п	UBING IAMETER (in	chest 3		LL SCREEN INTE	RVAL DEPTH:	ST. TO	ATIC DEPTI	f et BTOC):	29	.28	PUF	rge pump typ Bailer:	™ MONJ	Qrn	
WELL VOLUME PU	RGE: 1 WEL	L VOLUME =	TOTAL V	VELL DEF	тн втос	- STATIC E	EPTH TO WA	TER) X	WELL	CAPACITY							
(only Ni out if ap	pšcable)	=	⁷ 43	76	^в - 29	28 Ft) X	0.163	galfit	2.:	36	gal						
EQUIPMENT VOLU	ME PURGE: 1	EQUIPMENT	VOL, = P	'UMP VOI	.ume + (tue	BING CAPAC	ITY X	TUBING	LENGTH) + FLOW (CELL V	OLUME		_			
(only fill out if ap	pécabia)	2	// -		<u>_aalaa</u>	<u> </u>	F()	+	gai	and and a second second second second second second second second second second second second second second se	: 	gaj	T	2	-		
INITIAL PUMP OR TUBING DEPTH IN WELL (feel):	33	8	FINAL P DEPTH	PUMP OR TU IN WELL (fe	BING st):	38	Purg Initia	ING TED AT:	134	لو		PURGING ENDED AT:	412	TOTAL VOLUI PURGED (gaß	^{(E} 2.	34	
TIME	VOLUME PURGED	CUMUL VOLUM	- E	PURGE	ФЕРТН ТО	p원 (standard	TEMP.			DISSOLA	/ED IN	ORP (mV)	τι	JRBIDITY (NTUs)	COLOR (describe	OI (des	JOR (cribe)
	(gailons)	PURGE foailens		(gpm)	WATER (fept BTOC)	unitsj				mg/L							
1346		<u> </u>		6.09	30.1		-		-	-				0	be	10	ont
1350	0.36	0.3	6	<u>0.09</u>	365	7.82	13.6	120	15	2.6	4	71.3	7	<u>(4)</u>	pland	2	
1354	0.30	0.71	2	0.09	22.7	7.22	14,5	129	7	16	2	<u>72.7</u>	3	<u>59</u>	11	\downarrow	
1400	0.54	1.2		<u>D.09</u>	34.45	7.20	117.2	12	78	24	<u> </u>	75.6	<u> </u>	<u>74</u>		11	
1409	0.36	1.6	2	0.09	35.1	7.78	14,3	127	Υ Υ	2.3	2	767	2	57		╇	
1488	0.36	<u> </u>	<u> </u>	0.07	532	7-15	14.4	128	0	2.4	5	71.0	2	65		┼╌╏	
1412	0.34	2.5	<u>4</u>	0.04	3,67	175	<u> 4.4</u>	128	<u> </u>	しら		77.4	2	66		┼╌┶	-
															-		
	Chevron Carl														+	+	
				Sales and the second se												+	
					\sim	<u> </u>											
						\triangleleft											
						6		~									
									Constant State of Constant								
												Constant of the local division of the local					
														COLUMN STREET, STRE			
WELL CAPACITY (G	CARACITY (ot): 0,75" = 0,	.02; 1": - 0.0008;	= 0.04; ·	$1.25^{\circ} = 0.08$	3; 2" = 0.1	6; 3" = 0.37	7; 4"=1	0.65; f	5″ = 1.02; .006: 1/	1 ≓"6 סח~"כי	.47; 12" \10; 5/8	= 5,88 * = 0.016				\neg
PURGING EQUIPME	ENT CODES:	B = Bailer;	= 0.0000 BP =	Bladder I	- 0.0014, Pump; E	ESP = Electri	c Submersible	Pump;	9P ≍ F	Peristaític P	ump;	0 = Oth	er (Spec	ify)			
						SAI	MPLING DA	IA			SAMPLI	NG		SAMPLING	1.		
SAMPLED BY (PRINT) / AF	FILLATION: A.	willis	(Asl	.) SAMPL	.ER(S) SIGNATU	JRE(S):	\sim				INITIATE	ED AT:	<u>42</u>	ENDED AT:	11	114	
PUMP OR TUBING DEPTH IN WELL (feet):	3	8		MATER	g Rial, code: pe				FIEL	D-FILTERED: Filtration Equips	nent Type	Υ C	₽_	Filler Size		mm)	
	FIELD	DECONTAMINATI	ION: PL	лмр ү	9	TUBING	Y (replaced				DUPLIC	ATE: Y	Ł)			
SAMP	LE CONTAINER S	PECIFICATION	1	_		SAM	IPLE PRESERVAT	TON				ED ANALYSIS		SAMPLING FO	SUBEMENT	AMPLE P	UMP TE (mL
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (I	mL) F	RESERVATIVE		TOTAL VOL	ر I	FINAL pH (S	tanard Units)		METHOD	1000	COD	E	permin	iute)
รารง.404 กก			126.		0320		IDED IN PIELD (IN	-)							-	<u> </u>	\exists
6W . 1.32	ð	PE	ean	,-	COLUMN TWO IS NOT THE OWNER.	CULTURE -						EPA 537M		API	2	15	U I
						No. of Concession, Name	~ 2										
Constanting of the owner of the owner of the owner of the owner owner owner owner owner owner owner owner owner	No. of Concession, Name						\simeq					ACCURE SOL		of/2===			
	X	K K							COLUMN STREET, ST.				`	\sum	\leq		
			,			<u> </u>											-
REMARKS:	y crub	ced = "	FD -	well	end Ca	ф (b.:	75) = 5	(reen	~								
	AC - 4-	nhor Gloser	CG = Ch-	ar Glass		vothulener	DD = Doluce	onvlene:	S = 900		Tefloor	0=0	her (Soci	~i6A			-
SAMPLING EQUIPM	ENT CODES:	APP = Aft	er Peristal	ltic Pump;	B = Ba	iler, BP	= Bladder Pun	apyranie, 1p; ES	P ≍ Elec	tric Submer	sible Pu	ump;	101 10100	~11 ¥/			
		RFPP = F	Reverse Fi	tow Perist	altic Pump; abilization Crit	SM = Stra teria for range	w Method (Tul of variation of la	bing Gravi ist three cor	ty Drain); secutive i	O = Oi readings	iner (Sp	ecify)					

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)

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C-141 W 8/03

M2027.0003

Aero	starSE	S			GRO	UNDWA	TER SAN	MPLING	s Loo	G		••				
Installation: +###F8 M20	127.0003 E	((Swor	RTH	AF	\$	Site:	site	- 4 -	Fai	rmere	-7-	FA FA	re s	lation		
well NO; MW	18 PFC	21040	3		5/	AMPLE ID: E	LSWHO	4-00	3-6	w-01	33	DA	ле: 5	5-31-	18	
						PU	rging da	TA								
WELL DIAMETER (inches):	2.0 "	T D	UBING IAMETER (ind	:hes): 1/4	oD 38	LI SCREEN INTE	RVAL DEPTH:	STA TO V	TIC DEPTI	H eet BTOC): 🍃	27.4	19	PU	BAILER: 🎢	0' <i>PP</i>	
WELL VOLUME PU	RGE: 1 WEL	I. VOLUMÈ ≈	(TOTAL W	VELL DEP	TH BTOC -	- STATIC D	EPTH TO WA	ATER) X	WELL	CAPACITY						
(only fill out If ap	plicable)	=	° 38	.92	^R - 2 7	.43° ×	0.163	gal/ft =	1.8	76	gal					
EQUIPMENT VOLU	ME PURGE:	1 EQUIPMENT	VOL. = PI	UMP VOL	UME + (TUE	BING CAPAC	ITY X	TUBING L	ENGTH	i) + FLOW (CELL V	OLUME	\sim			
(only na out a ap	pscable)	NA			gal <u>≈ (</u>	X	Ft)	+ 	gal			gai 	œ_			9
INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	32		FINAL P DEPTH	UMP OR TU IN WELL (fee	^{BING} 3	3	PURG INITA	ing Ted at:	113	2		PURGING ENDED AT:	150	TOTAL VOLUME PURGED (gallon	» 1-	06 0.
TIKE	VOLUME	COYON NOT THE	F	PURGE RATE	DEPTH	pH (standard	темр.	CON uS/c	D.	DISSOLV	/EC	ORP (mV)	יד	URBIDITY (NTUs)	GOLOR (describe	ODOR B) (describe)
TIME	(gallons)	PURGE		(gpm)	WATER (feet BTOG)	units)	(0)			mg/L		()		((quescriser
1132	~			0.05	27.47	75	-	—							Elen	nore
1137	0.3	0.3	: (2.05	27.72	7.40	17.3	129	i5	3.4	2	102.7	2	1.9		\perp
1142	0.2	0,	5 0	20.05	27.90	7.41	12.1	127	3	2.8	<u>9</u>	1023	5	5.0		
1/44	0.1	0.1	<u>e k</u>	2.05	22.0	1.39	17.3	124	<u> </u>	2.74	5	100 4	3	6.6	┝─┤─	┿╋
1148	0.2	6.0	<u>s</u> [0). 05	28.1	2.35	17.4	126	6	2.6	3	98.1		<u>7.1</u>		+
150	8.1	0.0	<u>1 (</u>	<u> </u>	27 24	7.39	17.5	12.6	<u>,7</u>	2.5	8	94.5	2	0,1	1	
																<u> </u>
		- Constanting					<u> </u>	 							<u> </u>	
			and the second s	No. of Concession, Name				 								+
		<u> </u>		_	Contraction of the local division of the loc											+
							-	2							1	+
							~		$\mathbf{\Sigma}$							
							- Contraction of the second									+
												COLUMN DE LE COLUM				
														COLUMN TO A COLUMNT TO A COLUMN TO A COLUMNT.		
																NUL CHENNEL
WELL CAPACITY (C	Gallons Per Fo	ot): 0.75° = 0	.02; 1":	≈ 0.04 ;	1,25" = 0,06	3; 2" = 0,1	6; 3" = 0,3	7; 4" = 0	.65	5″ ≖ 1.02;	6° = 1	.47; 12"	= 5.88			-
TUBING INSIDE DIA PURGING EQUIPMI	. CAPACITY (ENT CODES:	(Gal./Ft.): 1/8 B ⇒ Bailer	′ ≈ 0.0006; BP ≈	3/16" Bladder F	= 0.0014; ² ump; E	1/4" = 0.002 SP = Electric	26; 5/16" = c Submersible	0.004; Pump;	3/8" = 0 PP = 1	0.006; 1/. Peristaltic Pe	2" = 0.0 ump;	010; 5/8 O = Oth	l" = 0.01 er (Spec	6 .ify)		
						SAN	MPLING DA	TA	•							
SAMPLED BY (PRINT) / AF		$1.\omega/k$	5 145	DSAMPL	ER(S) SIGNATL		50				INITIATE	ED AT: //	50	ENDED AT:	//5	2
PUMP or tubing	23		<u> </u>	TUBING	3	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			FIEL	D-FILTERED;		Y C		Filter Size		mm
DEPTH IN WELL (feat):		DECONTAMINAT	10N- 19L		HAL CODE: PE	TUBING				Fitration Equips	pent Type Invenc	ATE Y	TN	}		
SAMP	LE CONTAINER S	PECIFICATION		Ī	<u> </u>	SAM	PLE PRESERVAT	TION							\$	SAMPLE PUMP
SAMPLE ID CODE	e CONTÁRIERS	NATESIAL CODE	VOLUME (*	nt l	RESERVATIVE		TOTAL VOL	F	INAL oH (5	Stanard Units)	INTEN	DED ANALYSIS METHOD	AND/OR	SAMPLINO EQL CODE	IPMENT	FLOW RATE (ml. per minula)
					USED	AD	ded in Field (m	L)			ļ					
elswindy 003-	2	PT	RSA	ニート								EPA 537M	I	AVA	,	200
6W-033		· E	TACL	+										- / / /	<u> </u>	
		 		+		+	\sim					Concession of Concession			-+	
	2			+							<u> </u>		- CONTRACTOR	Z	s	,
		_	CONC.	+					-	~	 				~	
REMARKS:	well 1	complete	l .5	irecr	is T	D-we	H end c	up(0.0	15)	= 38.1	67 -	28.6	ר			
MATERIAL CODES	AG = 4	mber Glass:	CG = Cles	ar Glass	PE = Pot	velhvlene:	PP = Polyon	opvlene:	S = Sille	cone: T=	Teflon	0 = 01	her (Spe	cify)		
SAMPLING EQUIPM	IENT CODES:	APP = Af	er Peristal	tic Pump;	B = Ba	iler; BP	= Bladder Pun	np; ESI	P = Elec	tric Submer	sible Pa	ump;				
		RFPP = i	teverse Fl	ow Perista <u>St</u>	auc Pump; ablization Crit	SM = Strat terta for range	w Method (Tu of variation of la	oing Gravity ist three cons	y Drain); secutive	O = OI readings	uter (Sp	несіғу)]

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

C-142 06103

3/6/19

Aerostar SES...

GROUNDWATER SAMPLING LOG

Instatistion: Ellswort	hAFB M202	27.0003			Site:	5 (R-52	was	4.197	0)				
WELL NO: MW	18PFC (0501		S/		LSWH	05-0	001-	- GrW	-630	DATE:	5/4/12	3	
					PU	RGING DA	TA							
WELL DIAMETER (inches):	2	Tubing Diameter	Ny λ	1 OD 35	LL SCREEN INTE	ERVAL DEPTH: 25,22-1	STA TO V	TIC DEPTH VATER (feel	BTOC):	21.34	PU	rge pump type Bailer:	PP	
WELL VOLUME PU	RGE: 1 WELL	VOLUME = (TOTAL	WELL DEPT	H BTOC -	STATIC DEF	TH TO WATE	R) X W	ELL CAP/	ACITY					
(only fill out if ap	picable)	=(} I	5,47	¤ -21	.34(=0) ×	0,163	6aNt ≖	2.	3	દુર્શ				
EQUIPMENT VOLU	ME PURGE: 1	EQUIPMENT VOL.E	eume volu	JME + (TUBI	NG CAPACIT	<u>үх</u> т	UBING LEN	igth) + F	LOW CEI	LVOLUME		······	7	4 T
(onay ha out if ep	p(icable)		-	ព្រុង = (x	Fl)	+	gal	-	(gai			5/4/	118
INITIAL PUMP OR TUBIN DEPTH IN WELL (feet):	० २०	FINA DEP	l pump or ti Th in Well (fi	JBING Net):	30	PURG INITIA	ing Ted at:	150	0	PURGING ENDED AT:	1525	TOTAL VOLUME PURGED (gale	η ^L 8	°750
	VOLUME		PURGE	DEPTH	pH (standard	TEMP.	CON	D,	DISSOLV	ED ORP	Ť	URSIDITY	COLOR	ODOR
IME	r(gailens)	PURGED	man m	WATER	units)	(-c)	haid	m	mg/L	n (nav)		(4105)	(nesetime)	(describe)
1565	1750	1750	350	22.56	7.28	14,2	288	3	4.4	1 11.4		4.0	clear	none
1510	1750	3500	350	22.86	7,24	13.7	28	67	3,5	3 -23	l	6.0		
1515	1750	52.50	350	22,98	7,22	13.4	270	64	2.9	9 -17,0	12	•5		{
1520	1750	7000	350	23,04	1.22	13,6	21	12	2.1	1 -21,0	1 13	<u>.។</u>		
1923	1720	8150	250	~,16	1,26	(),)	<i>J</i> 15	, <u> </u>	2.9	6 - 34,4	1 1	0, 2		
														F
			ļ					$ \rightarrow$			_			
		AT									-			
		1.18												
		<u> </u>												
]			
WELL CAPACITY (G	allons Per Foo	t): 0.75" = 0.02; 1"	= 0.04; 1 3: 3/16" =	.25" ≈ 0.06; 0.0014: 1	2" = 0.16; /4" = 0.0026;	3" = 0.37; 5/36" = 0.0	4" = 0.65; 04· 3/8"	5" = 1.0)2; 6" ≓ 1/2" = (1.47; 12" = 5.	88 0.016			
PURGING EQUIPME	ENT CODES:	8 = Bailer; BP	= Bladder Pi	imp; ES	P = Electric S	ubmersible Pu	ump; P	P ≈ Perist	altic Pump	; O = Other	(Specify)			
SAMPI EN RY (PPINT) / A		al 17 1.	1 SAMP	FR(S) SIGNATI	URE(S): D		T 1) ,		SAMPLING	526	SAMPLING	152	7
PUMP OR TUBING		rue (wo Bh	TUBIN	G	NN IN	uk j	Indis	FIELD-F	ILTEREO:	INITIATED AT:	(N)	ENDED AT:	(52	mm
DEPTH IN WELL (feet):		30	MATE	RIAL CODE: PE				Filt	ration Equips	vent Type:				
SAMP	FIELD D	PECIFICATION	PUMP Y	\mathcal{O}	TUBING	Y N (replace PLE PRESERVAT	9) 10N			DUPLICATE:	<u>Y (N</u>	<u>}</u>	SA	MPLE PUMP
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE VOLUM	E (mL)	RESERVATIVE		TOTAL VOL	FI	VAL pH (Star	nard Units)	INTENDED ANALY: METHO	sis and/or D	SAMPLING EQU CODE	IPMENT FL	OW RATE (mL per minute)
ELSWH 05-	2	DE 12	5			DEO IN MELD (MI	.)			EPA 537	м	API	,	35Û
001-00-05			_		\leftarrow					\sim			_	
						Sen								
		NK										×		
								\leq					\leq	
			<u> </u>				<u> </u>		\geq					
REMARKS:	ell pub	not cempts	ute, Ti	oc is	1,14° a	195								
MATERIAL CODES-	4G = Am	ber Glass: CG = Ch	ear Glass	PE = Polve	ihviene: P	P = Polynrom	/iene; S ≃	Silicone	T = Tef	on: O = Other	(Specify)			
SAMPLING EQUIPM	ENT CODES:	APP = After Perist	altic Pump;	8 = Baile	ar; BP=E	Bladder Pump;	ESP =	Electric S	ubmersibl	e Pump;	(
		KLLL - Kenselse L	ow renstalt	e rump;	ONI - ORSW N		GIAVHY DI	aan, C		obecity/				

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

\$ 25/07

Aerostar SES_{ut}

GROUNDWATER SAMPLING LOG

installation: Ellswort	hAF8 M20:	27.0003				Sile:	_5 (B~5	2 crus	4,19	70))				
WELL NO: MU	118 P =	050	2		s		LSWHO	5-0	002-	Gw-	02	5 DA	(TE: 🕻	5/03	118	
,		<u> </u>				PU	RGING DA	TA								
WELL	0	T	UEING	1/4		LL SCREEN INTE	RVAL DEPTH:		STATIC DEPT	н	10	171	PUI	RGE PUMP TYPE	00	
DIAMETER (Inches):	<u></u>		IAMETER (in	ches):	00 2	,85Ft	19,85 Ft		TO WATER (R	eet BTOC):	14,	14	OR	BAILER:	rr	
WELL VOLUME PU	RGE: IWELL	.votume≍ (LL DEPT	H BIOC -	STATIC DEF		:R) X	WELL CA							
(ounà pu ond u at	pp3cable)		' 3C	2.1	Ft - q	,[Υ[^{Ft}) ×	0,163	gabit	= la 1	D	çai					
EQUIPMENT VOLU	ME PURGE: 1	EQUIPMENT	VOL. = PU	MP VOLU	ME + (TUBI	NG CAPACIT	Y X T	UBING	LENGTH) +	FLOW CE		UME				MIN
(only the out if or	plicobic)				. <u>nal(</u>	×_	Et 1		<u>leg</u>			<u>aəl</u>				1
NUTAL OULD OD YURIN		-	(current)				lauaa								,	3718
DEPTH IN WELL (feet):	<u> </u>	5	DEPTH	IN WELL (fe	et):	25	INITIA	TED AT:	153	35		ENDED AT:	629	PURGED (pailon	****1	18,900
	VOLUME	CUMU	-	PURGE	DEPTH	pH {standard	TEMP.		COND.	DISSOLV	EO	ORP	τι	JABIDITY	COLOR	ODOR
TIME	(gellons)	PURGE		HATE .	10 WATER	units)	(~c)		µs/cm	oxrge mg/L	N	(BA)		(NTUS)	(describe) (describe)
1540	1750		μ <u>m</u> -[250	いteet BTDC1		177	2	886	20	7	-326		59	cia.	0.000
1545	1750	2 50	$\frac{30}{30}$	250	1976	7 29	12.0	28	248	10	7	-651	•	<u>01</u>	1	I
1550	1750	n 25		<u>3 JU</u> 356	19.90	1,~ 0	11.9	35	869	(.U	(-878		<u>,51</u>		
1665	1750	7 00	<u>, , , , , , , , , , , , , , , , , , , </u>	350	19 82	775	11 9	$\tilde{\gamma}$	920	0.4	7	-980	9	7 2		
1600	1750	0 75	<u> </u>	350	1984	7 94	119	5	419	0.4	-	-106 U		11		
	12 END	12 7 6	$\frac{2}{2}$	350	1984	7.72	17 2	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	176	0.9	\$	-1151	2	1/ 2		+ + -
1620	1620 350015 750 350 1984 7.24 12.7 3266 1.64 -118.6 22.4 1623 105016,800 350 19.84 7.25 13.0 3308 1.55 -120.0 17.4															
$\frac{1623}{1626} = \frac{1050}{17} = \frac{100}{850} = \frac{100}{1684} = \frac{100}{125} = \frac{100}{1200} = \frac{100}{170} = \frac{100}{1600} = \frac{100}{170} = \frac{100}{17$																
$\frac{1625}{1626} = \frac{1050}{17} \times \frac{800}{50} = \frac{350}{17} \times \frac{14.84}{50} = \frac{1.25}{13.0} = \frac{13.06}{3308} = \frac{1.55}{10.0} = \frac{17.4}{17.3}$																
1626 1050 17,850 356 19.84 7.25 13.1 3316 1.70 -1262 17.3 1629 1050 18,900 350 19.84 7.24 13.0 3322 1.70 -119.6 17.0																
166	10.00	10,0		220	1 ((,), (1710	_)) _	52-	6 C C	<u> </u>		l			
					_			-								
		14														
		51311	5													
		<i>u</i> ·														
WELL CAPACITY (G	allons Per Foo	t): 0. 75 " = 0.0	 2; 1*=(3.04; 1.	25° = 0.06;	2" = 0,16;	3" = 0.37;	4″ ≈ 0,	.65; 5* = 1	.02; 6" =	1.47;	12" = 5.88	3			
TUBING INSIDE DIA	CAPACITY (C	Sal./F1.): 1/8"	= 0,0006;	3/16" =	0.0014; 1	/4" = 0.0026;	5/16" = 0.0	04;	3/8" = 0.006	; 1/2" = (0.010;	5/8" = 0,(016			
PURGING EQUIPME	ENT CODES:	B = Bailer;	8P ≈ B	ladder Pu	mp; ES	P = Electric S SAM	ubmersible Pu	imp; TA	PP = Peri	staltic Pump	o; () = Other (S	Specify)			
SAMPLED BY (PRINT) (A			Las 1	SALIDI		195(9)	$n \sim c$	$\overline{\tau}$	1.		SAMPLI		20	SAMPLING	11.2	,
	H.	reck in	nush	Trents		100	relly	m	Ser .		INITIATE	DAT: 16.	<u>~</u>	ENDED AT:	(6)	<u>i</u>
DEPTH IN WELL (feet):	2	5		MATER	AL CODE: PE				FIELD	Pration Equips	nent Type	ç (2	Filler Size		mm
	FIELD (ECONTAMINATIO	DN: PU	vi₽ Y	\bigcirc	TUBING	Y (N (replace	si	I		DUPLIC	ATE: Y	N)		
SAMP	LE CONTAINER S	PECIFICATION				SAM	PLE PRESERVAT	אסו							S/	MPLE PUMP
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (m	nL) Pi	RESERVATIVE		TOTAL VOL		FINAL pH (SI	anard Units)	INTENU	METHOD	AND/OR	CODE	PMENI	per minute}
P11 P				\leftarrow	USED	ADI	ED (N FIELD (ml	.)			<u> </u>					
862-6W-07	2	PE	125									EPA 537M		APP	1	350
												_			-	
/							An									
	1	T I			····			\leq					\rightarrow			
	'r						····	7							\rightarrow	
			-	-				-+	<u> </u>				ł			
	out .	امان	+ 10 "i	TOC	30.4	show a	round r	<u>ا</u> ماجريا			L				1	
REMARKS:	1- N	- comp	, ·			2	د ر	~~	~~~							
MATERIAL CODES:	AG = Arr	ber Glass; C	CG ⊐ Clear	Glass;	PE = Polye	thylene; P	P = Polypropy	lene;	S = Silicone	; T = Tell	on; (D ≈ Other (S	Specify)			
SAMPLING EQUIPM	ENT CODES:	APP = Afte	r Peristaltic	Pump;	B = Baile	n; BP=8	ladder Pump;	ES	P = Electric		e Pump	; a				
		111 FF ∺ K(8)	WUN DE L'IUW	1 PUPRIE	ar with the second	- ouaw M	ionioa (subinĝ	GIAVAY	, crany,	Oner (ohecit)	,				

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)

65/07

AerostarSES.

GROUNDWATER SAMPLING LOG

Installation: Elisworth	AFB M202	7.0003				Site	6(981	8 R-	1 000	shi))				
WELL NO: MW1	8PFC O	601			SA		LSWHO	6-0	01-6	w-c	18	DA	TE:	5/9/18		
P						P۱	JRGING DA	TA								
WELL DIAMETER (inches):	2	τι οι	JBING 🔰	4 M 1817	OD WEI	L SCREEN INT	IO.O.IFt		STATIC DEPT	H net BTOC):	15.	56	PU	rge pump type Bailer:	PP	
WELL VOLUME PUP	rge: 1 Well	VOLUME = (1	TOTAL WELL	. DEPT	н втос -	STATIC DE	PTH TO WATE	R) X	WELL CA	PACITY						
(only fill out if ap	pticable)	Ξ	20.3	34	ri - 15,	,56% ×	0,163	gal/¶i	- O,-	18	gal					
EQUIPMENT VOLUN	NE PURGE: 1	EQUIPMENT	/ol. = Pum	P VOLU	ime + (tubii	NG CAPACI	<u>тү х т</u>	UBING	LENGTH) +	FLOW CEI	LVOL	JME				AT
<u> </u>	plicable)				gaì ≃ (×	Ft)	+	gał	8	6	jal			5/	1/18
INITIAL PUMP OR TUBINI DEPTH IN WELL (feet):	ľ	8	FINAL PUN DEPTH IN	%P OR TU WELL (fe	IBING et):	18	PURG INITIA	NG FED AT:	111	5	Ê	ENDED AT:	132	TOTAL VOLUME PURGED (pallon	He H	250
THE	VOLUME	CUMUL.	. P	URGE	DEPTH	pit (slandærð	TEMP,		COND.	DISSOLV	ÆD N	ORP (m)0	T	URBIDITY (NTUs)	COLOR	DDOR (describe)
TIME	(gallonst ML	PURGE	mL 🕷	TZm	WATER	units)	(0)		Rotein	mg/L		<u>.</u> ,		((acception)
1120	1250	125	50 2	50	15.69	7.40	13.8	స	21	6.3	4	15.1		89.6	clei	none
1123	750	20	00 2	-50	15,75	7.17	13.5	5	04	6.2	5	0.5	i.	13.4		\vdash
1126	750	27	<u>50 2</u>	50	15.75	<u>า.แ</u>	13.3	4	90.1	6.0	12	-87		<u>8.8</u>		
1127	750	330	50 2	50	15,75	7.14	131	<u>પ</u>	16,6	1.0	<u>ю</u> •ч	<u>-10,4</u> -9 L	i	$\frac{3.6}{2.6}$	-	++-
1.00	1.20						11210		001 1	670	<u> </u>		<u> </u>			
											\square					
·																
	4	\sim														
1	r l latte															
	51															
WELL CAPACITY (G	alions Per Fool	t): 0.75* = 0,02	2; 1° = 0.0) 4; 1.	.25* = 0.06;	2' = 0,16;	3° = 0.37;	4 " = 0.	65; 5"=:	1.02; 6" =	• 1.47;	12" = 5.8	3			1
TUBING INSIDE DIA PURGING FOUIPME	CAPACITY (C	al./Ft.): 1/8" = B = Bailer:	= 0.0006; BP = Bla	3/16" ≍ dder Pu	0,0014; 1, 100' ES	/4" = 0,0026; P = Electric	5/16" = 0.0 Submersible Pu	04; imp:	3/8" = 0.006 PP = Peri	; 1/2" ≈ static Pum	0.010; x: C	5/8° = 0.) = Olher (5	016 Specify)			
		D Dullet)	01 044	1		SA	MPLING DA	TA				10		IRANDUNO		
SAMPLED BY (PRINT) / A	FFILIATION: A	rek Th	rolski	SAMPL	ER(S) SIGNATI	JRE(S):	Lek (Ju	ntelin	~	INITIATE		33	ENDED AT:	113	4
PUMP OR TUBING	1	8			g Bal code: pe				FIELD	D-FILTERED:	۲ nent Type	r' (:	N	Filter Size		നന
	FIELD D	ECONTAMINATIO	n: Pump	Y	6	TUBING	Y N (replace	D	I		DUPLIC/	ATE: Y	N)		
SAMP	LE CONTAINER S	PECIFICATION			RESERVATIVE	SA	TOTAL VOL	TON			ÍNTEND	ED ANALYSIS	AND/OR	SAMPLING EQU	IPMENT F	MPLE PUMP LOW RATE (mL
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (mL)		USED	А	DED IN FIELD (m	L)	FINAL pH (S	tanard Units)		METHOD		CODE		per minute)
ELSWH06- 001-GW-01	32	PE	125	\square								EPA 537M		APF)	250
							Sen									
		1		+										- Su		
															\searrow	
いい Remarks:	ll put	not co	mplet	s. 54	*C4np	1,5	` ags									
MATERIAL CODES:	AG = An	ber Glass; C	G = Clear G	lass;	PE ≈ Polya	thylene;	PP = Polypropy	dene;	S = Silicone	∋; T≖Tef	lon; (D = Olher (Specify)			
SAMPLING EQUIPM	ENT CODES;	APP = After RFPP = Rev	r Peristaltic F /erse Flow P	^o ump; eristalti	B = Balle c Pump;	er; BP = SM = Straw	Bladder Pump; Method (Tubing	ES Gravit	P = Electric y Drain);	Submersib O = Other	e Pump (Specify	; /)				
				St	abilization Crit	eria for rance	of variation of la	st three	consecutive	readings						

pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation; optionally, ± 0.2 rng/L or ± 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

C-145

AerostarSES...

GROUNDWATER SAMPLING LOG

	Installation: Eliswort	h AFB M202	27.0003				Site:	60	188	R-	6-08	(h)				
	WELL NO: MWL	SPFC(2602			S/		SW HOE	-007	G1	N- 01	\$ D	ate: 5	14/18		
,							PU	RGING DA	ТА							
	WELL DIAMETER (inches):	2	т С	ubing Vameter	Yu in. (inches):	оД ^{WEI} 20	LI SCREEN INTI), (1 Ft -		ST TO	ATIC DEPT WATER (f	'H ieet BTOC):	15.52	OR I	GE PUMP TYPE BAILER:	ρ	
	WELL VOLUME PUR	RGE; 1 WELL	. VOLUME ≃ (TOTAL V	VELL DEPT	н втос -	STATIC DEP	TH TO WATE	R) X V	VELL CA	PACITY					
	(only fill out if ap	oplicable)	-	20	0,36	fi - 15	52F1) x	0,163	galifi	• 0.	8	Baj				
	EQUIPMENT VOLU	ME PURGE: 1	EQUIPMENT	VOL. = F	PUMP VOLU	JME + (TUBI	NG CAPACIT	ү х т	UBING LE	ENGTH) +	FLOW CEL	L VOLUME				AT
ł	(only fill out if ap	olicabio)	<u></u>			gal = (X	Ft-)				gal			5/	1/18
	INITIAL PUMP OR TUBIN DEPTH IN WELL (feet);	⁶ ا (R	FINAL DEPT	L PUMP OR T	JBING Het):	18	PURG	ING TED AT:	101	5	PURGING ENDED AT:	1034	TOTAL VOLUME PURGED (g alan	μL L	(500
ļ		VOLUME	COMU		PURGE	DEPTH	pH (slandard	TEMP.	CO	ND,	DISSOLV	ED ORP	UT U	RBIDITY	COLOR	ODOR
	11ME		PURGE	e Dan L	HATE 1917	VATER	units)	(°C)	րջ	/cm	mg/L	N (01¥)		N I US)	faescribe	(describ
Ì	1020	1500	150	0	300	16.68	7.28	(3.2	6	30	4.4	3 35,4	-	155	cloud	- non
ļ	1023	900	240	<u>90</u>	300	17,05	7.13	13.0	5	64	4.4	9 35,6	3	<u>qu</u>		1
	1026	900	530	<u>v</u>	300	17,52	7,05	12.9	-41	35	6.2	1 36,2	3	<u> 43</u>	\square	
	1036	150	40	$\frac{0}{0}$	150	1.05	7.14	14.4	<u>50</u>	<u>98</u>	2.	1 72,6	-7	$\frac{00}{13}$	$\left \cdot \right $	+ -
ŀ	01	-1.50	120	JŲ	1.20	[[.0]	(₁ (-(1.1	JU	<u>, 10</u>	,	<u> </u>	<i>6</i>	15		1
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		Fig	18													ļ
		510	-													
ļ	WELL CAPACITY (G	allons Per Foo	(t): 0.75" = 0.0	2: 1	= 0.04: 1	.25" = 0.06;	2" = 0.16;	3" = 0.37:	4" = 0,65	: 5″≖	1.02; 6*≖	1.47: 12" = 5.8	16			I
Ŀ	TUBING INSIDE DIA	. CAPACITY (C	Gal./Ft.): 1/8"	= 0.0006	; 3/16" =	0.0014; 1	4" = 0.0026;	5/16" = 0.0	04; 3/6	3" = 0,006	5; 1/2" = (0.010; 5/8" = 0	.016			
Ľ	PORGING EQUIPME	ENT CODES;	B = Baller;	BPa	Eladder Pu	imp; es	P = Electric S SAN	APLING DA	TA	PP = Per	Istallic Pump	; 0 = Otner (Specity)			
\$	SAMPLED BY (PRINT) / A		Irek Ti	rol		ER(S) SIGNATU	JRE(S):	Frelk	Tu	161	hd)35	SAMPLING ENDED AT:	101	13
ſ	PUMP OR TUBING	1 8			TUBIN					FIEL	D-FILTERED:	Υ (B	Filter Size		mm
Ľ	SEP IN IN WELL DEBU.	FIELD 0	DECONTAMINATI	DN: F	NWL A	(AL CODE, FE	TUBING	Y (N (replace	9	'	and an and a second second second second second second second second second second second second second second	DUPLICATE:	۶ N			
F	SAMPI	LE CONTAINER S	PECIFICATION				SAM	PLE PRESERVAT	ION			INTENDED ANALYSI	S AND/OR	SAMPLING EQU	S) IPMENT É	MPLE PUM
	SAMPLE 10 CODE	# CONTAINERS	MATERIAL CODE	VOLUME	: (mL)	USED	AD	DED IN FIELD (m)	.) F	INAL pH (S	itanard Units)	METHOD		CODE		per minute)
	ELSWHOG-002 -GW-018	2	PÉ	12!	5							EPA 537M	1	APP		150
	ElswH06-007 • WW-018 #S/MSD	٩	ØБ	125	5		\sum	An				EPA 53	7M	APP		150
-\$	02-6W-918	2	PE	12	5				\leq			EPH 53	2M	APP		150
┝					_								No. of Concession, Name	-	$\rightarrow \downarrow$	
-					P 18.44	• •	22.	*			10.20		Ĺ.	معادة معادة		-
F	W EUU REMARKS:	. pud no	r comp	DIE,	SHICK	ω _ρ , ι	, L) a	35. U d	roppilu Nell V	y wa	tto ler	el took	san ite h	rple a	fter o mbio	rne litz
ī	MATERIAL CODES:	AG = An	ber Glass;	CG = Cle	ar Glass;	PE = Polye	thylene; P	P = Polypropy	lena; S	= Silicon	e; T = Tefi	on; O = Other ((Specify)	<u>u</u> .		<u> </u>
ľ	MANIPLING EQUIPM	ENT CODES:	AFF = Alle RFPP = Re	verse Flo	auc Pump; ow Peristalli	c Pump;	sM = Straw N	lethod (Tubing	Gravity D	- ciecuio Vrain);	O = Other	e Fump; (Specify)				

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)

(Jes 05/10

Aerostar SES.

GROUNDWATER SAMPLING LOG

installation: E[Swort]	hAFB M202	27.0003				Silø;	6 (1988	ß-	- Cra	sh)					
WELL NO: MW	18PFC	0603			S/		SWHO	6-00	3 ~ 6	rw 0	55	DA	TE:	5/7/	18	
					-	PU	IRGING DA	TA								
WELL DIAMETER (inches):	2	r D	UBING IAMETER (inch	1/2 N	10D WE	LL SCREEN INTI	ERVAL DEPTH: らんしらい	ST TO	ATIC DEPT WATER (fo	H net BTOC):	35.	26	PU	rge pump typ Bailer:	ESP	
WELL VOLUME PUR	RGE: 1 WELL	.Volume = (FOTAL WEL	L DEPT	Н ВТОС -	STATIC DEF	PTH TO WATE	R) X V	VELL CA	PACITY						
(only fill out if ap	pšcable}	-	60.1	40	FI - 31	5,2 (50) x	0.163	gath	- 4,	1	gal					
EQUIPMENT VOLU	ME PURGE: 1	EQUIPMENT	VOL. = PUM	IP VOLU	IME + (TUBI	NG CAPACIT	ד א י	UBING LE	NGTH) +	FLOW CEL	L VOL	UME				AT
(ordy fill out if 20)	oScable)	······································	<u> </u>	- 111	.ga!=_(×·	<u> </u>	+	gat			gai			3,	7/18
INITIAL PUMP OR TUBIN DEPTH IN WELL (feet):	• 55	, ,	FINAL PUI DEPTH IN	MP OR TU WELL (fe	JBING et):	55	PURG	ING TED AT:	153	5		PURGING	620	TOTAL VOLUM PURGED.(galler	me it	5,75°
	VOLUME	CUMUL	- F	URGE	DEPTH	рН (stangard	TEMP.	ca	ND.	DISSOLV	ED	ORP	τι	RBIDITY	COLOR	PODOR
TIME	(gallens)	VOLUM PURGE	د المب	RATE	TO WATER	uni(≤)	(***)	μS	leni	OXYGE mg/L	N	(mV)		(NTUs)	(describe)	(describe)
1545	3500	3,50	0 3	50	38,95	6.74	15,0	44	8	4.4	17	35.6	l	63	clear	none
1555	3300	7,01	20 3	350	42.76	6,73	14.4	44	υι	3,8	55	29.2	t	7.9		
1605	3500	(0,5	0-0 3	50	46.26	6.75	14.6	4n	n	3,4	N	27.3	1	2.2		
1610	1756	12,2	50	350	47.52	6.7h	MM	44	36	3.	22	26.4		15.2	└── └──	
1615	1750	14,0		50	48.87	6.74	<u>14.6</u>	44	20	5,6	2	26.4		<u>4.8</u>		1
1620	<u>v 150</u>	15,7	20 2	50	50,61	6 12	12.1		~ `	ا رد	<u>``</u>	τι,υ	6	, J 0 6		
i																
		<u> </u>	· · · · · · · · · · · · · · · · · · ·													
	0.7		-													
		77/18														
WELL CAPACITY (G	allons Per Foo	1): 0,75° = 0,0	2; 1* = 0.0	04; 1. autori -	.25" ≈ 0.06;	2" = 0.16;	3" = 0.37;	4" = 0.65	; 5" = 1	i.02; 6" =	1.47;	12" = 5.88	3			
PURGING EQUIPME	ENT CODES:	8 = Baller;	= 0.0000; BP = Bla	and = adder Pu	0.0014; 1 mp; ES	74 = 0.0026; P = Electric S	Submersible P	i04, 3/c imp;	PP = Peri	stallic Pump	5,010, I; I	0 = Other (5	Specify)			
				CALLD?				\overline{T}	81. 0	<u>.</u>	SAMPLI	NG 1.7	<u></u>	SAMPLING	1/-	
PILLED OF THRING	PPIDATION: A	rell Two	olsh	TURINI	3	Une(s).	nek	/ mil	SIM LEIELT	SEIL TERED	INITIATI		501 53	ENDED AT:	167	. 2
DEPTH IN WELL (feet):		55		MATER	NAL CODE: PE					utration Equipr	rent Type	3:				
SALIAS	FIELD I	PECIFICATION	DN: PUMF	<u>`</u> (\$)	N	TUBING	Y (N (replace				DUPLIC	ATE: Y	<u>(</u>	>	SA	WPLE PUMP
GADAF				Р	RESERVATIVE		TOTAL VOL				INTENC	ED ANALYSIS	AND/OR	SAMPLING EQ	JPMENT FL	OW RATE (mL
SAMPLE ID CODE	# CONTAINERS	WATERIAL CODE	VOLUME (mL)	USED	AD	DED IN FIELD (m	L)	INAL pH (S	tanard Units)		ule mod				po, manua)
ELSWHOG-	()	РB	125	\square								EPA 537M		BSP		350
005-600-0	いん										/					
							Sen									
	Ž			\top				$ \forall$				<u></u>		40		
									\sim							
				1						\geq						
REMARKS:	all me	ll pud,	rot-con	mple	fe. in	eu stri	chip!	0.88	s'a	gs						
MATERIAL CODES:	AG = Am	iber Glass; (CG = Clear G	Glass;	PE = Poive	ithylene; F	P = Polyprop	/lene; S	= Silicone	ə; T∓Tefi	on;	O = Olher (S	Specify)			
SAMPLING EQUIPM	ENT CODES:	APP = Afte	r Peristallic	Pump; Peristal#	B = Baile	ar, BP = 8 SM = Straw M	Bladder Pump;	ESP I Gravily F	= Electric	Submersibl	e Pum); v)	-,			
		11111-414		anatatt	a rumpi	win - Judit I	of variation of la	al three ger	seculiye 1	- Juidi	(abacu	1/				

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)

_{C-147} 5/07

Aerostar SES...

GROUNDWATER SAMPLING LOG

nstallation: Ellsworth							C11. 7	7	ע	·Ha	0	_/	120	22	
	AFB M2027	.0003				Site:	SIR I	<u> [axi</u>	way 0	<u>471</u> 1		esn EC/	120	007	
VELL NO: MWI	3PFC07	0			5A		JUHO 1	- 001- 6	W= 032	>		- 5-7-	<u>0 / 0</u>		
		TUB	ING		1, HWEL	L SCREEN INTE	RVAL DEPTH:	STATIC D	EPTH			PURG			
AMETER (inches):	2.0"	DIAN	AETER (inche	<u>»): 1/</u>	40D 40	13 Ft - 1	<u>30.13¤</u>	TO WATE	R (feet BTOC):	<u> </u>	80	OR B	AILER: P1	2	
VELL VOLUME PUR	RGE: 1 WELL V	OLUME = (TC	TAL WEL	DEPTI	н втос -	STATIC DEP	TH TO WATE	R) X WELL	CAPACITY						
(only fill out if app	olicable)	= (<u></u> 40.3	8	^в /4.	17 Ft) × (0.16	ga¥nt ⇒ L		gai					
QUIPMENT VOLUN	AE PURGE: 1 E	QUIPMENT VC)L. = PUM =	P VOLU	JME + (TUBIN	IG CAPACIT	Υ Χ ΤΙ ΕU	JBING LENGTH	H) + FLOW CE	gal gal	E				
(onAu⊓onrushi	bicaple)	N/A	-					<u> </u>	1			<u> </u>		_	
ITTAL PUMP OR TUBING	35		FINAL PUR	AP OR TU WELL (fe	JBING net):	35	PURGI	NG red at: 12	34	PUI ENI	DED AT:	255	URGED (galler	•: ()	<u> </u>
	VOLUME	CUMUL	- T P	URGE	DEPTH	p원 (standard	TEMP.	COND.	DISSOL	/ED	ORP (mbb	ายศ	(BIDITY	COLOR (rfescribe)	ODOR (describe)
TIME	PURGED (gallons)	VOLUME PURGED		RATE (gpm)	TO WATER	units)	(°C)	µS/cm		-	(arr)	,	11037	1	
17211		(oations)		.04	ILL 45	~	_		-					Clean	non
1240	0 14	0 74		<u></u>	16.45	7.07	13.7	0.794	2.5	4 -9	4.8	au), [(
1740	n 2n	<u> </u>		- <u></u>	il al	1.13	13.5	0.297	1 2.7	5 -5	5.5	12	Ĵ.		
12 58	5 20	- 10 ⁴	1 10	ંડ્પ	17.34	1.18	13.3	0.300	a. 7	3 + 5	9.7		2		
1255	0.10	0.24		.04	13.25	7.17	13.1	0.302	2.5	2-0	62.0	12		1	1
	U.av			<u> </u>											
	NO DE LO DE													<u> </u>	ļ
		NGS DOG TO STORE	A											_	<u> </u>
			4.526		Concession of the local division of the loca			L							
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					<u> </u>	ļ	<u> </u>	<u> </u>			Concession of the local division of the loca				1
							<u> </u>	<u> </u>	-			-	No. of Concession, Name		
								<u> </u>		· · ·		<u> </u>			1
			<u> </u>					<u> </u>							
	Callons Per Fool): 0.75° = 0.02	<u>1*</u> =0	.04: '	1.25" = 0.06;	<u>1</u> 2' = 0.16;	3" ⇒ 0.37 ;	4* = 0.65;	5" = 1.02; 6"	= 1.47;	12" = 5.8	8			
TUBING INSIDE DI	A. CAPACITY (C	ial./Ft.): 1/8" =	0.0006;	3/16" =	= 0.0014; 1	1/4" = 0.0026;	5/16" = 0,	004; 3/8" = 0	0.006; 1/2" :	0.010;	5/8" = 0	016			
PURGING EQUIPM	ENT CODES:	B = Bailer;	BP ≈ 8	adder P	'ump; ES	SP = Electric *	Submarsinia P			np; U	≍ Other (ShacuA)			
						SA	MPLING DA	ump; PP≖ ∖TA	Peristaltic Pun						
SAMPLED BY (PRINT) /		SUP. C	101	SAMP	LER(S) SIGNAT	SA URE(S):	MPLING D/	ATA	Peristaltic Pun	SAMPLIN		755	SAMPLING	12	57
Sampled by (Print) /		willis (A	ISL	SAMP	LER(S) SIGNAT	SA TURE(S):	MPLING D/	Pump; PP = \TA	FIELD-FILTERED	SAMPLING INITIATED Y	at: / a	755	SAMPLING ENDED AT: Filter Size	12	57
SAMPLED BY (PRINT) / PUMP OR TUBING DEPTH IN WELL (feel):	AFFILIATION: A.U 35	willis (A	ISL	SAMP TUBIN MATE	PLER(S) SIGNAT NG ERIAL CODE: PE	SA TURE(S):	MPLING D		FIELD-FILTERED	SAMPLING INITIATEO Y pment Type:	ат: /а́	755 D	SAMPLING ENDED AT: Filter Size	12	<u>57</u>
SAMPLED BY (PRINT) / PUMP OR TUBING DEPTH IN WELL (feel):	AFFILIATION: A. (35 FIELD D	W:11:5 (A	N: PUB	SAMP TUBIN MATE	PLER(S) SIGNAT	SA TURE(S): : : : : :		Pump: PP = ATA	Peristallic Pun FIELD-FILTERED Filtration Equ	SAMPLING INITIATED Y priment Type: DUPLICAT	at: / a	7 <i>55</i> D	SAMPLING ENDED AT: Filter Size	12	57 mm
SAMPLED BY (PRINT) / PUMP OR TUBING DEPTH IN WELL (feet): SAMI	AFFILIATION: A. (35 FIELD D PLE CONTAINER S	ECONTAMINATIO	N: PUb	SAMP TUBM MATE IP Y	PLER(S) SIGNAT	SA TURE(S): TUBING SAJ	Y N (replace WPLING D/	Pump: PP = ATA) ================================	FIELD-FILTERED	SAMPLIN INITIATED Y pment Type: DUPLICAT	AT: / a	5 55	SAMPLING ENDED AT: Fiter Size		57 Parm AAAPLE PUMP LOW RATE (m per minuto)
SAMPLED BY (PRINT) / PUMP OR TUBING DEPTH IN WELL (feet): SAM SAMPLE ID CODE	AFFILIATION: A. (35 FIELD D FIELD D FIELD D # CONTAINERS	CONTAMINATIO		IP Y	PLER(S) SIGNAT	SA rure(s): : : : : : : : :	Y (H (replaced) WPLING D/ Y (H (replaced) MPLE PRESERV/ TOTAL VOL DDED IN FIELD (n	Pump; PP = ATA) (Tion nL) FINAL	Peristallic Pun FIELD-FILTERED Filtration Equ pH (Stanard Units)	SAMPLIN INITIATED Y pment Type: DUPLICAT	AT: / a	555	SAMPLING ENDED AT: Filter Size SAMPLING EC COD		AMPLE PUMP LOW RATE (m per minuto)
SAMPLED BY (PRINT) / PUMP OR TUBING DEPTH IN WELL (feet): SAMPLE ID CODE EI SWHO7-OL	AFFILIATION: A. (35 FIELD E PLE CONTAINER S # CONTAINERS	ECONTAMINATIO	N: PUR VOLUME (17 1250	SAMF TUBIN MATE IP Y	PLER(S) SIGNAT	SA TURE(S): TUBING SAJ	Y N (roptac MPLING D/ Y N (roptac MPLE PRESERVA TOTAL VOL DDED IN FIELD (n	PP PP ATA	Peristallic Pun FIELD-FILTERED Filtration Equi	SAMPLIN INITIATED Y pment Type: DUPLICAT	AT: / a AT: / a ())))))))))))))))))	S AND/OR	SAMPLING ENDED AT: Filter Size SAMPLING EC COD		57 mm AMPLE PUMP LOW RATE (m per minuto)
SAMPLED BY (PRINT) / PUMP OR TUBING DEPTH IN WELL (feet): SAMPLE ID CODE ELSWHO7-OD I GUD - 0 3 5	AFFILIATION: A. I. 35 FIELD D PLE CONTAINERS # CONTAINERS	WILL'S (A ECONTAMINATIO PECIFICATION MATERIAL CODE PE	N: PUR VDLUME (17 125~L each	SAMF TUBIN MATE IP Y	PLER(S) SIGNAT		Y N (replac MPLING D/ Y N (replac MPLE PRESERVA TOTAL VOL ODED IN FIELD (n	Pump; PP = ATA) (Tion nL) FINAL	Peristallic Pun FIELD-FILTERED Filmation Equ pH (Stanard Units)	SAMPLINK INITATEO Y preent Type: DUPLICAT	AT: / a AT: / a C TE: M D ANALYSI METHOD EPA 537M	7 5 5 (N S AND/OR A	SAMPLING ENDED AT: Fiter Size SAMPLING EC COD	IZ NUIPMENT F	AMPLE PUMP LOW RATE (m per minuto)
SAMPLED BY (PRINT) / PUMP OR TUBING DEPTH IN WELL (foot): SAMI SAVINE ID CODE ELSW(107-061- GUU - 035	AFFILIATION: A. (35 FIELD D FIELD CONTAINER S CONTAINERS	WILL'S (A RECONTAMINATIO PECIFICATION MATERIAL CODE PE	N: PUR VOLUME (17 125~L each	SAMF TUBIN MATE (P Y	PLER(5) SIGNAT		Y H (replace MPLE PRESERV) TOTAL VOL DDED IN FIELD (n	PIP = ATA)	Peristallic Pun FIELD-FILTERED Filtration Equ pH (Stanard Units)	SAMPLINC INITIATED Y prient Type: DUPLICAT	AT: / a AT: / a ())))))))))))))))))	7 55 ((N S AND/OR A	SAMPLING ENDED AT: Filter Size SAMPLING EC COD	NUPMENT F	57 Parts AMPLE PUMP LOW RATE (m per minuto) 150
SAMPLED BY (PRINT) / PUMP OR TUBING DEPTH IN WELL (feet): SAM SAMPLE ID CODE ELSWH07-061 GUI - 035	AFFILIATION: A.I. 35 FIELD D FIELD D FLE CONTAINERS	Willis (A ECONTAMINATIO PECIFICATION MATERIALCODE PE	NE PUR VOLUME (17 125~L each	SAMF TUBIN MATE IP Y	PLER(S) SIGNAT		Y N (noplace)	Pump; PP = ATA) 	Peristallic Pun FIELD-FILTERED Filtration Equ pH (Stanard Units)	SAMPLING INITATED Y pmeht Type: DUPLICAT INTENDE	AT: 10 AT: 10 D ANALYSI METHOD EPA 537N	755 (SAMPLING ENDED AT: Fiter Size SAMPLING EC COD	IZ NUPMENT F E	57 Tom AAMPLE PUMP LOW RATE (m per minuto) 150
	AFFILIATION: A. I. 35 FIELD D PLE CONTAINERS 8 CONTAINERS	Willis (A ECONTAMINATIO PECIFICATION MATERIAL CODE PE	N: PUR VOLUME (N 125~ each	IP Y	PLER(S) SIGNAT		Y N (replac	Pump; PP = ATA 	Peristallic Pun FIELD-FILTERED Filmation Equi	SAMPLING INITIATED Y prent Type: DUFLICAT INTENDE	AAT: 10 AAT:	755 S AND/OR A	SAMPLING ENDED AT: Fiter Size SAMPLING EC COD	DUIPMENT F	57 Turn AAAPLE PUIMP LOW RATE (m per minuto) 150
SAMPLED BY (PRINT) / PUMP OR TUBING DEPTH IN WELL (feet): SAMPLE ID CODE ELSWHO7-OD I GUD - 0 3 5	AFFILIATION: A. I. 35 FIELD D FIELD	Willis (A ECONTAMINATIO FECIFICATION MATERIAL CODE PE	N: PUL VOLUME (17 125AL Each				MPLING D/ V N(replax NPLE PRESERV/ TOTAL VOL DDED IN FIELD (n	Pump; PP = ATA 	Peristalitic Pun Field-Fil.TEREO Filmation Equi	SAMPLING INITIATED Y prient Type: DUPLICAT INTENDE	AAT: / AA	255 S AND/OR A	SAMPLING ENDED AT: Fiter Size		577 nm AMPLE PUMP LOW RATE (m per minuto)
SAMPLED BY (PRINT) / PUMP OR TUBING DEPTH IN WELL (feet): SAMPLE ID CODE ELSW#107-061 GUD - 035	AFFILIATION: A . (35 FIELD D FIELD FIELD	WILL'S (A ECONTAMINATIO PECIFICATION MATERIAL CODE PEC	NE PUL VDLUME (17 125AL Each	SAMF TUBI? MATE IP Y			MPLING D/ V H (replaced) MPLE PRESERVI TOTAL VOL DDED IN FIELD (r	Pump; PP = ATA 	Peristaliic Pun FiELD-FILTERED Filmation Equ	SAMPLING INITIATED Y prinent Type: DUPLICAT INTENDE	B AAT: / a	2 5 5 f) ((N S AND/OR A	SAMPLING ENDED AT: Fiter Size	I2 RUIPMENT F	577 Inn AMPLE PUMP LOW RATE (m per minuto) 150
SAMPLED BY (PRINT) / PUMP OR TUBING DEPTH IN WELL (foot): SAMPLE ID CODE ELSWH07-061- GUD - 0.35	AFFILIATION: A.I. 35 FIELD E FIELD E F	Willis (A ECONTAMINATIO PECIFICATION MATERIAL CODE PE PE ELSWI	N: PUR VOLUME (r 125 ~ each	SANF TUB9 MATE IP Y LL)	PLER(S) SIGNAT NG ERIAL CODE: PE ND PRESERVATIVE USED		V Norphan	Pump: PP = ATA	Peristalitic Pun FIELD-FILTERED Filtration Equ pH (Stanard Units)	SAMPLING INITIATED Y priment Type: DUPLICAT INTENDE	D ANALYSI METHOD	7 5 5	BAMPLING ENDED AT: Fiter Size		577 nm AMPLE PUMP LOW RATE (m per minula)
SAMPLED BY (PRINT) / PUMP OR TUBING DEPTH IN WELL (feet): SAMPLEID CODE ELSWH07-061- GW - 0.35 KREMARKS: T K W	AFFILIATION: A.I. 35 FIELD D PLE CONTAINERS FIELD D FLE CONTAINERS FIELD D FLE CONTAINERS FIELD D FLE CONTAINERS	Willis (A ECONTAMINATIO PECIFICATION MATERIAL CODE PE PE ELSWF Complete	N: PUL VOLUME (M 125~L each 1 - R of	SAUF TU99 NATE IP Y	PLER(S) SIGNAT NG ERIAL CODE: PE N PRESERVATIVE USED		V N (noplace)	TTA	Peristalitic Pun FIELD-FILTERED Filtration Equi pH (Stanard Units) 5 Sowy 1	SAMPLINE INTIATEO Y prinent Type: DUPLICAT	AT: 1 a	7 5 5 (N S AND/OR A	SAMPLING ENDED AT: Fitter Size	I2 RUIPMENT F	577 Turn AAMPLE PUIMP LOW RATE (m per minuto) 150
SAMPLED BY (PRINT) / PUMP OR TUBING DEPTH IN WELL (feet): SAMPLE ID CODE ELSW(107-061- GU - 0.35 K REMARKS: X K W	AFFILIATION: A. I. 35 FIELD D FIELD	Willis (M ECONTAMINATIO PECIFICATION MATERIAL CODE PE PE Conplete Conplete Mar Glasse	$\frac{4SL}{VOLUME}$ $\frac{VOLUME}{VOLUME}$ $\frac{125nL}{each}$ $\frac{1}{1} - R$ cf $2G = Clean$	SAMF TU89 NATE LL) LL) S - (Glasse	PLER(S) SIGNAT NG ERIAL CODE: PE (N) PRESERVATIVE USED DI9 A PE = Poly		PP = Polyprod	Pip = ATA ATA Yell Yell TRNAL FINAL Yell Yel	Peristalitic Pun FIELD-FILTERED Filtration Equi pH (Stanard Units) 5 Sowy 1 illcone; T = 1	SAMPLING INITIATED Y priment Type: DUPLICAT INTENDE	AT: / a AT: /	255	SAMPLING ENDED AT: Fiter Size		577 TUTI AAMPLE PUIMP LOW RATE (IT per minuto) 150

pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saluration; 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

AJ 5/15

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Aerostar SES...

GROUNDWATER SAMPLING LOG

								/ /			L \				
installation: Ellsworth	AFB M202	7.0003				Sita:		(JU	Aa_	taxi	WEST		-1		
	18PFC	070	2		SA		LSWHC	<u>- 1</u>	002-	·GW-	<u>021</u>	<u> </u>	121	18	
						PU	RGING DA	A				-			
WELL	ŋ	TU	BING	1/4 1	rOD WEL	L SCREEN INTI	ERVAL DEPTH:	ST	TATIC DEPTH	t BTOCK	4,09	OR B	SE PUMP TYPE AILER:	? P	
WFUL VOLUME PUR	GE: 1 WELL	VOLUME = (T	OTAL W	ELL DEP	TH BTOC -	STATIC DEF	TH TO WATE	R) X V	WELL CAP	ACITY					
(ooly 53 out if app	vincable)	=	()	ςų	Ft - 114	δ9.F0 ×	0163	galifi	= 1.	47 .	al				
(0.2)			L	5, V		0.	005								
EQUIPMENT VOLUM	E PURGE: 1	QUIPMENT V	/OL. = P	UMP VOL	UME + (TUBI	NG CAPACIT	у х т	UBING LI	ENGTH) +	FLOW CELL	VOLUME			Ŕ	π
(only fill out if app	Ecable)		=		tsatsa	 *-					. <u> </u>		5	72171	8
INITIAL PUMP OR TUBING			FINAL	PUMP OR T	UBING	<u> </u>	PURG	NG N	-5/21/1	18 V C	PURGING	50.1	OTAL VOLUME		1 8/15
DEPTH IN WELL (feet):	<u> </u>	1	DEPTI	H IN WELL (I	eet):	21	INITIA	ED AT:	400		O ENDED AT:	, אי ן וּ	URGED (Dalon	COLOR	0008
THE	VOLUME	CUMUL		PURGE	TO	pri (standard	(°C)	ц	S/cm	OXYGEN	(mV)	(1	۱TUs)	(describe)	(describe)
) me	(galitons)	PURGED	un t.	the	WATER	មរាស				тgЛL					
1655	1000	(00	2)	200	14.26	7.26	14.6	16	544	2.7-	7 -11.7	10	5	Clear	none
1760	(000	200	D	200	14,28	7.17	13.8	jn	NO	2.3	1 -14.7	5	4.9	1	1
1705	1000	200	0	200	14.28	7.33	17.9	12	znn	4,88	5 -16.5	ι	9.6		
709	600	340	0	200	14.28	7.42	12.5	L	209	6.3	0 -16.8	ľ	7,5		
	600	420	20	200	14.28	7.48	12.5	11	193	6.9	9 ~17.1	14	1.7	}	
1714	600	481	20	200	14.28	7.47	12.4	11	184	7.0	8 -15.7	l	2.5)	
	000	~0~		200		6. 1					×				
							1								
				·			1								
							1								
							F								
			- IA	9-											
			1	TUS											
			312	<u> 1-0</u>	_		1	 							
						1									
						<u> </u>									
WELL CAPACITY (G	alloos Per Foo	0.75' = 0.0	2: 1"	i ⊨ 0.04:	1.25* = 0.06;	2" = 0.16;	3" = 0.37;	4" = 0.6	i5; 5"≖`	1.02; 6* = [·]	1.47; 12°≈5,8	6			
TUBING INSIDE DIA	CAPACITY (C	Gal/Ft.): 1/8" -	≠ 0,0006	; 3/16"	= 0.0014;	1/4" = 0.0026;	5/16" ⇒ 0.	004; 3	s/8" = 0.006	; 1/2° = 0.	.010; 5/8" = 0.	016			
PURGING EQUIPME	ENT CODES:	B ≃ Bailer,	BP ≃	Bladder F	Pump; ES	SP = Electric SA	Submersible P MPLING DA	ump; TA	PP ≈ Per	istalic Pump;	O = Other (Specity)			
[2 . 4. 5	- ,	1. 1 641		11PE/S):	17.1.	T	61	/ *	SAMPLING	715	SAMPLING	17	17.
SAMPLED BY (PRINT) / A		mek ji	wols	K SAM	- Len(a) alonn	CILL (O).	may 1	Va	NO C	D SUITERED:	NITIATED AT:	<u>45</u>	ENDED AT:	<u> </u>	. 0
PUMP OR TUBING	2	1		TUBI	NG FRIAL CODE: PE	<u>.</u>			ricu	Fibration Equipme	ent Type:	2			
DEF IT IN TREE (ICO).	FIELD	ECONTAMINATIO	DN: F	PUMP Y	N)	TUBING	Y N (replac	<u>edi</u> ~		Į	DUPLICATE: Y	N	5		
SAMP	LE CONTAINER S	PECIFICATION				SAI	MPLE PRESERVA	TION			NTENDED ANALYSI		SAMPLING FOI	S/	WPLE PUMP
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	E (mL)	PRESERVATIVE	≤	TOTAL VOL		FINAL pH (S	Stanard Units)	METHOD	37,110,010	CODE		per minute)
					USEO	A	DDED IN FIELD (n	ւլ)							
ELSWHO7-	ຸງ	PE	12	5							EPA 537M	.	APP		200
002-6W-02	<u> </u>	10			<u> </u>			<u> </u>			*		IMI		
							Son								
								$ \rightarrow $					×		
			-						-				The state		,
										\sim				\rightarrow	·
	L					I									
w	ell pa	& con	.pr	મર											
REMARKS:	·		•												
					DE - R 1	anthaul	DD - Delver	ularo:	R - Cillar	10. T - Tel	on: <u>O = Olber</u>	(Specify)			
MATERIAL CODES:	AG = An MENT CODES:	nber Glass; APP = Afte	uG = Cł er Perista	ear Glass; altic Pump	r⊨=Poly ; B=Bai	reinyiene; iler; BP =	Bladder Pum	yiene;); ES	P = Electri	c Submersible	a Pump;	(99900J)			
		RFPP = Re	verse Fl	ow Perista	Itic Pump; Stabilization C	SM = Straw	Method (Tubit e of variation of	ig Gravity last three o	y Drain); consecutive	O = Other (readings	Specify)				

pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation; oplionally, ± 0.2 mg/L or ± 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; oplionally ± 5 NTU or ± 10% (whichever is greater)

M2027.0003

05/24 G-149

AerostarSES...

GROUNDWATER SAMPLING LOG

							······								
installation: Elisworth	AFB M2027	7.0003				Site:	$\neg ()$	<i>i</i> elta	40	<u>xi</u>	34				
WELL NO: MWI	* DEC.C	27.03			SA		LSWHC	7 -	003	- Gw	-021 DAT	r⊧ 5	1211	18	
1.00						PU	RGING DAT	A							
WELL	2	TUP	ING	1/4 N	OD WEL	L SCREEN INTI	RVAL DEPTH:	STA	ATIC DEPTH	1	15.55	PUR	SE PUMP TYPE	PP	
DIAMETER (Inches):	<u>.</u>		METER (inch		125 H BTOC 7	5 UFt -	15, 66 Ft	10 R) X M	VELL CAP	ACITY		04.5	JOLEN		
WELL VOLUME PUR	RGE: 1 WELL	VOL0ME = (IC				617.110 Del	~ 1 LZ			<u>-</u>	al				
(only धि out if ap	p(cable)	= (25,	11	^m - 15,	Ⴢ ブჼª ^	0.102	, gant	1.	l '					
FOLIPMENT VOLU	ME PURGE: 1	EQUIPMENT V	OL. = PUN	P VOLL	JME + (TUBI	NG CAPACIT	יד א י	UBING LE	NGTH) +	FLOW CELL	VOLUME				AT
(only fillout if ap	olicable)		=				Et 1		ਪੁੰਸ਼	••••••••••••••••••••••••••••••••••••••	<u></u>			5/:	21/18
			Insue ou	10 00 33	BINO		PURG	NG			PURGING		FOTAL VOLUME		- 2 / 2
INITIAL PUMP OR TUBIN DEPTH IN WELL (feel):	° 2	1	DEPTH IN	WELL (fe	el):	21	INITIA	ED AT:	154	5	ENDED AT:	GZO ,	PURGED (galler	با مرتبه	>250
	VOLUME	CUMUL.	1	PURGE	DEPTH	्रभ (standard	TEMP.	CON	ND.	DISSOLVE	0 ORP (mV)	Tu f	RBIDITY NTUS)	(describe)	(describe)
TIME	PURGED (gelicitis)	VOLUME PURGED		RATE (9 pm)*	10 WATER	veite)	['G)	μa	rcin	mg/L	(,	,			
	760	<u></u>		E C		-1.31	14.6	10	37	Н.1	6 -52.9	6	28	dout	none
1550	700	100	» [<u>50</u> 60	1515	7.26	123	99	4	И.2	5-910	ι	89	clen	- ma
1.255	150	120		<u>50</u>	10,05	-1 27	12.1	10	$\frac{1}{1}$	5.0	8 -98.3		Ø7		
1000	150	200	$\frac{2}{2}$	<u> 20</u>	15.62	- 27	125	175	20	5,0	1 ~102.	6	1.4		
1600	1-1-20	2 71	<u>8 H</u>	<u> 20</u> 50	10,00	7 2	12.4	10	28	62	5 -104.6		33.6		
1010	750			50	16 6 5	7.50	121	101	<u>, 0</u>	6.5	4 -106.6		22.6		
	150	4 20		155	1020	749	12.7	10	45	64	0 -108.3	T I	8.8		
1620	150	223	<u>>0</u>	190	12,02	1.00	1000	10		0, 0					
												-			
												<u> </u>			
														<u>† </u>	
		- A	<u> </u>									<u> </u>			
			21	<u></u>			1								
L		-5	~~									<u> </u>			
	f														
	Outland Des Fac	N: 0.75° ~ 0.01		04-	1 25" = 0.06*	2" = 0.16:	3° = 0.37:	4" = 0.65	5: 6°≓	1.02: 6' =	1,47; 12" = 5.8	1 18		1	. <u>1</u> , ,
TUBING INSIDE DI	A. CAPACITY (Gai/FL): 1/8*=	0,0006;	3/16" =	= 0.0014;	1/4" = 0.0026	; 5/16" = 0.0	004; 3/	8" = 0,006	5; 1/2" = 0	.010; 5/8" = 0	.016			
PURGING EQUIPM	ENT CODES:	B ≈ Bailer;	BP≃B	ladder P	'ump; E	SP = Electric	Submersible P	ump;	PB ≃ bet	istallic Pump	O = Other (Specify)			
r		0	-				IN LING DI		1	21		: 21	SAMPLING	14.*	17
SAMPLED BY (PRINT) /	AFFILIATION:	Bell 'In	molsk	A SAM	PLER(S) SIGNA	TURE(S):	<u>Prek</u>		an	(Sh)	INITIATED AT:		ENDED AT:	104	
PUMP OR TUBING	2	21		TUBI	NG	:	_		FIEL	D-FILLERED: Filtration Equipm	т ent Type:	9	F K () () () () () () () () () (jini.
DEPTH IN WELL (reet):	FIELD	DECONTAMINATIO	N: PU	412 Y	N	TUBING	Y N (reptac	54) /			DUPLICATE:	r (ň	>		
SAM	PLE CONTAINER 5	PECIFICATION				SA	MPLE PRESERVA	TION			AUTOMOTO ANALYO			S.	AMPLE PUMP
SAUPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (*	sL)	PRESERVATIV	E .	TOTAL VOL		FINAL pH (4	Stanard Units)	METHOD	5 AND/OR	COD		per minute)
UNITE ID CODE	1001111110				USED	^	DDED IN FIELD (n	1L)							
ELSWHO7-	1, 9	PF.	125								EPA 537	M	AP	6	150
003- GW-0			120	_		\prec					r		<u> </u>	<u> </u>	
							Sou								
	\rightarrow			_								\sim			
	-75%							\rightarrow	<				3		
		\vdash	<u> </u>	_						\sim					
ļ	<u> </u>	L	~										I		
	well	, ord c	ompl	eR.											
REMARKS:		1	•	•											
			no -		05-0-1	ue thul an th	DD - Dahmer	wlenc:	S = Silina	ne' T≃Tef	inn' Q = Olber	(Specify)			
MATERIAL CODES	S: AG = AI	mber Glass; APP = Affe	uci = Clea er Peristali	r Glass; c Pump	PE=Pol	yennyiene; iller; BP =	= Bladder Pum	o; ESF	P = Electri	ic Submersib	e Pump;	<u></u>			
		RFPP = Re	verse Flov	v Perista	utic Pump; Stabilization C	SM = Straw	Method (Tubin te of variation of	ng Gravity Jast three o	Drain); onsecutiva	O = Other readings	(Specify)				

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)

M2027.0003

10055/524

Aeros	starSE:	5			GRO	UNDWA	TER SAI	VIPLI	NG LOO	G						
installation; Ellsworth	AFB M202	27.0003				Site	8 (1	Mart	en u	ush 2	006)					
WELL NO: MW	189FC	10801			s/	MPLEID: B	LSWHO	8 - 6	901-G	w "OL	14	ÐAT	≈ 5/1/18			
	- Ar					PL	RGING DA	TA								
WELL DIAMETER (inches):	2	דו סו	JEING) AMETER (Inche	V2 M ≈: 3/	0D WEL 6 50 51.	LL SCREEN INT	ERVAL DEPTH: 36, 28 Ft		STATIC DEPT TO WATER (6	H eet BTOC):	16.03	•	PURGE PUMP TY OR BAILER:	°⁼ PP		
WELL VOLUME PUP	RGE: 1 WELL	VOLUME = (1	TOTAL WEL	L DEPT	H BTOC -	STATIC DE	TH TO WATE	R) X	WELL CA	PACITY						
(only fill out if sp	plicable)	-	(51)3	2	^{FL -} 16.	03 FN ×	0.163	gaVit	- 5.	אר .	al					
EQUIPMENT VOLUN	ME PURGE: 1	EQUIPMENT	/ol. = PUM =	P VOLU	IME + (TUB ∞1 = (гү Х 1 ——	UBING	LENGTH) +	FLOW CELL	VOLÜME	era Tara da f			47 511	718
INITIAL PUMP OR TUBIN	° Ц.		FINAL PUI	AP OR TU	BING UI		PURG	ING	101	<u>^</u>	PURGIN	ig AT		ME	22	500
DEPTH IN WELL (feet):	- <u>-</u> -	COMUL	DEPTHIN P	WELL (fe URGE	et): DEPTH	рН	TEMP.	TED AT:	DND,	DISSOLVE	D OR	P	TURBIDITY	COLOR		DOR
тиме .	PURGED	VOLUMI		RATE	TD	(standard units)	(°¢)		µS/cm	OXYGEN	(m)	n	(NTUs)	{describe) (đe	scribe)
	mL	PURGEL		<u>.</u>	WATER Ifeet BTOCI	A (8		0 F	1	mg/L	60	-	ar i			
1015	12.50	1,250	$> \frac{1}{2}$	50	1.24	6,68	10.6	25	110	1.66	166.	7	16.6	- clea	<u>1^'</u>	+~~~@
1020	1250	4,901	0 2	<u>50</u>	1.12	6.00	10.1	29	150	0.8		4		<u>e e e e</u>	4	+
1030	2300	300	$\frac{o}{2}$	50	8.90	6,01	10.1	24	130	0.1		11	201	COL	∦—	+
1040	2500	(30)	$\frac{\nu}{2}$	20	10 24	6.14	16 9	20	2/1	0.4		0.0	<u>201</u> 240	++-	+	+
	0 500			70 7 A	9.47	6.18	1028	25	<u>201</u>	0.3	-122	212	257			
1100	2500		$\frac{1}{2}$	2 <u>20</u> 0 60	19 49	7.02	10.9	97.	101	6 28	-13	1.8	307	+	+	├──
1120	2500	17 50	50 2	50	9.54	705		96	<u> </u>	0.20	-13	11	262			[
<u>1120</u>	2500	20 00	6 2	50	19.59	7.12	11.0	27	157	(9.25	5 -13	3.i	222		\square	
1140	2500	92500	<u> </u>	50	18.62	715	11 1	27	544	0.74	-130	.8	718			
							<u> </u>									
											_+	-+				
	×۲														<u> </u>	
1	ELL	x													ļ	
\leq													·······		<u> </u>	
WELL CAPACITY (G	allons Per Foo	l): 0.75" = 0.0	2; 1 [#] ≈ 0.0	04; 1.	.25" = 0.06;	2" = 0,16;	3* = 0,37;	4" = 0.	65; 5*= 2/8* - 0.004	1.02; 6"≈' a: 1/0"∽0	1.47; 12" = 010: 5/8'	=5.88 '-00	16			
PURGING EQUIPME	ENT CODES:	B = Bailer;	= 0.0006, BP = Bła	idder Pu	mp; ES	P = Electric \$	Submersible P	ump;	PP = Per	istaltic Pump;	0 = 01	her (S	pecify)			
						SA			- A 2	<i>,</i>	AMPLING	1.1.1	SAMPLING		_	
SAMPLED BY (PRINT) / A	FFILIATION: A	rek li	molsh	t SALIPI	ER(S) SIGNAT	URE(S):	Me "	14	ul'ile	int 1	NITIATED AT:	11-	11 ENDED AT	114	2	
PUMP OR TUBING	41	ы		TUBING					FIEL	D-FILTERED: Ethnion Environ	Y ent Tune:	Ľ	Filter Size		mm	
DEPTHIN WELL (1990).	FIELD (DECONTAMINATIO	DN: PUMP	> Y ((N)	TUBING	Y N (replac				UPLICATE:	Y	(n)			
SAMP	LE CONTAINER S	PECIFICATION			<u> </u>	SAN	IPLE PRESERVA	אסוד						S DELARMENT	AMPLE	
SAMPLE ID CODE	# CONTAINERS	WATERIAL CODE	VOLUME (mL	р .)	RESERVATIVE	AC	TOTAL VOL	iL)	FINAL pH (S	Stanard Units)	MET	IL Y SIS / HOD	COL	E	perm	inute)
ELJWH08- 071-6W-044	3	PÊ	125	\square							EPA	637M	Apo		25	Ö
	/					\searrow	Sen									
	\sim	201						\bigtriangledown					TA	1		
		10												\square		
										\sim						
REMARKS: VOL	h pad me dr	not con me to la	mpleste	der der	HUL W recal ,	p of w n turb	ell~co nidity. (-35 Colle	red 3	5, Coll Sompl	e bot	San Hes	mple att	er 1 mrbil	we hity	<i>u</i>
MATERIAL CODES:	AG = An	nber Glass; (CG = Clear C	Glass;	PE = Polye	athylene;	PP = Polyprop	ylene;	S = Silicon	e; T = Tefic	n; 0 = 0	lhər (S	pecify)			
SAMPLING EQUIPM	ENT CODES:	APP = Afle RFPP = Re	verse Flow F	r∙ump; Peristalti	ы = Bail ic Pump;	er, BP≐ SM≓Straw	Method (Tubin	g Gravit	y Drain);	O = Other (Specify)					

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Stabilization Criteria for range of variation of last linee 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)

C-151 05/07

Aero	starSE	S _{iic}		GRO	UNDWA	TER SA	VIPLING LO	G				
Installation: Ellswor	lh AFB M20	27,0003			Site	8	Marten	Crash				
WELL NO: MM	118PF	COAC)2	s,		LSW	108- (202-01	N-013	126	118	
					PL	JRGING DA	TA	ib	13		-	
WELL DIAMETER (inches);	2"	TU: DIA	BING METER (Inches):	4 4ª	L SCREEN INT	ERVAL DEPTH:	STATIC DEP TO WATER (La	OR BAILER:		
WELL VOLUME PL	IRGE: 1 WEL	VOLUME = (T	OTAL WELL DE	ртн втос -	STATIC DE	PTH TO WATE	R) X WELL CA	PACITY	N C	AN		
(only fill out if a	pplicable)	~ (49.63	n - 16	13 ^{Ft) ×}	0.16	^{galett} " 50	36 "				
EQUIPMENT VOLU	IME PURGE: 1	EQUIPMENT V		LUME + (TUB)	NG CAPACI		UBING ENGTH) -	FLOW CELL V				
(only fill out if a	pp(cabe)		- 0	gal = (× 2500	45 10	+ 6 7 🕬	- 0.31	J gal			
Initial pump or tubi	4G 45	-	FINAL PUMP OF		5	PURG	ING 171	12	PURGING	TOTAL VO	DLUME C	
DEPTH IN WELL (feel):		CUMUL,	DEPTH IN WELL	. (feet): E DEPTH	<u> у</u> м	INITIA TEMP.	TED AT:	DISSOLVED	ENDED AT:		(gallons): 5 COLOR	
TIME	VOLUME PURGED	VOLUME	RATE	то	(standarð units)	(°C)	μ5/cm	OXYGEN	(mV)	(NTUs)	(describe) {describe
10110	(genona)	PURGED (galions)	(stadb)	WATER (feet BTOC)		ļ		mg/L				
1/15	-	-	-04	6.12	1 02	17-7	75-37	1 20	210		- N	
1400	A CAO	H 1 0		20 72	<u>1002</u> (01	12.6	14921	1.24	-Jook	100		
1315	0.90	2.79		2010	1.66	17.1	25207	005	-76 -7	14.7		۲ ۲
325	0.40	3.6	0 .09	22.93	LARL	12.5	25270	0.36	-55.5	15.6	- N	ťờ
1335	0.90	4.5	0.00	23.38	6.86	12.7	25450	0.34	-62.5	11.7	<u>N</u>	N.
1399	0.36	4.8	6 009	23.45	6.87	12.6	25421	0.39	-639	9.47	N	N
1347	0.36	500	22 009	23.46	<u>6.87</u>	12.6	25420	0.38	-64.1	8.68	N_	N
1.242	0.36	2.40	2 4094	23,44	6.86	12.7	25421	0.37	-65.4	7.46	- <u>N</u>	
	<u> </u>											
											_	
			_		$\overline{}$							
					2							
	Callena Por Fee	t): 0.75 ⁴ - 0.02:		1.05 - 0.09	TP = 0.48.	2 - 0 27:	4-045-51-	100: 01-14	10 ² - 5 6			
TUBING INSIDE DIA	A. CAPACITY (ij. 0.73 = 0.02, Sal./Fl.): 1/8" =	0.0006; 3/16 [°]	1.23 = 0.00, ' = 0.0014; 1/	2 = 0.30, 4" ≈ 0.0026;	5/16" = 0.0	4 = 0,65, 5 = 04; 3/8" = 0.005	9.02, 0	, 12 → 5.60); 5/8" = 0.0)16		
PURGING EQUIPM	ENT CODES:	B = Bailer;	8P = Bladder	Pump; ES	P = Electric S SAM	iubmersible Բե /IPLING DA	mp; PP = Peri TA	istaltic Pump;	O = Other (S	ipecify)		
SAMPLED BY (PRINT) / /		In No	S and SAR	PLER(S) SIGNATU		Matta	Matter	SAM		15 SAMPLI	NG 2L	16
PUMP OR TUBING	<u>المسملا</u>	LIES NE	TUE	ING	,	n vy	FIELD	D-FILTERED:	Y (N Filter S	AT: :	nm m
DEPTH IN WELL (feet):	75		MAT	TERIAL CODE: PE	TIAUA	anner anner	ب_ل_ج	Filtration Equipment T	ype:			
SAMF	LE CONTAINER S	PECIFICATION	. PUMP Y	<u> </u>	SAM	PLE PRESERVAT	ION	OUP	TOULE: A	\leftarrow	s	WPLE PUMP
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (mL)	PRESERVATIVE		TOTAL VOL	FINAL pH (S	INTE tanard Units)	NDED ANALYSIS METHOD	AND/OR SAMPLING	BEQUIPMENT F	LOW RATE (m per minute)
				USED	AD	DED IN FIELD (ml	<u>}</u>					
NH08-00	2-2	PE	Cach						EPA 537M	l P	P	320
W-AVIE					\leftarrow				~~			
					5	Ser						
·····							\leq			10	Z	
							\rightarrow					
	L	L					I					
REMARKS:	hell	complete	ed.									
MATERIAL CODES:	AG ⇒ An	iber Glass; CO	3 = Clear Glass;	PE = Polyet	hylene; P	P = Polypropy	ene; S = Silicone	a; T ≈ Teflon;	O = Olher (S	pecify)		

pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings < 20% saturation; opkionally, ± 0.2 mg/L or ± 10% (whichever is greater) Turbidity: all readings < 20 NTU; opkionally ± 5 NTU or ± 10% (whichever is greater)

C-152

60 05/10

Aero	star SE	Sut			GRO	UNDWA	TER SAI	MPLI	NG LO	G						
Installation: Elliswort	hAFB M20	27.0003		•••••		Site	8 M	in	en (mah						
WELL NO: MIN	12 PF	C. 080	3		s.	AMPLE 1D:	FLSW	HO	$\beta - \alpha$	32.0	nul-	ALK-DA	TE: L	11261	2018	5
<u> </u>	ų presidentinių darbandariai (m. 1996). Lietuvio darbandariai (m.			٥ľ	TID	Pl	JRGING DA	TA	<u> </u>		<u>. yy</u>	<u>~</u>		<u>+1 - </u>	<u></u>	<u> </u>
WELL DIAMETER (inches):	2"	T	UBING KAMETER (Inch	es);	4 0D 51				STATIC DEPT TO WATER (f	TH (eet BTOC):	60	14	PU OF		Ρ	
WELL VOLUME PU	RGE: 1 WEL	L VOLUME = (TOTAL WEL	l dep	гн втос -	STATIC DE	PTH TO WATE	R) X	WELL CA	PACITY	MĀ	V)			•	
(only M out if ap	picable) 34	240	50.2	SØ	^н 6	,14 ^{Ft)} ×	0.16	gaint	-340	24	gal	5.4	8			
EQUIPMENT VOLU	ME PURGE: 1	EQUIPMENT	VOL. ≈ PUM	P VOL	UME + (TUBI	NG CAPACI		UBING	LENGTH) +	FLOW CE	LL VO	UME	·····			
(ou) is out it ap	pucable)		=	0,0) ^{gai} = (0626 ×	15 R)	• •	2 **	Ō	131	<u>1</u>				
INITIAL PUMP OR TUBIN DEPTH IN WELL (feet):	<u> </u>	<u>5 </u>	FINAL PU	WELL (F	UBING (5	PURG	ING TED AT:	101	0		PURGING ENDED AT:	139	TOTAL VOLUM PURGED (gallor	<u>.</u> 5.	62
TIME	VOLUME PURGED	CUMUI VOLUM	- F	URGË RATE	0ЕРТН ТО	pH (standard	ТЕМР. (⁰ С)		BOND. µS/cm	DISSOL	/ED EN	ORP (mV)	т	UREIDITY (NTUS)	COLOR (describe)	ODOR (describe)
	{gallons}		: MAL	(gpm)	WATER	ornest				mg/l.						
1010	-	200	<u></u>	<u>6</u>	16.14			-						10	None	None
1010	state	0.5		<u>か</u> いた	100	6.06	1140	23	000 110	6.8)	12665	2	<u> </u>	N,	
1025	22	0,1		<u>75</u>	20 65	6.94	17.20	23	776	2.76	-	94.7	24	5.7	NI	- ג -
1030	.25	1.0	- C	5	20,91	6.82	12.2.0	23	712	2.2	>	83.5	1	7.9	Ń	N
1040	0.50	1.50	6	05	21.65	6.56	12.20	23	736	2.5	3	51.6	2	0	N	N.
1050	0.20	2.0		25	22.30	6.79	12.30	13	<u>195</u>	200	<u>}</u>	42.6	_2;	<u>0.2</u>	N	N_{-}
		0165 V 2 2		<u>86</u>	72.00	6-10	16.5	13	<u>880</u> 412	2.2	1	355	2	5.3	<u>-</u>	+M-1
	0.8	4		00	24.85	6.75	12.4	24	<u>75</u> 285	<u>2,00</u>		19.1	30	2.5		N
1130	0.8	4.9	0 .	୦ନ	25.45	676	R.H	24	379	1.4	3	13.8		1.6	Ň	Ň
1133	0.24	501	1 0	<u>٢ô</u>	25.6	6.77	17.04	24	418	1.3	3	8.5	7.	85	N	<u>N</u>
1136	0.24	5.3	8 0	<u>୍ଜନ</u>	255	<u>6.78</u>	12.3	24	403	1.31	2	G e ⁴		<u>-12-</u>	N	N
1154	0067	506	<u>6 0</u>	<u>00</u>	63/03	b */1	14.5	24	703	106	Ч	242	1	<u>ل%هم</u>	N	
WELL CAPACITY (G	allons Per Foo): 0.75" = 0.0 Col /도나 1/8"	2; 1° = 0.1)4; 1 2//6"-	.25* ≈ 0.06;	2" = 0.16; (4" - 0.0026;	3" ≈ 0.37; 5/16" ~ 0.0	4* = 0,⊧	65; 5″ ≒ ` 3/8″ ~ 0.006	1.02; 6*=	: 1.47; 0.010:	12" = 5.88) 116			
PURGING EQUIPME	ENT CODES:	B = Bailer;	= 0,0008; BP = Bla	dder P	ump; ES	P = Electric \$	Submersible Pu	ump;	29P ≃ Peri	istaltic Pum	0.010, o;	0/8 = 0.6 O ≈ Other (S	Specify)			
			16/14		ER(S) SIGNATI	SAI	MAT 1	M.	A.		SAMPL	ING 117	0	SAMPLING	1111	2
PUMP OR TUBING	M	: les Net	175	TUBIN	G		MUS	1 Qu	JSQ.)-FILTERED:	INITIAT		<u>) 1</u> N	ENDED AT:	117	2
DEPTH IN WELL (feet);	<u>45'</u>			MATE	RIAL CODE: PE					Plantion Equip	nent Typ	w: (>		
SAMP	FIELD I	DECONTAMINATION	DN: PUMP	<u>````(</u>	N J	TUBING	Y N (replace	d) TON			DUPLIC	CATE: Y			SA	MPLE PUMP
SALIPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (ml.) ‡	RESERVATIVE		TOTAL VOL		FINAL pH (S	lanard Units)	INTEN	DED ANALYSIS METHOD	AND/OR	SAMPLING EQL CODE	IPMENT FL	.OW RATE (mL per minute)
	1			\vdash	USED	DA	DED IN FIELD (m)	<u> </u>								
ELSWHO8-	6	PE	12304	<u>qn</u>								EPA 537M		PP	(<	200
∞5~6₩~ ⇔!5						\sum	Sen				~					
- ,			~													
		- CX		+				7	$\overline{}$				······			
			\sim							\geq						
REMARKS:	fred	Com	ne led	•												
		,														
MATERIAL CODES:	AG = An	nber Glass; (CG = Clear C	lass;	PE = Polye	thylene; i	PP = Polypropy	lene;	S = Silicone	e; î = Tel	lan;	O = Other (S	Specify)			
SAMPLING EQUIPM	ENT CODES:	APP = Afte RFPP = Re	er renstattic l verse Flow F	-ump; leristalt	ы = Haile ic Pump;	SM = Straw	Hethod (Tubing	ES Gravity	r = ciectric Drain);	ouomersib O ⇒ Other	e Pum (Specii	р, (y)				
				5	aomization Offe	ens (or range	us variation of la	SU INTER (vusecutive	eauligs						

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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

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Aero	starSE	S _u			GRO	UNDWA	TER SAM	N PLI		∍¥	. etl	comple	chel)		
Installation: ~1/21/AFD=1/12 0	27.0003 EU	SWORT	- (†	AFR	>	Site	5.7	.9								
WELL NO: NW	SPFC	2901A			S/	AMPLE ID: EC	SWHOG	- 00	N - 60	~-03	13 F	ף ך	.⊪: 5	-31-	13	
						PU	RGING DA	TA	1							
WELL DIAMETER (inches):	2.6"	1	UBING KAMETER (ir	_{uches):} V t	1' 3S	13 Ft			STATIC DEPTI	et arco): 3	31,7	-Q	PU. OR	RGE PUMP TYPE	, mo-	560^
WELL VOLUME PU (only fill out if ap	RGE: 1 WEL pēcable)		(TOTAL)	well def 8 .91	тн втос в З І	- static d 70 ^{ft)} x		(TER) galvf	x well	CAPACITY	gal					
EQUIPMENT VOLU (only f2l out if ap	ME PURGE: - plicab/le)		' VOL. = F	PUMP VOL	UME + (TUE	BING CAPAC	ITY X	TUBI	NG LENGTH) + FLOW (ELL V		C			
INITIAL PUMP OR TUBING DEPTH IN WELL (feet):		35	FINAL I DEPTH	PUMP OR TU I'IN WELL (fe	BING et):	33	Purg Initta	NG FED AT:	CH	62 19	58	PURGING	602	TOTAL VOLUME PURGED (galons); C	.28
ТІМЕ	VOLUME PURGED (galions)	CUMU VOLUM PURGE (ration	E	PÜRGE RATE (gpm)	DEPTH TO WATER (feet BTOC)	pH (standarð units)	TEMP, (^o C)		COND. µS/cm	DISSOLV OXYGE mg/L	'ED N	ORP (mV)	T	URBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
1558	-			0.08	X,53		-			-		-	-		tuho	none
602	0.27	0.2	8	0.05	33.50	7.45	13.1	30	8 79	3.2	3	865		OR		
				. ~						<u> </u>			7	<i>•</i> •••		
		·····	100	<u>c s</u>	anp) t	abo	2		an	-4	Jen	<u>a</u>	g_		
								<u></u>						<u></u>		
		Constitution of the Consti	-													
			and the second second	Card Contraction of the local division of the local division of the local division of the local division of the												
					Survey of the Constraints											
						THE OWNER DOWN	COMO - CONCOMENT									
									Z							
								7		and the second second						
											- Contraction	Contraction of				
													Contra a second			
																,
	L														State Street of the	
WELL CAPACITY (G TUBING INSIDE DIA	Sallons Per Fo CAPACITY (ot): 0.75" = 0 'Gai./Ft.): 1/8'	.02; 1" ' = 0.0006	= 0.04; i: 3/16"	1.25" = 0.00 = 0.0014:	3; 2" = 0.1 1/4" = 0.002	6; 3" ≈ 0.37 36: 5/16" =	7; 4' 0.004:	' = 0.65; ! 3/8" = 0	5" = 1.02; .006: 1/	6" = 1 2" = 0.4	1.47; 12" 010: 5/8	= 5,88 " = 0.01(6		
PURGING EQUIPM	ENT CODES:	B = Bailer	BP =	= Bladder (Pump; E	SP = Electric	Submersible	Pump	PP = {	Peristaltic Pu	ımp;	O = Oth	er (Spec	ify)		
SAMPLED BY (PRINT) (AL		11 /	Act	SAMP	ER/S) SIGNATI	SAN REIS)		IA			SAMPL		0.0	SAMPLING		~ 4
PUMP OR TURING	-	withs (430		3	-(r			FIELI	-FILTERED	INITIAT		5	ENDED AT:	16	07
DEPTH IN WELL (feet):	33			MATER	IAL CODE: PE					Filtration Equips	nent Type					
SAME	FIELD	DECONTAMINAT	ION: PI	UMP Y	\bigcirc	TUBING	Y N (replaced				DUPLIC	ATE: Y	(N	<u>} </u>	54	MPLE PLIMP
SALVELE (D CODE	# Containers	MATERIAL CODE	VOLUME ((mi.) F	RESERVATIVE	AD	TOTAL VOL DED IN FIELD (ml	.)	FINAL pH (S	tanard Units)	INTEN	DED ANALYSIS METHOD	AND/OR	SAMPLING EQU CODE	PMENT FL	.OW RATE (ml. per mínute)
600-037A	¥3)	PE	Jasn Cac	ζ. L	/							EPA 537M		n 07500;		300
							\times				(
	< <			_				X							-+	
		-		_										$\vdash c$	<u> </u>	
REMARKS:	pre t	o turb	id ily	- 3	bottes	i sam	pled				<u>}</u>			L		
MATERIAL CODES:	AG = Ar	nber Glass;	CG = Cle	ar Glass;	PE = Pol	vethylene;	PP = Polypro	pylene	e; S = Sillo	one; T=	Teflon	; 0 = Oth	ner (Spe	cify}		
SAMPLING EQUIPM	ENT CODES:	APP = Afi RFPP = I	er Perista Reverse F	itic Pump; low Perista Si	B = Bai altic Pump; abilization Crite	ler; BP = SM = Strav eria for range	 Bladder Purr w Method (Tul of variation of la 	ip; ping Gr st three	ESP = Elec avity Drain); consecutive	o = Ot eadings	sible Pi her (Sp	ump; becify)				
	perature: + 0	2 °C Specific	Conduct	ance + F	% Dissolva	d Oxygen: a	li readinas < 2	0% 50	luration: coti	onelly + 0 3	2 mo/l	or + 10% /u	hicheve	r is greater). T	urhidibe	ell readince

pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% seturation; optionally, ± 0.2 mg/L or ± 10% (whichever is greater) Turbidity; all readin ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: March 14, 2016

C-154

06/0/

3/6/19

Aerostar SES.,

GROUNDWATER SAMPLING LOG

Installation: HELAED HAX	me e	LYWOR	th r	+FB		Site:	Sik 9	•								
WELL NO: MW	18PFC 0	902A			Si	AMPLE ID: EC	SWH09	002	- GU	ı - 030	A	Dį	ATE: 5	5-31-	18	
						PU	RGING DA	ТА								
WELL DIAMETER (inches):	2.0 ^r	T D	uaing Iameter (_{inches):} /	100 34		RVAL DEPTH:	s T	STATIC DEPTI TO WATER (fe	H net BTOC): 🖌	26.7	3	PU	rge pump typ Bailer:	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	in PP
WELL VOLUME PU	IRGE: 1 WEL	L VOLUME =	(TOTAL	WELL DEP	тн втос	 STATIC D 	EPTH TO WA	TER)	X WELL	CAPACITY					<u> </u>	
(only fill out if sp	oplicable)	=	· 35-	55	r - X	·73 ^{FI)} *	0.143	gə∜ft	= (13	gal					
EQUIPMENT VOLU (only Mout if ap	ME PURGE: 1 xp5cable)		= ، VOL ٿي	PUMP VOI	.UME + (TUE g과 = (DING CAPAC	ITY X <u>Ft.)</u>	TUBING	G LENGTH	i) + FLOW (CELL VC	LUME	M			
INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	3	30	FINAL DEPT	. PUMP OR TU H IN WELL (fe	(BING	30	PURG INITIA	ing Ted at:	13	56	PI EI	JRGING NDED AT:		TOTAL VOLUN PURGED (gažo	IE ns):	
	VOLUME	CUMU	-	PURGE	DEPTH	pH {standard	TEMP.	_°	OND.	DISSOL	/ED	ORP	ī	URBIDITY	COLOR	ODOR
11646	(gallons)	PURGE	с D	(gpm)	WATER	units)	(*c)			mg/L		{mv}		(4105)	laescupe	(describe)
1514			·	0.05	26.92			-			•		-	an she and a she and a she and a she and a she and a she and a she and a she and a she and a she and a she and	Cles	none
1518	1.0	10		0.05	27.23	7.52	165	12	42	3.1	1 1	23. Ù	ſ	2١	Î	1
1522	0.15	0.7	\$ <u></u>	0.05	27.40	1.17	14.3	11	30	ما . 3	2 1	24.6	9	4.5		
1524	6.1	0.4	5	0.05	27.53	7.75	165	11	23	3.6	<u>4 </u> [24.6	5	2.4	\square	<u> </u>
1528	0.25	8.5	570	0.05	27.83	7.76	16.5		20	3.5	<u>0 </u>	22.4	$\frac{2}{2}$	<u>4.1</u>	┼┼	
1532	6.23	0.0	(>	6,0 <u>)</u>	10.6%	7.14	16.7		128	3.5	4	19.9	<u> </u>	0.2		
⊢^		•														
	\vdash															
			_										<u> </u>			
			$\langle \rangle$					<u> </u>		·			-	-		
							\geq	R								
									5~							
											No. of Concession, Name	~				
												-	-	4		
WELL CAPACITY (C	Gallons Per Fo	ot): 0.75" = 0	.02; 1 - 0.000	" = 0.04; e: 3/4e"	1.25" = 0.06	3; 2" = 0.16 1/4" = 0.002	$6; 3^{\circ} = 0.37$	7; 4"=	= 0.65; ; 2/9" ~ 0	5" = 1.02;	6" = 1.4 0.01 = "0	7; 12*	= 5.66	à		
PURGING EQUIPM	ENT CODES:	B = Bailer	= 0.000 BP	= Bladder I	0.0034; Pump; ε	ESP = Electric	c Submersible	Pump;	9/8 = 0 PP = F	Peristaltic P	2 = 0.01 ump;	0; 5/6 0 = 0{h	er (Spec	s sify)		
[. /				SAN	APLING DA	TA			SAMPLIN	3		SAMPLING		
SAMPLED BY (PRINT) / A	FFILIATION: A	willis/A	4L	SAMPI	ER(S) SIGNATL)RE(S): 5	<u> </u>				INITIATED	AT: 5	32	ENDED AT:	15.	5
PUMP OR TUBING DEPTH IN WELL (feet):	3,	ر رو رو		TUBIN	G RIAL CODE: PE	•			FIELI	D-FILTERED; Filtration Equips	Y ment Type:	C	<i>™</i>	FDler Size		mm
, , , , , , , , , , , , , , , , , , ,	FIELD	DECONTAMINAT	ON: F	PUMP Y		TUBING	Y N (replaced				DUPLICAT	E: Y				
SAM	PLE CONTAINER S	PECIFICATION				SAM	IPLE PRESERVAT	non			NTENDS			SAMPI ING EC	UNDIACAT 6	
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	(mL)	RESERVATIVE		TOTAL VOL		Final pH (S	itanard Units)	, ATTENDE	METHOD	3 ALLOIOIN	CODI		per minuta)
KISWH 69-002-			làsa		USED		DED IN HELD (MI									
6W-030A	2	PE	cael		$\overline{}$							EPA 537M	1	TP	r	150
											<u> </u>	<u> </u>				
		~					Z						\sim	<u> </u>		
								<u>`</u>	~						3	
			~			<u> </u>				<u> </u>	<u> </u>			<		
remarks: D	to not	comp	leleo	ત									,			
MATERIAL CODES:	AG = Ar	nber Glass;	CG = Ck	ear Glass;	PE = Pol	yethylene;	PP = Polypro	opylene;	S = Silio	cone; T =	Teflon;	0 = Ot	her (Spe	cify)		
SAMPLING EQUIPM	ENT CODES:	APP = Aft REPP = P	er Perista Reverse I	altic Pump; Flow Perist	B = Ba altic Pumo:	ller; BP = SM ⇒ Strav	 Bladder Purr W Method (Tul 	νρ; E bing Grav	ESP = Elec	tric Submer O = O	sible Pur her (Spe	np; cify)				
L				S	abilization Crit	enta for range	of variation of la	st three co	onsecutive	readings						I

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)

C-155 6/6/

Aerostar SES...

GROUNDWATER SAMPLING LOG

									170					
stallation: Ellsworth	AFB M2027.	0003			Site	SIT	- 10 -	· wu		<u> </u>	A	.10.1	0	
ELL NO: MWI	SPFC1	001				LSWHIL	- 001	- 60	1-04	2	DATE: 5	-17-1	/	
	<u> </u>				PU	IRGING DAT	A				Inunc			
/ELL	204	TUB	NG	1/4 %	ELL SCREEN INT	ERVAL DEPTH:	STA	TIC DEPTH	I nt PTOC):	9.81	OR B/	ALLER:	PP	
AMETER (Inches):			ETER (Inches):	רן כוטיי - FPTH BTOC	STATIC DE	PTH TO WATE	τ) X W	ELL CAP	ACITY					
VELL VOLUME PURC	BE: 1 WELL V		(-0	B .0	11 F0 X	N 11	gal/ft ≈	la.1	ga	et.				
(only 12 out if appl	icable)	= (50.59	" "	01	0.16		Ψų	P					
OLISPMENT VOLUM	E PURGE: 1 E	QUIPMENT VO	X = PUMP V	OLUME + (TU	BING CAPACI	τγ χ τι	JBING LEI	NGTH) +	FLOW CELL	VOLUME			_	
(only fill out if appl	icable)	16	=	gai = (×	Ft }	+	gai	=	gal		An.)	
	۲ ۲	VA -	femal public		-	PURGI	NG .			PURGING	102	OTAL VOLUME	Δ.	1.4
ITTIAL PUMP OR TUBING EPTH IN WELL (feet):	45		DEPTH IN WE	LL (feet):	45	INITIAT	ED AT:	60	U	ENDED AT	103% F	URGED (galons	COLOR	ODOR
	VOLUME	CUMUL.	PUR	GE DEPTH	pH (standard	темр.	CON	<u>_</u> @) ОКР (mV)	((TUs)	{describe}	{describe}
TIME	PURGED (gallens)	VOLUME	RAT (gpt	E TO m) WATER	units)	("G}	ms	im	mg/L					
		(galions)		fleet BIOC		+		-		-			clean	none
1020			0.04		1 7.7	10.2		11	1.82	61.9	17	.4	1	1
1027	0.2	6.0	0.0	4 1.91	7.46	10.0	51		1.70	1.2		2.0		
1028	0.12	0.3	1 0.0	24 10.25	1 7.63	1, 0	5	~~ > ~.	1. 1.3	2 1-21				
1032	0,16	0.4	0 0.0	4 11.2	1 1,60	110,2	5.	20	1, 20	62		. 3		
1036	1.0	0.66	(0.0	4 12.6	8 7.60	10.4	2.	54	1.6		1 14			
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					1		1							
														4
	Collons Per Fon	n. 075* ≈ 0 0/	2: 1" = 0.04	1.25° = 0.0	16; 2° = 0.16	s; 3° = 0.37;	4" = 0.6	5; 5*=	1.02; 6" =	1.47; 12" =	5,88			
WELL CAPACITY (G	CAPACITY (Gal./F1.): 1/8" =	0.0006; 3	/16" = 0.0014;	1/4" = 0.002	26; 5/16" = 0.	.004; 3,	/8" = 0.00	16; 1/2" = C	0.010; 5/8"	= 0.016 er/Specify)			
PURGING EQUIPM	ENT CODES:	B = Bailer;	BP ≈ Blad	der Pump;	ESP = Electri	AMPL ING D	Pump; ATA	PP ≈ Pe	enstanic Pump	<u>, 0-01</u>	let (opecity)			
							5			SAMPLING	1471	SAMPLING	10	28
SAMPLED BY (PRINT) / /	AFFILIATION: H	Neilsor	(ASL)	SAMPLER(S) SIG	NATURE(S):	- Cara				INITIATED AT:		ENDED AI:		- <u>0 %</u>
PUMP OR TUBING		uс		TUBING	. 05				Fibration Equipr	nent Type:	\odot			
DEPTH IN WELL (feet):	FIE! N	DECONTAMINATIO	DN: PUMP	Y (N)	TUBIN	G Y (N (repla	ced			DUPLICATE:	Y ()		
SAM	PLE CONTAINER	PECIFICATION			:	SAMPLE PRESERV	ATION			INTENDED AND		SAMPLING FO	UIPMENT	SAMPLE PUMP FLOW RATE (n
	1		V010157-11	PRESERVA	ITVE	TOTAL VOL		FINAL pH	(Stanard Units)	MET	HOD	COD	E	per minute)
SAMPLE 10 CODE	# CONTAINERS	MATERIAL CODE	VOLUME (mL)	USED		ADDED IN FIELD (mL)							
ELSIAN 10-001-	\top	0-	125 ~L	\sim						EPA	537M	AG	>p	150
6NJ-0615	2	re	each		\leq					 				
				1		Xa)						l	ļ	
			<u> </u>			Sich				<u> </u>		Children of the local division of the local		······································
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		\overline{k}								L		ļ'	\leq	<u>></u>
	1	\rightarrow	1							<u> </u>				
		`	4											
DEMARKS:														
isennisiko.														
MATERIAL CODE	S• ∆G≓A	mber Glass:	CG = Clear G	ass; PE=	Polyethylene;	PP = Polypr	opytene;	S = Silic	one; T≖Te	flon; O = C	ther (Specify	<i>i</i>)		
SAMPLING EQUIP	MENT CODES	: APP = Aff	er Peristaltic	Pump; B=	Bailer, B	P = Bladder Pur	np; ES	SP = Elec v Drain):	tric Submersit O = Other	ole Pump; r (Specify)				
L		RFPP = R	everse Flow I	reristanic Pump Stabilizati	r, om = otr on Criteria for ra	ange of variation of	of last three	consecutiv	ve readings				11.316	ll madiana d

 bitspill/zation Criteria Jor United Of Variation on test innere consecutive, tearmate.

 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)

 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

M2027.0003

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AerostarSES...

GROUNDWATER SAMPLING LOG

Elleworth	AFB M2027	0003			Silo:	ال مازك) + (JWI	?					
		<u></u> ר		S/		<u>الاتيارا</u>	- ^^		41-07	5 .	ATE: S	- 19-	18	
	N-C 1002	*			PU				<u>,,, ,, , , , , , , , , , , , , , , , ,</u>					
VEL		TUB	NG	1/ WE	LL SCREEN INTE	RVAL DEPTH:	si	ATIC DEPTH		0.20	PURG	IE PUMP TYPI	PP	
IAMETER (inches):	20.0		METER (inches):	'/u 6D 40	15 Ft -	30.15 _{Ft}	TC	WATER (fee	at BTOC):	0.85	OR B	AILER:	1/	
VELL VOLUME PUR	GE: 1 WELL V	OLUME = (TO	TAL WELL D	EPTH BTOC -	STATIC DEF	TH TO WATE	R) X 1	WELL CAP						
(only fill out if app	sicabia)	= (40. 40	Ft - 10	. Yマ ^{E1)} ×	0.16	galdt	- 4. 4 4:7	3	a				
EQUIPMENT VOLUM	IE PURGE: 1 E	QUIPMENT VO	DL, = PUMP \	/OLUME + (TUB	NG CAPACIT	үхт	UBING L	ENGTH) +	FLOW CELL	VOLUME	<u> </u>	`		
(only fill out if app	oficable)	NA		gal = (X	Ft.)		gai			en l		E .	
NITUAL PUMP OR TUBING DEPTH IN WELL (feel):	35		FINAL PUMP DEPTH IN WE	OR TUBING ELL (feet):	35	PURG	ing Ted at:	09	10	ENDED AT:	0932	URGED (galo		0DOR
TIME	VOLUME PURGEO	CUMUL.	PUR RA	GE DEPTH	pK (standard units)	(°C)	Ē	Stem W	OXYGEN	(mV)		(TUS)	(describe)	(describe)
62.0	(galions)	PURGED (gations)	(gp	m) WATER (reet BIDG)			mo,	<u>cm</u>		· · · · · · · · · · · · · · · · · · ·	+-			
0910	<u>⊢−,</u>	<u></u>	0.0	7 12.24	78.	10.1	u.	7.7 🤝	_ a6	5 74.2	31	5.2	Clean	none
0914	0.14	0.19	0.0	4 12.44	141		u.	/# ντ	11.75	1.9.5		1.4	1	1
0920	0.24	0.70	2 0.0	<u>- 17.08</u>	7.40 7 UK	10	<u>u</u>	ù	13.71	5 633	18	,2	\square	
0 9 1 2	0.00	0.00	7 4 0	$\frac{1}{2}$ $\frac{15.11}{12}$	145	10	u.,	ч	0.6	5 62.9	6	85	F	L
0750	0.20	<u> </u>	<u> </u>	1 (4.0)	<u>/· / /</u>	10.0								
No. of Concession, Name				_										
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									-COLORADO CARDON CO	and and a state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of				
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									<u> </u>				<u> </u>	
WELL CAPACITY (C	Gallons Per Foo	t): 0.75" = 0.02	2; 1" = 0.04	k; 1.25" = 0.06	; 2" = 0.16;	3" = 0.37; 5/16" = 0	4" = 0,6 nn∡-	35; 5" ⇒ 3/8" ⇒ 0 00/	1.02; 6*≃ 3· 1/2"=(	1.47; 12"≕ 3.010: 5/8"=	5,85 = 0.015			
TUBING INSIDE DI/ PURGING EQUIPM	A. CAPACITY (C ENT CODES:	B = Bailer;	BP = Blad	/16" = 0.0014; der Pump; E	SP = Electric	Submersible F	ourite Sourite	PP ≈ Per	istaltic Pump	ı; O ≃ Othe	er (Specify)			
					SA		ATA			SAMPLING	\$977	SAMPLING		621
SAMPLED BY (PRINT) /		NellSon	(ASL)	SAMPLER(S) SIGN/		and _				INITIATED AT:	1152	ENDED AT:		736
PUMP OR TUBING	-	25		TUBING				FIEL	D-FILTERED: Fitration Equip:	Y nent Type:	$\checkmark$	Fitter Size		70.03
DEPTH IN WELL (feet):	EIELD		N: PUMP		TUBING	Y (N (repla	ced)			DUPLICATE:	Y N			
SAM	PLE CONTAINER S	PECIFICATION			SA	MPLE PRESERV	ATION						OUIPMENT F	AMPLE PUMP
BAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (mL)	PRESERVAT	VE A	TOTAL VOL NDDEO IN FIELO (	mL)	FINAL pH (	Stanard Units)	METH	OD	COL	DE	per minuta)
ELSWH10-002-	2	PE	125mL							EPA 5	37M	AP	n	150
Clautine ND-			126-11	<u> </u>	$\rightarrow$						17		, 1	
Gw-935	2	ΡĒ	each			Sen					$\leq$			
·							$\geq$	-				$\rightarrow$	$ \rightarrow $	
		10		L					~			<u> </u>	⋛	
			$\leq$							<u>.</u>			<u>&gt;-</u> +	
REMARKS:														
MATERIAL CODE	S: AG = A	mber Glass;	CG = Clear G	lass; PE = Po	lyethytene;	PP = Polypro	pylene;	S ≈ Silico SP = Electr	ne; T = Te ic Submarch	flon; O = Oll	ner (Specify)	· · · ·		
SAMPLING EQUIP	MENT CODES	: APP = Afte RFPP = Re	er Peristaltic F werse Flow P	-ump; В = В eristallic Pump;	SM = Strav	- blauder Pdfr w Method (Tub	ing Gravi	ly Drain);	O = Other	(Specify)				
				Stabilization	Criteria for ran	ge of variation o	f last three	consecutive	e 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)

19-51/19

Aero	starSE:	Suc		GI	ROUN	DWA	TERSAN	/IPLI	NG LOO	*	hvel	l comp	k <del>ota</del>	t			
insta ^s ation: The AFO+ M2		SWORTH	1 MPB	•		Site;	Sik	10	- 44	りてい	G	)					
	8PFC 10	03			SAMPLE	10: EL	- 01HL	003	- Gu	-04	<u>5 5</u>	59 DA	TE: ()	- 3 - †	8		
		<b>_</b>		7	÷	PU	RGING DA	TA			_,	4	51.0				1
WELL DIAMETER (inches):	J.& ''	TU DIA	BING WIETER (inches	= 2/2 "	59.23	Ft -	19.28 Ft		TO WATER (fe	t et BTOC):	5 <b>Q</b>	.48	OR	BAILER:	Nav200	^ر بر	
WELL VOLUME PU (only Ell out il ap	RGE: 1 WEL pôcable)	- VOLUME = {	TOTAL WEL	L DEPTH BT	50 - 5 <b>%,48</b>	TATIC D	ертн то wa 0 / 6 3	(TER)	x well	сарасіту . <b>49</b>	gal						
EQUIPMENT VOLU (only fill out if ap	ME PURGE: 1 plicable)		VOL. = PUM =	P VOLUME + gal =	(TUBING (		ITY X	TUBIN	IG LENGTH	) + FLOW C	ELL V	OLUME	4	2			
INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	<u> </u>	1	FINAL PUMI DEPTH IN V	OR TUBING /ELL (feel):	. (	59	PURG	ing Ted at:	1512	) -		PURGING ENDED AT:	1518	TOTAL VOLUM PURGED (gaSor	ы): <b>С</b>	.30	
TIME	VOLUME PURGED (galions)	CUMUL VOLUME PURGED (gallons)	PU R (g	iRGE DEPT ATE TO pm) WATE (feet BT	H (s) R (S)	pH tandard units)	темр, ( ^о с)	Ć	μ ^{B/em}	DISSOLV OXYGEI mg/L	ED N	ORP (mV)		URBIOITY (NTUs)	GOLOR (describe)	ODOR (describe)	
1512	-	Į,	0.	05 56.2	29 -	~		<u> </u>	-		1				-	-	
1514	D.1	0.1	<u> </u>	2 37	47 /	11-	15.7	1,	202	1.9	4	12.1		<u>v</u> K	1 und	none	4
	0.5	0.2	5 6.0	S -X ¥		49	16.2		259	1.9	7	133.1		R	+1-		WERDRY
1617	10.05	0.30	0 0.	05 1 7	€- <u>(</u>	<u> </u>	-		-			_			1-	╞╴	Afresing
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WELL CAPACITY ( TUBING INSIDE DI PURGING EQUIPM	Gallons Per Fo . CAPACITY ( ENT CODES:	ot): 0,75" = 0.0 Gal./Ft.): 1/8" B = Baller:	02; 1* = 0 = 0.0006; BP = Bk	.04; 1.25" = 3/16" = 0.001 adder Pump;	0.08; 4; 1/4 ESP	2" = 0,10 = 0.002 = Electric	6; 3" = 0.3" :6; 5/16" = : Submersible	7; 4 0.004; Pump;	'= 0.65;	5" = 1.02; 1.006; 1/. Peristaltic Po	6" == 1 2" = 0.1 Jmp;	I.47; 12* 010; 5/8 O≖Oth	= 5.88 " = 0.01 er (Spec	3 ify)			
		제도	<u> </u>	SAMPLER(S) SIG	NATUREIS						SAMPL		17	SAMPLING	151	2	1
PUMP OR TUBING	······································	<u>1032+ (</u>	41	TUBING		<u> </u>	Part -		FIELI	D-FILTERED:	INITIAT	ED AT: 17. Y	N)	ENDED AT: Filter Stze	101		
DEPTH IN WELL (feet):	5	9		MATERIAL CODE	E PE			-		Filtration Equips	nent Type	e:					
SAM	FIELD	DECONTAMINATION	IN: PUMP		1	SAM	PLE PRESERVA				DOPLIC	ALE: Y		<u> </u>	SA	MPLE PUMP	
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (ml.)	PRESERV	NT/VE	AD	TOTAL VOL DED IN FIELD (ml	L)	FINAL pH (S	itanard Units)	INTEN	DED ANALYSIS METHOD	AND/OR	SAMPLING EQ CODE	UIPMENT FI	LOW RATE (mL per minute)	
EUSWH10-001- 64-059	3	PE	HSml each	<u> </u>								EPA 537M		API		doD	
- Aller Aller						`	X										
		2		·····									~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	<i>S</i>			
			<u> </u>													Contraction of the local division of the loc	
犬 い Remarks: 大子	Woter (	rleted evel hele	ow man	soon, we	rele	e on	tor of r	hon	5000 -	no w	(r	cooling	• •				
MATERIAL CODES	: AG≖Ar	nber Glass; (	CG = Clear (	Blass; PE =	Polyeth	ylene;	PP = Polypr	opylen	e; S = Silk	cone; T=	Teflon	; O = Ol	her (Spe	cify)			
SAMPLING EQUIPM	IENT CODES:	APP = Afte RFPP = R	er Peristaltic everse Flow	Pump; B Peristaltic Pur	= Bailer; np; S	BP = M = Strav	= Bladder Pun w Method (Tu	np; bing Gi	ESP = Elec avity Drain);	tric Submer O = Ot	sible P her (S	ump; pecify)				<u> </u>	j
oVi + 0 2 units. Top	in a ratura + 0	2 °C. Specific	Conductand	Stabilizatio	n Criteria	for range rvoen: a	of variation of la III readings < 2	<u>ist three</u> 20% sa	consecutive	readings ionally + 0.3	2 mo/l	or + 10% (v	vhicheve	er is oreater)	Turbidity:	: ali readinos	

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 reading ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

AerostarSES...

#### **GROUNDWATER SAMPLING LOG**

	ACD 112027	0002				Site	Site	11- 6	006	A NO	2765 1	FST	ARE	ĥ	
Installation: EliSWORIN					SA	MPLE ID:	<u> </u>	- 00 1	<u>- 6</u>	1.2 - 0	15 04	TE: C	- 20	- 18	,
WELL NO: MWI	SPPCI	101			0,				- 0	<u></u>					
WFIL		TUE	ING		r wei	L SCREEN INTE	RVAL DEPTH:	STAT	IC DEPTH	1	13 95	PUR	GE PUMP TYPE	00	
DIAMETER (inches):	2.0	DIA	METER (Inc	hes):	100 19.	99 R - 4				et BTOC):		ORE	IAILER:	γτ	
WELL VOLUME PUR	GE: 1 WELL V	Volume = (To	DTAL WE	LL DEPT	H BIOC -	STATIC DEP		rt) A 991		<b>ה</b> ר ה	a				
(enly fill out if app	ficable)	= (	20.	2	m - 13	v.95° *	0.165	gasir	1.	۰ ~u	-				
EQUIPMENT VOLUM	E PURGE: 18	EQUIPMENT V	01. = PU	MP VOLU	IME + (TUB)	NG CAPACIT	у х т	UBING LEN	IGTH) +	FLOW CELL	VOLUME				
(only fill out if app	scable}	NA			ପ୍ରଲ = (	×	Ft )		ਉਬ		gal		2		
INITIAL PUMP OR TUBING			FINAL P	UMP OR TU	BING	~	PURG	ING	55	57	PURGING	ILIU	TOTAL VOLUME	. A.	80
DEPTH IN WELL (feet):	<u> </u>	CUMUR	DEPTHI	N WELL (fe	et):	<u>د</u> الا	TEMP.	TED AT: CON	<u> </u>	DISSOLVE	ENDED AT: D ORP	TU	REIDITY	COLOR	ODOR
ТІМЕ	VOLUME PURGEO	VOLUME		RATE	το	(standard units)	(°C)	asio	"C	OXYGEN	(mV)	(	NTUS)	(describe)	(describe)
	(gailons)	PURGED		(gpm)	WATER			maya	in.	mg/L				Coud	0001
1556			<u> </u>	2.04	14.00					1 7	2 -1010		de la	Lizar	1012
1600	0.16	6.16		5.04	14.00	7.72	$    \cdot O$	0.	12	9.1	107.0	· · · · ·	52	$\vdash$	
1604	0.6	0.3		<u>) 04</u>	14,00	7.10	10.9		77	1.0	9 12/5	5	14.7		
1668	0.10	0.44		1 64	11.00	7.70	107	$D_{\cdot}$	<del>;;</del>	10.7	12.9		4	Doge	
	0.14	0.0		04		7.72	10.6	$\frac{0}{0}$	32	6.80	-186.3		- 8	L	
1617	0.14	0.40	<u> </u>	). • 1	<u> </u>		10.0	<u> </u>	<u> </u>						
			$\neg$	<											
							5					L			
					$\sim$	1 mg									<u> </u>
												<u> </u>		<u> </u>	
						<u> </u>						<u> </u>			
						<u> </u>				`	$\rightarrow$				
					<u> </u>		<u> </u>					$\vdash$			+
		0.075-00	L	0.04	1.25" = 0.08:	2' = 0.16'	3* = 0.37:	4" = 0.65;	5* =	1.02: 6" =	1,47; 12" = 5.	88		$\leq$	
TUBING INSIDE DIA	alions Per Foo , CAPACITY (0	(): 0.75 = 0.0. Sal/Ft.): 1/8"=	= 0.0006;	3/16" =	= 0.0014;	1/4" = 0.0026	5/16" = 0.	004; 3/8	" = 0,000	6; 1/2" = 0	.010; 5/8" = (	0.016			~
PURGING EQUIPM	ENT CODES:	B = Bailer;	BP = I	Bladder P	'ump; E	SP = Electric SA	Submersible F MPLING D/	ump; I ATA	PP = Pe	istatlic Pump	; O = Other	(Specity)			
		willis	1 450		LER(S) SIGNA		47					JU	SAMPLING	ما	17
DUUD OD YURKO	<u> </u>	<u>J. neiisen</u>	(IPC		NG				FIEL	D-FILTERED:	Y Y		Filter Size	1.4	mm
DEPTH IN WELL (feet):	1 3	>		MATE	RIAL CODE: P	E		<u> </u>		Filtration Equips	enl Type:	${}$			
	FIELD (	DECONTAMINATIO	DN: PL	лмр ү	()	TUBING	Y N (replaced by the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second se				DUPLICATE:	Y Q	<u></u>	s	AMPLE PUMP
SAM	LE CONTAINER S	PECIFICATION		_	PRESERVATIV	E	TOTAL VOL				INTENDED ANALY	SIS AND/OR	SAMPLING EQ	UIPMENT F	LOW RATE (mL per minute)
SALUPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	(mL)	USED	- A	DDED IN FIELD (r	ni.) F	'INAL pH (	Stanard Units)	METHO				
-CSW1411-001-		05	125~								EPA 537	M	400	,	150
6W-015	2	re	each	1											
$\square$							An					_			
$\square$	$\downarrow$					`		+					$\leftarrow$		
	$\vdash$	2						$\rightarrow$	<				200	<u>-</u> +	
		0		_											<hr/>
	<u>.</u>	L						L			L			L	
REMARKS															
MATERIAL CODES	; AG ≈ Ar	nber Glass;	CG = Cle	ar Glass;	PE = Po	yethylene;	PP = Polypro	pylene; S	= Silico	ne; T = Tel	lon; O = Othe	r (Specify	)		
SAMPLING EQUIP	MENT CODES:	APP = Aft	er Perista werse Elo	Itic Pump	; B = Ba altic Pump;	aller; BP = SM = Strav	<ul> <li>Bladder Purn Method (Tubi</li> </ul>	p; ESP ng Gravity I	= Electri Drain);	ic Submersib O = Other	ie rump; (Specif <u>y)</u>				

RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); 0 = Onier (3 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)

M2027.0003 Ju 05/20

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#### GROUNDWATER SAMPLING LOG

Installation: Eilswort	hAFB M202	27.0003				Site	Site	11-	SPRA	1 ~0	271	e T	FCT /	FREM		
WELL NO: MW	19PFL	1102			si	AMPLE ID: (	ELSWI	(1-)	062- (	SW-0	15	04	.TE: 5	- 20	-18	
						PL	JRGING DA	TA								
WELL DIAMETER (inches);	2.0'	т т о	J8ING IAMETER (inc		('OD)	LL SCREEN INT	ERVAL DEPTH:		STATIC DEP TO WATER (	TH feet BTOC):	10.0	11	PU	RGE PUMP TYPI BAILER:	Þ	
WELL VOLUME PU	RGE: 1 WELL	.VOLUME ≃ (	FOTAL WE	LL DEPT	Н ВТОС -	STATIC DE	PTH TO WATE	R) X	WELL C/	PACITY						
(only KI out if ap	picable)	-	· 26.	3	Ft - 10	. <b>ና (</b> ^{FI)} ×	0.163	gal/fl	=   + !	53	gal					
EQUIPMENT VOLU	ME PURGE: 1	EQUIPMENT	VOL. = PU	MP VOLU	JME + (TUBI	NG CAPACI	ר א או	UBING	LENGTH)	+ FLOW CE	ll vol		`			
(only is out if ap	policad;e)	N	A :		ga = (	X		+	gaj				3			
INITIAL PUMP OR TUBIN DEPTH IN WELL (feet):	۹ <b>( ز</b>	5	FINAL PI DEPTH I	ump or tr N Well (fe	JBING (1 set):	5	PURG	ING TED AT:	144	2		PURGING	500	TOTAL VOLUX! PURGED (gallor	E 15): Ĉ	. 68
THE	VOLUME	CUMUL		PURGE	DEPTH	pH {standerd	TEMP,		COND.	DISSOL	/ED	ORP	Ţί		COLOR	ODOR
STAE	(gallons)	PURGE		(gpm)	WATER (feet 810C)	units)	(0)	η	S/cm	mg/L		()		(1113)	(20001104)	luescribe
1442			C	2.04	0.90	1	Ĺ	-			1				Clear	none
1446	0.16	0.16		0.04	1.02	8.07	10.9	0.4	04	1.4	5	176.9	U	<u>51</u>		$\square$
1440	0.16	0.3		<u>7.04</u>	11.05	7.93	10.6	0.	<u>40 (</u>	1.4	<u>(</u> )	<u>173.4</u>	8	<u>6.4</u>		$\square$
	0.14	0.4		<u>70,0</u>	1102	7.12	10.3	0.	- <u>107</u> -		19 7 1	(6/. 7)	4	8.9	$\vdash$	
1453	0.12			<u>, or</u>	103	7.93	10.2		409	0,	17	1619		3.2		╞╞┯
1200	0.00	0.10	<u>s h</u>	).0-1		1.12	10.8	0,		• • •	-	1407		<u></u>		† ·
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			+													
							$\sim$	4	)							
										_						ļ
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															$\sim$	
																$\square$
WELL CAPACITY (G	allons Per Foo	t): 0.75'≃0.0	2; 1"=0	).04; 1	.25" = 0.06;	2" = 0.16;	3" = 0,37;	4" ≈ 0. 004:	.65; 5°=	1.02; 6" =	1.47;	12* = 5.8i	8 016			
PURGING EQUIPME	ENT CODES:	9 = Bailer;	= 0.0006; BP = B	a/i6 ≞ ladder Pu	10.0014, 1 imp; ES	P = Electric	Submersible P	ump;	978 - 0.00 PP = Pe	istaltic Pum	0.010, p;	0 = Olher (	Specify)			
	4	willis				SA					SAMPL	NG		SAMPLING		<u></u>
SAMPLED BY (PRINT) / A	IFFILIATION:	wilson (	45L)	SAMP	ER(S) SIGNAT	UHE(S):	112_				INITIAT		20	ENDED AT:	750	· ~
DEPTH IN WELL (feet):	- 15	)		MATER	RIAL CODE: PE					Fittration Equip	nent Typ	, L	<u>〜</u>			
Calif	FIELD I	DECONTAMINATIO	DN: PUN	AP Y	$(\mathbb{N})$	TUBING	Y N (replace	ed) TION			DUPLIC	ATE: Y		$\bigcirc$	8	WPIE EINP
	LEGONTAINER	FEORIGATION		P	RESERVATIVE		TOTAL VOL				INTEN	ED ANALYSIS	AND/OR	SAMPLING EQL	JIPARENT F	OW RATE (m
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (m	NL)	USED	AL	DED IN FIELD (m	ι)	FINAL pH (	Stanard Units)		and in top		6662		per inglassy
G.Swilli -002-60	2	PE	12 SAC									EPA 537M		APP		50
015			cach	<u> </u>		$\leftarrow$										
			-				Sen						_			
	$\geq$	<u> </u>			******			$\neg$		•		····				
	N	X			· · · · · · · · · · · ·											_
										$\geq$						
REMARKS:																
MATERIAL CODES	AG = An	ber Glass: (	CG = Clear	Glass:	PE = Polve	hytene:	PP = Polyprop	viene:	S = Silicar	le; T≖Tel	lon;	O = Other (	Specify)			
SAMPLING EQUIPM	ENT CODES:	APP = Afte	r Peristallio verse Flow	Pump; Peristal#	B = Baili c Pumo:	er; BP = SM ≕ Straw	8 adder Pump Method (Tubio	ES G Gravit	SP = Electri v Drain):	c Submersib O = Other	le Pum (Specif	 3; V)				

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)

M2027.0003

An 05/20 C-160

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#### GROUNDWATER SAMPLING LOG

Installation: Ellsworth	AFB M202	7.0003					Site:	Site	11	SPK	AY NO	22	LE 1	~ F	ME	7	
WELL NO: MW(	BPFC 1	03			s/	AMPLE 1D	E	CSWIH	1-	იივ-	600-	07	20 🕫	ITE: <b>5-</b>	- 20 - 1	8	
						·	ΡU	RGING DAT	ΓA								
WELL DIAMETER (Inches):	2.0"	TI D	UBING IAMETER (Inche)	" Y.	100 NE	LL SCREE		ERVAL DEPTH:	-	STATIC DEPT	H eet BTOC):	3.	55	PUP	RGE PUMP TYPE BAILER:	PP	•
WELL VOLUME PUP	RGE: 1 WELL	VOLUME = (	TOTAL WELL	. DEPT	Н ВТОС -	STATK	DEP	PTH TO WATE	R) X	WELL CA	PACITY			ł			
(only fill out if ap	p¥cable)	=	· 15, "	{	Ft - ] 3,	S B	) X	0.163	gal/ft	* (	.93	gal					
EQUIPMENT VOLUN	AE PURGE: 1	EQUIPMENT	VOL. = PUMP	P VOLL	IME + (TUBi	NG CAP	ACIT	Y X T	U8ING I	ENGTH) +	FLOW CE	l vol	UME				
(only fill out if ap	pūcable)	NA	<del></del>		<u></u>		×	Ft)	t	nal	<u>=</u>		<u>gal</u> (	A			
INITIAL PUMP OR TUBING	3	20	FINAL PUM DEPTH IN Y	P OR TU VELL (fe	J8ING et):	do		PURGI	NG 'ED AT:	152	4		PURGING ENDED AT:	534	TOTAL VOLUM PURGED (gallor	s): 0	.40
TINE	VOLUME PURGED	CUMUL VOLUM	- PI E R	irge Ate	DEPTH TO	p)- (stand	i tard	темр. ( ^о с)	°		DISSOLV	'ED N	ORP (mV)	rı	IRƏIDITY (NTUs)	COLOR (describe)	ODOR {describe}
	(gallons)	PURGE (gallons	D (9	spm)	WATER (feet 8TOC)	aan			m 2	1cm	mg/L						
1524	/	·	<u>()</u>	٥4	13.55	-	· _	-	-				1.40 0	<u> </u>	2	clear	1015
1520	0.14	11.0	0	<u>.04</u>	14.10	7.	78	0.5	0	. 95	4.6	<u>0</u>	198.9	$\left  \begin{array}{c} \checkmark \\ \vdots \end{array} \right $	<u>'8.(</u>		
1520	0.09	0.2	4 0	<u>.04</u>	14.45	1.0	19	18.6	<u>0</u> .	45	4.0	$\frac{y}{c}$	-150.1		<u> </u>	<u></u>	
1616	0.00	0, <u>5</u>		5	11.0	7.0	1 <u>7</u> 95	10 U	<u> </u>	<u>99</u>	<u> </u>	<u>&gt;</u>	120 L		<u>♪の</u> タユ	LIOUNY	
~ ~ ~	0.00	0.1		.01	17, 11		0.5	10.9		· · ·	(• (	<u>'U</u>	110.0	`		-	
									·····				······				
				-													
				/			$\backslash$	$\square$									
							44	LAY									<u></u>
							~		~								<u> </u>
																	<u> </u>
												-	/				
														L		$\sim$	<u> </u>
WELL CAPACITY (G	alions Per Foo	t): 0,75" = 0,0	12; 1" = 0.0	4; 1	.25" = 0.06;	2" = (	),16; 0026:	3" = 0.37;	4" = 0,€	35; 5" = xe" = 0.00€	1.02; 6"=	1.47;	12" = 5,8 5/8" = 0	8 016			
PURGING EQUIPME	NT CODES:	B = Baiter;	8P = 9la	der Pu	0.0014, i imp; ES	SP = Ele	ctric S	Submersible Pu	imp;	PP = Per	istaltic Pum	o.o.io, o;	0 = Other (	Specify)	-		
		1.641111		<b>I</b>			SAM		ΓΑ			SAMPL	ING L	-74	SAMPLING	160	) /
SAMPLED BY (PRINT) / A	FFILIATION: M	Neilson	<u>`</u>	SAMPL	LER(S) SIGNAT	URE(S):	-			t riri		INITIA		521	ENDED AT:	[] 4	<u> </u>
DEPTH IN WELL (feet):	2	LO		MATER	GRIAL CODE: PE	L					Filtration Equip	nent Typ	e:	ے گ	,		
	FIELD	ECONTAMINATI	on: Pump	Y	$(\mathbb{N})$	TU	BING	Y N(replace				DUPLI	CATE: Y			le.	
SAMP	LE LUNI AINER S	FEURICATION		P	RESERVATIVE		oAM	TOTAL VOL	,			INTEN	DED ANALYSI	S AND/OR	SAMPLING EQU	IPMENT F	LOW RATE (mL
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (mL)		USED		AD	DED IN FIELD (ml	.)	FINAL pH (8	Stanard Units)		RETIOD		GODE		,, ,
E(31411-003-	2	Pr-	(25mL	$\frown$	<				T				EPA 537M		API	•	150
CM-020	<u> </u>	2	leach			$\prec$									,,,,,		120
		_					$\geq$	Sen						_			
		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		·					$\neg$						₹ M		
																Σ	
251(42)/2																	
rcn/////0;																	
MATERIAL CODES:	AG ≕ An	nber Glass;	CG = Clear G	lass;	PE = Poly	ethylene	;F	PP = Polypropy	iene;	S = Silicon	e; T≖Tel	lon;	O = Olher (Specify)			
SAMPLING EQUIPM	ENT CODES:	APP = Afle RFPP = Re	er Peristaltic F everse Flow P	oump; eristall	B = Bail ic Pump;	ler; I SM ≍ S	BP = E traw M	Bladder Pump; Method (Tubing	ES Gravity	P = Electric Drain);	: Submersib O = Other	ie Purr (Speci	ip; fy)				
				-		and the		at undefine of lo	of three	annonthin	condinan						

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

M2027.0003

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GROUNDWATER SAMPLING LOG

RGE: 1 EQL RGE: 1 EQL ALUME RGE0 ALUME RGE0 AlUME	FC120 . 6'' 1 WELL VO »' URGE: 1 EQ	TUBI DIAM DLUME = (TO = (UUPMENT VC	ING METER (inches DTAL WELL 37,3	"ҚД С Дертн	54 50 87. BTOC -	MPLE ID: FL PU	RGING DA	? - (TA	001-	6W-	0 32	DATE:	4-25	-18	,
JRGE: 1 EQL) JRGE: 1 EQL) JRGE: 3 A JLUME IRGEO allons)). 6 '' 1 WELL VO *) URGE: 1 EQ	DLUME = (TO = (ING METER (inches DTAL WELL 37.3	DEPTH			RGING DA	TA							
JRGE: 1 EQL JRGE: 1 EQL JUME IRGEO allons)), 6 '' 1 WELL VO ») URGE: 1 EQ	DLUME = (TO = (UIPMENT VC	ING AETER (inches DTAL WELL 37.3	DEPTH	BTOC -	05 Ft -	ERVAL DEPTH:								
I WELL VOI) JRGE: 1 EQL) JRGE: 1 EQL) JUME IRGEO allons)	1 WELL VO ») URGE: 1 EQ	DLUME = (TO = (UIPMENT VC	TAL WELL	DEPTH	BTOC -	07 Ft - 6	<u>)</u> , , , , , , , , , , , , , , , , , , ,		STATIC DEPTH	1	355	PL		-	
JRGE: 1 EQL) 3 A XLUME IRGEO allons)	v) URGE: 1 EQ	= (UIPMENT VC	37.3		0100 -	STATIC DEP	TH TO WATE	R) X	WELL CAR	PACITY	0,0 -		REALER: F		
JRGE: 1 EQL) 3 2 JLUME JRGEO allons)	») URGE: 1 EQ »)	UIPMENT VC	51.3	n		()			~ ~ ~	7-1.			·		
JRGE: 1 EQI) JLUME JRGEO allons)	URGE: 1 EQ	UIPMENT VO	and the second se	v	* - <u>1</u> 3	6) F0 ×	0.(6)	gayn	۱ ,ک ۱	87	gal				
3 A XLUME IRGEO allons))L.≕PUMP	VOLUN	AE+(TUBli al = (10)		ΥΧΤ .?) ευ	UBING + A	LENGTH) +	FLOW CEL		/			
ろみ XLUME IRGEO allons)			C) -	. •	·- aru	· A	Ŭ		0	" go	C			
)LUME)RGEO allons)	32		FINAL PUMP	OR TUB	ING	32	PURG		121	6	PURGING	120	TOTAL VOLUME	. 3.	2
DLUME JRGEO allons)		CUMUL	PU	AGE	DEPTH	- pH	TEMP.		SOND.	DISSOLV	ENGLOAN	1 au	URBIDITY	COLOR	Ē
allons)	OLUME URGEO	VOLUME	R	ATE	то	(slandard	(°c)	-	usicm/	OXYGE	(mV)		(NTUs)	(describe)	(4
	allons)	PURGED	(9	pm}	WATER	units)		m	1cm	mg/L					
		(03)(05)	6	05	1560	 -				_				Chan	
		~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~		र्स	12 62	7 1/2	1	10	40		C LOG		110	d	ţ
$\frac{n}{2}$	$\cdot n$	<u> </u>	> 0.	<u>~</u>	13.04	475	11.6	17.	79	1.7	2 187.	4 4	62	(14)	£
<u>95</u>	.95	0.70	200	591	14.20	4.15	11.2	19.	50	7.40	D 193.	<u>a /</u>	30	10	
45	45	1.15	0.	09 1	17 72	7.50	11.5	19.	57	8.37	192	31/	89		
15	45	11.		19	71.01	761	11.3	101	17	9.34	141.	2 /	25		
	7.	2 2 2	- 0.0	<u>~</u> _		5 00	113	1.0	52	0 28	100	, / ,	17	-+-	
72	12	<u> 4.05</u>	- 10-	<u>07</u>	XYS	<u>1.50</u>	11.2	17		7.50	184.	<u>4 4</u>	<u>رو</u>		-
7	7	2.95	2 0.	090	12.94	<u>7.50</u>	11.4	19.	53	8.31		44	6		
9	9	3.85	5 0	.091	26.75	7.51	11.4	19	.50	7.3	3 1/95.	2 1	57		
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												+	<u> </u>		-
				<u> </u>								<u> </u>			
Per Foot); (s Per Foot);	0.75" = 0,02;	1" = 0.04	l; 1.2	5" = 0.06;	2" = 0.16;	3" = 0.37;	4" = 0.	85; 5" = 1	.02; 6* =	1.47; 12" = 6	.88			
ACITY (Gal/i	ACITY (Gal.	/F1.): 1/8" = 0	0.0006; 3	/16" = 0	.0014; 1.	4" = 0.0026;	5/16* ≈ 0,0	04;	3/8" = 0.006	1/2" = 0	.010; 5/8" =	0.016			
ODES: B	CODES: E	B = Bailer;	BP = Blad	der Pun	ıp; ES	P = Electric S	ADI NHC DA	imp;	PP = Peri	staltic Pump	C = Olhe	r (Specify)			
	_	146					VIELEN OF DA				SAMPLING /	NCC	SAMPLING	125	=
10N: A. WI		1115		SAMPLE	R(S) SIGNATI		m					(2)	ENDED AT:	120	7
3 1	3 1			TUBING					FIELD	-FILTERED:	Y (∇	Filter Size		mm
<u> </u>	2			MATERIA	L CODE: PE				F	iltration Equipri	ent Type:		<u> </u>		
FIELD DECO	FIELD DECO	ontamination:	PUMP	<u> </u>	<u>~</u>)	TUBING	Y N (replace	<u> </u>			DUPLICATE:	Y ()	<u>↓</u>		
ITAINER SPECI	NTAINER SPECI	IFICATION				SAM	PLE PRESERVA	MON			INTENOTO ANAL		SAMPLING FOL	SAL	3PU OVY
NTAINERS MAT	NTAINERS MAT	ITERIAL CODE	OLUME (mL)	PRE	ESERVATIVE USED	AD	TOTAL VOL	u	FINAL pH (SI	anard Units)	METHO	D	CODE	PMENTPL	bet
		(25~(-								1		
2 1	2	PE 0	each								EPA 53	/м	APP	j i	3
						\sum	Sen								
								_							
$a \parallel$	a							\rightarrow	<u> </u>					$\sim \perp$	
14-	14-	I.											Les /		
		~	1							/				\downarrow	
														4	
		r Glass; CG	i = Clear Gi	ass;	PE = Polye	thylene; F	PP = Polypropy	/tene;	S = Silicone	; T = Tefl	on; O = Olhe	r (Specify)			
/		3 = Ambe	a = Amber Glass; CG	3 = Amber Glass; CG = Clear G	3 = Amber Glass; CG = Clear Glass;	3 = Amber Glass; CG = Clear Glass; PE = Polye	3 = Amber Glass; CG = Clear Glass; PE = Polyethylene; F	3 = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polyprop; DES; APP = After Peristaltic Pumo; B = Bailer; BP = Bladder Pumo;	3 = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polyeropylene; iDES; APP = After Peristaltic Pump; B = Baller; BP = Bladder Pump; ES	3 = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone DES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric	3 = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Telfo IDES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible	B = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Othe DES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; DES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; C = Other (Secretic)	B = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Tetlon; O = Other (Specify) DES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; DES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; DES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; DES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; DES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; DES: APP = After Peristaltic Pump; B = Bailer; BP = Breader Pump; ESP = Electric Submersible Pump; DES: APP = After Peristaltic Pump; B = Bailer; BP = Breader Pump; ESP = Electric Submersible Pump; DES: APP = After Peristaltic Pump; B = Bailer; BP = Breader Pump; ESP = Electric Submersible Pump; DES: APP = After Peristaltic Pump; B = Bailer; BP = Breader Pump; ESP = Electric Submersible Pump; DES: APP = After Peristaltic Pump; B = Bailer; BP = Breader Pump; ESP = Electric Submersible Pump; B = Bailer; BP =	3 = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify) DES: APP = After Peristaltic Pump; B = Balder Pump; ESP = Electric Submersible Pump; PE = Pougene Eleve Podetbille Pump; BM = Starter, Method (Chubing Gravity Deal); O = Other (Specify)	3 = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Terllon; O = Other (Specify) DES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; DES: APP = After Peristaltic Pump; B = Bailer; BP = Silicone; T = Terllon; O = Other (Specify)

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)

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J.

GROUNDWATER SAMPLING LOG

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WELL DIAMETER (inches)	2"	T Ir	iubing Diameter ((~		/2"10 WE		RVAL DEPTH:	ST/	NTIC DEPT	H set BTOCX:	30	26				 n	1
WELL VOLUME	PURGE: 1 WEL	L Volume ≈ (TOTAL WE	LL DEPT	TH BTOC -	STATIC DEP	TH TO WATE	R) X V	ELL CA	PACITY	-		104	DALCH, P		,	1
(only 181 ou	if appöcable)	-	50.	ЧÒ	r - 30	,2 4₽® ×	0.163	galifit ≠	3.:	28)	gal						
EQUIPMENT VC	LUME PURGE:	1 EQUIPMENT	VOL. = PU	MP VOLI	JME + (TUBI	NG CAPACIT	Y X 1	UBING LE	NGTH) +	FLOW CEI	L VOI	.UME					1
(only fill out	lf app§cable)		÷	0	gal ≖ ((), 006 ×	49 Ft)	+ 0.,	20 gal	₹0.4	17	gal					
INITIAL PUMP OR TR DEPTH IN WELL (fee	using 45	5	FINAL P DEPTH I	UMP OR TU N WELL (fa	JBING set):	45	PURG	ING TED AT:	141	4		PURGING ENDED AT:	15 02	TOTAL VOLU! PURGED (gal	1E 3.	48)	
ТІМЕ	VOLUME PURGEO	CUMU VOLUN	L. AE	PURGE RATE	нтчэа то	pH (standard usits)	TEMP. (^P C)	CON			ieo N	ORP (mV)	т	URBIDITY (NTUs)	(describe)	(describe)	
	(galtons)	PURGE (gallon	:D sì	(gpm)	WATER (feet BTOC)	unator		m5/0	S (mg/L						<u> </u>	
[4]4				<u></u>	29.79	770	12 2								Cloud	none	linit
1422	0.4	1 1 10	5 6		33.88	$\frac{7.20}{7.20}$	14 1		10	<u>יי</u> א א	<u>4</u> 2-	10.7	5	<u>8</u> 9	++	1	
1437	0.30	0952	m	5.05	34.77	7.21	14.0	11.	05	51	5	191.9	5	39	\uparrow		
14 40	0.63	1,53		.09	35.79	7.22	14.3	11.0	5	5.7	iv	184.9	4	97			1
1451) 0.9[2.4	8 0	0.09	35.38	1.21	14.4	10.	27	5. 3	20	128.9	3	58			
1500	0.00	33	8 10	<u>).69</u>	35.91	7.20	14.6	11.(22	5.3	0	187.4	<u>,</u>	<u>23</u>			
150%	0.10	<u>3.4</u>	8 10	0.00	50.08	7.20	14.4	11.0	22	5.20	<u> </u>	186.3		<u> </u>	<u> </u>		
	+																
															1		
						$\sim_{\mathcal{F}}$											
								\geq									
																	- ·
WELL CAPACIT	(Galions Per For	l)2; 1" = C	.04; 1	.25* = 0.06;	2" ≈ 0.16;	3" = 0.37;	4" = 0.65;	5" = 1	.02; 6" =	1.47;	12" = 5.80	L 3			<u> </u>	
TUBING INSIDE	DIA. CAPACITY (Gai./Ft.): 1/8" B⇒Bailer:	= 0.0006; BP = B	3/16" =	0.0014; 1.	/4" = 0,0026; P = Electric Si	$5/16^* = 0.0$	104; 3/8 ⁴	' = 0.006 P = Peri	; 1/2" = t stallic Puroc	0.010;	5/8" = 0,0 O = Olber (5	016 Spacify)				
				- <u>\</u>		SAN	IPLING DA	TA		onanio i unip		o outer je	,peenij)	1			1
SAMPLED BY (PRINT		Willis/M.1	Veilsonk	DA)AMPL	ER(S) SIGNAT		\sim				SAMPL INITIAT	ING ED AT: 15	22	SAMPLING	150	24	
PUMP OR TUBING	45			TUBING					FIELD	-FILTERED:	10.01 Tun	Y (<u>м</u>	Filter Size		מצח	
	FIELD	DECONTAMINATI	on: Pun	IP Y		TUBING	Y (N (replace	Hall (b)	<u> </u>		DUPLIC	ATE: Y					
S	WPLE CONTAINER :	SPECIFICATION	1		-	SAMP	LE PRESERVAT	NON			INTEN			SALIE! ING FO	SA HIPMENTE EI	MPLE PUMP	
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME (m	ι) ^P	NESERVATIVE	án.	TOTAL VOL	FI	NAL pH (St	tanard Units)		METHOD	/010/01	CODE		per minute)	
112-002-66	y	0-	IZSAL	+		,	10 IV 1 1.00 (II					CD4 00314		ิก		<u>_</u>	
045	2	PE	each		\geq							EPA 537M		Monson		200	
							and				\ \						
		2		_				-						\searrow			
														-2	\leq	Σ	
															$-\uparrow$		
		1					****			3					L_		
REMARKS;																	

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)

@ 4/22/18

AerostarSES.

GROUNDWATER SAMPLING LOG

Installation: Fillswort	hAFR M20	27 0003				si	· < 11-	10) Q.,	11.		321	ก			
		<u> </u>				$-\hat{a}$	<u> </u>		<u>- 50</u>	non	93	1029	0			
WELL NO: MW	118 PF	<u>C1202</u>	<u>,</u>		S/	WIDTE IDCH	WISHE	12	003-	6	<u>316</u>	7 D/	ΠΕ: 4	-22-1	7	
						Р	URGING DA	TAE	DNH10	<-003	- 6(<u>0-1460</u>				
WELL DIAMETER (loches):	2.0 '	t I	UBING	3/		L SCREEN IN	7.72		STATIC DEPT		12	2.87	PL		5	
WELL VOLUME PU	RGE: 1 WELL	VOLUME = (TOTAL WEL	L DEPT	H BTOC -	STATIC D	EPTH TO WAT	ER) X	WELLCA	PACITY				OMILEN: Fr	-	
(only Ellout if as	ppScab(e)	-	17.	92	B . 13	17	0162	naVi		~ ~						
				10	12	2 ((VIIV)	9.00	" - D.'	72	уa					
EQUIPMENT VOLU	ME PURGE: 1	EQUIPMENT	VOL. = PUN	P VOLU	JME + (TUBI	NG CAPAC	ITY X .	UBING	ENGTH) +	FLOW CE	LL VOL	UME				
(only fill out if ap	ppficable)		ш	0	gal = (O	.004	16 FD	+ (D.20 🖬	- D	.79	0al				
										V						
DEPTH IN WELL (feet):	" 6	•	DEPTH IN	WELL (fe	et):	16	INIT	ATED AT:	153	8		ENDED AT	555	PURGED (gation	\$; O	.85
	/ VOLUME	CUMU	L. 1	VRGE	DEPTH	pH /standard	TEMP.		COND.	DISSOL	VED	ORP	т	URBIDITY	COLOR	ODOR
TIME	PURDED (gailons)	VOLUM		RATE (com)	TO WATER	units)	(°¢)	-		OXYG	EN	(mV)		(NTUs)	(describe)	(describe)
1777		(gallon:	<u>.</u>		(feet BTOC)			m,	<u>2/cm</u>	rigit.						
1520			0	.05	10.6			<u> </u>					-		Cleak	none
1544	0.20	0.	000	<u>'0></u>	13.42	7.50	2 11.8	11	10.01	10.0	<u>کر</u>	2024		61	<u>_</u>	-1
1246	0.10	0.4	00	<u>, 05</u>	13.99	7.50	2 11.4	110	6.20	9.5	3	207	3	<u>08</u>	Cloud	
1550	0.20	0.4	<u>0 0</u>	.05	14.35	7.44	1 11.3	15	5.00	9,4	56	197.3	1	121		
1555	0.25	0.	<u>85 0</u>	.05	14.71	7.49	11.3	15	5.01	9.4	50	91.3	1	100	_	<u> </u>
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WELL CAPACITY (G	allons Per Foo	l): 0.75° = 0.0	 2; 1'≃0,i		25" = 0.06;	2" = 0,16;	3" = 0.37;	4" = 0	.65; 5"=1	1.02; 6* =	: 1.47;	12" = 5.88	3			
TUBING INSIDE DIA	. CAPACITY (C	Gal./Ft.): 1/8***	= 0.0006;	3/16" =	0.0014; 1/	4" = 0.0026	; 5/16" = 0.0	104;	3/8" = 0.006	; 1/2 =	0.010;	5/8" = 0.0	016			
PURGING EQUIPME	ENT CODES:	B = Bailer;	BP ≍ 8la	dder Pu	mp; ESI	P = Electric	Submersible P	ump; TA	PP = Peri	stallic Pum	o; I	0 = Other (S	ipecify)			
	A	willis		1				IA .			SAMPL	NG		SAMPLING	م میں ا	
SAMPLED BY (PRINT) / A	M	Neilson	(ASL)	SAMPL	ER(S) SIGNAIL	RE(S):	Ja-				INITIAT		<u>></u>	ENDED AT:	120) <i>†</i>
PUMP OR TUBING	16			TUBING					FIELD	D-FILTERED:		Y C	<u>_</u> ∪_	Filter Size		mm
	FIELD D	ECONTAMINATIO	DN: PUMF	Y		TUBING	Y (replace			-tuation Equips	DUPLIC	ATE: Y		<u> </u>		
SAMP	LE CONTAINER S	PECIFICATION	•			SA	MPLE PRESERVA	TON						$rac{1}{2}$	SAL	IPLE PUNP
SAMPLE ID CODE	# CONTAINED®	MATERIAL CODE	VOLUME (m)	PI	RESERVATIVE		TOTAL VOL			tanant Lietes	INTEN	ED ANALYSIS METHOD	AND/OR	SAMPLING EQU CODE	PMENT FLO	DW RATE (mL per minule)
E 10 000E	*		rocome (mL	1	USED	A	DDED IN FIELD (m	L)								ŕ
ECSMHIX-003-	2	0.5	125~(\sim								EPA 537M		400		200
64-016		re	each											APP	•	200
						. <	XCW						~			
\		<u>`</u>											2	V		
	US I	\leq							/				1		\triangleleft	
			Y							/						
															•	
REMARKS:																
MATERIAL CODES:	AG = Am	ber Glass; C	G = Clear G	lass;	PE = Polyet	hylene;	PP = Polypropy	tene;	S = Silicone	a; T≃Tef	lon;	0 = Olher (S	ipecify)			
SAMPLING EQUIPM	ENT CODES:	APP = Afte	r Perislattic F	² ump;	B = Baile	r, BP=	Bladder Pump; Method (Tubic	Es	SP = Electric	Submersib	e Pump	ν; Δ				
		NEEL - 1(6)	atao 110W P	Sta	bilization Crite	ria for range	nomination of la	st three	consecutive r	eadings	្រមុំដំដែ	0				

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

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Q 4/22/13

Project Name:	Site Inspections of AFFF	Areas (USACE Omah	a District)			
ASL Project No:	M2027.0003				***************************************	
Installation:	Ellsworth AFB					
Date:	4-26-18					
Sample Technician(s):	A.W.illis					
Station ID: FIS	11+02-004					****
Location Description:						
3500', 240° 5W0	of Building 7219	between Row	guand RU	w 80		
Type(s) of Sample (cire	cle all that apply):	Sediment	Surface W	ater	Groundwa	ater
Sample Collected from	m (circle one):	Channel/Ditch	Holding Por	nd/Lagoon	Lake/Pond	\supset
		River/Stream	Trench		Other B	443
	MS/MSD	SEDIMENT SAI	MPLE		•	
Sample ID:	FIZMAND-004-20.	- 40 - 60 Sample	Collection Time:			
Cample Death	0-05		collection nime.		<u>`</u> _ ۲	
Sample Deptn:	<u> </u>	Seain	hent Description:	SIT/org	$\frac{1}{2}$	
Collection Method:	3 25001 DE	<i>}</i>	nalysis/Method:			
Sample Container.	J doume fe		Preservative:		NONE	

	MS/MSD	SURFACE WATER	SAMPLE			
(Somple ID:	- 102-102-004-504	~ 90) Di Samala	Collection Time:	UUUD		
Sample ID.	12 - N.S	Sample	Usection Method:	COAR		
Analysis/Method:	EPA 537M	Sa	imple Container:	2 125	a) DF	
Preservative:	NONE	Water Qu	ality (circle one):	Clear Slou	dv Turbid	Other
	G	ROUNDWATER SAM	PIE (GRAB)		****	
					فيرهمون المراجع المراجع والمراجع	
Sample ID:		Sample	Collection Lime.		~	
Sample Depth:		Et to			and the second designed and th	
Analysis/Method:	EPA 537M	C	mple Container:			
Preservative:	NONE	Water Qu	ality (circle one):	Clear Clou	dy Turbid	Other
COMMENTS:						

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ASL Project No: M2027.0003 Installation: Ellsworth AFB Date: 5-16-18 Sample Technician(s): Λ:[IG Station ID: SW19 PFC 100 4 Location Description: 475 'S E of Building 3cdS Type(s) of Sample (circle all that apply): Sediment Sample Collected from (circle one): Channel/Ditch Holding Pond/Lagoon Lake/Pond River/Stream Trench Other Sediment Description: Sample Dopth: 0-0.5 ' Sample Container: 1,250 mL Sample Container: 1,250 mL Sample Container: 1,250 mL Sample Container: 0.5 ' Sample Depth: 0-0.5 ' Sample Container: 1,250 mL Sample Container: 1,250 mL Sample Container: 0.945 Sample Depth: 0-0.5 ' Sample Container: 0.945 Collection Method: 6405 Sample Container: 1,250 mL Sample Container: 0.125 mL Sample Container: 0.125 mL Sample
Installation: Elisworth AFB Date: 5-16-18 Sample Technician(s): A.wi,116 Station ID: SW18 pFC 1004 Location Description: 475 'S E of Buildhag 3005 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 Other SEDIMENT SAMPLE Sample Depth: 0-0.5 ' Sample Depth: 0-0.5 ' Collection Method: 5/200 Sample Collection Time: 0945 Sample Container: 1,250mL SurFACE WATER SAMPLE Sample ID: ELSWH10-004-SW-001 Sample Collection Time: 0945 Sample Container: 1,250mL Preservative: NONE SurFACE WATER SAMPLE Sample ID: ELSWH10-004-SW-001 Sample Collection Time: 0945 Collection Method: 5/200 Collection Time: 0945 Sample Container: 1,250mL Preservative: NONE SurFACE WATER SAMPLE Sample Depth: 0-0.5 ' Sample Container: 2,125mL cech Preservative: NONE Water Quality (circle one): Clear Cloudy Turbid Other GROUNDWATER SAMPLE (GRAB)
Date: 5-16-18 Sample Technician(s): A.will's Station ID: SW12 PFC 1004 Location Description: 475' SE of Building 3005 Type(s) of Sample (circle all that apply): Sediment Sample Collected from (circle one): Channel/Ditch Holding Pond/Lagoon Lake/Pond River/Stream Trench Sample Collected from (circle one): Channel/Ditch Sample ID: ELSWHIO-004-SD-001 Sample Collection Time: Sample Depth: O-0.5' Sediment Description: Collection Method: SP=00 Sample Collection Time: Sample Container: 1, 250 mL Preservative: Sample ID: ELSWHIO-004-SW-001 Sample Collection Time: Sample Depth: 0-0, 5' Collection Method: EPA 537M Sample Depth: 0-0, 5' Collection Time: 0 945 Sample Depth: 0-0, 5' Sample Collection Time: 0 945 Sample Depth: 0-0, 5' Sample Collection Time: 0 945 Sample Depth: 0-0, 5' Sample Collection Time: 0 945 Sample Container: 0, 5 5'
Sample Technician(s): A.will'6 Station ID: SW12 PFC 100 4 Location Description: 475 ' 5 E of Building 3005 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: ELSWH10-004-SD-001 Sample Collection Time: 0945 Sample Depth: 0-0.5 ' Sediment Description: 0rganic 511H Collection Method: 5P500 Sample Collection Time: 0945 Sample Container: 1, 250 mL Preservative: NONE Sample Depth: 0-0.5 ' Collection Method: EPA 537M Sample Depth: 0-0.5 ' Sample Collection Time: 0945 Sample Container: 1, 250 mL Preservative: NONE Sample Depth: 0-0.5 ' Collection Method: 6040 Analysis/Method: EPA 537M Sample Container: 2, 125mL coch Preservative: NONE Water Quality (circle one): Clear Cloudy Turbid Other GROUNDWATER SAMPLE (GRAB)
Station ID: SWIRPEC 1004 Location Description: 475 ' 5 E of Building 3005 Type(s) of Sample (circle all that apply): Sediment Surface Water Groundwater Sample Collected from (circle one): Channel/Ditch Holding Pond/Lagoon Lake/Pond Sample Collected from (circle one): Channel/Ditch Holding Pond/Lagoon Lake/Pond Sample Collected from (circle one): Channel/Ditch Holding Pond/Lagoon Lake/Pond Sample Collection film: 0945 Sectiment Description: Organic Silt Collection Method: 5900 Sediment Description: Organic Silt Collection Method: 5900 Preservative: NONE Sample Container: 1, 250mL Sample Collection Time: 0945 Sample Depth: 0-0,5 ' Collection Method: 6296 Sample Depth: 0-0,5 ' Collection Method: 6296 Sample Depth: 0-0,5 ' Sample Collection Time: 0945 Analysis/Method: EPA 537M Sample Collection Time: 0445 Preservative: NONE Sample Container: 2, 125mL code Preservative: <
Location Description: 475 ' 5 E of Building 3005 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 Sample Collected from (circle one): Channel/Ditch Holding Pond/Lagoon Lake/Pond River/Stream Trench Other Other Sample ID: ELSWH 10 ~ 004 - 5D ~ 001 Sample Collection Time: D 945 Sample Depth: 0 ~ 0.5 ' Sediment Description: Organic Sill+ Collection Method: 5 / 000 Sediment Description: EPA 537M Sample Container: 1, 2 5 0 mL Preservative: NONE Sample Depth: 0 - 0, 5 ' Sample Collection Time: 0 945 Sample Depth: 0 - 0, 5 ' Collection Method: Gend . Sample Depth: 0 - 0, 5 ' Sample Collection Time: 0 945 . Sample Depth: 0 - 0, 5 ' Collection Method: 2, 125 mL coch . Analysis/Method: EPA 537M Sample Container: </td
475' S E of Building 3005 Type(s) of Sample (circle all that apply): Sediment Surface Water Groundwater Sample Collected from (circle one): Channel/Ditch Holding Pond/Lagoon Lake/Pond Sample Collected from (circle one): Channel/Ditch Holding Pond/Lagoon Lake/Pond Sample Collected from (circle one): Channel/Ditch Holding Pond/Lagoon Lake/Pond Sample Collected from (circle one): Channel/Ditch Holding Pond/Lagoon Lake/Pond Sample Collection Time: D 945 Sample Depth: O - 0.5 ' Sediment Description: Organic Sill+ Collection Method: EPA 537M Sample Container: 0 945 Sample Collection Time: D 945 Sample Depth: 0 - 0.5 ' Collection Method: Gene Collection Time: 0 945 Sample Depth: 0 - 0.5 ' Coll
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 Other Sample Collected from (circle one): Channel/Ditch Holding Pond/Lagoon Lake/Pond SetDIMENT SAMPLE SetDIMENT SAMPLE SetDIMENT SAMPLE SetDiment Description: D 945 Sample Depth: O - 0.5 ' Sediment Description: O rganic 3ilt Analysis/Method: EPA 537M Sample Container: 1, 250mL Preservative: NONE Sample Collection Time: D 945 Sample ID: ELSWH10-004-SW-001 Sample Collection Time: D 945 Collection Method: Gan5 Sample Depth: D - 0, 5 ' Collection Method: Gan5 Collection Method: Gan5 Sample Depth: D - 0, 5 ' Sample Collection Time: D 945 Groundwater Sample Depth: D - 0, 5 ' Collection Method: Gan5 Gan5 Sample Container: D - 0, 5 ' Collection Method: Gan45 Gan5
Sample Collected from (circle one): Channel/Ditch Holding Pond/Lagoon Lake/Pond River/Stream Other Other
River/Stream Other SEDIMENT SAMPLE SEDIMENT SAMPLE Sample Depth: 0 - 0.5 ' Sample Collection Time: D 945 Sample Depth: 0 - 0.5 ' Sediment Description: Organic Sillt Collection Method: SPEND Preservative: NONE SURFACE WATER SAMPLE SurFACE WATER SAMPLE Sample Dopth: 0 - 0.5 ' Sample Collection Time: 0 945 SurFACE WATER SAMPLE Sample Depth: 0 - 0.5 ' Collection Time: 0 945 Sample Collection Time: 0 945 Collection Method: Gaand Sample Collection Time: 0 9445 Collection Method: Gaand Colspan= Colspan= Colspan= Colspan="2">Colspan= Colspan= Co
SEDIMENT SAMPLE Sample ID: ELSWHIO-004-SD-001 Sample Collection Time: 0945 Sample Depth: 0-0.5 ' Sediment Description: 0rganic Sill+ Collection Method: 59000 Analysis/Method: EPA 537M Sample Container: 1,250mL Preservative: NONE SURFACE WATER SAMPLE Sample ID: ELSWHI0-004-SW-001 Sample Collection Time: 0945 Sample Depth: 0-0.5 ' Collection Method: Gans Sample Depth: 0-0.5 ' Sample Collection Time: 0945 Sample Depth: 0-0.5 ' Collection Method: Gans Preservative: NONE Sample Container: 2, 125mL coch Preservative: NONE Water Quality (circle one): Clear GROUNDWATER SAMPLE (GRAB) Sample Container: 2, 125mL coch
Sample ID: ELSWHIO-DO4-SD-COI Sample Collection Time: D 945 Sample Depth: O - 0.5 ' Sediment Description: Organic Silt Collection Method: SPSON Analysis/Method: EPA 537M Sample Container: 1,250mL Preservative: NONE SURFACE WATER SAMPLE Sample ID: ELSWHIO-004-SW-001 Sample Collection Time: 0 945 Sample Depth: D - 0.5 ' Collection Method: 6/2945 Sample Depth: D - 0.5 ' Collection Method: 6/2945 Sample Depth: D - 0.5 ' Sample Collection Time: 0 945 Sample Depth: D - 0.5 ' Collection Method: 6/2945 Preservative: NONE Water Quality (circle one): Clear Cloudy Turbid Other GROUNDWATER SAMPLE (GRAB) Sample Collection Preservative: Nohe Sample Collection Preservative: Sample Collection Preservative
Sample Depth: 0-0.5' Sediment Description: Organic Sill Collection Method: 5Pon Analysis/Method: EPA 537M Sample Container: 1,250mL Preservative: NONE SURFACE WATER SAMPLE Sample ID: ELSWH10-004-SW-001 Sample Collection Time: 0945 Sample Depth: 0-0.5' Collection Method: 6rand Sample Depth: 0-0.5' Collection Method: 6rand Sample Depth: 0-0.5' Collection Method: 6rand Preservative: NONE Water Quality (circle one): Clear Cloudy GROUNDWATER SAMPLE (GRAB)
Collection Method: SPSON Analysis/Method: EPA 537M Sample Container: 1,250mL Preservative: NONE SurFACE WATER SAMPLE Sample ID: ELSWH10-004-SW-001 Sample Collection Time: 0945 Sample ID: ELSWH10-004-SW-001 Sample Collection Time: 0945 Sample Depth: 0-0,5' Collection Method: 6@AA5 Analysis/Method: EPA 537M Sample Container: 2,125mL cmch Preservative: NONE Water Quality (circle one): Clear Cloudy Turbid GROUNDWATER SAMPLE (GRAB) Cloudy Turbid Other
Sample Container: 1,250mL Preservative: NONE SurfACE WATER SAMPLE Sample ID: ELSWH10-004-SW-001 Sample Collection Time: 0945 Sample Depth: 0-0,5' Collection Method: 6/445 Analysis/Method: EPA 537M Sample Container: 2, 125mL cach Preservative: NONE Water Quality (circle one): Clear GROUNDWATER SAMPLE (GRAB) Clear Cloudy Turbid
SURFACE WATER SAMPLE Sample ID: ELSWH10-004-SW-001 Sample Collection Time: 0945 Sample Depth: 0-0.5' Collection Method: 6RAD Analysis/Method: EPA 537M Sample Container: 2, 125mL coch Preservative: NONE Water Quality (circle one): Clear Cloudy Turbid GROUNDWATER SAMPLE (GRAB) Collection Cloudy Collection Cloudy Collection Cloudy Cloudy Collection Cloudy
SURFACE WATER SAMPLE Sample ID: ELSWH10-004-SW-001 Sample Collection Time: 0945 Sample Depth: 0-0,5' Collection Method: 6@A6 Analysis/Method: EPA 537M Sample Container: 2,125mL cach Preservative: NONE Water Quality (circle one): Cloudy Turbid Other GROUNDWATER SAMPLE (GRAB) Collection Cloudy Collection Cloudy Cloudy
SURFACE WATER SAMPLE Sample ID: ELSWH10-004-SW-001 Sample Collection Time: 0945 Sample Depth: 0-0.5' Collection Method: 6RAB Analysis/Method: EPA 537M Sample Container: 2, 125mL cach Preservative: NONE Water Quality (circle one): Cloudy Turbid GROUNDWATER SAMPLE (GRAB) Collection Sample Container Cloudy Turbid
Sample ID: ELSWHID-004-SW-001 Sample Collection Time: 0945 Sample Depth: 0-0,5' Collection Method: 62n6 Analysis/Method: EPA 537M Sample Container: 2,125mL cach Preservative: NONE Water Quality (circle one): Clear Cloudy Turbid GROUNDWATER SAMPLE (GRAB) Collection Time: 0945 Collection Method: 62n6 Collection
Sample Depth: D-0,5' Collection Method: GRAD Analysis/Method: EPA 537M Sample Container: 2,125mL cach Preservative: NONE Water Quality (circle one): Clear Cloudy Turbid Other GROUNDWATER SAMPLE (GRAB)
Analysis/Method: EPA 537M Sample Container: 2, 125mL cach Preservative: NONE Water Quality (circle one): Clear Cloudy Turbid Other GROUNDWATER SAMPLE (GRAB)
Preservative: NONE Water Quality (circle one): Clear Cloudy Turbid Other GROUNDWATER SAMPLE (GRAB)
GROUNDWATER SAMPLE (GRAB)
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: GPS

C-16 5/19

Project Name:	Site Inspections of AFF	FF Areas (USACE C	maha District)			
ASL Project No:	M2027.0003					
Installation:	Ellsworth AFB					
Date:	5/16/18					
Sample Technician(s):	A.Willis					
Station ID: 5WIS	8PFC 1106					
Location Description:						
1300°, 2805Wof	Pump house #2				***********	
Type(s) of Sample (circ	cle all that apply):	Sediment	Surface W	/ater	Groundwa	ater
Sample Collected from	m (circle one):	Channel/Ditch	Holding Po	nd/Lagoon	Lake/Pond	
		River/Stream	Trench		Other	
		SEDIMEN	SAMPLE			
Sample ID:	ELSWH11-006-	SD1001 Sa	mple Collection Time:	0900		
Sample Depth:	6-0.5'	5	Sediment Description:	organic	silt	
Collection Method:	Spon		Analysis/Method:		EPA 537M	
Sample Container:	1,250mL		Preservative:		NONE	
L						
		SURFACE WA				
Sample ID:	ELSWH11-006 -	5 W-001 Sa	mple Collection Time: _	0900		
Sample Depth:	0-0.51		Collection Method:	graub		-,,
Analysis/Method:	EPA 537N	Λ	Sample Container:	2,125	mleam	Other
Preservative:	NONE	vvate	er Quality (circle one):		ουαγ Γυτρία	Other
		GROUNDWATER	SAMPLE (GIAB)			
Sample ID:		Sa	nple Collection Time:			
Sample Depth:		- *	Collection Method:	Charles and the second se		
Analysis/Method:	EPA 537N	Λ	Sample Container:			
Preservative:	NONE	Wate	er Quality (circle one):	Clear Clo	oudy Turbid	-Other
COMMENTS:	PSV			*********************************	**************	
M2027 0002			167 / /			2/6/10
1v12027.0003	(Dr a	5/ 19			5/0/19

Project Name:	Site Inspections of AFFF	Areas (USA	CE Omaha	a District)			
ASL Project No:	M2027.0003						
Installation:	Ellsworth AFB						
Date:	4-22-18	······································					
Sample Technician(s):	A.Willis / M. Neils	ωn	\sim		·····		
Station ID: -70-80-90	Lows-and-Out full 430	Pond # 3)	5W18	PFC 0204-12	04 Sit	e 12 - Build	ding 88240
Location Description:		ł.			01 010	UII Duii	
3225', 210° 5W	of building 7230	NEAR RO	0PW				
Type(s) of Sample (circle all that apply):		Sedime	Surface V		Vater	Grou	Indwater
Sample Collected fro	m (circle one):	Channel/[Ditch	Holding Pa	nd/Lagoon	Lake/	Pond
				Trench		Othe	Culvert
		SEDI	MENTSAN	IPLE			
Sample ID:	ELSWH12-004- 50	100-0	Sample	Collection Time:	1615	5	
Sample Depth:	0-0.6		Sedim	ent Description:	Jandu	silt	
Collection Method:	5000l		А	nalysis/Method:		EPA 537M	
Sample Container:	1,250mL PE			Preservative:		NONE	
	·			-			
		SURFACE	E WATER \$	SAMPLE			
Sample ID:	ELSIA/HI2-004-5~	0 - 00	Sample (Collection Time;	1615		
Sample Depth:	0-0.6	·····	Co	llection Method:	GRAG	3	
Analysis/Method:	EPA 537M		Sai	mple Container:	2,125	ML PE	
Preservative:	NONE		Water Qua	llity (circle one):	Clear (Cloudy Turt	oid Other
	GI	ROUNDWA	TER SAM	PLE (GRAB)		***************************************	
Sample ID:			(Sample)	Collection Time:			
Sample Depth:				tection Method:			
Analysis/Method:	EPA 537M		Sar	nple Container:			
Preservative:	NONE		Water Qua	lity (circle one):	Clear	Cloudy Turk	oid Other

COMMENTS:							
				(ga	$D_{4/2}$	2/18	
				,		1.0	
·····							



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	Project Name:	SI of AFF	F Areas Omaha		
	ASL Project No:	M2027.0	003		
	Installation:		Ellswo	rth AFB	
	Date:	Giles 1,2,2	1,4,5,6,7,8,9,11	12 on 6	-1-18 / sik 12 6-4-
Sa	ample Technician:	A.willis,	J. Vojak		/
	Sheet:	1 of 2			
Well:	MW18PFC0101	Well:	MW18PFC0102	Well:	MW18PFC0103
Time:	0945	Time:	002	Time:	0952
DTŴ:	16.62 FT BTOC	DTW:	22.39 FT BTOC	DTW:	14.69 FT BTOC
Final TD of	f Well: 21.91	Final TD of	Well: <u> </u>	Final TD of	Well: 22.28
Well:	MW18PFC0201	Well:	MW18PFC0202	Well:	MW18PFC0203
Time:	1058	Time:	1044	Time:	1052
DTW:	14,07 FT BTOC	DTW:	/3, 02 FT BTOC	DTW:	4,47 FT BTOC
Final TD of	f Well: <u>39,78</u>	Final TD of	Well: <u>39,31</u>	Final TD of	Well: 18.20
Well:	MW18PFC0204	Well:	MW18PFC0205	Well:	MW18PFC0206
Time:	(334	Time:	1321	Time:	1326
DTW:	33,74 FT BTOC	DTW:	22,97 FT BTOC	DTW:	19,51 FT BTOC
Final TD of	fWell: 44,04	Final TD of	Well: <u>33,47</u>	Final TD of	Well: 19.87
Well:	MW18PFC0207	Well:	¥ MW18PFC0301	Well:	MW18PFC0302
Time:	1315	Time:	0858	Time:	0901
DTW:	20,47 FT BTOC	DTW:	8.91 FT BTOC	DTW:	/1.28 FT BTOC
Final TD of	Well: <u>33.84</u>	Final TD of	Well: <u>(8,97</u>	Final TD of	Well: / 9,58
Well:	MW18PFC0303	Well:	MW18PFC0401	Well:	MW18PFC0402
Time:	0905	Time:	1440	Time:	1429
DTW:	9,32 FT BTOC	DTW:	2္၀,ၷ႙ FT BTOC	DTW:	29.28 FT BTOC
Final TD of	Well: 12.90	Final TD of	Well: 34.06	Final TD of	Well: <u>43.76</u>
Well:	MW18PFC0403	Well:	MW18PFC0501	Well:	MW18PFC0502
Time:	1432	Time:	6748	Time:	0752
DTW:	27.41 FT BTOC	DTW:	19.40 FT BTOC	DTW:	17.43 FT BTOC
Final TD of	Well: <u>38.92</u>	Final TD of	Well: <u>34.69</u>	Final TD of	Well: <u>29.61</u>
Well:	MW18PFC0601	Well:	MW18PFC0602	Well:	MW18PFC0603
Time:	6350	Time:	0919	Time:	0934
DTW:	13.17 FT BTOC	DTW:	/0.77 FT BTOC	DTW:	14/42 FT BTOC
Final TD of	Well: 18.79	Final TD of	Well: 19,08	Final TD of	Well: <u>59,55</u>
Well:	MW18PFC0701	Well:	MW18PFC0702	Well:	MW18PFC0703
Time:	1020	Time:	1016	Time:	1025
DTW:	13.66 FT BTOC	DTW:	/3.96 FT BTOC	DTW:	/5,4/ FT BTOC
Final TD of	Well: 39.13	Final TD of	Well: 24.23	Final TD of	Well: 24,07-
Well:	MW18PFC0801	Well:	MW18PFC0802	Well:	MW18PFC0803
Time:	1545	Time:	1543	Time:	1540
DTW:	14.36 FT BTOC	DTW:	14, 7/ FT BTOC	DTW:	15,07 FT BTOC
Final TD of	Well: 51.09	Final TD of	Well: <u>49.26</u>	Final TD of	Well: <u>49.83</u>

* 0301 had stunding water in vault up to TOC



Project Name:	SI of AFFF	- Areas Omaha		
ASL Project No:	M2027.000	03		
Installation:		Ellswo	orth AFB	
Date:	site 1,2,3,	4,5,67,8,9,11	126-1-1	8/ Sile 10 6-4-18
Sample Technician:	A. Willis,	J. Vojak		
Sheet:	2 of 2			
Well: MW18PFC0901A	Well:	MW18PFC0902/4	Well:	MW18PFC1001
Time: 8945 1341	Time:	+002 1346	Time:	1413
DTW: 31.72 - 16-6-2 FT BTOC	DTW: 25,7 <u>0</u>	22.39 FT BTO	CDTW:	SIN FT BTOC
Final TD of Well: 21-9+ 33.91	Final TD of V	Vell: <u> </u>	Final TD o	f Well: H9-II
Well: MW18PFC1002	Well:	MW18PFC1003	Well:	MW18PFC1101
Time: 1410	Time:	1520	Time:	6805
DTW: 9.90 FT BTOC	DTW:	56.61 FT BTO	CIDTW:	12,57 FT BTOC
Final TD of Well: 39.31	Final TD of V	Vell: <u>59.53</u>	Final TD o	f Well:
Well: MW18PFC1102	Well:	MW18PFC1103	Well:	MW18PFC1201
Time: 6국21	Time:	0830	Time:	1240
DTW: 9.32 FT BTOC	DTW:	13.76 FT BTO	DTW:	12.49 FT BTOC
Final TD of Well: 19.17	Final TD of V	Vell: 23.71	Final TD o	f Well: <u>37.17</u>
Well: MW18PFC1202	Well:	MW18PFC1203	Well:	MW930107
Time: 1247	Time:	254	Time:	1006
DTW: 30.50 FT BTOC	DTW:	12.31 FT BTO	C DTW:	31.75 FT BTOC
Final TD of Well: 50.65	Final TD of V	Vell: 17.47	Final TD o	f Well: <u>37,28</u>
		BLANK		

Appendix D Laboratory Case Narratives Data Validation Report and Analytical Data Sheets DATA VALIDATION REPORT

M2027.0003 (Omaha) Ellsworth AFB

SAMPLE DELIVERY GROUP: B894616, B897127, B8A6782, B8B1135, B8C0381, B8C4298, B8D4761, B8J4786

Prepared for

Aerostar SES LLC

May 21, 2018, Revised August 13, 2018





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- 5 FD RPDs
- 6 Extracted Internal Standards
- 7 Injected Internal Standards



ACRONYMS AND ABBREVIATIONS

°C	Celsius
%	Percent
%D	percent difference
В	blank contamination
CB	calibration blank
CCAL	continuing calibration
CCV	continuing calibration verification
COC	chain of custody
CLP	Contract Laboratory Program
DL	detection limit
EPA	US Environmental Protection Agency
ER	equipment rinsate
FB	field blank
FD	field duplicate
ICAL	initial calibration
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
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
RPD	relative percent difference
RRF	relative response factor
RSD	relative standard deviation
SDG	sample delivery group
ТВ	trip blank
U	not detected
UJ	not detected; associated value is an estimate



I. INTRODUCTION

Task Order Title: M2027.0003 (Omaha) Ellsworth AFB

Contract: W9128F-15-D-0051

MEC^x Project No.: 1529.001H.01

Sample Delivery Group: B894616, B897127, B8A6782, B8B1135, B8C0381, B8C4298, B8D4761, B8J4786

Project Manager: Jenny Vance

Matrix: Soil/Water

QC Level: Stage 2B, Stage 4

No. of Samples: 151

Laboratory: Maxxam

TABLE 1 - SAMPLE IDENTIFICATION

Sample Name	Lab Sample Name	Matrix	Collection	Method	Validation Level
ELSWH08-001-SO-030	GNR551	SO	2018-04-23 15:05	E537M	Stage 2B
ELSWH08-001-SS-001	GNR550	SO	2018-04-23 09:55	E537M	Stage 2B
ELSWH08-002-SO-040	GNR548	SO	2018-04-23 08:30	E537M	Stage 2B
ELSWH08-002-SO-940	GNR549	SO	2018-04-23 08:30	E537M	Stage 2B
ELSWH08-002-SS-001	GNR546	SO	2018-04-22 14:45	E537M	Stage 2B
ELSWH08-003-SO-046	GNR569	SO	2018-04-22 09:40	E537M	Stage 2B
ELSWH08-003-SS-001	GNR568	SO	2018-04-21 14:25	E537M	Stage 2B
ELSWH08-004-SO-051	GNR571	SO	2018-04-22 14:25	E537M	Stage 2B
ELSWH08-004-SS-001	GNR566	SO	2018-04-21 11:40	E537M	Stage 2B
ELSWH10-001-SS-001	GNR552	SO	2018-04-24 11:00	E537M	Stage 2B
ELSWH12-001-SO-023	GNR561	SO	2018-04-19 17:10	E537M	Stage 2B
ELSWH12-001-SS-001	GNR559	SO	2018-04-19 15:05	E537M	Stage 2B
ELSWH12-001-SS-901	GNR560	SO	2018-04-19 15:05	E537M	Stage 2B
ELSWH12-002-GW-045	GNR553	WG	2018-04-22 15:02	E537M	Stage 2B
ELSWH12-002-SO-036	GNR558	SO	2018-04-19 11:35	E537M	Stage 2B
ELSWH12-002-SS-001	GNR557	SO	2018-04-19 09:57	E537M	Stage 2B
ELSWH12-003-GW-016	GNR554	WG	2018-04-22 15:55	E537M	Stage 4



Sample Name	Lab Sample Name	Matrix	Collection	Method	Validation Level
ELSWH12-003-SO-006	GNR564	SO	2018-04-20 14:30	E537M	Stage 4
ELSWH12-003-SS-001	GNR565	SO	2018-04-20 09:57	E537M	Stage 2B
ELSWH12-004-SD-001	GNR555	SE	2018-04-22 16:15	E537M	Stage 4
ELSWH12-004-SW-001	GNR556	WS	2018-04-22 16:15	E537M	Stage 4
ELSWH-RS-001	GNR562	WQ	2018-04-19 16:45	E537M	Stage 2B
ELSWH-RS-002	GNR563	WQ	2018-04-20 14:25	E537M	Stage 2B
ELSWH-RS-003	GNR567	WQ	2018-04-21 14:20	E537M	Stage 2B
ELSWH-RS-004	GNR570	WQ	2018-04-22 14:22	E537M	Stage 2B
ELSWH-RS-005	GNR547	WQ	2018-04-23 08:25	E537M	Stage 2B
ELSWH02-001-SO-030	GOF439	SO	2018-04-26 12:57	E537M	Stage 2B
ELSWH02-002-SO-031	GOF438	SO	2018-04-25 15:25	E537M	Stage 2B
ELSWH02-003-GW-013	GOF448	WG	2018-04-26 15:41	E537M	Stage 2B
ELSWH02-003-SO-004	GOF437	SO	2018-04-25 11:00	E537M	Stage 2B
ELSWH02-004-SD-001	GOF444	SE	2018-04-26 14:40	E537M	Stage 2B
ELSWH02-004-SD-901	GOF445	SE	2018-04-26 14:40	E537M	Stage 2B
ELSWH02-004-SW-001	GOF446	WS	2018-04-26 14:40	E537M	Stage 2B
ELSWH02-004-SW-901	GOF447	WS	2018-04-26 14:40	E537M	Stage 2B
ELSWH08-002-GW-045	GOF443	WG	2018-04-26 13:45	E537M	Stage 2B
ELSWH08-003-GW-045	GOF442	WG	2018-04-26 11:39	E537M	Stage 2B
ELSWH10-001-SO-040	GOF435	SO	2018-04-24 15:35	E537M	Stage 2B
ELSWH12-001-GW-032	GOF441	WG	2018-04-25 12:55	E537M	Stage 2B
ELSWH-RS-006	GOF434	WQ	2018-04-24 15:25	E537M	Stage 2B
ELSWH-RS-007	GOF436	WQ	2018-04-25 10:53	E537M	Stage 2B
ELSWH-RS-008	GOF440	WQ	2018-04-26 12:40	E537M	Stage 2B
ELSWH02-001-GW-035	GQ1097	WG	2018-05-04 12:31	E537M	Stage 2B
ELSWH02-002-GW-035	GQ1096	WG	2018-05-04 09:31	E537M	Stage 2B
ELSWH02-006-GW-030	GQ1099	WG	2018-05-04 13:50	E537M	Stage 4
ELSWH02-006-SO-024	GQI081	SO	2018-05-01 11:50	E537M	Stage 2B
ELSWH02-006-SS-001	GQ1079	SO	2018-05-01 09:20	E537M	Stage 4

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Sample Name	Lab Sample Name	Matrix	Collection	Method	Validation Level
ELSWH02-007-SS-001	GQ1092	SO	2018-05-03 10:40	E537M	Stage 2B
ELSWH02-008-SS-001	GQ1090	SO	2018-05-02 14:19	E537M	Stage 2B
ELSWH05-001-GW-030	GQ1098	WG	2018-05-04 15:26	E537M	Stage 2B
ELSWH05-001-SO-028	GQ1086	SO	2018-05-02 09:45	E537M	Stage 2B
ELSWH05-001-SS-001	GQI084	SO	2018-05-02 07:42	E537M	Stage 2B
ELSWH05-002-GW-025	GQ1095	WG	2018-05-03 16:30	E537M	Stage 2B
ELSWH05-002-SO-020	GQI083	SO	2018-05-01 15:32	E537M	Stage 2B
ELSWH05-002-SS-001	GQI082	SO	2018-05-01 13:35	E537M	Stage 2B
ELSWH05-003-SO-009	GQI088	SO	2018-05-02 11:45	E537M	Stage 2B
ELSWH05-003-SO-909	GQ1089	SO	2018-05-02 11:45	E537M	Stage 2B
ELSWH05-003-SS-001	GQI087	SO	2018-05-02 10:49	E537M	Stage 2B
ELSWH06-002-SO-010	GQI111	SO	2018-05-05 14:15	E537M	Stage 2B
ELSWH06-002-SS-001	GQI110	SO	2018-05-05 13:15	E537M	Stage 4
ELSWH06-003-SO-054	GQI109	SO	2018-05-05 11:40	E537M	Stage 2B
ELSWH06-003-SS-001	GQI107	SO	2018-05-05 08:08	E537M	Stage 2B
ELSWH08-001-GW-044	GQ1094	WG	2018-05-01 11:41	E537M	Stage 2B
ELSWH09-003-SO-028	GQI101	SO	2018-05-04 09:57	E537M	Stage 2B
ELSWH09-003-SS-001	GQ1093	SO	2018-05-04 08:00	E537M	Stage 2B
ELSWH10-002-SO-029	GQI106	SO	2018-05-04 17:10	E537M	Stage 2B
ELSWH10-002-SS-001	GQI105	SO	2018-05-04 15:22	E537M	Stage 2B
ELSWH11-003-SO-015	GQI103	SO	2018-05-04 13:00	E537M	Stage 2B
ELSWH11-003-SS-001	GQI102	SO	2018-05-04 11:00	E537M	Stage 2B
ELSWH11-005-SS-001	GQI104	SO	2018-05-04 13:15	E537M	Stage 2B
ELSWH-RS-009	GQ1080	WQ	2018-05-01 11:40	E537M	Stage 2B
ELSWH-RS-010	GQI085	WQ	2018-05-02 08:00	E537M	Stage 2B
ELSWH-RS-011	GQI091	WQ	2018-05-03 09:32	E537M	Stage 2B
ELSWH-RS-012	GQI100	WQ	2018-05-04 09:52	E537M	Stage 2B
ELSWH-RS-013	GQI108	WQ	2018-05-05 11:35	E537M	Stage 2B
ELSWH02-005-SO-034	GRF770	SO	2018-05-07 13:05	E537M	Stage 2B



Sample Name	Lab Sample Name	Matrix	Collection	Method	Validation Level
ELSWH03-002-GW-017	GRF780	WG	2018-05-10 14:21	E537M	Stage 2B
ELSWH03-002-SO-011	GRF766	SO	2018-05-06 13:50	E537M	Stage 2B
ELSWH03-002-SO-911	GRF767	SO	2018-05-06 13:50	E537M	Stage 2B
ELSWH03-003-GW-016	GRF779	WG	2018-05-10 13:21	E537M	Stage 2B
ELSWH03-003-SO-011	GRF768	SO	2018-05-06 15:03	E537M	Stage 2B
ELSWH03-004-SO-011	GRF771	SO	2018-05-07 16:05	E537M	Stage 4
ELSWH06-001-GW-018	GRF778	WG	2018-05-09 11:33	E537M	Stage 4
ELSWH06-001-SO-012	GRF765	SO	2018-05-06 10:40	E537M	Stage 2B
ELSWH06-001-SS-001	GRF764	SO	2018-05-06 10:13	E537M	Stage 2B
ELSWH06-002-GW-018	GRF776	WG	2018-05-09 10:35	E537M	Stage 2B
ELSWH06-002-GW-918	GRF777	WG	2018-05-09 10:35	E537M	Stage 2B
ELSWH06-003-GW-055	GRF775	WG	2018-05-07 16:21	E537M	Stage 2B
ELSWH06-004-SO-035	GRF762	SO	2018-05-06 09:10	E537M	Stage 2B
ELSWH06-004-SS-001	GRF760	SO	2018-05-06 07:45	E537M	Stage 2B
ELSWH06-004-SS-901	GRF761	SO	2018-05-06 07:45	E537M	Stage 2B
ELSWH07-001-SO-029	GRF773	SO	2018-05-08 12:56	E537M	Stage 2B
ELSWH07-001-SS-001	GRF772	SO	2018-05-08 08:50	E537M	Stage 2B
ELSWH07-002-SS-001	GRF759	SO	2018-05-09 14:10	E537M	Stage 4
ELSWH07-004-SO-013	GRF747	SO	2018-05-08 14:00	E537M	Stage 2B
ELSWH07-004-SS-001	GRF774	SO	2018-05-08 13:20	E537M	Stage 2B
ELSWH11-001-SO-012	GRF755	SO	2018-05-09 10:48	E537M	Stage 2B
ELSWH11-001-SS-001	GRF754	SO	2018-05-09 10:00	E537M	Stage 2B
ELSWH11-002-SO-010	GRF751	SO	2018-05-09 09:35	E537M	Stage 2B
ELSWH11-002-SS-001	GRF750	SO	2018-05-09 08:42	E537M	Stage 2B
ELSWH11-004-SO-012	GRF757	SO	2018-05-09 11:25	E537M	Stage 2B
ELSWH11-004-SS-001	GRF756	SO	2018-05-09 11:11	E537M	Stage 2B
ELSWH11-005-SO-013	GRF758	SO	2018-05-09 12:45	E537M	Stage 2B
ELSWH11H-002-SO-910	GRF752	SO	2018-05-09 09:35	E537M	Stage 2B
ELSWH-RS-014	GRF763	WQ	2018-05-06 09:05	E537M	Stage 2B



Sample Name	Lab Sample Name	Matrix	Collection	Method	Validation Level
ELSWH-RS-015	GRF769	WQ	2018-05-07 13:01	E537M	Stage 2B
ELSWH-RS-016	GRF749	WQ	2018-05-08 13:55	E537M	Stage 2B
ELSWH-RS-017	GRF753	WQ	2018-05-09 09:30	E537M	Stage 2B
ELSWH-RS-018	GRF781	WQ	2018-05-10 12:15	E537M	Stage 2B
ELSWH-SB-001	GRF748	WQ	2018-05-08 14:15	E537M	Stage 2B
ELSWH01-001-GW-015	GTF558	WG	2018-05-20 09:25	E537M	Stage 2B
ELSWH01-001-GW-915	GTF559	WG	2018-05-20 09:25	E537M	Stage 2B
ELSWH01-001-SO-013	GTF550	SO	2018-05-17 09:47	E537M	Stage 4
ELSWH01-001-SO-913	GTF551	SO	2018-05-17 09:47	E537M	Stage 2B
ELSWH01-001-SS-001	GTF547	SO	2018-05-17 08:33	E537M	Stage 2B
ELSWH01-001-SS-901	GTF548	SO	2018-05-17 08:33	E537M	Stage 2B
ELSWH01-002-SO-012	GTF543	SO	2018-05-16 13:30	E537M	Stage 2B
ELSWH01-002-SS-001	GTF542	SO	2018-05-16 12:50	E537M	Stage 2B
ELSWH01-003-SO-025	GTF541	SO	2018-05-15 16:00	E537M	Stage 2B
ELSWH01-003-SS-001	GTF540	SO	2018-05-15 14:10	E537M	Stage 2B
ELSWH01-004-SO-012	GTF545	SO	2018-05-16 14:30	E537M	Stage 2B
ELSWH01-004-SS-001	GTF544	SO	2018-05-16 13:40	E537M	Stage 2B
ELSWH01-MW930107-GW- 034	GTF530	WG	2018-05-16 15:54	E537M	Stage 2B
ELSWH02-007-GW-018	GTF537	WG	2018-05-18 11:27	E537M	Stage 4
ELSWH02-008-GW-029	GTF535	WG	2018-05-18 10:16	E537M	Stage 2B
ELSWH02-008-GW-929	GTF536	WG	2018-05-18 10:16	E537M	Stage 2B
ELSWH03-001-SO-009	GTF552	SO	2018-05-17 13:25	E537M	Stage 2B
ELSWH04-002-SO-035	GTF533	SO	2018-05-18 10:30	E537M	Stage 2B
ELSWH04-002-SS-001	GTF532	SO	2018-05-18 08:45	E537M	Stage 4
ELSWH07-001-GW-035	GTF525	WG	2018-05-15 12:55	E537M	Stage 2B
ELSWH07-002-SO-013	GTF534	SO	2018-05-09 16:10	E537M	Stage 2B
ELSWH07-003-SO-016	GTF539	SO	2018-05-15 11:50	E537M	Stage 2B
ELSWH07-003-SS-001	GTF538	SO	2018-05-15 10:15	E537M	Stage 2B

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Sample Name	Lab Sample Name	Matrix	Collection	Method	Validation Level
ELSWH10-001-GW-045	GTF556	WG	2018-05-19 10:36	E537M	Stage 2B
ELSWH10-002-GW-035	GTF553	WG	2018-05-19 09:32	E537M	Stage 2B
ELSWH10-002-GW-935	GTF554	WG	2018-05-19 09:32	E537M	Stage 2B
ELSWH10-004-SD-001	GTF528	SE	2018-05-16 09:45	E537M	Stage 4
ELSWH10-004-SW-001	GTF529	WS	2018-05-16 09:45	E537M	Stage 2B
ELSWH11-001-GW-015	GTF562	WG	2018-05-20 16:14	E537M	Stage 2B
ELSWH11-002-GW-015	GTF560	WG	2018-05-20 15:00	E537M	Stage 2B
ELSWH11-003-GW-020	GTF561	WG	2018-05-20 14:34	E537M	Stage 2B
ELSWH11-006-SD-001	GTF526	SE	2018-05-16 09:00	E537M	Stage 2B
ELSWH11-006-SW-001	GTF527	WS	2018-05-16 09:00	E537M	Stage 2B
ELSWH-RS-019	GTF524	WG	2018-05-15 09:10	E537M	Stage 2B
ELSWH-RS-020	GTF546	WQ	2018-05-16 12:49	E537M	Stage 2B
ELSWH-RS-021	GTF549	WQ	2018-05-17 09:35	E537M	Stage 2B
ELSWH-RS-022	GTF531	WG	2018-05-18 08:40	E537M	Stage 2B
ELSWH-RS-023	GTF555	WQ	2018-05-19 09:55	E537M	Stage 2B
ELSWH-RS-024	GTF557	WQ	2018-05-20 08:10	E537M	Stage 2B
ELSWH01-003-GW-035	GUB621	WG	2018-05-21 11:02	E537M	Stage 2B
ELSWH01-004-GW-018	GUB622	WG	2018-05-21 15:11	E537M	Stage 2B
ELSWH02-005-GW-040	GUB625	WG	2018-05-23 14:35	E537M	Stage 2B
ELSWH03-001-GW-015	GUB627	WG	2018-05-24 12:09	E537M	Stage 2B
ELSWH04-001-SO-029	GUB619	SO	2018-05-22 14:57	E537M	Stage 2B
ELSWH04-001-SS-001	GUB618	SO	2018-05-22 12:52	E537M	Stage 2B
ELSWH04-003-SO-027	GUB616	SO	2018-05-18 14:10	E537M	Stage 2B
ELSWH04-003-SS-001	GUB608	SO	2018-05-18 12:18	E537M	Stage 2B
ELSWH04-004-SO-031	GUB609	SO	2018-05-18 15:15	E537M	Stage 2B
ELSWH04-005-SO-020	GUB610	SO	2018-05-18 16:15	E537M	Stage 4
ELSWH07-002-GW-021	GUB624	WG	2018-05-21 17:15	E537M	Stage 4
ELSWH07-003-GW-021	GUB623	WG	2018-05-21 16:21	E537M	Stage 2B
ELSWH09-001-SO-005	GUB615	SO	2018-05-21 14:30	E537M	Stage 2B



Sample Name	Lab Sample Name	Matrix	Collection	Method	Validation Level
ELSWH09-001-SS-001	GUB614	SO	2018-05-21 12:12	E537M	Stage 2B
ELSWH09-002-SO-005	GUB620	SO	2018-05-21 10:25	E537M	Stage 2B
ELSWH09-002-SS-001	GUB612	SO	2018-05-21 08:55	E537M	Stage 2B
ELSWH09-002-SS-901	GUB613	SO	2018-05-21 08:55	E537M	Stage 2B
ELSWH-RS-025	GUB611	WQ	2018-05-21 08:45	E537M	Stage 2B
ELSWH-RS-026	GUB617	WQ	2018-05-22 10:55	E537M	Stage 2B
ELSWH-RS-027	GUB626	WQ	2018-05-23 13:40	E537M	Stage 2B
ELSWH04-001-GW-032	GWJ144	WG	2018-05-31 17:46	E537M	Stage 2B
ELSWH04-002-GW-038	GWJ141	WG	2018-05-31 14:12	E537M	Stage 2B
ELSWH04-003-GW-033	GWJ140	WG	2018-05-31 11:50	E537M	Stage 4
ELSWH09-001-GW-033A	GWJ143	WG	2018-05-31 16:02	E537M	Stage 2B
ELSWH09-002-GW-030A	GWJ142	WG	2018-05-31 15:32	E537M	Stage 2B
ELSWH10-003-GW-059	GWJ146	WG	2018-06-03 15:17	E537M	Stage 2B
ELSWH10-003-SO-050	GWJ151	SO	2018-05-31 12:00	E537M	Stage 2B
ELSWH10-003-SS-001	GWJ150	SO	2018-05-24 13:12	E537M	Stage 2B
ELSWH-RS-028	GWJ149	WQ	2018-05-24 13:09	E537M	Stage 2B
ELSWH-RS-030	GWJ145	WQ	2018-06-03 14:50	E537M	Stage 2B
ELSWH-RS-29	GWJ139	WQ	2018-05-31 11:10	E537M	Stage 2B
ELSWH-WS-001	GWJ148	SO	2018-06-03 18:00	E537M	Stage 2B
ELSWH-WW-001	GWJ147	WG	2018-06-03 18:00	E537M	Stage 2B
ELSWH02-004-SD-901A	HJG660	SE	2018-07-31 09:20	E537M	Stage 2B
ELSWH02-004-SW-001A	HJG661	WS	2018-07-31 09:15	E537M	Stage 2B
ELSWH02-004-SW-901A	HJG662	WS	2018-07-31 09:15	E537M	Stage 2B
ELSWH02-004-SD-001A	HJG659	SE	2018-07-31 09:20	E537M	Stage 2B
ELSWH-RS-001A	HJG658	WQ	2018-07-31 09:05	E537M	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) B894616, B897127, B8A6782, B8B1135, B8C0381, B8C4298, B8D4761 and B8J4786:

- Cooler temperatures recorded on the COCs indicated all samples were received at temperatures within the control limits of ≤10°C.
- Field and laboratory personnel signed and dated the COCs.
- Some COC corrections were made by overwriting the original entry, rather than lining out.
- The case narratives for these SDGs and the COCs noted custody seals were present and intact on the coolers upon receipt at the laboratory.
- In SDG B8B1135, sample containers for ELSWH03-002-SO-911 were labelled as ELSWH03-002-GW-911. The sample was a soil, the client was notified and the sample was logged in according to the correct identification on the COC.
- SDG B8C0381 soil and water samples were reported in separate pdf sample packages due to the size.



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.
В	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.
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

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



Reason Code	Definition
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	ТВ
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
22*	Radiological calibration



Reason Code	Definition
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 MODIFIED

K. Zilis of MEC^x reviewed these SDGs May22-August 12, 2018.

III.1. HOLDING TIMES

All samples were extracted within 28 days of collection and analyzed within 45 days of extraction.

III.2. CALIBRATION

Calibration criteria were met except for the outliers noted below.

III.2.1. INITIAL CALIBRATION

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 r² values were within the control limit of \geq 0.990 or r values \geq 0.995. Applicable %RSDs were within the control limit of \leq 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 (ICS) recoveries were within the control limits of 70-130%.

III.3. QUALITY CONTROL SAMPLES

III.3.1. METHOD BLANKS

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

LCS recoveries were within the control limits of 70-130%, and RPDs for water LCS/LCSD pairs were within the control limit of \leq 30%.

III.3.3. MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Outliers affecting parent sample data and qualifications assigned are noted below. Qualifications were not assigned for recovery outliers not occurring in both the MS and MSD, or for RPD outliers or high recoveries if the outlier compound was not detected in the parent sample. If the parent sample concentration of an analyte exceeded 4× the spike amount, recoveries and the RPD were not evaluated. With exceptions noted below, recoveries and RPDs affecting sample data were within the control limits of 70-130% and \leq 30%, respectively.

SDG B894616

MS/MSD analyses were performed on soil sample ELSWH12-001-SS-001. Recoveries were outside of QC limits for PFHxS and PFOS. Both analytes were present in the native sample, PFOS was present at greater than 4x the spike concentration. Qualifications were not assigned for PFHxS as only the MSD recovery exceeded QC limits.



Matrix spikes were not requested or performed for water samples.

SDG B897127

MS/MSD analyses were performed on soil sample ELSWH02-004-SD-001 and on water sample ELSWH02-004-SW-001. All soil sample MS/MSD recoveries were compliant except for the PFBS RPD at 31%. Spike recoveries were 79 and 108%. This compound was not detected in the sample and no qualifiers were applied.

Recoveries were above the control limits of 70-130% for PFTrDA in the MS and MSD of the water sample, at 137% and 133%, respectively. The 13C2-PFTeDA internal standard recovery in the native sample analysis, as well as both matrix spikes was below QC limits and results for associated compounds PFTeDA and PFTrDA were previously qualified for the internal standard recovery. These compounds were not detected in the sample.

SDG B8A6782

MS/MSD analyses were performed on soil samples ELSWH05-003-SO-009 and ELSWH06-002-SO-010. All recoveries and RPDs affecting sample data were within the control limits of 70-130% and \leq 30%, respectively.

SDG B8B1135

MS/MSD analyses were performed on soil samples ELSWH11-002-SO-010 and ELSWH06-004-SS-001, and water sample ELSWH06-002-GW-018. All recoveries and RPDs for the ELSWH11-002-SO-010 matrix spikes were within the control limits of 70-130% and \leq 30%, respectively, with the following exceptions. The recovery of PFOS was high in sample ELSWH06-004-SS-001 in the MS and MSD at 142 and 167%. This compound was detected in the sample at 29 ug/L and was qualified as estimated. The water matrix spike PFDS recovery was low at 54% below the control limits of 70-130%. In addition, extracted internal standards MPFDoDA and MPFTrDA had low recoveries at 46 and 49% respectively, with lower control limit of 50%. The MSD internal standard and target compound recoveries were within control limits but the RPD was high at 44% with a control limit of 30%. The undetected result for PFDS in sample ELSWH06-002-GW-018 was qualified as estimated for the precision measure outlier.

SDG B8C0381

As designated on the COC, soil samples ELSWH01-001-SS-001 and ELSWH01-001-SO-013, and water sample ELSWH01-001-GW-015 were used for the matrix spike and matrix spike duplicate analyses. Due to high concentrations of target compounds in the sample, a matrix duplicate was performed instead of MS/MSD for samples ELSWH01-001-SS-001 and ELSWH01-001-GW-015. Recoveries and the RPD were not evaluated for 8:2 FTS and PFOS in the spike analyses for ELSWH01-001-SO-013 because the native sample concentrations were greater than 4 times the spiked amount.

SDG B8C4298

Samples were not designated on the COC for matrix spike analysis. Matrix spikes were performed on soil sample ELSWH04-005-SO-020. Matrix spikes were not performed on a water sample. Water QC batch 5557332 was shared with SDG B8C0381 (see above) and due to high concentrations of target compounds in SDG B8C0381 sample ELSWH01-001-GW-015, a matrix duplicate was performed instead of MS/MSD.



SDG B8D4761

Samples were not designated on the COC for matrix spike analysis. Matrix spikes were performed on water sample ELSWH10-003-GW-059. Soil MS/MSD analysis was not performed on a project sample and precision data was not available.

SDG B8J4786

MS/MSD analyses were performed on soil sample ELSWH02-004-SD-001A and water sample ELSWH02-004-SW-001A. All recoveries and RPDs were compliant.

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

Field blanks and equipment blanks are listed in the table below. There were no reported detections above the LOD in any of the blanks.

Table 4-FB/EB Detects

Field or Equipment Blank	Detects	Concentration μg/L	LOQ µg/L
ELSWH-RS-001	none	N/A	N/A
ELSWH-RS-002	none	N/A	N/A
ELSWH-RS-003	none	N/A	N/A
ELSWH-RS-005	none	N/A	N/A

SDG B897127

CDC 0004616

Field or Equipment Blank	Detects	Concentration µg/L	LOQ μg/L
ELSWH-RS-006	none	N/A	N/A
ELSWH-RS-007	none	N/A	N/A
ELSWH-RS-008	none	N/A	N/A

SDG B8A6782

Field or Equipment Blank	Detects	Concentration µg/L	LOQ μg/L
ELSWH-RS-009	none	N/A	N/A
ELSWH-RS-010	none	N/A	N/A
ELSWH-RS-011	none	N/A	N/A
ELSWH-RS-012	none	N/A	N/A
ELSWH-RS-013	none	N/A	N/A



SDG B8B1135

Field or Equipment Blank	Detects	Concentration μg/L	LOQ μg/L
ELSWH-RS-014	none	N/A	N/A
ELSWH-RS-015	none	N/A	N/A
ELSWH-RS-016	none	N/A	N/A
ELSWH-RS-017	none	N/A	N/A
ELSWH-RS-018	none	N/A	N/A
ELSWH-SB-001	none	N/A	N/A

SDG B8C0381

Field or Equipment Blank	Detects	Concentration	LOQ
		μg/L	μg/L
ELSWH-RS-019	none	N/A	N/A
ELSWH-RS-020	none	N/A	N/A
ELSWH-RS-021	none	N/A	N/A
ELSWH-RS-022	none	N/A	N/A
ELSWH-RS-023	none	N/A	N/A
ELSWH-RS-024	none	N/A	N/A

SDG B8C4298

Field or Equipment Blank	Detects	Concentration	LOQ
		μg/L	μg/L
ELSWH-RS-025	none	N/A	N/A
ELSWH-RS-026	none	N/A	N/A
ELSWH-RS-027	PFHxS	0.0081 J	0.02
		•	

Adjusting for matrix, 0.0081 μ g/L PFHxS * 0.125L/0.0025kg = 0.405 μ g/kg. PFHxS has been qualified based on the equipment blank results up to 5x this value, or 2.02 μ g/kg.

SDG B8D4167

Field or Equipment Blank	Detects	Concentration µg/L	LOQ μg/L
ELSWH-RS-028	none	N/A	N/A
ELSWH-RS-029	none	N/A	N/A
ELSWH-RS-030	6:2 FTS	0.012 J	0.02

6:2 FTS was not detected in any of the soil samples and no qualifiers have been applied.

SDG B8J4786

Field or Equipment Blank	Detects	Concentration µg/L	LOQ µg/L
ELSWH-RS-001A	none	N/A	N/A



III.4.2. FIELD DUPLICATES

Field duplicate pairs are listed below. RPDs for detections above the LOQ were within the control limit of \leq 30%, and detects below the LOQ, in one or both samples of a pair, were within the control limit of ±LOQ, with exceptions noted in the table below. Results for the outlier target analytes were qualified as estimated (J for detects or UJ for nondetects) in both samples of a pair.

Table 5-FD RPDs

<u>SDG B894616</u>				
Parent Sample	Field Duplicate	Target Analyte	RPD Outliers	
ELSWH08-002-SO-040	ELSWH08-002-SO-940	N/A	None	
ELSWH12-001-SS-001	ELSWH12-001-SS-901	PFOS	40%	

SDG B897127

Parent Sample	Field Duplicate	Target Analyte	RPD Outliers
ELSWH02-004-SD-001	ELSWH02-004-SD-901	PFOS	45%
ELSWH02-004-SW-001	ELSWH02-004-SW-901	N/A	None

SDG B8A6782

Parent Sample	Field Duplicate	Target Analyte	RPD Outliers
ELSWH05-003-SO-009	ELSWH05-003-SO-909	N/A	None

SDG B8B1135

Parent Sample	Field Duplicate	Target Analyte	RPD Outliers
ELSWH06-002-GW-018	ELSWH06-002-GW-918	N/A	None
ELSWH06-004-SS-001	ELSWH06-004-SS-901	PFOA	40%
ELSWH03-002-SO-011	ELSWH03-002-SO-911	PFHxS	49%
ELSWH11-002-SO-010	ELSWH11H-002-SO-910	N/A	None

SDG B8C0381

Parent Sample	Parent Sample Field Duplicate		RPD Outliers
		6:2 FTS	89%
		PFBS	±LOQ
		PFBA	98%
		PFHpA	±LOQ
ELSWH02-008-GW-029	ELSWH02-008-GW-929	PFHS	83%
		PFHxA	94%
		PFOA	100%
		PFOS	88%
		PFPeA	93%
		6:2 FTS	166%
ELSWH01-001-SS-001		8:2 FTS	55%
	LF2M H01-001-22-201	PFHS	130%
		PFOA	±LOQ

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Parent Sample	Field Duplicate	Target Analyte	RPD Outliers
		PFOS	54%
ELSWH01-001-SO-013	ELSWH01-001-SO-913	None	None
		PFHeA	34%
EF3MU01-001-0M-012	HOT-001-GM-012 EF2MH01-001-GM-312	PFPeA	32%

ELSWH02-008-GW-029 is consistently higher than the duplicate sample. ELSWH01-001-SS-001 is consistently lower than the duplicate sample.

SDG B8C4298

Parent Sample	Field Duplicate	Target Analyte	RPD Outliers
ELSWH09-002-SS-001	ELSWH09-002-SS-901	PFOS	154%

The sample and sample duplicate PFOS concentrations were 4 and 31 μ g/L respectively.

SDG B8D4761

Field duplicates were not collected with this SDG

SDG B8J4786

Parent Sample	Field Duplicate	Target Analyte	RPD Outliers
ELSWH02-004-SD-001A	ELSWH02-004-SD-901A	PFOS	70.6%
ELSWH02-004-SW-001A	ELSWH02-004-SW-901A	N/A	None

The sample and sample duplicate PFOS concentrations were 23 and 11 $\mu g/L$ respectively

III.5. INTERNAL STANDARDS PERFORMANCE

III.5.1. EXTRACTED INTERNAL STANDARD RECOVERY

As stated on the certificate of analysis for the samples, "Per- and polyfluoroalkyl substances (PFAS) as identified as surrogates on the certificate of analysis represent the extracted internal standard." Except as noted in the tables below, all extracted internal standards were within DoD QSM 5.1.1 Table B-15 criteria of 50-150% recovery.

Table 6-Extracted Internal Standards

SDG B894616			
Internal Standard	% Recovery	Affected Samples	Associated Target Analyte(s)
13C2-PFDoA	NIA	ELSWH08-002-SS-001	PFDoA
13C2-PFTeDA	NA		PFTeDA, PFTrDA

The samples were reextracted and analyzed at a 10x dilution. Extracted internal standards were compliant and results were reported from this analysis. Reporting limits were raised accordingly

The recovery of 13C2PFBA was low in the LCSD waters extraction batch. The samples were reextracted for PFBA in batch 5514083. All results were based on compliant QC and compliant internal standard recoveries.



SDG B897127

Internal Standard	% Recovery	Affected Samples	Associated Target Analyte(s)
13C2-PFTeDA	42%	ELSWH02-004-SW-001	PFTeDA, PFTrDA
13C2-PFDoA			PFDoA
13C2-PFTeDA	NA	ELSWH02-004-SD-001	PFTeDA, PFTrDA
13C2-PFUnA			PFUnA
13C2-PFTeDA	NA	ELSWH02-004-SD-901	PFTeDA, PFTrDA

The results for the affected target compounds in the water sample, ELSWH02-004-SW-001, have been qualified as estimated (UJ).

The soil samples, ELSWH02-004-SD-001 and ELSWH02-004-SD-901, were reextracted and analyzed at a 10x dilution. Extracted internal standards were compliant and results were reported from this analysis.

SDG B894616

All extracted internal standards were within DoD QSM 5.1.1 Table B-15 criteria of 50-150% recovery.

SDG B8B1135

Internal Standard	% Recovery	Affected Samples	Associated Target Analyte(s)
13C2PFBA	36%	ELSWH06-003-GW-055	PFBA

The results for the affected target compound in the water sample, ELSWH06-003-GW-055, has been qualified as estimated (UJ).

SDG B8C0381

Internal Standard	% Recovery	Affected Samples	Associated Target Analyte(s)
13C2-PFTeDA NA	NA	ELSWH10-004-SD-001	
	NA	ELSWH01-002-SS-001	PFTEDA, PFTTDA

The recovery of internal standard 13C2-PFTeDA was below QC criteria in the original analysis. The samples were reextracted and analyzed at a dilution. Extracted internal standards were compliant and results were reported from this analysis. Reporting limits were raised accordingly

III.5.2. INJECTED INTERNAL STANDARD RECOVERY

The applicable labeled internal standard recoveries were all within the control limits of ±50% of the peak areas of the response for standard level 4 of the calibration curve with the following exceptions exception of ELSWH11-004-SO-012 and ELSWH02-005-SO-034. The area response of both injected internal standards, MPFHxA and MPFDA, were slightly higher than 50% more than the response for standard level 4 of the calibration curve. As a conservative approach, the detects were flagged as estimated (J) even though the extraction internal standards (upon which the quantitation is based) were within the control limits. Injection internal standards were added post extraction by the laboratory as required by the DoD QSM 5.1.1 Table B-15.



Table 7-Injected Internal Standards

<u>SDGs B8B1135</u>				
Internal Standard	% Recovery	Affected Sample	Associated Target Analyte(s)	
13C6-PFHxA	153%			
13C9-PFDA	152%	ELSWH11-004-SO-012	all	
13C6-PFHxA	151%			
13C9-PFDA	151%	ELSWH02-005-50-034	all	

SDGs B8C0381

Internal Standard	% Recovery	Affected Sample	Associated Target Analyte(s)	
13C6-PFHxA	150.4%	FLSW/H01-004-SS-001 100X	PEOS	
13C9-PFDA	158%		1105	
13C9-PFDA	155%	ELSWH01-004-SO-012 100X	PFOS	
13C9-PFDA	152%	ELSWH01-001-SS-001 100X	PFOS	
13C6-PFHxA	156%		DEOS	
13C9-PFDA	161%	ELSWH01-001-33-901 100X	PF03	
13C9-PFDA	151%	ELSWH01-001-SS-901 10X	All except PFOS	
13C6-PFHxA	152%			
13C9-PFDA	155%		FFU3, 0.2 FI3	
13C9-PFDA	153%	ELSWH03-001-SO-009 10x	PFOS	

The laboratory noted that the sample extracts showed visible indication of evaporation. The high response for the injection internal standards should be accounted for with the extracted internal standards which would reflect any evaporation affecting the target compounds. As a conservative approach, the detects were flagged as estimated (J) even though the extraction internal standards (upon which the quantitation is based) were within the control limits.

III.6. COMPOUND IDENTIFICATION

Compound identification was verified for the following samples:

SDG B894616

Soil samples ELSWH12-004-SD-001, and ELSWH12-003-SO-006 and water samples ELSWH12-003-GW-016 and ELSWH12-004-SW-001

SDGs B897127

None.

SDGs B8A6782

Soil samples ELSWH02-006-SS-001 and ELSWH06-002-SS-001 and water sample ELSWH02-006-GW-030, were validated at a level 4.

SDGs B8B1135

Soil samples ELSWH07-002-SS-001 and ELSWH03-004-SO-011, and water sample ELSWH06-001-GW-018 were validated at a level 4.



SDGs B8C0381

Soil samples ELSWH10-004-SD-001, ELSWH04-002-SS-001 and ELSWH01-001-SO-013, and water sample ELSWH02-007-GW-018 were validated at a level 4.

Review of retention times and the ion chromatograms indicated no issues with compound identification. The laboratory analyzed for 18 perfluorinated compounds by Modified EPA Method 537. Review of retention time and the ion chromatograms indicated no issues with compound identification.

SDGs B8C4298

Soil sample ELSWH04-005-SO-020 and water sample ELSWH07-002-GW-021 were validated at a level 4. ELSWH04-003-GW-033

SDGs B8D4761

Water sample ELSWH04-003-GW-033 was validated at a level 4.

SDGs B8J4786

All samples were validated at a level 2B.

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), based on extracted sample amount and applicable dilution factors. The laboratory calculated and reported compound-specific detection limits. Detects below the LOQ were qualified as estimated (J). Nondetects are valid to the LOD.

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

Most samples were initially analyzed undiluted. The samples listed below were either extracted using reduced sample volumes and/or reanalyzed at one or more further dilutions to report various target analytes within the linear range of the calibration. Analytes were reported from the least dilute analysis possible of multiple dilutions to report all target analytes within the linear calibration range.

SDG B894616

Based on screening results indicating the presence of high concentrations of target analytes, two of the three water site samples were extracted using reduced sample volumes, resulting in effective initial dilutions and five of the 18 soil or sediment samples were analyzed at dilutions. The table below summarizes the initial analysis dilutions and further dilutions required for the specific target compounds listed. Reporting limits were raised accordingly.

Sample	Initial Analysis	Reanalysis	Target Compounds
FLSWH12-002-GW-016	2×	20×	PFHxS
EL3W1112-003-0W-010	2*	20^	PFHxA
ELSWH12-004-SW-001	5×	50×	PFHxS
			PFHxA
ELSWH12-002-SS-001		10	8500
ELSWH12-001-SS-001	1x	10x	PFOS

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Sample	Initial Analysis	Reanalysis	Target Compounds
ELSWH12-003-SS-001			
ELSWH12-001-SS-901	10x	100x	PFOS
ELSWH12-003-SO-006	1x	10x	PFPeA

SDG B897127

Dilutions were not required for analyses in this SDG to bring target compounds within the linear range of the instrument. Reporting limits were however elevated due to dilutions for internal standard compliance (See III.5.1).

SDG B897127

All samples were originally analyzed without dilutions or reduced sample volumes so no undetected results were reported with elevated reporting limits. Sample ELSWH02-002-GW-035 was analyzed with a reduced sample volume to quantitate PFHxA and the reporting limit was elevated 10x. Samples ELSWH05-001-SS-001 and ELSWH05-003-SS-001 were analyzed at a 10x dilution to quantitate PFOS in the linear range and the reporting limit for this compound was elevated accordingly.

SDG B8B1135

All samples were originally analyzed without dilutions or reduced sample volumes so no undetected results were reported with elevated reporting limits. Sample ELSWH06-001-SS-001 was analyzed at a 10x dilution to quantitate PFOS in the linear range and the reporting limit for this compound was elevated accordingly. Water samples ELSWH03-003-GW-016 and ELSWH03-002-GW-017were analyzed with a reduced sample volume to quantitate PFHxS and PFOS and the reporting limit was elevated 10x.

SDG B8C0381

Based on screening results indicating the presence of high concentrations of target analytes, samples were diluted or extracted using reduced sample volumes, resulting in effective initial dilutions. The table below summarizes the initial analysis dilutions and further dilutions required for the specific target compounds listed. Reporting limits were raised accordingly. Sample ELSWH01-MW930107-GW-034 was analyzed by the high level methodology for the quantitation of PFHxS, effectively a 400x dilution.

Sample	Initial Analysis	Reanalysis	Target Compounds
ELSWH10-004-SD-001	1x	10x	PFOS
ELSWH04-002-SS-001	1x	10x	PFOS
ELSWH01-003-SS-001	1x	10x	PFOS
ELSWH01-002-SS-001	1x	100x	PFOS
ELSWH01-002-SO-012	10x	100x	PFOS
ELSWH01-004-SS-001	10x	100x	PFOS
ELSWH01-004-SO-012	1x	100x	PFOS
ELSWH01-001-SS-001	10x	100x	PFOS
ELSWH01-001-SS-901	10x	100x	PFOS
ELSWH01-001-SO-013	1x	10x	6:2 FTS, PFOS



Sample	Initial Analysis	Reanalysis	Target Compounds
ELSWH01-001-SO-913	1x	10x	6:2 FTS, PFOS
ELSWH03-001-SO-009	1x	10x	PFOS
ELSWH01-MW930107-GW-034	100x	400x	PFHxS
ELSWH10-004-SW-001	1x	10x	PFHxS
ELSWH02-008-GW-029	1x	10x	PFOS
ELSWH01-001-GW-015	10x	100x	6:2 FTS PFBS PFBA PFHxS PFHA PFOS PFPeA
ELSWH01-001-GW-915	10x	100x	6:2 FTS PFBA PFHxS PFHA PFOS PFPeA

SDG B8C4298

Based on screening results indicating the presence of high concentrations of target analytes, samples were diluted or extracted using reduced sample volumes, resulting in effective initial dilutions. The table below summarizes the initial analysis dilutions and further dilutions required for the specific target compounds listed. Reporting limits were raised accordingly.

Sample	Initial Analysis	Reanalysis	Target Compounds
ELSWH04-003-SS-001	10×	100×	PFOS
			6:2 FTS
			PFBS
FLSW/H01-002-GW/-025	10×	100×	PFHxS
ELSWIND1-003-000-035	10^	100^	PFHxA
			PFPeA
			PFOS
			6:2 FTS
			PFHxS
ELSWH01-004-GW-018	10×	100×	PFHxA
			PFPeA
			PFOS
	1.	10.	6:2 FTS
ELSWH02-005-GW-040 1X		TOX	PFHxS
ELSWH03-001-GW-015	1x	10x	PFOS



SDG B8D4761

Based on screening results indicating the presence of high concentrations of target analytes, samples were diluted or extracted using reduced sample volumes, resulting in effective initial dilutions. The table below summarizes the initial analysis dilutions and further dilutions required for the specific target compounds listed. Reporting limits were raised accordingly.

Sample	Initial Analysis	Reanalysis	Target Compounds
			6:2 FTS
			PFBS
	10~	100~	PFHxA
EL3WH-WW-001	TOX	100×	PFHxS
			PFPeA
			PFOS

The rest of the samples were originally analyzed without dilutions or reduced sample volumes so no undetected results were reported with elevated reporting limits, with the exception of PFTeDA, PFTrDA and PFDoA in sample ELSWH10-003-SO-050 which were reported from a dilution analysis because the extracted internal standard recovery was low in the original analysis (see section III.5.1). Sample ELSWH04-003-GW-033 was analyzed with a reduced sample volume to quantitate 6:2 FTS, PFHxS and PFHxA and the reporting limit was elevated 10x. Sample ELSWH10-003-SS-001 was analyzed at a 10x dilution to quantitate PFOS within the calibration range.

SDG B8J4786

All samples were analyzed without dilutions or reduced sample volumes. No undetected results were reported with elevated reporting limits.

III.8. SYSTEM PERFORMANCE

SDGs B894616, B897127, B8A6782, B8B1135, B8C0381, B8C4298, B8D4761, B8J4786 No issues were noted with system performance.



IV. SUMMARY AND CONCLUSIONS

MEC^x evaluated a total of 2,772 data records from field samples during the validation and qualified 72 records (2.6% of the data) as estimated values (J for a detect and UJ for a nondetect). The qualification was required for potential equipment blank contamination, MS/MSD accuracy and precision outliers, internal standard outliers and field duplicate precision outliers. Nondetect compounds were flagged (U) to indicate that the compound was analyzed for but not detected above the laboratory detection limit (DL). Specific qualification were discussed in the text above.

Overall, the quality of the data was acceptable. The precision and accuracy results 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. The outliers in the precision measurements were due to an MS/MSD RPD outlier and to field duplicate 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. The outliers in the accuracy measurements were due to potential equipment blank contamination, an MS/MSD recovery outlier and extraction and injection internal standard outliers. 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. Four analytes were flagged for potential equipment blank contamination. The laboratory did utilize a weighted 1/X calibration curve which was not forced through zero. Although this is a deviation from Method 537, it is acceptable on DoD projects and was considered acceptable by the reviewer. Holding times were met for all analyses. 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 2,772 target data points, no data points were rejected, resulting in a completeness of 100%.



V. REFERENCES

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Maxxam

Prepared for: Aerostar SES LLC

Project: M2027.0003 (OMAHA) ELLSWORTH AFB

Analytical Data Package (Level IV)

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

Maxxam Job #: B8A6782

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

Maxxam

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 Pallen

Project Manager

Stephanie Pollen 2018.05.25 14:36:11 -04'00'

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Maxxam Analytics

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 matrixspecific 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 ¹³C-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.

Maxxam Job: B8A6782 - Soil Analysis

Sample Analysis

Samples were initially extracted on QC batches 5526291 (2018/05/11) and 5526314 (2018/05/11). During analytical set up, a discrepancy was observed in sample vial labels, indicating possible sample mix-up. These QC batches were rejected and not analyzed. Samples were re-extracted and analyzed on QC batches 5531867 (2018/05/16) and 5531868 (2018/05/16). Due to contamination of 6:2 Fluorotelomersulfonate (6:2FTS) in the Method Blank (Blank) on QC batch 5531868 (2018/05/16), samples GQI110 (*ELSWH06-002-SS-001*) and GQI111 (*ELSWH06-002-SO-010*) were further re-extracted and re-analyzed for this analyte on QC batch 5540201 (2018/05/22).

Due to high concentrations, dilutions were required for Perfluorooctanesulfonate (PFOS) in the following samples:

GQI084 ELSWH05-001-SS-001 GQI087 ELSWH05-003-SS-001

Detection limits were adjusted accordingly.

Quantitation of PFAS

Many PFAS (e.g. PFOS) have several isomeric forms that may show up as separate or partially-merged peaks in the analytical chromatograms. These peaks will be integrated and the areas summed such that the result represents the concentration of the sum of the linear and branched isomers, per USEPA (2009). Instrumentation is calibrated using certified quantitative standards containing only the linear isomer for all target analytes, except Perfluorooctane sulfonate (PFOS) and Perfluorohexane sulfonate (PFHxS), which are calibrated using certified branched and linear isomer mixtures. As additional certified reference materials containing branched and linear isomers become commercially available, they will be incorporated into the analytical method.

Data Qualifiers

U – Analyte was not detected and is reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J – The reported result is an estimated value (e.g., matrix interference was observed, or the analyte was detected at a concentration outside the calibration range).

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Maxxam Job: B8A6782 - 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 5524158 (2018/05/10). Due to high concentration, the following sample was analyzed for Perfluorohexanoic acid (PFHxA) using a reduced sample extraction volume:

GQI096 ELSWH02-002-GW-035

Detection limit was adjusted accordingly.

Quantitation of PFAS

Many PFAS (e.g. PFOS) have several isomeric forms that may show up as separate or partially-merged peaks in the analytical chromatograms. These peaks will be integrated and the areas summed such that the result represents the concentration of the sum of the linear and branched isomers, per USEPA (2009). Instrumentation is calibrated using certified quantitative standards containing only the linear isomer for all target analytes, except Perfluorooctane sulfonate (PFOS) and Perfluorohexane sulfonate (PFHxS), which are calibrated using certified branched and linear isomer mixtures. As additional certified reference materials containing branched and linear isomers become commercially available, they will be incorporated into the analytical method.

Data Qualifiers

U – Analyte was not detected and is reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J – The reported result is an estimated value (e.g., matrix interference was observed, or the analyte was detected at a concentration outside the calibration range).

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

I. SAMPLE RECEIPT/ANALYSIS

a) Sample Listing

Maxxam	Client	Date	Date	Date	Date	Initial
ID	Sample ID	Sampled	Received	Prepped	Run	Calibration
PFOS and PFO	DA in soil by SPE/LCMS					
GQI079	ELSWH02-006-SS-001	2018/05/01	2018/05/08	2018/05/15	2018/05/16	2018/05/16
GQI081	ELSWH02-006-SO-024	2018/05/01	2018/05/08	2018/05/15	2018/05/16	2018/05/16
GQI082	ELSWH05-002-SS-001	2018/05/01	2018/05/08	2018/05/15	2018/05/16	2018/05/16
GQI083	ELSWH05-002-SO-020	2018/05/01	2018/05/08	2018/05/15	2018/05/16	2018/05/16
GQI084	ELSWH05-001-SS-001	2018/05/02	2018/05/08	2018/05/15	2018/05/16	2018/05/16
GQ1086	ELSWH05-001-SO-028	2018/05/02	2018/05/08	2018/05/15	2018/05/16	2018/05/16
GQ1087	ELSWH05-003-SS-001	2018/05/02	2018/05/08	2018/05/15	2018/05/16	2018/05/16
GQ1088	ELSWH05-003-SO-009	2018/05/02	2018/05/08	2018/05/15	2018/05/16	2018/05/16
GQ1089	ELSWH05-003-SO-909	2018/05/02	2018/05/08	2018/05/15	2018/05/16	2018/05/16
GQ1090	ELSWH02-008-SS-001	2018/05/02	2018/05/08	2018/05/15	2018/05/16	2018/05/16
GQ1092	ELSWH02-007-SS-001	2018/05/03	2018/05/08	2018/05/15	2018/05/16	2018/05/16
GQ1093	ELSWH09-003-SS-001	2018/05/04	2018/05/08	2018/05/15	2018/05/16	2018/05/16
GQI101	ELSWH09-003-SO-028	2018/05/04	2018/05/08	2018/05/15	2018/05/16	2018/05/16
GQI102	ELSWH11-003-SS-001	2018/05/04	2018/05/08	2018/05/15	2018/05/16	2018/05/16
GQI103	ELSWH11-003-SO-015	2018/05/04	2018/05/08	2018/05/15	2018/05/16	2018/05/16
GQI104	ELSWH11-005-SS-001	2018/05/04	2018/05/08	2018/05/15	2018/05/16	2018/05/16
GQI105	ELSWH10-002-SS-001	2018/05/04	2018/05/08	2018/05/15	2018/05/16	2018/05/16
GQI106	ELSWH10-002-SO-029	2018/05/04	2018/05/08	2018/05/15	2018/05/16	2018/05/16
GQI107	ELSWH06-003-SS-001	2018/05/05	2018/05/08	2018/05/15	2018/05/16	2018/05/16
GQI109	ELSWH06-003-SO-054	2018/05/05	2018/05/08	2018/05/15	2018/05/16	2018/05/16
GQI110	ELSWH06-002-SS-001	2018/05/05	2018/05/08	2018/05/19	2018/05/22	2018/05/16 & 2018/05/22
GQI111	ELSWH06-002-SO-010	2018/05/05	2018/05/08	2018/05/19	2018/05/22	2018/05/16 & 2018/05/22
PFOS and PFO	DA in water by SPE/LCMS					
GQ1080	ELSWH-RS-009	2018/05/01	2018/05/08	2018/05/10	2018/05/10	2018/05/10
GQ1085	ELSWH-RS-010	2018/05/02	2018/05/08	2018/05/10	2018/05/10	2018/05/10
GQI091	ELSWH-RS-011	2018/05/03	2018/05/08	2018/05/10	2018/05/10	2018/05/10
GQ1094	ELSWH08-001-GW-044	2018/05/01	2018/05/08	2018/05/10	2018/05/10	2018/05/10
GQ1095	ELSWH05-002-GW-025	2018/05/03	2018/05/08	2018/05/10	2018/05/10	2018/05/10
GQ1096	ELSWH02-002-GW-035	2018/05/04	2018/05/08	2018/05/10	2018/05/10	2018/05/10
GQ1097	ELSWH02-001-GW-035	2018/05/04	2018/05/08	2018/05/10	2018/05/10	2018/05/10
GQ1098	ELSWH05-001-GW-030	2018/05/04	2018/05/08	2018/05/10	2018/05/10	2018/05/10
GQ1099	ELSWH02-006-GW-030	2018/05/04	2018/05/08	2018/05/10	2018/05/10	2018/05/10
GQI100	ELSWH-RS-012	2018/05/04	2018/05/08	2018/05/10	2018/05/10	2018/05/10
GQI108	ELSWH-RS-013	2018/05/05	2018/05/08	2018/05/10	2018/05/10	2018/05/10

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 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 Pallen Project Manager- Site Assessment

2018/05/25

Date

oject Name. Site Inspection ultiple Sites, United States arouter Project Manager- and Date to:	Ifeat Treat torAque Air Fores Brian Odom Jenny Vance. BOdom@shoepreenv.com ivanceigaerostar.net	ut Required ut <u>Disposid</u> (865) 483-7904	Job No.: Ma Installation:	027 0903 (1 EUSLuo	Omaha) E171 195 B	P	B8 S4	EN	782 V-130	57		ale Types: - Normal FD = Finio Duplicate	-	
impler(a): borstory Name/Address: assam Analytics, loc 40 Campobelio Rd. resissands, Ostaria IN21.8	IL Laboratory Shipping Addr Maxam Analytics of Padfa Depot 289 Geyaga Rd Cheektowaga, NY 1422 Blazes undicate "MOLD FOR P	5 10 - KUP	Contact: Me Phone (90) omail: MD	ilissa DiGri) 817-5700 Grazia ()mi	ext. 5754 axxam.ca	a of 1/1 analytics Sectory)	1			4		AB = Ambient Blank or Field Reagent Blank EB = Equipmint Rimeté Matrice VO = Sei SO = Sei VYP = Polable Water SE = Sedment WS = Surface Water		
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Project Name: Site inspectiv Multiple Sites, United States	on of Aqueous Film Forming Foam Areas. s Air Force Installations		Job No.: 1	12027.0003	(Omaha)	s					1	
Aerostar Project Manager: Send Data to:	Brian Odom, BOdomg specproenv.com Johny Vance, jvance@perostar.net	(478) 357-4905 (865) 483-7904					1					Sample Types:
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Your Project #: M2027.0003 (OMAHA) Site Location: ELLSWORTH AFB Your C.O.C. #: n/a

Attention: Jenny Vance

Aerostar SES LLC SES Construction and Fuel Serv 1006 Floyd Culler Court Oak Ridge, TN USA 37830

> Report Date: 2018/05/23 Report #: R5165433 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8A6782

Received: 2018/05/08, 14:01

Sample Matrix: Ground Water # Samples Received: 6

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
PFOS and PFOA in water by SPE/LCMS (1)	6	2018/05/10	2018/05/10	CAM SOP-00894	EPA 537 m

Sample Matrix: Soil # Samples Received: 22

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
Moisture	22	N/A	2018/05/10	CAM SOP-00445	Carter 2nd ed 51.2 m
PFOS and PFOA in soil by SPE/LCMS (1)	22	2018/05/15	2018/05/16	CAM SOP-00894	EPA537 m

Sample Matrix: Water # Samples Received: 5

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
PFOS and PFOA in water by SPE/LCMS (1)	5	2018/05/10	2018/05/10	CAM SOP-00894	EPA 537 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Page 1 of 54

M2027.0003



Your Project #: M2027.0003 (OMAHA) Site Location: ELLSWORTH AFB Your C.O.C. #: n/a

Attention: Jenny Vance

Aerostar SES LLC SES Construction and Fuel Serv 1006 Floyd Culler Court Oak Ridge, TN USA 37830

> Report Date: 2018/05/23 Report #: R5165433 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8A6782

Received: 2018/05/08, 14:01

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance. * RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Per- and polyfluoroalkyl substances (PFAS) identified as surrogates on the certificate of analysis represent the extracted internal standard.

Encryption Key

typh Pallin

Stephanie Pollen Project Manager 23 May 2018 14:11:29

Please direct all questions regarding this Certificate of Analysis to your Project Manager. Stephanie Pollen, Project Manager Email: SPollen@maxxam.ca Phone# (905) 817-5700

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total Cover Pages : 2 Page 2 of 54

Maxxam

Prepared for: Aerostar SES LLC

Project: M2027.0003 (OMAHA) ELLSWORTH AFB

Analytical Data Package (Level IV)

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

Maxxam Job #: B8B1135

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

Maxxam

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 Pallin

Project Manager

Stephanie Pollen 2018.06.04 10:40:03 -04'00'

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

Maxxam Analytics

4 of 1885

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 matrixspecific 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 ¹³C-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.

Maxxam Job: B8B1135 – Soil Analysis

Sample Analysis

Soil extracts were initially pre-screened and estimated concentrations were obtained so that samples could be appropriately diluted for analysis on QC batches 5541157 (2018/05/25) and 5543059 (2018/05/25). Due to high concentration, dilution was required for Perfluorooctanesulfonate (PFOS) in the following sample:

GRF764 *ELSWH06-001-SS-001*

Detection limit was adjusted accordingly.

Peak areas of injection internal standard analytes were marginally above the upper control limit for the following samples:

GRF757ELSWH11-004-SO-012GRF770ELSWH02-005-SO-034

There is no impact on data quality. All other QC acceptance criteria including extracted internal standard analyte recoveries were met for these samples.

Quantitation of PFAS

Many PFAS (e.g. PFOS) have several isomeric forms that may show up as separate or partially-merged peaks in the analytical chromatograms. These peaks will be integrated and the areas summed such that the result represents the concentration of the sum of the linear and branched isomers, per USEPA (2009). Instrumentation is calibrated using certified quantitative standards containing only the linear isomer for all target analytes, except Perfluorooctane sulfonate (PFOS) and Perfluorohexane sulfonate (PFHxS), which are calibrated using certified branched and linear isomer mixtures. As additional certified reference materials containing branched and linear isomers become commercially available, they will be incorporated into the analytical method.

Data Qualifiers

U – Analyte was not detected and is reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J – The reported result is an estimated value (e.g., matrix interference was observed, or the analyte was detected at a concentration outside the calibration range).

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

Maxxam Job: B8B1135 – 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 5536376 (2018/05/18), 5538474 (2018/05/24) and 5540994 (2018/05/24). Due to high concentrations, the following samples were analyzed for selected analytes using reduced sample extraction volumes:

GRF779ELSWH03-003-GW-016Perfluorohexanesulfonate (PFHxS), Perfluorooctanesulfonate (PFOS)GRF780ELSWH03-002-GW-017Perfluorohexanesulfonate (PFHxS), Perfluorooctanesulfonate (PFOS)

Detection limits were adjusted accordingly.

The following samples were initially analyzed on QC batch 5538474 (2018/05/24):

 GRF748
 ELSWH-SB-001

 GRF749
 ELSWH-RS-016

 GRF763
 ELSWH-RS-014

Due to 6:2 Fluorotelomersulfonate (6:2FTS) contamination in the Method Blank, samples were re-extracted and reanalyzed for this analyte on QC batch 5547534 (2018/05/26), past the method defined hold time. 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.

Extracted Internal Standard Analytes

The extracted internal standard analytes ¹³C₄-Perfluorobutanoic acid (¹³C₄-PFBA), ¹³C₅-Perfluoropentanoic acid (¹³C₅-PFPeA), $^{13}C_2$ -Perfluorohexanoic acid ($^{13}C_2$ -PFHxA), $^{18}O_2$ -Perfluorohexanesulfonate (¹⁸O₂-PFHxS), $\label{eq:perfluoroheptanoic acid ($^{13}C_4$-PFHpA), $^{13}C_4$-Perfluorooctanoic acid ($^{13}C_4$-PFOA), $^{13}C_4$-Perfluorooctanesulfonate ($^{13}C_4$-Perfluorooctanesulfonate ($^{13}C_4$-Pe$ PFOS), ¹³C₅-Perfluorononanoic acid (¹³C₅-PFNA), ¹³C₂-Perfluorodecanoic acid (¹³C₂-PFDA), ¹³C₂-Perfluoroundecanoic acid (¹³C₂-PFUnA), ¹³C₂-Perfluorododecanoic acid (¹³C₂-PFDoA), ¹³C₂-Perfluorotetradecanoic acid (¹³C₂-PFTeDA), ¹³C₈-Perfluorooctane sulfonamide (${}^{13}C_8$ -PFOSA), ${}^{13}C_2$ -6:2 Fluorotelomersulfonate (${}^{13}C_2$ -6:2FTS) and ${}^{13}C_2$ -8:2 Fluorotelomersulfonate (¹³C₂-8:2FTS) are used to guantify native Perfluorobutanoic acid (PFBA), Perfluoropentanoic acid (PFPeA), Perfluorohexanoic acid (PFHxA), Perfluorobutanesulfonate (PFBS) & Perfluorohexanesulfonate (PFHxS), Perfluoroheptanoic acid (PFHpA), Perfluorooctanoic acid (PFOA), Perfluorooctanesulfonate (PFOS), Perfluorononanoic acid (PFNA), Perfluorodecanoic acid (PFDA) & Perfluorodecanesulfonate (PFDS), Perfluoroundecanoic acid (PFUnA), Perfluorododecanoic acid (PFDoA), Perfluorotridecanoic acid (PFTrDA) & Perfluorotetradecanoic acid (PFTeDA), Perfluorooctane sulfonamide (PFOSA), 6:2 Fluorotelomersulfonate (6:2FTS) and 8:2 Fluorotelomersulfonate (8:2FTS) respectively. The recoveries observed for selected extracted internal standard analytes were below the defined lower control limit (LCL) for the following samples:

GRF753ELSWH-RS-017(13C2-PFDoA, 13C2-PFTeDA)GRF775ELSWH06-003-GW-055(All extracted internal standard analytes)

These samples were re-extracted and re-analyzed for the associated native analytes on QC batches 5551160 (2018/05/29) and 5543607 (2018/05/25) respectively. Acceptable ${}^{13}C_2$ -PFDoA and ${}^{13}C_2$ -PFTeDA recoveries were obtained for sample GRF753 (*ELSWH-RS-017*) on re-analysis. Low recovery of ${}^{13}C_4$ -PFBA was confirmed in sample GRF775 (*ELSWH06-003-GW-055*). Acceptable recoveries were obtained for all other extracted internal standards in this sample. Both samples were re-analyzed past the method defined hold time. 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.

Quantitation of PFAS

Many PFAS (e.g. PFOS) have several isomeric forms that may show up as separate or partially-merged peaks in the analytical chromatograms. These peaks will be integrated and the areas summed such that the result represents the concentration of the sum of the linear and branched isomers, per USEPA (2009). Instrumentation is calibrated using certified quantitative standards containing only the linear isomer for all target analytes, except Perfluorooctane sulfonate (PFOS) and Perfluorohexane sulfonate (PFHxS), which are calibrated using certified branched and linear isomer mixtures. As additional certified reference materials containing branched and linear isomers become commercially available, they will be incorporated into the analytical method.

Data Qualifiers

U – Analyte was not detected and is reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J – The reported result is an estimated value (e.g., matrix interference was observed, or the analyte was detected at a concentration outside the calibration range).

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

PROJECT NARRATIVE

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



I. SAMPLE RECEIPT/ANALYSIS

a) Sample Listing

Maxxam	Client	Date	Date	Date	Date	Initial
ID	Sample ID	Sampled	Received	Prepped	Run	Calibration
PFOS and PFO	DA in soil by SPE/LCMS					
GRF747	ELSWH07-004-SO-013	2018/05/08	2018/05/11	2018/05/22	2018/05/25	2018/05/25
GRF750	ELSWH11-002-SS-001	2018/05/09	2018/05/11	2018/05/22	2018/05/25	2018/05/25
GRF751	ELSWH11-002-SO-010	2018/05/09	2018/05/11	2018/05/22	2018/05/25	2018/05/25
GRF752	ELSWH11H-002-SO-910	2018/05/09	2018/05/11	2018/05/22	2018/05/25	2018/05/25
GRF754	ELSWH11-001-SS-001	2018/05/09	2018/05/11	2018/05/22	2018/05/25	2018/05/25
GRF755	ELSWH11-001-SO-012	2018/05/09	2018/05/11	2018/05/22	2018/05/25	2018/05/25
GRF756	ELSWH11-004-SS-001	2018/05/09	2018/05/11	2018/05/23	2018/05/25	2018/05/25
GRF757	ELSWH11-004-SO-012	2018/05/09	2018/05/11	2018/05/23	2018/05/25	2018/05/25
GRF758	ELSWH11-005-SO-013	2018/05/09	2018/05/11	2018/05/23	2018/05/25	2018/05/25
GRF759	ELSWH07-002-SS-001	2018/05/09	2018/05/11	2018/05/23	2018/05/25	2018/05/25
GRF760	ELSWH06-004-SS-001	2018/05/06	2018/05/11	2018/05/23	2018/05/25	2018/05/25
GRF761	ELSWH06-004-SS-901	2018/05/06	2018/05/11	2018/05/23	2018/05/25	2018/05/25
GRF762	ELSWH06-004-SO-035	2018/05/06	2018/05/11	2018/05/23	2018/05/25	2018/05/25
GRF764	ELSWH06-001-SS-001	2018/05/06	2018/05/11	2018/05/23	2018/05/25	2018/05/25
GRF765	ELSWH06-001-SO-012	2018/05/06	2018/05/11	2018/05/23	2018/05/25	2018/05/25
GRF766	ELSWH03-002-SO-011	2018/05/06	2018/05/11	2018/05/23	2018/05/25	2018/05/25
GRF767	ELSWH03-002-SO-911	2018/05/06	2018/05/11	2018/05/23	2018/05/25	2018/05/25
GRF768	ELSWH03-003-SO-011	2018/05/06	2018/05/11	2018/05/23	2018/05/25	2018/05/25
GRF770	ELSWH02-005-SO-034	2018/05/07	2018/05/11	2018/05/23	2018/05/25	2018/05/25
GRF771	ELSWH03-004-SO-011	2018/05/07	2018/05/11	2018/05/23	2018/05/25	2018/05/25
GRF772	ELSWH07-001-SS-001	2018/05/08	2018/05/11	2018/05/23	2018/05/25	2018/05/25
GRF773	ELSWH07-001-SO-029	2018/05/08	2018/05/11	2018/05/23	2018/05/25	2018/05/25
GRF774	ELSWH07-004-SS-001	2018/05/08	2018/05/11	2018/05/23	2018/05/25	2018/05/25
PFOS and PFO	DA in water by SPE/LCMS					
GRF748	ELSWH-SB-001	2018/05/08	2018/05/11	2018/05/25	2018/05/26	2018/05/24 & 2018/05/26
GRF749	ELSWH-RS-016	2018/05/08	2018/05/11	2018/05/25	2018/05/26	2018/05/24 & 2018/05/26
GRF753	ELSWH-RS-017	2018/05/09	2018/05/11	2018/05/22	2018/05/24	2018/05/24 & 2018/05/29
GRF763	ELSWH-RS-014	2018/05/06	2018/05/11	2018/05/25	2018/05/26	2018/05/24 & 2018/05/26
GRF769	ELSWH-RS-015	2018/05/07	2018/05/11	2018/05/17	2018/05/18	2018/05/18
GRF775	ELSWH06-003-GW-055	2018/05/07	2018/05/11	2018/05/23	2018/05/25	2018/05/18
GRF776	ELSWH06-002-GW-018	2018/05/09	2018/05/11	2018/05/22	2018/05/24	2018/05/24
GRF777	ELSWH06-002-GW-918	2018/05/09	2018/05/11	2018/05/22	2018/05/24	2018/05/25
GRF778	ELSWH06-001-GW-018	2018/05/09	2018/05/11	2018/05/22	2018/05/24	2018/05/24
GRF779	ELSWH03-003-GW-016	2018/05/10	2018/05/11	2018/05/22	2018/05/24	2018/05/24
GRF780	ELSWH03-002-GW-017	2018/05/10	2018/05/11	2018/05/22	2018/05/24	2018/05/24
GRF781	ELSWH-RS-018	2018/05/10	2018/05/11	2018/05/22	2018/05/24	2018/05/24

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 temperature less than 10 degrees Celsius. Cooler custody seal was present and intact.

c) Documentation Problems: Sample "ELSWH03-002-SO-911" was labelled as "ELSWH03-002-GW-911", proceeded with ID on the COC with client's consent.

II. SAMPLE PREP:

No problems encountered





III. SAMPLE ANALYSIS:

See also comments within the appropriate Certificate of Analysis

a) Hold Times: Due to rework requirements, the following samples were analyzed past hold time: ELSWH-SB-001 ELSWH-RS-016, and ELSWH-RS-014 (for 6:2FTS), ELSWH-RS-017 (for PFDoA, PFTrDA, PFTedA), and ELSWH06-003-GW-055 (for all analytes).

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 f anager- Site Assessr diation/ Ultra Trace

2018/06/04 Date

roject Name: Site Inspectio	n of Aqueous Film Forming Form Areas		Job No.: M	2027.0003 (Omaha)	1					
Aultiple Sites, United States	Air Force Installations		Installation:	ELISWO	or th APB				ANALYSI	s	
verostar Project Manager: iend Data to:	Brian Odom, BOdom@specproenv.com (Jenny Vance, jvance@aerostar.net	478) 397-4906 (865) 483-7904					N				Sample Types: N = Normal FD = Field Duplicate
ampler(s): ろ.vojaと、	A. willis										AB = Ambient Blank or Field Reagent Blank EB = Equipment Rinsate
aboratory Name/Address: laxxam Analytics, Inc 740 Campobello Rd. lississauga, Ontario 5N2L8	Laboratory Shipping Addre Maxxam Analytics c/ö FedEx Depot 299 Cayuga Rd. Cheektowaga, NY 1422 Please indicate "HOLD FOR P	ess: 5 ICKUP"	Contact: Mi Phone: (90 email: MD	elissa DiGr 5) 817-5700 iGrazia@m	azia), ext. 5784 Iaxxam.ca	st of 18 analytes below)					Matrix: WG = Groundwater SO = Soil WP = Potable Water SE = Sediment WS = Surface Water
MAXXAM use only	Sample ID	Date Collected	Time Collected	Samplo Type	Matrix	PFAS (see li		/			WQ = Field QC (AB, EB)
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	ELSW H11-001-55-001	Stonlin	1000	N	50	1					
	ELSWH11-001-50-012	5109/18	1048	N	50	1			-		
	ELSUH11 -004-55-001	5/02/18	1111	N	50	1					
	ELSWH 11-004-50-012	510-118	125	N	50	1		1			11-May-18 13:53
	ELSWH11-005-50-013	Stoalis	1245	N	50	1	1.000		_		Stephanie Pollen
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Project Name: Site Inspection Multiple Sites, United States	n of Aqueous Film Forming Foam Areas, Air Force Installations		Job No.: Ma	EUSW	ORTHATS										6
Aerostar Project Manager: Send Data to:	Brian Odom, BOdom@specproenv.com Jenny Vance, jvance@aerostar.net	478) 397-4906 (865) 483-7904	Internet				1		VALYSIS			Sample T	ypes: nal		
Sampler(s): J. Vojak	, A.willis						$ \rangle$					AB = Amb EB = Equi	ient Blank or Field R pment Rinsate	eagent Bla	ink
Laboratory Name/Address: Maxxam Analytics, Inc 3740 Campobello Rd. Mississauga, Ontario .5N2L8	Laboratory Shipping Addr Maxxam Analytics c/o FedEx Depot 299 Cayuga Rd. Cheektowaga, NY 1422 Please indicate "HOLD FOR P	ess: 5 ICKUP"	Contact: Me Phone: (905 email: MD	olissa DiGr 5) 817-5700 iGrazia@m	azia , ext. 5784 axxam.ca	st of 18 analytes below)						Matrix: WG = Gro SO = Soil WP = Pota SE = Sed WS = Surf	undwater able Water iment ace Water		
MAXXAM use only	Sample ID	Date Collected	Time Collected	Sample Type	Matrix	PFAS (see li		\setminus				WQ = Fiel	d QC (AB, EB)		
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•	EISUH06-004-35-901	5/06/18	0745	FO	50	1		1		1			su anc.	-	
•	ELSUHOG -004 - 50 -035	5106/18	0410	N	50	1					1	-	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		1
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•	ELSW1+06-001 - 55-001	5/06/18	1013	N	50	(1		1	1			
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	ESWH03-002-50-911	5106/18	1350	FD	50	1			1	-			X	~	
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•	ELSWH07-001-50-029	5108119	1256	N	SU	1							-	/	
•	ELSW1407-004-55-001	5108118	1320	N	SU	۱									/
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Project Name: Site Inspectic Multiple Sites, United States	on of Aqueous Film Forming Foam Areas, Air Force Installations		Job No.: M	2027.0003 (Omaha)	T									
Aerostar Project Manager: Send Data to: Sampler(s):	Brian Odom, BOdom@specproenv.com Jenny Vance, jvance@aerostar.net	478) 397-4906 865) 483-7904							ANALYSI	5		Sample T N = Nor FD = Fie	ypes: mal d Duplicate		
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aboratory Name/Address: faxxam Analytics, Inc 740 Campobello Rd, fississauga, Ontario 5N2L8	Laboratory Shipping Addm Maxxam Analytics c/o FedEx Depot 299 Cayuga Rd. Cheektowaga, NY 1422 Please indicate "HOLD FOR P	ss: CKUP"	Contact: M Phone: (90 email: MD	elissa DiGr 5) 817-5700 iGrazia@m	azia , ext. 5784 axxam.ca	t of 18 analytes below)						Matrix: WG = Groundwater SO = Soil WP = Potable Water SE = Sediment WS = Surface Water			
MAXXAM use only	Sample ID	Date Collected	Time Collected	Sample Type	Matrix	PFAS (see its						WQ = Fie	d QC (AB, EB)		
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Aerostar Project Manager: Send Data to:	Brian Odom, BOdom@specproenv.com (4 Jenny Vance, jvance@aerostar.net (8	78) 397-4906 65) 483-7904	installation.				N		ANALYSI	s		Sample T N = Norr	ypes: mal		
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Laboratory Name/Address: Maxxam Analytics, Inc 6740 Campobello Rd. Mississauga, Ontario L5N2L8	Laboratory Shipping Addres Maxxam Analytics c/o FedEx Depot 299 Cayuga Rd. Cheektowaga, NY 14225 Please indicate "HOLD FOR PIC	is: KUP"	Contact: Me Phone: (905 email: MD	olissa DiGra 5) 817-5790 Grazia@m	azia , ext. 5784 axxam.ca	st of 18 analytes below)						Matrix: WG = Gro SO = Soil WP = Pota SE = Sed WS = Surf	undwater able Water iment ace Water		
MAXXAM use only	Sample ID	Date Collected	Time Collected	Sample Type	Matrix	PFAS (see is			\backslash			WQ = Fiel	d QC (AB, EB)		
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	ELSWH03-002-GW-017	5/10/18	1421	N	WG	2	-		-	1			Z	4	-
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ignature	Date/Time	lignature	t	Date/Timu			1	Perflore	obeptaone at Obstance Mo	lica ve M.	PTEPA PTEPA	105-46-4 	6.2 Fluenstelesser sulfanz 8.2 Fluesotelemes sulfanz Perfluenshisteren and	e szera e szera pena	17619-97-2 19108-14-4 175-22-4
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Stephanie Pollen

To: Subject: Stephanie Pollen RE: [JOB#:B8B1135] FLAG resolution sample ID correction

Please note, this message originated outside of the Maxxam mail system. Please use caution when opening links or attachments. Thanks, Stephanie – Lagree with you.

From: Stephanie Pollen [mailto:SPollen@maxxam.ca]
Sent: Friday, May 11, 2018 4:19 PM
To: Jenny Vance <<u>JVance@aerostar.net</u>>; Laura Natzke <<u>LNatzke@aerostar.net</u>>
Cc: Ashley Willis <<u>AWillis@aerostar.net</u>>
Subject: Ellsworth AFB (Maxxam job B

Good afternoon,

We received the below submission for Ellsworth AFB and our sample inspection staff has informed me that sample "ELSWH03-002-SO-911" is labelled on the bottle as "ELSWH03-002-**GW**-911". The sample is soil, I am assuming this was just a transcription error so we will proceed with the ID as per the CoC. Please let me know otherwise.

Thank you and have a great weekend!

utigite Kites, Lindad States	ei of Altancian Filai Farming Finan Astan. Alt False familiarium		Jack No. 40	E D.B.	Denine)	-							
minister Personal Mensioner and Data ter	Brian Olders, IED to - Database from Later Servey Versia, man-configure state from	(478) (87-600) (841) (821-764					1					Sample Typ rf = Morris FD = Fond	des. d' Duminada
J. Valate	A Hillis						1					AB + Artiste EB + Eister	est Blank or Fauld Husspord Blank- round Romato
Roostory Bang Address annon Analytics, Inc. 48 Cantyniaelis Rd. Intinaacga, Onlarie W21,9	Lemmanley Timoning Adm Maranet Analytics Sin Fadder Dent 381 Geynage Ad Chanktowaya, WY 1420 Planar sumada "HOLOTOR F		Costate the	Grand Color	atta-							Matrix: WG = Grout SO = Sof WP = Potel SE = Sector WS = Sector	ndenstell ne Wilson net ce Wilson
-	Name O	See Connect	-	Type	-	1						WG + Feld	GC (MR EIR)
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Kind regards,

STEPHANIE POLLEN, B.Sc. Project Manager, Site Assessment and Remediation/Ultra Trace Analysis

Office 905.817.5830 Mobile 416.432.3443 Toll free 800 565 7227 spollen@maxxam.ca

6740 Campobello Rd. / Mississauga, ON Canada L5N 2L8 maxxam.ca

Please Note: Maxxam will be CLOSED Monday May 21 for Victoria Day.



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Your Project #: M2027.0003 (OMAHA) Site Location: ELLSWORTH AFB Your C.O.C. #: na

Attention: Jenny Vance

Aerostar SES LLC SES Construction and Fuel Serv 1006 Floyd Culler Court Oak Ridge, TN USA 37830

> Report Date: 2018/05/30 Report #: R5184408 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8B1135 Received: 2018/05/11, 13:53

Sample Matrix: Ground Water # Samples Received: 6

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
PFOS and PFOA in water by SPE/LCMS (1)	5	2018/05/22	2018/05/24	CAM SOP-00894	EPA 537 m
PFOS and PFOA in water by SPE/LCMS (1)	1	2018/05/23	2018/05/25	CAM SOP-00894	EPA 537 m

Sample Matrix: Soil # Samples Received: 23

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
Moisture	23	N/A	2018/05/14	CAM SOP-00445	Carter 2nd ed 51.2 m
PFOS and PFOA in soil by SPE/LCMS (1)	6	2018/05/22	2018/05/25	CAM SOP-00894	EPA537 m
PFOS and PFOA in soil by SPE/LCMS (1)	17	2018/05/23	2018/05/25	CAM SOP-00894	EPA537 m

Sample Matrix: Water

Samples Received: 6

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
PFOS and PFOA in water by SPE/LCMS (1)	1	2018/05/17	2018/05/18	CAM SOP-00894	EPA 537 m
PFOS and PFOA in water by SPE/LCMS (1)	3	2018/05/18	2018/05/24	CAM SOP-00894	EPA 537 m
PFOS and PFOA in water by SPE/LCMS (1)	2	2018/05/22	2018/05/24	CAM SOP-00894	EPA 537 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Page 1 of 63



Your Project #: M2027.0003 (OMAHA) Site Location: ELLSWORTH AFB Your C.O.C. #: na

Attention: Jenny Vance

Aerostar SES LLC SES Construction and Fuel Serv 1006 Floyd Culler Court Oak Ridge, TN USA 37830

> Report Date: 2018/05/30 Report #: R5184408 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8B1135 Received: 2018/05/11, 13:53

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Per- and polyfluoroalkyl substances (PFAS) identified as surrogates on the certificate of analysis represent the extracted internal standard.

Encryption Key

typh Pallin

Stephanie Pollen Project Manager 30 May 2018 15:59:01

Please direct all questions regarding this Certificate of Analysis to your Project Manager. Stephanie Pollen, Project Manager Email: SPollen@maxxam.ca Phone# (905) 817-5700

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam

Prepared for: Aerostar SES LLC

<u>Project</u>: M2027.0003 (OMAHA) ELLSWORTH AFB

Analytical Data Package (Level IV)

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

Maxxam Job #: B8C0381

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

Maxxam

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 Vallen

Project Manager

Stephanie Pollen 2018.06.18 12:16:24 -04'00'

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

Maxxam Analytics

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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 matrixspecific 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 ¹³C-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.

Sample Analysis

Soil extracts were initially pre-screened and estimated concentrations were obtained so that samples could be appropriately diluted for analysis on QC batches 5549693 (2018/05/28-30) and 5549696 (2018/05/28-29). Due to high concentrations, dilutions were required for selected analytes in the following samples:

GTF528	ELSWH10-004-SD-001	Perfluorooctanesulfonate (PFOS)
GTF532	ELSWH04-002-SS-001	Perfluorooctanesulfonate (PFOS)
GTF540	ELSWH01-003-SS-001	Perfluorooctanesulfonate (PFOS)
GTF542	ELSWH01-002-SS-001	Perfluorooctanesulfonate (PFOS)
GTF543	ELSWH01-002-SO-012	All analytes
GTF544	ELSWH01-004-SS-001	All analytes
GTF545	ELSWH01-004-SO-012	Perfluorooctanesulfonate (PFOS)
GTF547	ELSWH01-001-SS-001	All analytes
GTF548	ELSWH01-001-SS-901	All analytes
GTF550	ELSWH01-001-SO-013	Perfluorooctanesulfonate (PFOS), 6:2 Fluorotelomersulfonate (6:2FTS)
GTF551	ELSWH01-001-SO-913	Perfluorooctanesulfonate (PFOS), 6:2 Fluorotelomersulfonate (6:2FTS)
GTF552	ELSWH03-001-SO-009	Perfluorooctanesulfonate (PFOS)

Detection limits were adjusted accordingly.

Peak areas of injection internal standard analytes were above the defined upper control limit (UCL) for selected dilutions in the following samples:

GTF544	ELSWH01-004-SS-001
GTF548	ELSWH01-001-SS-901
GTF551	ELSWH01-001-SO-913

Sample vials were visually inspected and evaporation of vial contents was observed. Because quantitation is performed using isotope dilution and internal standard techniques, any apparent gains of the target compound that may occur during extract evaporation will be mirrored by a similar gain of the labeled internal standard, and as such can be accounted for and corrected. Therefore, the quantitation of target and extracted internal standard analytes is not affected by the high injection internal standard analyte peak areas.

Extracted Internal Standard Analytes

The extracted internal standard analyte ${}^{13}C_2$ -Perfluorotetradecanoic acid (${}^{13}C_2$ -PFTeDA) is used to quantify native Perfluorotridecanoic acid (PFTrDA) & Perfluorotetradecanoic acid (PFTeDA). The recoveries observed for this extracted internal standard analyte were below the defined lower control limit (LCL) for the following samples:

GTF528 *ELSWH10-004-SD-001* GTF542 *ELSWH01-002-SS-001*

Samples were re-extracted and re-analyzed for the associated native analytes on QC batch 5554876 (2018/06/02-03). Results were reported from diluted extracts where acceptable ${}^{13}C_2$ -PFTeDA recoveries were obtained. Detection limits were adjusted accordingly.

QC Samples

Matrix Spike and Matrix Spike Duplicate (MS/MSD) was performed on sample GTF547 (*ELSWH01-001-SS-001*) on QC batch 5549693 (2018/05/28-30) but not analyzed due to high concentrations of target analytes in the native sample.

Quantitation of PFAS

Many PFAS (e.g. PFOS) have several isomeric forms that may show up as separate or partially-merged peaks in the analytical chromatograms. These peaks will be integrated and the areas summed such that the result represents the concentration of the sum of the linear and branched isomers, per USEPA (2009). Instrumentation is calibrated using certified quantitative standards containing only the linear isomer for all target analytes, except Perfluorooctane sulfonate (PFOS) and Perfluorohexane sulfonate (PFHxS), which are calibrated using certified branched and linear isomer mixtures. As additional certified reference materials containing branched and linear isomers become commercially available, they will be incorporated into the analytical method.

Data Qualifiers

U – Analyte was not detected and is reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J – The reported result is an estimated value (e.g., matrix interference was observed, or the analyte was detected at a concentration outside the calibration range).

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

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

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

I. SAMPLE RECEIPT/ANALYSIS

a) Sample Listing

		1	
М	a	XXam	
		Analytics Inc	

Maxxam	Client	Date	Date	Date	Date	Initial
ID	Sample ID	Sampled	Received	Prepped	Run	Calibration
PFOS and PFC	DA in soil by SPE/LCMS					
GTF526	ELSWH11-006-SD-001	2018/05/16	2018/05/22	2018/05/26	2018/05/28	2018/05/28-30
GTF528	ELSWH10-004-SD-001	2018/05/16	2018/05/22	2018/05/26	2018/05/28	2018/05/28-30 & 2018/06/02-03
GTF532	ELSWH04-002-SS-001	2018/05/18	2018/05/22	2018/05/26	2018/05/28	2018/05/28-30
GTF533	ELSWH04-002-SO-035	2018/05/18	2018/05/22	2018/05/26	2018/05/28	2018/05/28-30
GTF534	ELSWH07-002-SO-013	2018/05/09	2018/05/22	2018/05/26	2018/05/28	2018/05/28-30
GTF538	ELSWH07-003-SS-001	2018/05/15	2018/05/22	2018/05/26	2018/05/28	2018/05/28-30
GTF539	ELSWH07-003-SO-016	2018/05/15	2018/05/22	2018/05/26	2018/05/28	2018/05/28-30
GTF540	ELSWH01-003-SS-001	2018/05/15	2018/05/22	2018/05/26	2018/05/28	2018/05/28-30
GTF541	ELSWH01-003-SO-025	2018/05/15	2018/05/22	2018/05/26	2018/05/28	2018/05/28-30
GTF542	ELSWH01-002-SS-001	2018/05/16	2018/05/22	2018/05/26	2018/05/28	2018/05/28-30 & 2018/06/02-03
GTF543	ELSWH01-002-SO-012	2018/05/16	2018/05/22	2018/05/26	2018/05/28	2018/05/28-30
GTF544	ELSWH01-004-SS-001	2018/05/16	2018/05/22	2018/05/26	2018/05/28	2018/05/28-30
GTF545	ELSWH01-004-SO-012	2018/05/16	2018/05/22	2018/05/26	2018/05/28	2018/05/28-30
GTF547	ELSWH01-001-SS-001	2018/05/17	2018/05/22	2018/05/26	2018/05/28	2018/05/28-30
GTF548	ELSWH01-001-SS-901	2018/05/17	2018/05/22	2018/05/26	2018/05/28	2018/05/28-30
GTF550	ELSWH01-001-SO-013	2018/05/17	2018/05/22	2018/05/26	2018/05/29	2018/05/28-29
GTF551	ELSWH01-001-SO-913	2018/05/17	2018/05/22	2018/05/26	2018/05/28	2018/05/28-30
GTF552	ELSWH03-001-SO-009	2018/05/17	2018/05/22	2018/05/26	2018/05/28	2018/05/28-30

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 temperature less than 10 degrees Celsius. Cooler custody seals were present and intact.

c) Documentation Problems: Sample ELSWH01-MW930107-GW-034 required high level analysis, client confirmed to proceed. Due to the size of the submission, the Data Package was split into soil and water versions.

II. SAMPLE PREP:

No problems encountered

III. SAMPLE ANALYSIS:

See also comments within the appropriate Certificate of Analysis

a) Hold Times: Due to rework requirements, the following samples were analyzed past hold time; ELSWH02-008-GW-029, ELSWH02-008-GW-929, and ELSWH02-007-GW-018.

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.

tigh Palle

Project Manager- Site Assessmer and Remediation/ Ultra Trace

2018/06/18 Date

Aerosta	rSES	1006 Floyd Cul Oak Ridge, TN 865-481-7	er Court 37830 837	Chai Analy	n of Cust sis Requ	ody R est Nu	ecord/ imber:				0305 Page 1 of 34			
Project Name: Site Inspection Multiple Sites, United States /	of Aqueous Film Forming Foam Areas, Nr Force Installations		Job No.: M2 Installation:	ELISCIC	omaha)				MALYSI					
Aerostar Project Manager: Send Data to:	Brian Odom, BOdom@specproenv.com (Jenny Vance, jvance@aerostar.net (478) 397-4906 865) 483-7904					1				Sample Types; N = Normal ED = Field Dunlicate			
Sampler(s):						1	1				AB = Ambient Blank or Field Reagent Blank EB = Equipment Rinsate			
Laboratory Name/Address: Maxxam Analytics, Inc 6740 Campobelio Rd. Mississauga, Ontario LSN2L5	Laboratory Shipping Addr Maxam Analytics clo FedEx Dopot 299 Cayuga Rd. Cheektowaga, NY 1422! Please Indicale "HOLD FOR Pl	ss: SCKUP"	Phone: (98) email: Spo	ephanie Pol i) 817-5830 illen@maxx	lien .am.ca	tat of 18 analytiss below)		/	/		Matrix: WG = Groundwater SO = Soil WP = Potable Water SE = Sediment WS = Surface Water WS = Surface Water Eleft O(C, GB, EB)			-
MAXXAM use only	Sample ID	Date Collected	Time Collected	Sample Type	Matrix	PFAS (see				/				
т. 4	ELSWH - RS - DIM +	2013/05/15	0910	EB	WQ	2				-1	NOTES Assucius w/ KLSWH 17-001-6W-035			
	ELSWH07-001 - 6W-035	2018/05/15	1255	N	NG	2	1				01.0			
•	ELSWHI -006-50-001	2018/05/16	0900	N	SE	2								
	ELSWH 11-006-5W-001	2018/05/16	0900	N	WS	2						4.		
	EUSWHIO-004 - 50 =001	2018/05/16	0945	N	SE	2	1							
	ELSWH10-004-SW-001	2012/05/16	0945	N	WS	2		1-1	1 - 7					
	ELSWHOI- MLA30107-64-0	21/20/810C H	1554	N	616	2					2			
		-									INTERNATIONAL SOLID SAMPLE			
1		D	P2				-		-					
					-		-		-	-	22-May-18 14:19			
						-		/	/	1				
				Total #	of Container	14	-			-	HGL ENV-980			
RELINQUISHED BY	05/20/18 1600	RECEIVED BY: Durie Sing		2015/03	5/22 1	4-19	Analyte List:	Trail or	45.42.711	-	FEPTum PAR STIME CAS Commission FAR STIME CAS FVS Line of 1 Pedies are released on the State Petra Petra Petra FVS Line of 1 Pedies are released on the State Petra Petra Petra FVS Line of 1 Pedies are released on the State Petra Petra Petra		1	
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Aerosta	rSES	1006 Floyd Cu Oak Ridge, T 865-481-	ller Court N 37830 7837	Analy	sis Requ	est Nu	imber:	+			F	Page 2 of 34			
roject Name: Site Inspection Iultiple Sites, United States /	n of Aqueous Film Forming Foam Areas, Air Force Installations		Job No.: M2	EIISWC	Omaha))RTH_			AP	NALYSIS						
erostar Project Manager: iend Data to:	Brian Odom, BOdom@specproenv.com (Jenny Vance, jvance@aercstar.net	(478) 397-4906 (865) 483-7904										Sample Types: N = Normal FD = Field Duplicate			
ampler(s): A.willis,	ArekT.						/					AB = Ambient Blank or Field Reagent Blank EB = Equipment Rinsate			
aboratory Name/Address: laxxam Analytics, Inc. 740 Campobello Rd. Alississauga, Ontario .5N2L8	Laboratory Shipping Adm Maxxam Analytics c/o FedEx Depot 299 Gayuga Rdi. Cheektowaga, NY 1422 Please indicate "HOLD FOR P	955: .5 4CKUP"	Contact: Me Phone: (90) email: MD	elissa DiGra 5) 817-5700, JiGrazia@m	izia , ext. 5784 axxam.ca	ist of 18 analytes below						Matrix: WG = Groundwater SO = Soil WP = Potable Water SE = Sediment WS = Surface Water WM = Freid OC (AB EB)			
MAXXAM use only	Sample ID	Date Collected	Time Collected	Sample Type	Matrix	PFAS (see li								•	
	ELSWH-RS-022	5/18/18	0840	EB	NQ.	2						NOTES			
	ELSU404-002-55-001	5118118	6945	N	50	1					1				
	ELSWHOM-002-50-035	5/18/18	1030	N	50	1									
	ELSWI407-602-50-013	5/9/18	1610	N	50	1						X			
•	FIGNH 09-003-6W-029	5/18/18	1016	N	5V6	2						Cor		5	
٠	FISWH02-008-6W-929	5/18/18	1016	FD	WG	2									
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Aerostar Project Manager: Send Data to:	Brian Odom. BOdom@spacproenv.com (4 Jenny Vance, jvance@aerostar.net (8	478) 397-4906 365) 483-7904					1					N = Normal				
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	ELSWHOI-001-6W-015	2018/05/20	0925	N	WG	6						als/mSD			
	FISHH01-001-GW-915	2018/05/20	0925	FD	WG	2		12.00							
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,	F(SWH11-003-6W-020	2018/05/20	1534	N	WG	2									
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Stephanie Pollen

From:	Jenny Vance <jvance@aerostar.net></jvance@aerostar.net>
Sent:	Thursday, May 24, 2018 12:18 PM
То:	Stephanie Pollen
Cc:	Laura Natzke, Brian Odom
Subject:	RE: High Level Analysis: Ellsworth AFB (Maxxam job B8C0381)

Please note, this message originated outside of the Maxxam mail system. Please use caution when opening links or attachments. Thanks, Stephanie. Go ahead, but keep us posted.

From: Stephanie Pollen [mailto:SPollen@maxxam.ca]
Sent: Thursday, May 24, 2018 12:02 PM
To: Jenny Vance <<u>JVance@aerostar.net</u>>
Cc: Laura Natzke <<u>LNatzke@aerostar.net</u>>; Brian Odom <<u>BOdom@specproenv.com</u>>
Subject: RE: High Level Analysis: Ellsworth AFB (Maxxam job B8C0381)

Hi Jenny,

The lab has confirmed PFHxS will definitely need high level. PFHxA, PFOS & 6:2-FTS might need it, we'll need to see the results of the 100x SPE first.

Kind regards,

STEPHANIE POLLEN, B.Sc. Project Manager, Site Assessment and Remediation/Ultra Trace Analysis

Office 905.817.5830 Mobile 416.432.3443 Toll free 800 565 7227 spollen@maxxam.ca

6740 Campobello Rd. / Mississauga, ON Canada L5N 2L8 maxxam.ca



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From: Jenny Vance [mailto:JVance@aerostar.net]
Sent: Thursday, May 24, 2018 11:09 AM
To: Stephanie Pollen
Cc: Laura Natzke; Brian Odom
Subject: RE: High Level Analysis: Ellsworth AFB (Maxxam job B8C0381)

M2027.0003

Please note, this message originated outside of the Maxxam mail system. Please use caution when opening links or attachments.

I suspect the samples were prescreened and showed high levels of one or more analytes. If so, can you tell us which analytes are requiring a 100x dilution? As always, my fear is that we won't be able to determine whether PFOS or PFOA exceed regulatory criteria. If one or both of those was detected at high levels, I don't think we have a problem (well – except for the obvious contamination at the well).

From: Stephanie Pollen [mailto:SPollen@maxxam.ca]
Sent: Thursday, May 24, 2018 11:01 AM
To: Jenny Vance <<u>JVance@aerostar.net</u>>
Cc: Laura Natzke <<u>LNatzke@aerostar.net</u>>
Subject: High Level Analysis: Ellsworth AFB (Maxxam job B8C0381)

Good morning Jenny,

The lab has informed me that the below samples require high-level analysis. Can you please confirm if we are OK to proceed?

Maxxam job B8C0381 (Ellsworth AFB)

ELSWH01-MW930107-GW-034 (GFT530) ELSWH01-001-GW-015 (GFT558) ELSWH01-001-GW-915 (GFT559)

Kind regards,

STEPHANIE POLLEN, B.Sc. Project Manager, Site Assessment and Remediation/Ultra Trace Analysis

Office 905.817.5830 Mobile 416.432.3443 Toll free 800 565 7227 spollen@maxxam.ca

6740 Campobello Rd. / Mississauga, ON Canada L5N 2L8 maxxam.ca



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Your Project #: M2027.0003 (OMAHA) Site Location: ELLSWORTH AFB Your C.O.C. #: na

Attention: Jenny Vance

Aerostar SES LLC SES Construction and Fuel Serv 1006 Floyd Culler Court Oak Ridge, TN USA 37830

> Report Date: 2018/06/12 Report #: R5232914 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8C0381

Received: 2018/05/22, 14:19

Sample Matrix: Ground Water # Samples Received: 13

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
PFOS and PFOA in water by SPE/LCMS (1)	1	2018/05/25	2018/06/06	CAM SOP-00894	EPA 537 m
PFOS and PFOA in water by SPE/LCMS (1)	1	2018/05/26	2018/05/27	CAM SOP-00894	EPA 537 m
PFOS and PFOA in water by SPE/LCMS (1)	3	2018/05/30	2018/06/01	CAM SOP-00894	EPA 537 m
PFOS and PFOA in water by SPE/LCMS (1)	5	2018/05/31	2018/06/04	CAM SOP-00894	EPA 537 m
PFOS and PFOA in water by SPE/LCMS (1)	3	2018/06/04	2018/06/11	CAM SOP-00894	EPA 537 m

Sample Matrix: Soil # Samples Received: 16

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
Moisture	16	N/A	2018/05/24	CAM SOP-00445	Carter 2nd ed 51.2 m
PFOS and PFOA in soil by SPE/LCMS (1)	15	2018/05/26	2018/05/28	CAM SOP-00894	EPA537 m
PFOS and PFOA in soil by SPE/LCMS (1)	1	2018/05/26	2018/05/29	CAM SOP-00894	EPA537 m

Sample Matrix: SEDIMENT # Samples Received: 2

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
Moisture	2	N/A	2018/05/24	CAM SOP-00445	Carter 2nd ed 51.2 m
PFOS and PFOA in soil by SPE/LCMS (1)	2	2018/05/26	2018/05/28	CAM SOP-00894	EPA537 m

Sample Matrix: Surface Water # Samples Received: 2

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
PFOS and PFOA in water by SPE/LCMS (1)	2	2018/05/26	2018/05/27	CAM SOP-00894	EPA 537 m

Sample Matrix: Water # Samples Received: 6

Analyses Quantity Extracted Analyzed Laboratory Method Reference		Date	Date		
	Analyses	Quantity Extracted	Analyzed	Laboratory Method	Reference

Page 1 of 76

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, LSN 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca


Attention: Jenny Vance

Aerostar SES LLC SES Construction and Fuel Serv 1006 Floyd Culler Court Oak Ridge, TN USA 37830

> Report Date: 2018/06/12 Report #: R5232914 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8C0381 Received: 2018/05/22, 14:19

Sample Matrix: Water # Samples Received: 6

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
PFOS and PFOA in water by SPE/LCMS (1)	1	2018/05/25	2018/06/06	CAM SOP-00894	EPA 537 m
PFOS and PFOA in water by SPE/LCMS (1)	1	2018/05/26	2018/05/27	CAM SOP-00894	EPA 537 m
PFOS and PFOA in water by SPE/LCMS (1)	1	2018/05/28	2018/06/02	CAM SOP-00894	EPA 537 m
PFOS and PFOA in water by SPE/LCMS (1)	2	2018/05/30	2018/06/01	CAM SOP-00894	EPA 537 m
PFOS and PFOA in water by SPE/LCMS (1)	1	2018/05/31	2018/06/04	CAM SOP-00894	EPA 537 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Per- and polyfluoroalkyl substances (PFAS) identified as surrogates on the certificate of analysis represent the extracted internal standard.

Page 2 of 76

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca



Attention: Jenny Vance

Aerostar SES LLC SES Construction and Fuel Serv 1006 Floyd Culler Court Oak Ridge, TN USA 37830

> Report Date: 2018/06/12 Report #: R5232914 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8C0381 Received: 2018/05/22, 14:19

Encryption Key

. Palm

Stephanie Pollen Project Manager 12 Jun 2018 14:03:51

Please direct all questions regarding this Certificate of Analysis to your Project Manager. Stephanie Pollen, Project Manager Email: SPollen@maxxam.ca Phone# (905) 817-5700

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total Cover Pages : 3 Page 3 of 76

Maxxam

Prepared for: Aerostar SES LLC

<u>Project</u>: M2027.0003 (OMAHA) ELLSWORTH AFB

Analytical Data Package (Level IV)

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

Maxxam Job #: B8C0381

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

Maxxam

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 Pallen

Project Manager

Stephanie Pollen 2018.06.18 11:59:04 -04'00'

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

Maxxam Analytics

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 matrixspecific 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 ¹³C-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.

Maxxam Job: B8C0381 – 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 5548287 (2018/06/06), 5549674 (2018/05/27), 5551465 (2018/06/02), 5554565 (2018/06/03), 5555549 (2018/06/01-02) and 5557332 (2018/06/04-05). Due to high concentrations, the following samples were analyzed for selected analytes using reduced sample extraction volumes:

GTF529	ELSWH10-004-SW-001	Perfluorohexanesulfonate (PFHxS)
GTF530	ELSWH01-MW930107-GW-034	All analytes
GTF535	ELSWH02-008-GW-029	Perfluorooctanesulfonate (PFOS)
GTF558	ELSWH01-001-GW-015	All analytes
GTF559	ELSWH01-001-GW-915	All analytes

In addition, sample GTF530 (*ELSWH01-MW930107-GW-034*) was analyzed for Perfluorohexanesulfonate (PFHxS) by high level analysis with serial dilution on QC batch 5548299 (2018/05/28), with project approval by the client. Detection limits were adjusted accordingly.

Re-Analysis of QC batch 5548287

QC batch 5548287 was initially analyzed on 2018/05/28. During assembly of the Level IV data package, it was observed that raw data was not available for the Instrument Sensitivity Check (ISC) sample on this QC batch. Several samples on this QC batch required re-injection due to possible analyte carryover. A 2nd ISC was injected prior to these sample re-injections, and it is likely that the raw data for the original ISC was overwritten during this process. Because initial ISC data was no longer available, the entire batch was re-analyzed on 2018/06/06. Based on the initial analytical results (2018/05/28), the following sample was re-extracted for Perfluorobutanoic acid (PFBA) on QC batch 5555549 (2018/06/01-02) due to low recovery of the associated extracted internal standard analyte ($^{13}C_{4^-}$ Perfluorobutanoic acid, $^{13}C_4$ -PFBA):

GTF525 *ELSWH07-001-GW-035*

On re-analysis of QC batch 5548287 (2018/06/06), acceptable recovery was obtained for ¹³C₄-PFBA. The final result for Perfluorobutanoic acid (PFBA) was therefore reported from this re-analysis and the result from the re-extraction on QC batch 5555549 (2018/06/01-02) was not used.

QC Batch 5554565

The following samples were initially analyzed on QC batch 5554565 (2018/06/03):

GTF535 *ELSWH02-008-GW-029* GTF536 *ELSWH02-008-GW-929* GTF537 *ELSWH02-007-GW-018*

Due to failure of QC acceptance criteria in the Spike (LCS), samples were re-extracted and re-analyzed on QC batch 5563245 (2018/06/05-11), past the method defined hold time. 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. On the initial analysis of QC batch 5563245 (2018/06/05), the recovery observed for 8:2 Fluorotelomersulfonate (8:2FTS) in the Instrument Sensitivity Check (ISC) sample did not meet acceptance criteria. The entire batch was re-injected for this analyte on 2018/06/11.

Sample GTF531 (ELSWH-RS-022)

The following sample was initially analyzed on QC batch 5555549 (2018/06/01-02):

GTF531 ELSWH-RS-022

Due to discrepancies between the initial screening and analytical results, the sample was re-extracted and reanalyzed on QC batch 5563245 (2018/06/05-11), past the method defined hold time. Results from the re-analysis confirmed the initial results obtained on QC batch 5555549 (2018/06/01-02). Final results were therefore reported from the initial analysis on QC batch 5555549 (2018/06/01-02) which had been analyzed within hold time.

QC Samples

Matrix Spike and Matrix Spike Duplicate (MS/MSD) was required for sample GTF558 (*ELSWH01-001-GW-015*) on QC batch 5557332 (2018/06/04-05) but not performed to high concentrations of target analytes in the native sample. A Matrix Duplicate (MD) was analyzed instead.

Quantitation of PFAS

Many PFAS (e.g. PFOS) have several isomeric forms that may show up as separate or partially-merged peaks in the analytical chromatograms. These peaks will be integrated and the areas summed such that the result represents the concentration of the sum of the linear and branched isomers, per USEPA (2009). Instrumentation is calibrated using certified quantitative standards containing only the linear isomer for all target analytes, except Perfluorooctane sulfonate (PFOS) and Perfluorohexane sulfonate (PFHxS), which are calibrated using certified branched and linear isomer mixtures. As additional certified reference materials containing branched and linear isomers become commercially available, they will be incorporated into the analytical method.

Data Qualifiers

U – Analyte was not detected and is reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J – The reported result is an estimated value (e.g., matrix interference was observed, or the analyte was detected at a concentration outside the calibration range).

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

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

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

I. SAMPLE RECEIPT/ANALYSIS

a) Sample Listing

Maxxam	Client	Date	Date	Date	Date	Initial
ID	Sample ID	Sampled	Received	Prepped	Run	Calibration
PFOS and PFO	OA in water by SPE/LCMS					
GTF524	ELSWH-RS-019	2018/05/15	2018/05/22	2018/05/25	2018/06/06	2018/06/06
GTF525	ELSWH07-001-GW-035	2018/05/15	2018/05/22	2018/05/25	2018/06/06	2018/06/06
GTF527	ELSWH11-006-SW-001	2018/05/16	2018/05/22	2018/05/26	2018/05/27	2018/05/27
GTF529	ELSWH10-004-SW-001	2018/05/16	2018/05/22	2018/05/26	2018/05/27	2018/05/27
GTF530	ELSWH01-MW930107-GW-034	2018/05/16	2018/05/22	2018/05/26	2018/05/27	2018/05/27 & 2018/05/28
GTF530 Dup	ELSWH01-MW930107-GW-034	2018/05/16	2018/05/22	2018/05/25	2018/05/28	2018/05/28
GTF531	ELSWH-RS-022	2018/05/18	2018/05/22	2018/05/30	2018/06/01	2018/06/01-02
GTF535	ELSWH02-008-GW-029	2018/05/18	2018/05/22	2018/06/04	2018/06/11	2018/06/05-11
GTF536	ELSWH02-008-GW-929	2018/05/18	2018/05/22	2018/06/04	2018/06/11	2018/06/05-11
GTF537	ELSWH02-007-GW-018	2018/05/18	2018/05/22	2018/06/04	2018/06/11	2018/06/05-11
GTF546	ELSWH-RS-020	2018/05/16	2018/05/22	2018/05/26	2018/05/27	2018/05/27
GTF549	ELSWH-RS-021	2018/05/17	2018/05/22	2018/05/28	2018/06/02	2018/06/02
GTF553	ELSWH10-002-GW-035	2018/05/19	2018/05/22	2018/05/30	2018/06/01	2018/06/01-02
GTF554	ELSWH10-002-GW-935	2018/05/19	2018/05/22	2018/05/30	2018/06/01	2018/06/01-02
GTF555	ELSWH-RS-023	2018/05/19	2018/05/22	2018/05/30	2018/06/01	2018/06/01-02
GTF556	ELSWH10-001-GW-045	2018/05/19	2018/05/22	2018/05/30	2018/06/01	2018/06/01-02
GTF557	ELSWH-RS-024	2018/05/20	2018/05/22	2018/05/31	2018/06/04	2018/06/04-05
GTF558	ELSWH01-001-GW-015	2018/05/20	2018/05/22	2018/05/31	2018/06/04	2018/06/04-05
GTF558 Dup	ELSWH01-001-GW-015	2018/05/20	2018/05/22	2018/05/31	2018/06/04	2018/06/04-05
GTF559	ELSWH01-001-GW-915	2018/05/20	2018/05/22	2018/05/31	2018/06/04	2018/06/04-05
GTF560	ELSWH11-002-GW-015	2018/05/20	2018/05/22	2018/05/31	2018/06/04	2018/06/04-05
GTF561	ELSWH11-003-GW-020	2018/05/20	2018/05/22	2018/05/31	2018/06/04	2018/06/04-05
GTF562	ELSWH11-001-GW-015	2018/05/20	2018/05/22	2018/05/31	2018/06/04	2018/06/04-05

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 temperature less than 10 degrees Celsius. Cooler custody seals were present and intact.

c) Documentation Problems: Sample ELSWH01-MW930107-GW-034 required high level analysis, client confirmed to proceed. Due to the size of the submission, the Data Package was split into soil and water versions.

II. SAMPLE PREP:

No problems encountered

III. SAMPLE ANALYSIS:

See also comments within the appropriate Certificate of Analysis

a) Hold Times: Due to rework requirements, the following samples were analyzed past hold time; ELSWH02-008-GW-029, ELSWH02-008-GW-929, and ELSWH02-007-GW-018.

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 Pallin Project Manager- Site Assessment and Remediation/ Ultra Trace

2018/06/18 Date

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Project Name: Site Inspection Multiple Sites, United States /	of Aqueous Film Forming Foam Areas, Nr Force Installations		Job No.: M2 Installation:	ELISCIC	omaha)				MALYSI					
Aerostar Project Manager: Send Data to:	Brian Odom, BOdom@specproenv.com (Jenny Vance, jvance@aerostar.net (478) 397-4906 865) 483-7904					1				Sample Types; N = Normal ED = Field Dunlicate			
Sampler(s):						1	1				AB = Ambient Blank or Field Reagent Blank EB = Equipment Rinsate			
Laboratory Name/Address: Maxxam Analytics, Inc 6740 Campobelio Rd. Mississauga, Ontario LSN2L5	Laboratory Shipping Addr Maxam Analytics clo FedEx Dopot 299 Cayuga Rd. Cheektowaga, NY 1422! Please Indicale "HOLD FOR Pl	ss: SCKUP"	Phone: (98) email: Spo	ephanie Pol i) 817-5830 illen@maxx	lien .am.ca	tat of 18 analytiss below)		/	/		Matrix: WG = Groundwater SO = Soil WP = Potable Water SE = Sediment WS = Surface Water WS = Surface Water Eleft O(C (AB = B))			-
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•	ELSWHI -006-50-001	2018/05/16	0900	N	SE	2								
	ELSWH 11-006-5W-001	2018/05/16	0900	N	WS	2						4.		
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ierostar Project Manager: iend Data to:	Brian Odom, BOdom@specproenv.com (Jenny Vance, jvance@aerostar.net	(478) 397-4906 (865) 483-7904	-									Sample Types: N = Normal FD = Field Duplicate			
A.willis,	ArekT.						/					AB = Ambient Blank or Field Reagent Blank EB = Equipment Rinsate			
aboratory Name/Address: laxxam Analytics, Inc 740 Campobello Rd. fississauga, Ontario .5N2L8	Laboratory Shipping Addn Maxxam Analytics c/o FedEx Depot 259 Gayuga Rd. Cheektowaga, NY 1422 Please indicate "HOLD FOR F	ress: 25 PICKUP''	Contact: M Phone: (90 email: MD	elissa DiGra 5) 817-5700 DiGrazia@m	azia , ext. 5784 axxam.ca	ist of 18 analytes below					1122	Matrix: WG = Groundwater SO = Soil WP = Potable Water SE = Sediment WS = Surface Water WG = Sicid co (AB EB)			
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Project Name: Site Inspectio	on of Aqueous Film Forming Foam Areas,		Job No.: M2	027.0003 (0	Omaha)							1. ²⁴				
Multiple Sites, United States	Air Force Installations		Installation:	EISH	DETH_	-		-	ANALYSIS			Course Transition				
Aerostar Project Manager: Send Data to:	Brian Odom. BOdom@spacproenv.com (4 Jenny Vance, jvance@aerostar.net (8	478) 397-4906 365) 483-7904					1					N = Normal				
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	ELSWHOI - 001 - 55-001	5/17/18	0833	N	50	2			-	1		ASIMSD Inc				
	ELSU401-001-55-901	5/17/18	0833	FD	50	1	-		-	1						
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Aerostar Project Manager: Send Data to:	Brian Odom, BOdom@specproenv.com (Jenny Vance, jvance@aerostar.net (478) 397-4906 865) 483-7904	1									Sample Types: N = Normal			
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Laboratory Name/Address: Maxxam Analytics, Inc. 6740 Campobello Rd. Mississauga, Ontario L5N2L8	Laboratory Shipping Addr Maxxam Analytics c/o FodEx Depot 299 Cayuga Rd, Cheektowaga, NY 1422 Please Indicate "HOLD FOR P	S CKUP"	Contact: St Phone: (905 email: Spo	ephanie Po 5) 817-5830 ollen@maxx	llen (am.ca	Ist of 18 analytes below)		/		-		Matrix: WG = Groundwater SO = Soil WP = Potable Water SE = Sediment WS = Surface Water WO = Field OC (AB : ED)			
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	ELSWH- RS-024	2018/05/20	0810	N	WG	2					1	ASSOCIATE WE EDWARDI-UN-OUS		7	
	ELSWHOI-001-6W-015	2018/05/20	0925	N	WG	6						als/mSD			1.1.1
	ELSWH01-001- GW-915	2018/05/20	0925	FD	WG	2						\			
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Stephanie Pollen

From:	Jenny Vance <jvance@aerostar.net></jvance@aerostar.net>
Sent:	Thursday, May 24, 2018 12:18 PM
То:	Stephanie Pollen
Cc:	Laura Natzke, Brian Odom
Subject:	RE: High Level Analysis: Ellsworth AFB (Maxxam job B8C0381)

Please note, this message originated outside of the Maxxam mail system. Please use caution when opening links or attachments. Thanks, Stephanie. Go ahead, but keep us posted.

From: Stephanie Pollen [mailto:SPollen@maxxam.ca]
Sent: Thursday, May 24, 2018 12:02 PM
To: Jenny Vance <<u>JVance@aerostar.net</u>>
Cc: Laura Natzke <<u>LNatzke@aerostar.net</u>>; Brian Odom <<u>BOdom@specproenv.com</u>>
Subject: RE: High Level Analysis: Ellsworth AFB (Maxxam job B8C0381)

Hi Jenny,

The lab has confirmed PFHxS will definitely need high level. PFHxA, PFOS & 6:2-FTS might need it, we'll need to see the results of the 100x SPE first.

Kind regards,

STEPHANIE POLLEN, B.Sc. Project Manager, Site Assessment and Remediation/Ultra Trace Analysis

Office 905.817.5830 Mobile 416.432.3443 Toll free 800 565 7227 spollen@maxxam.ca

6740 Campobello Rd. / Mississauga, ON Canada L5N 2L8 maxxam.ca



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From: Jenny Vance [mailto:JVance@aerostar.net]
Sent: Thursday, May 24, 2018 11:09 AM
To: Stephanie Pollen
Cc: Laura Natzke; Brian Odom
Subject: RE: High Level Analysis: Ellsworth AFB (Maxxam job B8C0381)

Please note, this message originated outside of the Maxxam mail system. Please use caution when opening links or attachments.

I suspect the samples were prescreened and showed high levels of one or more analytes. If so, can you tell us which analytes are requiring a 100x dilution? As always, my fear is that we won't be able to determine whether PFOS or PFOA exceed regulatory criteria. If one or both of those was detected at high levels, I don't think we have a problem (well – except for the obvious contamination at the well).

From: Stephanie Pollen [mailto:SPollen@maxxam.ca]
Sent: Thursday, May 24, 2018 11:01 AM
To: Jenny Vance <<u>JVance@aerostar.net</u>>
Cc: Laura Natzke <<u>LNatzke@aerostar.net</u>>
Subject: High Level Analysis: Ellsworth AFB (Maxxam job B8C0381)

Good morning Jenny,

The lab has informed me that the below samples require high-level analysis. Can you please confirm if we are OK to proceed?

Maxxam job B8C0381 (Ellsworth AFB)

ELSWH01-MW930107-GW-034 (GFT530) ELSWH01-001-GW-015 (GFT558) ELSWH01-001-GW-915 (GFT559)

Kind regards,

STEPHANIE POLLEN, B.Sc. Project Manager, Site Assessment and Remediation/Ultra Trace Analysis

Office 905.817.5830 Mobile 416.432.3443 Toll free 800 565 7227 spollen@maxxam.ca

6740 Campobello Rd. / Mississauga, ON Canada L5N 2L8 maxxam.ca



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Attention: Jenny Vance

Aerostar SES LLC SES Construction and Fuel Serv 1006 Floyd Culler Court Oak Ridge, TN USA 37830

> Report Date: 2018/06/12 Report #: R5232914 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8C0381

Received: 2018/05/22, 14:19

Sample Matrix: Ground Water # Samples Received: 13

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
PFOS and PFOA in water by SPE/LCMS (1)	1	2018/05/25	2018/06/06	CAM SOP-00894	EPA 537 m
PFOS and PFOA in water by SPE/LCMS (1)	1	2018/05/26	2018/05/27	CAM SOP-00894	EPA 537 m
PFOS and PFOA in water by SPE/LCMS (1)	3	2018/05/30	2018/06/01	CAM SOP-00894	EPA 537 m
PFOS and PFOA in water by SPE/LCMS (1)	5	2018/05/31	2018/06/04	CAM SOP-00894	EPA 537 m
PFOS and PFOA in water by SPE/LCMS (1)	3	2018/06/04	2018/06/11	CAM SOP-00894	EPA 537 m

Sample Matrix: Soil # Samples Received: 16

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
Moisture	16	N/A	2018/05/24	CAM SOP-00445	Carter 2nd ed 51.2 m
PFOS and PFOA in soil by SPE/LCMS (1)	15	2018/05/26	2018/05/28	CAM SOP-00894	EPA537 m
PFOS and PFOA in soil by SPE/LCMS (1)	1	2018/05/26	2018/05/29	CAM SOP-00894	EPA537 m

Sample Matrix: SEDIMENT # Samples Received: 2

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
Moisture	2	N/A	2018/05/24	CAM SOP-00445	Carter 2nd ed 51.2 m
PFOS and PFOA in soil by SPE/LCMS (1)	2	2018/05/26	2018/05/28	CAM SOP-00894	EPA537 m

Sample Matrix: Surface Water # Samples Received: 2

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
PFOS and PFOA in water by SPE/LCMS (1)	2	2018/05/26	2018/05/27	CAM SOP-00894	EPA 537 m

Sample Matrix: Water # Samples Received: 6

	Date	Date		
Analyses	Quantity Extracted	Analyzed	Laboratory Method	Reference

Page 1 of 76

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, LSN 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca



Attention: Jenny Vance

Aerostar SES LLC SES Construction and Fuel Serv 1006 Floyd Culler Court Oak Ridge, TN USA 37830

> Report Date: 2018/06/12 Report #: R5232914 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8C0381 Received: 2018/05/22, 14:19

Sample Matrix: Water # Samples Received: 6

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
PFOS and PFOA in water by SPE/LCMS (1)	1	2018/05/25	2018/06/06	CAM SOP-00894	EPA 537 m
PFOS and PFOA in water by SPE/LCMS (1)	1	2018/05/26	2018/05/27	CAM SOP-00894	EPA 537 m
PFOS and PFOA in water by SPE/LCMS (1)	1	2018/05/28	2018/06/02	CAM SOP-00894	EPA 537 m
PFOS and PFOA in water by SPE/LCMS (1)	2	2018/05/30	2018/06/01	CAM SOP-00894	EPA 537 m
PFOS and PFOA in water by SPE/LCMS (1)	1	2018/05/31	2018/06/04	CAM SOP-00894	EPA 537 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Per- and polyfluoroalkyl substances (PFAS) identified as surrogates on the certificate of analysis represent the extracted internal standard.

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Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca



Attention: Jenny Vance

Aerostar SES LLC SES Construction and Fuel Serv 1006 Floyd Culler Court Oak Ridge, TN USA 37830

> Report Date: 2018/06/12 Report #: R5232914 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8C0381 Received: 2018/05/22, 14:19

Encryption Key

. Palm

Stephanie Pollen Project Manager 12 Jun 2018 14:03:51

Please direct all questions regarding this Certificate of Analysis to your Project Manager. Stephanie Pollen, Project Manager Email: SPollen@maxxam.ca Phone# (905) 817-5700

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total Cover Pages : 3 Page 3 of 76

Maxxam

Prepared for: Aerostar SES LLC

Project: M2027.0003 (OMAHA) ELLSWORTH

Analytical Data Package (Level IV)

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

Maxxam Job #: B8C4298

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

Maxxam

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:

Patricia Legette 2018.06.20 Project Manag 15:42:54 -04'00' Maxxam Analytics International 6740 Campobello Rd.

 \square

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 matrixspecific 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 ¹³C-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.

Maxxam Job: B8C4298 – Soil Analysis

Sample Analysis

Soil extracts were initially pre-screened and estimated concentrations were obtained so that samples could be appropriately diluted for analysis on QC batch 5559410 (2018/06/05). Due to high concentrations, dilution was required for the following sample:

GUB608 ELSWH04-003-SS-001

Detection limits were adjusted accordingly.

Quantitation of PFAS

Many PFAS (e.g. PFOS) have several isomeric forms that may show up as separate or partially-merged peaks in the analytical chromatograms. These peaks will be integrated and the areas summed such that the result represents the concentration of the sum of the linear and branched isomers, per USEPA (2009). Instrumentation is calibrated using certified quantitative standards containing only the linear isomer for all target analytes, except Perfluorooctane sulfonate (PFOS) and Perfluorohexane sulfonate (PFHxS), which are calibrated using certified branched and linear isomer mixtures. As additional certified reference materials containing branched and linear isomers become commercially available, they will be incorporated into the analytical method.

Data Qualifiers

U – Analyte was not detected and is reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J – The reported result is an estimated value (e.g., matrix interference was observed, or the analyte was detected at a concentration outside the calibration range).

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

Maxxam Job: B8C4298 – 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 5557332 (2018/06/04-05). Due to high concentrations, the following samples were analyzed for selected analytes using reduced sample extraction volumes:

GUB621	ELSWH01-003-GW-035	All analytes
GUB622	ELSWH01-004-GW-018	All analytes
GUB625	ELSWH02-005-GW-040	Perfluorohexanesulfonate (PFHxS), 6:2 Fluorotelomersulfonate (6:2FTS)
GUB627	ELSWH03-001-GW-015	Perfluorooctanesulfonate (PFOS)

Detection limits were adjusted accordingly.

The following samples were analyzed after an Instrument Blank (IB) with a concentration of 6:2 Fluorotelomersulfonate (6:2FTS) above the upper control limit (>1/2 LOQ):

ELSWH01-004-GW-018
ELSWH07-003-GW-021
ELSWH07-002-GW-021
ELSWH02-005-GW-040

These samples were re-injected together with an acceptable IB for verification of potential analyte carryover.

Quantitation of PFAS

Many PFAS (e.g. PFOS) have several isomeric forms that may show up as separate or partially-merged peaks in the analytical chromatograms. These peaks will be integrated and the areas summed such that the result represents the concentration of the sum of the linear and branched isomers, per USEPA (2009). Instrumentation is calibrated using certified quantitative standards containing only the linear isomer for all target analytes, except Perfluorooctane sulfonate (PFOS) and Perfluorohexane sulfonate (PFHxS), which are calibrated using certified branched and linear isomer mixtures. As additional certified reference materials containing branched and linear isomers become commercially available, they will be incorporated into the analytical method.

Data Qualifiers

U – Analyte was not detected and is reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J – The reported result is an estimated value (e.g., matrix interference was observed, or the analyte was detected at a concentration outside the calibration range).

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	Client	Date	Date	Date	Date	Initial
ID	Sample ID	Sampled	Received	Prepped	Run	Calibration
PFOS and PFC	OA in soil by SPE/LCMS					
GUB608	ELSWH04-003-SS-001	2018/05/18	2018/05/25	2018/06/01	2018/06/05	2018/06/05
GUB609	ELSWH04-004-SO-031	2018/05/18	2018/05/25	2018/06/01	2018/06/05	2018/06/05
GUB610	ELSWH04-005-SO-020	2018/05/18	2018/05/25	2018/06/01	2018/06/05	2018/06/05
GUB612	ELSWH09-002-SS-001	2018/05/21	2018/05/25	2018/06/01	2018/06/05	2018/06/05
GUB613	ELSWH09-002-SS-901	2018/05/21	2018/05/25	2018/06/01	2018/06/05	2018/06/05
GUB614	ELSWH09-001-SS-001	2018/05/21	2018/05/25	2018/06/01	2018/06/05	2018/06/05
GUB615	ELSWH09-001-SO-005	2018/05/21	2018/05/25	2018/06/01	2018/06/05	2018/06/05
GUB616	ELSWH04-003-SO-027	2018/05/18	2018/05/25	2018/06/01	2018/06/05	2018/06/05
GUB618	ELSWH04-001-SS-001	2018/05/22	2018/05/25	2018/06/01	2018/06/05	2018/06/05
GUB619	ELSWH04-001-SO-029	2018/05/22	2018/05/25	2018/06/01	2018/06/05	2018/06/05
GUB620	ELSWH09-002-SO-005	2018/05/21	2018/05/25	2018/06/01	2018/06/05	2018/06/05
PFOS and PFC	OA in water by SPE/LCMS					
GUB611	ELSWH-RS-025	2018/05/21	2018/05/25	2018/05/31	2018/06/04	2018/06/04-05
GUB617	ELSWH-RS-026	2018/05/22	2018/05/25	2018/05/31	2018/06/04	2018/06/04-05
GUB621	ELSWH01-003-GW-035	2018/05/21	2018/05/25	2018/05/31	2018/06/04	2018/06/04-05
GUB622	ELSWH01-004-GW-018	2018/05/21	2018/05/25	2018/05/31	2018/06/04	2018/06/04-05
GUB623	ELSWH07-003-GW-021	2018/05/21	2018/05/25	2018/05/31	2018/06/04	2018/06/04-05
GUB624	ELSWH07-002-GW-021	2018/05/21	2018/05/25	2018/05/31	2018/06/04	2018/06/04-05
GUB625	ELSWH02-005-GW-040	2018/05/23	2018/05/25	2018/05/31	2018/06/04	2018/06/04-05
GUB626	ELSWH-RS-027	2018/05/23	2018/05/25	2018/05/31	2018/06/04	2018/06/04-05
GUB627	ELSWH03-001-GW-015	2018/05/24	2018/05/25	2018/05/31	2018/06/04	2018/06/04-05

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 temperature less than 10 degrees celcius. Cooler custody seal was present and intact.

c) Documentation Problems: Lab proceeded with sample ID ELSWH09-002-SS-901 as per information listed on the container label. Sampling date for sample ID ELSWH01-003-GW-035 was confirmed to be 2018/05/21.

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

Maxxam Analytics

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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.

Project Manager- Site Assessment and Remediation/ Ultra Trace

2018/06/20

Date

Maxxam Analytics

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Attention: Jenny Vance

Aerostar SES LLC SES Construction and Fuel Serv 1006 Floyd Culler Court Oak Ridge, TN USA 37830

> Report Date: 2018/06/08 Report #: R5223525 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8C4298 Received: 2018/05/25, 13:30

Sample Matrix: Ground Water # Samples Received: 6

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
PFOS and PFOA in water by SPE/LCMS (1)	6	2018/05/31	2018/06/04	CAM SOP-00894	EPA 537 m

Sample Matrix: Soil # Samples Received: 11

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
Moisture	11	N/A	2018/05/29	CAM SOP-00445	Carter 2nd ed 51.2 m
PFOS and PFOA in soil by SPE/LCMS (1)	11	2018/06/01	2018/06/05	CAM SOP-00894	EPA537 m

Sample Matrix: Water # Samples Received: 3

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
PFOS and PFOA in water by SPE/LCMS (1)	3	2018/05/31	2018/06/04	CAM SOP-00894	EPA 537 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Page 1 of 34

Maxi Maxi Maxio San Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, LSN 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-1 87 Of M430 xam.ca

M2027.0003



Attention: Jenny Vance

Aerostar SES LLC SES Construction and Fuel Serv 1006 Floyd Culler Court Oak Ridge, TN USA 37830

> Report Date: 2018/06/08 Report #: R5223525 Version: 1 - Final

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Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance. * RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Per- and polyfluoroalkyl substances (PFAS) identified as surrogates on the certificate of analysis represent the extracted internal standard.

Encryption Key

typh Pallin

Stephanie Pollen Project Manager 08 Jun 2018 10:05:33

Please direct all questions regarding this Certificate of Analysis to your Project Manager. Stephanie Pollen, Project Manager Email: SPollen@maxxam.ca Phone# (905) 817-5700

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total Cover Pages : 2 Page 2 of 34

Maxxam

Prepared for: Aerostar SES LLC

Project: M2027.0003 (OMAHA) ELLSWORTH AFB

Analytical Data Package (Level IV)

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

Maxxam Job #: B8D4761

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

Maxxam

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:



Patricia Legette 2018.06.26 15:41:00 -04'00'

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

Maxxam Analytics M2027.0003

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 matrixspecific 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 ¹³C-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.

Maxxam Job: B8D4761 – Soil Analysis

Sample Analysis

Soil extracts were initially pre-screened and estimated concentrations were obtained so that samples could be appropriately diluted for analysis on QC batch 5573623 (2018/06/12). Due to high concentration, dilution was required for Perfluorooctanesulfonate (PFOS) in the following sample:

GWJ150 *ELSWH10-003-SS-001*

Detection limit was adjusted accordingly.

Extracted Internal Standard Analytes

The extracted internal standard analytes ${}^{13}C_4$ -Perfluorooctanesulfonate (${}^{13}C_4$ -PFOS), ${}^{13}C_2$ -Perfluorodecanoic acid (${}^{13}C_2$ -PFDA), ${}^{13}C_2$ -Perfluorodecanoic acid (${}^{13}C_2$ -PFDA) and ${}^{13}C_2$ -Perfluorotetradecanoic acid (${}^{13}C_2$ -PFTeDA) are used to quantify native Perfluorooctanesulfonate (PFOS), Perfluorodecanoic acid (PFDA), Perfluorodecanoic acid (PFDA), Perfluorotetradecanoic acid (PFDA) and Perfluorotetradecanoic acid (PFTrDA) & Perfluorotetradecanoic acid (PFTeDA) respectively. The recoveries observed for selected extracted internal standard analytes were below the defined lower control limit (LCL) for the following samples:

GWJ148	ELSWH-WS-001	(¹³ C ₂ -PFTeDA)
GWJ151	ELSWH10-003-SO-050	(¹³ C ₄ -PFOS, ¹³ C ₂ -PFDA, ¹³ C ₂ -PFUnA, ¹³ C ₂ -PFDoA, ¹³ C ₂ -PFTeDA)

Samples were re-extracted and re-analyzed for the associated native analytes on QC batch 5580295 (2018/06/16). Acceptable extracted internal standard analyte recoveries were obtained on re-analysis, except for ${}^{13}C_2$ -PFDoA and ${}^{13}C_2$ -PFTeDA in sample GWJ151 (*ELSWH10-003-SO-050*). Results for Perfluorododecanoic acid (PFDoA), Perfluorotridecanoic acid (PFTrDA) and Perfluorotetradecanoic acid (PFTeDA) were reported from the reduced volume extract for this sample, where acceptable extracted internal standard analyte recoveries were obtained. Detection limits were adjusted accordingly for these analytes.

Quantitation of PFAS

Many PFAS (e.g. PFOS) have several isomeric forms that may show up as separate or partially-merged peaks in the analytical chromatograms. These peaks will be integrated and the areas summed such that the result represents the concentration of the sum of the linear and branched isomers, per USEPA (2009). Instrumentation is calibrated using certified quantitative standards containing only the linear isomer for all target analytes, except Perfluorooctane sulfonate (PFOS) and Perfluorohexane sulfonate (PFHxS), which are calibrated using certified branched and linear isomer mixtures. As additional certified reference materials containing branched and linear isomers become commercially available, they will be incorporated into the analytical method.

Data Qualifiers

U – Analyte was not detected and is reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J – The reported result is an estimated value (e.g., matrix interference was observed, or the analyte was detected at a concentration outside the calibration range).

Sin Chii Chia, B.Sc. schia@maxxam.ca Office 905 817 5700 Maxxam Analytics M2027.0003
Maxxam Job: B8D4761 – 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 5569357 (2018/06/08). Due to high concentrations, the following samples were analyzed for selected analytes using reduced sample extraction volumes:

GWJ140 ELSWH04-003-GW-033 Perfluorohexanoic acid (PFHxA), Perfluorohexanesulfonate (PFHxS), 6:2 Fluorotelomersulfonate (6:2FTS)

GWJ147 ELSWH-WW-001 All analytes

Detection limits were adjusted accordingly.

During initial setup of the analytical batch sequence, it was observed that the following sample vials were not in the expected positions on the extraction vial rack:

GWJ144 ELSWH04-001-GW-032 GWJ147 ELSWH-WW-001

Inconsistencies were also observed between results from the reduced and full volume extracts for these samples. As a result, these samples were re-extracted and re-analyzed on QC batch 5574399 (2018/06/12) for confirmatory analysis.

Extracted Internal Standard Analytes

The extracted internal standard analyte ${}^{13}C_2$ -Perfluorotetradecanoic acid (${}^{13}C_2$ -PFTeDA) is used to quantify native Perfluorotridecanoic acid (PFTrDA) & Perfluorotetradecanoic acid (PFTeDA). The recovery observed for this extracted internal standard analyte was below the defined lower control limit (LCL) for the following sample on QC batch 5569357 (2018/06/08):

GWJ139 ELSWH-RS-29

The sample was re-extracted and re-analyzed for the associated native analytes on QC batch 5574399 (2018/06/12). Acceptable ${}^{13}C_2$ -PFTeDA recovery was obtained on re-analysis.

Quantitation of PFAS

Many PFAS (e.g. PFOS) have several isomeric forms that may show up as separate or partially-merged peaks in the analytical chromatograms. These peaks will be integrated and the areas summed such that the result represents the concentration of the sum of the linear and branched isomers, per USEPA (2009). Instrumentation is calibrated using certified quantitative standards containing only the linear isomer for all target analytes, except Perfluorooctane sulfonate (PFOS) and Perfluorohexane sulfonate (PFHxS), which are calibrated using certified branched and linear isomer mixtures. As additional certified reference materials containing branched and linear isomers become commercially available, they will be incorporated into the analytical method.

Data Qualifiers

U – Analyte was not detected and is reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J – The reported result is an estimated value (e.g., matrix interference was observed, or the analyte was detected at a concentration outside the calibration range).

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	Client	Date	Date	Date	Date	Initial
ID	Sample ID	Sampled	Received	Prepped	Run	Calibration
PFOS and PFO	DA in soil by SPE/LCMS					
GWJ148	ELSWH-WS-001	2018/06/03	2018/06/05	2018/06/11	2018/06/12	2018/06/12
GWJ150	ELSWH10-003-SS-001	2018/05/24	2018/06/05	2018/06/11	2018/06/12	2018/06/12
GWJ151	ELSWH10-003-SO-050	2018/05/31	2018/06/05	2018/06/11	2018/06/12	2018/06/12
PFOS and PFO	DA in water by SPE/LCMS					
GWJ139	ELSWH-RS-29	2018/05/31	2018/06/05	2018/06/07	2018/06/08	2018/06/12
GWJ140	ELSWH04-003-GW-033	2018/05/31	2018/06/05	2018/06/07	2018/06/08	2018/06/08
GWJ141	ELSWH04-002-GW-038	2018/05/31	2018/06/05	2018/06/07	2018/06/08	2018/06/08
GWJ142	ELSWH09-002-GW-030A	2018/05/31	2018/06/05	2018/06/07	2018/06/08	2018/06/08
GWJ143	ELSWH09-001-GW-033A	2018/05/31	2018/06/05	2018/06/07	2018/06/08	2018/06/08
GWJ144	ELSWH04-001-GW-032	2018/05/31	2018/06/05	2018/06/11	2018/06/12	2018/06/12
GWJ145	ELSWH-RS-030	2018/06/03	2018/06/05	2018/06/07	2018/06/08	2018/06/08
GWJ146	ELSWH10-003-GW-059	2018/06/03	2018/06/05	2018/06/07	2018/06/08	2018/06/08
GWJ147	ELSWH-WW-001	2018/06/03	2018/06/05	2018/06/11	2018/06/12	2018/06/12
GWJ149	ELSWH-RS-028	2018/05/24	2018/06/05	2018/06/07	2018/06/08	2018/06/08

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 temperature less than 10 degrees celsius. Cooler custody seal was present and intact.

c) Documentation Problems: For sample ELSWH10-003-GW-059, all three bottles received contained sediment.

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

Maxxam Analytics

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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.

Project Manager- Site Assessment and Remediation/Ultra Trace

2018/06/26

Date

Maxxam Analytics

12 of 1218

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Aerostar Project Manager: Send Data to:	Brian Odom, BOdom@specproenv.com (Jenny Vance, jvance@aerostar.net (478) 397-4906 865) 483-7904	-	-							Sample N = No FD = Fie	ypes: mal d Duplicate							1.1
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erostar Project Manager: end Data to:	Brian Odom. BOdom@specproenv.com Jenny Vance, jvance@aerostar.net	(478) 397-4906 (865) 483-7904					1					Sample Types: N = Normal FD = Field Duplicate AB = A mixed Blank or Field Reagent Blank			
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MAXXAM use only	Sample ID	Date Collected	Time Collected	Sample Type	Matrix	PFAS (see)						NOTES			62 X
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Your Project #: M2027.0003 (OMAHA) Site Location: ELLSWORTH AFB Your C.O.C. #: na

Attention: Jenny Vance

Aerostar SES LLC SES Construction and Fuel Serv 1006 Floyd Culler Court Oak Ridge, TN USA 37830

> Report Date: 2018/06/19 Report #: R5254242 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8D4761

Received: 2018/06/05, 14:11

Sample Matrix: Ground Water # Samples Received: 7

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
PFOS and PFOA in water by SPE/LCMS (1)	5	2018/06/07	2018/06/08	CAM SOP-00894	EPA 537 m
PFOS and PFOA in water by SPE/LCMS (1)	2	2018/06/11	2018/06/12	CAM SOP-00894	EPA 537 m

Sample Matrix: Soil # Samples Received: 3

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
Moisture	3	N/A	2018/06/07	CAM SOP-00445	Carter 2nd ed 51.2 m
PFOS and PFOA in soil by SPE/LCMS (1)	3	2018/06/11	2018/06/12	CAM SOP-00894	EPA537 m

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Results relate to samples tested.

Page 1 of 33

Max/Max/Max/area Arrentytices | Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-100 Toll-Free: 800-563-600 Toll-Free: 800-563-600 Toll-Free: 800-563-700 Toll-Free: 800-563-700 Toll-Free: 800-563-700 Toll-Free: 800-563-700 Toll-Free: 800-563-700 Toll-Free: 800-563-700 Toll-Free: 800-563-700 Toll-Free: 800-563-700 Toll-Free: 800-563-700 Toll-Free: 800-563-700 Toll-Free: 800-563-700 Toll-Free: 800-563-700 Toll-Free: 800-563-700 Toll-Free: 800-563-700 Toll-Free: 800-563-700 Toll-Free: 800-563-700 Toll-Free: 800-563-700 Toll-Free: 800-560-700 Toll-Free: 800-560-700 Toll-Free: 800-560-700-700-700-700-700-700-700-700



Your Project #: M2027.0003 (OMAHA) Site Location: ELLSWORTH AFB Your C.O.C. #: na

Attention: Jenny Vance

Aerostar SES LLC SES Construction and Fuel Serv 1006 Floyd Culler Court Oak Ridge, TN USA 37830

> Report Date: 2018/06/19 Report #: R5254242 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8D4761

Received: 2018/06/05, 14:11

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Per- and polyfluoroalkyl substances (PFAS) identified as surrogates on the certificate of analysis represent the extracted internal standard.

Encryption Key

Jalla

Stephanie Pollen Project Manager 19 Jun 2018 15:18:43

Please direct all questions regarding this Certificate of Analysis to your Project Manager. Stephanie Pollen, Project Manager Email: SPollen@maxxam.ca Phone# (905) 817-5700

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total Cover Pages : 2 Page 2 of 33

Maxxam

Prepared for: Aerostar SES LLC

Project: M2027.003 (OMAHA) ELLSWORTH AFB

Analytical Data Package (Level IV)

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

Maxxam Job #: B8J4786

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

Maxxam

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:

-	Drug
Project Ma	anager

Bureau Verilas Group Company

Ash.

Patricia Legette 2018.08.09 12:59:04 -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 matrixspecific 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 ¹³C-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.

Maxxam Job: B8J4786

Sample Analysis

Aqueous samples were analyzed on QC batches 5660879 (2018/08/03) and 5660880 (2018/08/03). Soil samples were analyzed on QC batch 5661601 (2018/08/04). No analytical difficulties were encountered.

Quantitation of PFAS

Many PFAS (e.g. PFOS) have several isomeric forms that may show up as separate or partially-merged peaks in the analytical chromatograms. These peaks will be integrated and the areas summed such that the result represents the concentration of the sum of the linear and branched isomers, per USEPA (2009). Instrumentation is calibrated using certified quantitative standards containing only the linear isomer for all target analytes, except Perfluorooctane sulfonate (PFOS) and Perfluorohexane sulfonate (PFHxS), which are calibrated using certified branched and linear isomer mixtures. As additional certified reference materials containing branched and linear isomers become commercially available, they will be incorporated into the analytical method.

Data Qualifiers

U – Analyte was not detected and is reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J – The reported result is an estimated value (e.g., matrix interference was observed, or the analyte was detected at a concentration outside the calibration range).

Adam Robinson Arobinson@maxxam.ca Office 905 817 5700, ext. 4057

PROJECT NARRATIVE

Maxxam Analytics Client Project #: M2027.003 (OMAHA)

Client: Aerostar SES LLC Client Project: M2027.003 (OMAHA)

I. SAMPLE RECEIPT/ANALYSIS

a) Sample Listing

Maxxam	Client	Date	Date	Date	Date	Initial
ID	Sample ID	Sampled	Received	Prepped	Run	Calibration
PFOS and PFO	A in soil by SPE/LCMS					
HJG659	ELSWH02-004-SD-001A	2018/07/31	2018/08/01	2018/08/02	2018/08/04	2018/08/04
HJG660	ELSWH02-004-SD-901A	2018/07/31	2018/08/01	2018/08/02	2018/08/04	2018/08/04
PFOS and PFO	A in water by SPE/LCMS					
HJG658	ELSWH-RS-001A	2018/07/31	2018/08/01	2018/08/02	2018/08/03	2018/08/03
HJG661	ELSWH02-004-SW-001A	2018/07/31	2018/08/01	2018/08/02	2018/08/03	2018/08/03
HJG662	ELSWH02-004-SW-901A	2018/07/31	2018/08/01	2018/08/02	2018/08/03	2018/08/03

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 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.



Project Manager- Site Assessment and Remediation/Ultra Trace

2018/08/09

Date

Maxxam Analytics

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rostar Project Manager: nd Data to: mpler(s):	Brian Odom, BOdom@specproenv.com (Jenny Vance, jvance@aerostar.net (478) 397-4906 865) 483-7904	RUST	+				ANALIS			Sample Types: N = Normal FD = Field Duplicate AB = Ambient Blank or Field Reagent Blank EB = Fourgood Blanctor			
2. Us poratory Name/Address xxam Analytics, Inc to Campobello Rd. Isitssauga, Ontario V2L8	Laboratory Shipping Addre Laboratory Shipping Addre Maxxam Analytics c/o FedEx Depot 299 Cayuga Rd. Cheektowaga, NY 14225 Please indicate "HOLD FOR Pl	iss: CKUP"	Contact: St Phone: (90) email: Spo	gphanie Po 5) 817-5830 Illen@max	illen kam.ca	ist of 16 analytes below)					Matrix: WG = Groundwater SO = Soil WP = Potable Water SE = Sediment WS = Surface Water WS = Surface Water			
MAXXAM use only	Sample ID	Date Collected	Time Collected	Sample Type	Matrix	PFAS (see l					-			
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Your Project #: M2027.003 (OMAHA) Site Location: ELLSWORTH AFB Your C.O.C. #: n/a

Attention: Jenny Vance

Aerostar SES LLC SES Construction and Fuel Serv 1006 Floyd Culler Court Oak Ridge, TN USA 37830

> Report Date: 2018/08/09 Report #: R5349363 Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B8J4786 Received: 2018/08/01, 13:50

Sample Matrix: SEDIMENT # Samples Received: 2

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
Moisture	2	N/A	2018/08/02	CAM SOP-00445	Carter 2nd ed 51.2 m
PFOS and PFOA in soil by SPE/LCMS (1)	2	2018/08/02	2018/08/04	CAM SOP-00894	EPA537 m

Sample Matrix: Surface Water # Samples Received: 2

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
PFOS and PFOA in water by SPE/LCMS (1)	2	2018/08/02	2018/08/03	CAM SOP-00894	EPA 537 m

Sample Matrix: Water # Samples Received: 1

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
PFOS and PFOA in water by SPE/LCMS (1)	1	2018/08/02	2018/08/03	CAM SOP-00894	EPA 537 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Page 1 of 18

 Max:Maxeerins Arregivities
 Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, LSN 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5775 volv@@xam.ca

 M2027.0003
 D-126
 3/6/19



Your Project #: M2027.003 (OMAHA) Site Location: ELLSWORTH AFB Your C.O.C. #: n/a

Attention: Jenny Vance

Aerostar SES LLC SES Construction and Fuel Serv 1006 Floyd Culler Court Oak Ridge, TN USA 37830

> **Report Date: 2018/08/09** Report #: R5349363 Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B8J4786

Received: 2018/08/01, 13:50

Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested. This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Per- and polyfluoroalkyl substances (PFAS) identified as surrogates on the certificate of analysis represent the extracted internal standard.

Encryption Key

Patricia Legette Project Manager 09 Aug 2018 12:40:46

Please direct all questions regarding this Certificate of Analysis to your Project Manager. Stephanie Pollen, Project Manager Email: SPollen@maxxam.ca Phone# (905) 817-5700

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Total Cover Pages : 2 Page 2 of 18

Maxxam

Prepared for: Aerostar SES LLC

Project: M2027.0003 (OMAHA) ELLSWORTH AFB

Analytical Data Package (Level IV)

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

Maxxam Job #: B894616

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

Maxxam

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 Vallen

Project Manager



Stephanie Pollen 2018.05.17 16:29:12 -04'00'

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

Maxxam Analytics

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 matrixspecific 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.
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- 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 ¹³C-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.

Maxxam Job: B894616 – Soil Analysis

Sample Analysis

Soil extracts were initially pre-screened and estimated concentrations were obtained so that samples could be appropriately diluted for analysis on QC batch 5507325 (2018/05/01-02). Due to exceedance of control chart limits, all samples were re-extracted and re-analyzed on QC batch 5513877 (2018/05/05). Dilutions were required for selected analytes in the following samples:

GNR557	ELSWH12-002-SS-001	Perfluorooctanesulfonate (PFOS)
GNR559	ELSWH12-001-SS-001	Perfluorooctanesulfonate (PFOS)
GNR560	ELSWH12-001-SS-901	All analytes
GNR564	ELSWH12-003-SO-006	Perfluorooctanesulfonate (PFOS)
GNR565	ELSWH12-003-SS-001	Perfluorooctanesulfonate (PFOS)

Detection limits were adjusted accordingly.

Extracted Internal Standard Analytes

The extracted internal standard analytes ${}^{13}C_2$ -Perfluorododecanoic acid (${}^{13}C_2$ -PFDoA) and ${}^{13}C_2$ -Perfluorotetradecanoic acid (${}^{13}C_2$ -PFTeDA) are used to quantify native Perfluorododecanoic acid (PFDoA) and Perfluorotridecanoic acid (PFTrDA) & Perfluorotetradecanoic acid (PFTeDA) respectively. The recoveries observed for these internal standard analytes were below the defined lower control limit (LCL) for the following sample:

GNR546 ELSWH08-002-SS-001

These recoveries were confirmed by re-extraction and re-analysis of the sample on QC batch 5518131 (2018/05/08). Results for the associated native analytes were reported from a 10x diluted sample where acceptable extracted internal standard analyte recoveries were obtained.

Quantitation of PFAS

Many PFAS (e.g. PFOS) have several isomeric forms that may show up as separate or partially-merged peaks in the analytical chromatograms. These peaks will be integrated and the areas summed such that the result represents the concentration of the sum of the linear and branched isomers, per USEPA (2009). Instrumentation is calibrated using certified quantitative standards containing only the linear isomer for all target analytes, except Perfluorooctane sulfonate (PFOS) and Perfluorohexane sulfonate (PFHxS), which are calibrated using certified branched and linear isomer mixtures. As additional certified reference materials containing branched and linear isomers become commercially available, they will be incorporated into the analytical method.

Data Qualifiers

U – Analyte was not detected and is reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J – The reported result is an estimated value (e.g., matrix interference was observed, or the analyte was detected at a concentration outside the calibration range).

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

Maxxam Job: B894616 - 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 5509182 (2018/05/02). Due to high concentrations, the following samples were analyzed using reduced sample extraction volumes:

```
GNR554 ELSWH12-003-GW-016
GNR556 ELSWH12-004-SW-001
```

Detection limits were adjusted accordingly.

The extracted internal standard analyte ${}^{13}C_4$ -Perfluorobutanoic acid (${}^{13}C_4$ -PFBA) is used to quantify native Perfluorobutanoic acid (PFBA). The recovery observed for this extracted internal standard analyte was below the defined lower control limit (LCL) for the Spike Duplicate (LCS Dup) on QC batch 5509182 (2018/05/02). All samples were re-extracted and re-analyzed for Perfluorobutanoic acid (PFBA) on QC batch 5514083 (2018/05/08).

Quantitation of PFAS

Many PFAS (e.g. PFOS) have several isomeric forms that may show up as separate or partially-merged peaks in the analytical chromatograms. These peaks will be integrated and the areas summed such that the result represents the concentration of the sum of the linear and branched isomers, per USEPA (2009). Instrumentation is calibrated using certified quantitative standards containing only the linear isomer for all target analytes, except Perfluorooctane sulfonate (PFOS) and Perfluorohexane sulfonate (PFHxS), which are calibrated using certified branched and linear isomer mixtures. As additional certified reference materials containing branched and linear isomers become commercially available, they will be incorporated into the analytical method.

Data Qualifiers

U – Analyte was not detected and is reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J – The reported result is an estimated value (e.g., matrix interference was observed, or the analyte was detected at a concentration outside the calibration range).

Sin Chii Chia, B.Sc. schia@maxxam.ca Office 905 817 5700 Maxxam Analytics Client Project #: M2027.0003 (OMAHA)

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

I. SAMPLE RECEIPT/ANALYSIS

a) Sample Listing

Maxxam	Client	Date	Date	Date	Date	Initial
ID	Sample ID	Sampled	Received	Prepped	Run	Calibration
PFOS and PFC	A in soil by SPE/LCMS					
GNR546	ELSWH08-002-SS-001	2018/04/22	2018/04/25	2018/05/03	2018/05/05	2018/05/05 & 2018/05/08
GNR548	ELSWH08-002-SO-040	2018/04/23	2018/04/25	2018/05/03	2018/05/05	2018/05/05
GNR549	ELSWH08-002-SO-940	2018/04/23	2018/04/25	2018/05/03	2018/05/05	2018/05/05
GNR550	ELSWH08-001-SS-001	2018/04/23	2018/04/25	2018/05/03	2018/05/05	2018/05/05
GNR551	ELSWH08-001-SO-030	2018/04/23	2018/04/25	2018/05/03	2018/05/05	2018/05/05
GNR552	ELSWH10-001-SS-001	2018/04/24	2018/04/25	2018/05/03	2018/05/05	2018/05/05
GNR555	ELSWH12-004-SD-001	2018/04/22	2018/04/25	2018/05/03	2018/05/05	2018/05/05
GNR557	ELSWH12-002-SS-001	2018/04/19	2018/04/25	2018/05/03	2018/05/05	2018/05/05
GNR558	ELSWH12-002-SO-036	2018/04/19	2018/04/25	2018/05/03	2018/05/05	2018/05/05
GNR559	ELSWH12-001-SS-001	2018/04/19	2018/04/25	2018/05/03	2018/05/05	2018/05/05
GNR560	ELSWH12-001-SS-901	2018/04/19	2018/04/25	2018/05/03	2018/05/05	2018/05/05
GNR561	ELSWH12-001-SO-023	2018/04/19	2018/04/25	2018/05/03	2018/05/05	2018/05/05
GNR564	ELSWH12-003-SO-006	2018/04/20	2018/04/25	2018/05/03	2018/05/05	2018/05/05
GNR565	ELSWH12-003-SS-001	2018/04/20	2018/04/25	2018/05/03	2018/05/05	2018/05/05
GNR566	ELSWH08-004-SS-001	2018/04/21	2018/04/25	2018/05/03	2018/05/05	2018/05/05
GNR568	ELSWH08-003-SS-001	2018/04/21	2018/04/25	2018/05/03	2018/05/05	2018/05/05
GNR569	ELSWH08-003-SO-046	2018/04/22	2018/04/25	2018/05/03	2018/05/05	2018/05/05
GNR571	ELSWH08-004-SO-051	2018/04/22	2018/04/25	2018/05/03	2018/05/05	2018/05/05
PFOS and PFC	A in water by SPE/LCMS					
GNR547	ELSWH-RS-005	2018/04/23	2018/04/25	2018/05/01	2018/05/02	2018/05/02 & 2018/05/08
GNR553	ELSWH12-002-GW-045	2018/04/22	2018/04/25	2018/05/01	2018/05/02	2018/05/02 & 2018/05/08
GNR554	ELSWH12-003-GW-016	2018/04/22	2018/04/25	2018/05/01	2018/05/02	2018/05/02 & 2018/05/08
GNR556	ELSWH12-004-SW-001	2018/04/22	2018/04/25	2018/05/01	2018/05/02	2018/05/02 & 2018/05/08
GNR562	ELSWH-RS-001	2018/04/19	2018/04/25	2018/05/01	2018/05/02	2018/05/02 & 2018/05/08
GNR563	ELSWH-RS-002	2018/04/20	2018/04/25	2018/05/01	2018/05/02	2018/05/02 & 2018/05/08
GNR567	ELSWH-RS-003	2018/04/21	2018/04/25	2018/05/01	2018/05/02	2018/05/02 & 2018/05/08
GNR570	ELSWH-RS-004	2018/04/22	2018/04/25	2018/05/01	2018/05/02	2018/05/02 & 2018/05/08

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 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 Pallin

Project Manager- Site Assessment and Remediation/ Ultra Trace

2018/05/17 Date

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Project Name: Site Inspection Multiple Sites, United States A	of Aqueous Film Forming Foam Areas, Nr Force Installations		Job No.: M20	27.0003 (O	maha) IRTH AFF	3	_	ANALYS	15	1	Sample Typ	es:	1 -		
Aerostar Project Manager: Send Data to:	Brian Odom, BOdom@specproenv.com (47 Jenny Vance, jvance@aerostar.net (86	8) 397-4906 5) 483-7904									N = Norma FD = Field (AB = Amble	al Duplicate Int Blank or Field Reagent Blank			
Sampler(s): J. Vojet/	A.Willis	a,	Contact: Mel	issa DiGra	zia	imot					Hatrix:	ndwater			4
Laboratory Name/Address: Maxxam Analytics, Inc 6740 Campobello Rd. Mississauga, Ontario L5N2L8	Laboratory shipping Audition Maxam Analytics t/o FodEx Depot 299 Cayuga R4. Cheektowaga, NY 14225 Please indicate "HOLD FOR PIC	кир"	Phone: (905) email: MDio	817-5700, Grazia@ma	, ext. 5784 axxam.ca	list of 15 analytes be	1				SO = Soil WP = Potab SE = Sedin WS = Surfa WQ = Field	nowater ment ce Water QC (AB, EB)			
MAXXAM use only	Sample ID	Date Collected	Time Collected	Sample Type	Matrix	PFAS (see		1			1	NOTES /			
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Aerostar Project Manager: Send Data to:	Brian Odom. BOdom@specproenv.com (4) Jenny Vance, jvance@aerostar.net (8)	78) 397-4906 65) 483-7904								•	Samp N = FD =	Normai Field Dup Ambient f	licate Blank or Field	Reagent Bl	ank						
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Laboratory Name/Address: Maxam Analytics, Inc 6740 Campobello Rd. Mississauga, Ontario L5N2L8	Laboratory Shipping Addres Maxxam Analytics c/o FedEx Depol 299 Cayuga Rd. Cheektowaga, NY 14225 Please indicate "HOLD FOR PIC	SS:	Contaci: Me Phone: (905 email: MDi	lissa DiGra:) 817-5700, Grazia@ma	tia ext. 5784 xxam.ca	ist of 18 analytes below)					Matri WG = SO = WP = SE = WS =	x: Groundw Soll Potable Sedimetri Surface	vater Nater t Water : (AB, EB)	.,			4.				
MAXXAM use only	Sample ID	Date Collected	Time Collected	Sample Type	Matrix	PEAS (see 1		1					NOT	ES							
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,	ELSWH12-002-50-036	04/12/18	1135	N	SO	1		_	1	-			-		_	-					
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t	ESWH08-004-50-051	04/22/18	1925	N	50	1						-	.2	-		-					
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Signature Printed Name	DateTine Firm	Printed Name		Entri Entri				verflor Gailine Verflor De D	ethanar Africa Africana a chui Martin a chui Africana a chui	828 A	VEZNA PEZNA PEZNA VEZNA VEZNA	11 = 2 75 5 5 6 1	(11) (1) (1) (1) (1) (1) (1) (1) (1) (1)	antia antia antia antia antia antia	10024 100 14403 200 %			8	۳,		



Your Project #: M2027.0003 (OMAHA) Site Location: ELLSWORTH AFB Your C.O.C. #: na

Attention: Jenny Vance

Aerostar SES LLC SES Construction and Fuel Serv 1006 Floyd Culler Court Oak Ridge, TN USA 37830

> Report Date: 2018/05/09 Report #: R5116443 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B894616

Received: 2018/04/25, 13:58

Sample Matrix: Ground Water # Samples Received: 2

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
PFOS and PFOA in water by SPE/LCMS (1)	2	2018/05/01	2018/05/02	CAM SOP-00894	EPA 537 m

Sample Matrix: Soil # Samples Received: 17

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
Moisture	17	N/A	2018/04/26	CAM SOP-00445	Carter 2nd ed 51.2 m
PFOS and PFOA in soil by SPE/LCMS (1)	17	2018/05/03	2018/05/05	CAM SOP-00894	EPA537 m

Sample Matrix: SEDIMENT # Samples Received: 1

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
Moisture	1	N/A	2018/04/26	CAM SOP-00445	Carter 2nd ed 51.2 m
PFOS and PFOA in soil by SPE/LCMS (1)	1	2018/05/03	2018/05/05	CAM SOP-00894	EPA537 m

Sample Matrix: Surface Water # Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
PFOS and PFOA in water by SPE/LCMS (1)	1	2018/05/01	2018/05/02	CAM SOP-00894	EPA 537 m

Sample Matrix: Water

Samples Received: 5

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
PFOS and PFOA in water by SPE/LCMS (1)	5	2018/05/01	2018/05/02	CAM SOP-00894	EPA 537 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca



Your Project #: M2027.0003 (OMAHA) Site Location: ELLSWORTH AFB Your C.O.C. #: na

Attention: Jenny Vance

Aerostar SES LLC SES Construction and Fuel Serv 1006 Floyd Culler Court Oak Ridge, TN USA 37830

> Report Date: 2018/05/09 Report #: R5116443 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B894616 Received: 2018/04/25, 13:58

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Per- and polyfluoroalkyl substances (PFAS) identified as surrogates on the certificate of analysis represent the extracted internal standard.

Encryption Key

typh Pallin

Stephanie Pollen Project Manager 09 May 2018 16:13:28

Please direct all questions regarding this Certificate of Analysis to your Project Manager. Stephanie Pollen, Project Manager Email: SPollen@maxxam.ca Phone# (905) 817-5700

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total Cover Pages : 2 Page 2 of 44

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam

Prepared for: Aerostar SES LLC

Project: M2027.0003 (OMAHA) ELLSWORTH AFB

Analytical Data Package (Level IV)

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

Maxxam Job #: B897127

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

Maxxam

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 Valler

Project Manager

Stephanie Pollen 2018.05.17 14:33:26 -04'00'

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

Maxxam Analytics

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 matrixspecific 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 ¹³C-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.

Maxxam Job: B897127 – Soil Analysis

Sample Analysis

Samples were initially analyzed on QC batches 5518131 (2018/05/08) and 5518141 (2018/05/08). The extracted internal standard analytes ${}^{13}C_2$ -Perfluoroundecanoic acid (${}^{13}C_2$ -PFUnA), ${}^{13}C_2$ -Perfluorododecanoic acid (${}^{13}C_2$ -PFDoA) and ${}^{13}C_2$ -Perfluorotetradecanoic acid (${}^{13}C_2$ -PFTeDA) are used to quantify native Perfluoroundecanoic acid (PFUnA), Perfluorododecanoic acid (PFDoA) and Perfluorotridecanoic acid (PFTrDA) & Perfluorotetradecanoic acid (PFTeDA) respectively. The recoveries observed for selected extracted internal standard analytes were below the defined lower control limit (LCL) for the following samples:

GOF444	ELSWH02-004-SD-001	(¹³ C ₂ -PFUnA, ¹³ C ₂ -PFDoA, ¹³ C ₂ -PFTeDA)
GOF445	ELSWH02-004-SD-901	(¹³ C ₂ -PFTeDA)

These recoveries were confirmed by re-extraction and re-analysis of GOF444 (*ELSWH02-004-SD-001*) on QC batch 5522080 (2018/05/10-14) and GOF445 (*ELSWH02-004-SD-901*) on QC batch 5522046 (2018/05/10-14). Results for the associated native analytes were reported from 10x dilutions of these samples where acceptable extracted internal standard recoveries were obtained. Detection limits were adjusted accordingly.

Quantitation of PFAS

Many PFAS (e.g. PFOS) have several isomeric forms that may show up as separate or partially-merged peaks in the analytical chromatograms. These peaks will be integrated and the areas summed such that the result represents the concentration of the sum of the linear and branched isomers, per USEPA (2009). Instrumentation is calibrated using certified quantitative standards containing only the linear isomer for all target analytes, except Perfluorooctane sulfonate (PFOS) and Perfluorohexane sulfonate (PFHxS), which are calibrated using certified branched and linear isomer mixtures. As additional certified reference materials containing branched and linear isomers become commercially available, they will be incorporated into the analytical method.

Data Qualifiers

U – Analyte was not detected and is reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J – The reported result is an estimated value (e.g., matrix interference was observed, or the analyte was detected at a concentration outside the calibration range).

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

Maxxam Job: B897127 - Water Analysis

Sample Analysis

Samples were initially analyzed on QC batch 5520643 (2018/05/09-10). The extracted internal standard analyte ${}^{13}C_2$ -Perfluorotetradecanoic acid (${}^{13}C_2$ -PFTeDA) is used to quantify native Perfluorotridecanoic acid (PFTrDA) & Perfluorotetradecanoic acid (PFTeDA). The recovery observed for this extracted internal standard analyte was below the defined lower control limit (LCL) for the following sample:

GOF446 *ELSWH02-004-SW-001*

The recovery was confirmed by re-extraction and re-analysis of the sample on QC batch 5525844 (2018/05/11).

Quantitation of PFAS

Many PFAS (e.g. PFOS) have several isomeric forms that may show up as separate or partially-merged peaks in the analytical chromatograms. These peaks will be integrated and the areas summed such that the result represents the concentration of the sum of the linear and branched isomers, per USEPA (2009). Instrumentation is calibrated using certified quantitative standards containing only the linear isomer for all target analytes, except Perfluorooctane sulfonate (PFOS) and Perfluorohexane sulfonate (PFHxS), which are calibrated using certified branched and linear isomer mixtures. As additional certified reference materials containing branched and linear isomers become commercially available, they will be incorporated into the analytical method.

Data Qualifiers

U – Analyte was not detected and is reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J – The reported result is an estimated value (e.g., matrix interference was observed, or the analyte was detected at a concentration outside the calibration range).

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	Client	Date	Date	Date	Date	Initial
ID	Sample ID	Sampled	Received	Prepped	Run	Calibration
PFOS and PF	OA in soil by SPE/LCMS					
GOF435	ELSWH10-001-SO-040	2018/04/24	2018/04/27	2018/05/07	2018/05/08	2018/05/08
GOF437	ELSWH02-003-SO-004	2018/04/25	2018/04/27	2018/05/07	2018/05/08	2018/05/08
GOF438	ELSWH02-002-SO-031	2018/04/25	2018/04/27	2018/05/07	2018/05/08	2018/05/08
GOF439	ELSWH02-001-SO-030	2018/04/26	2018/04/27	2018/05/07	2018/05/08	2018/05/08
GOF444	ELSWH02-004-SD-001	2018/04/26	2018/04/27	2018/05/07	2018/05/08	2018/05/08 & 2018/05/10-14
GOF445	ELSWH02-004-SD-901	2018/04/26	2018/04/27	2018/05/07	2018/05/08	2018/05/08 & 2018/05/10-14
PFOS and PF	OA in water by SPE/LCMS					
GOF434	ELSWH-RS-006	2018/04/24	2018/04/27	2018/05/08	2018/05/09	2018/05/09-10
GOF436	ELSWH-RS-007	2018/04/25	2018/04/27	2018/05/08	2018/05/09	2018/05/09-10
GOF440	ELSWH-RS-008	2018/04/26	2018/04/27	2018/05/08	2018/05/09	2018/05/09-10
GOF441	ELSWH12-001-GW-032	2018/04/25	2018/04/27	2018/05/08	2018/05/09	2018/05/09-10
GOF442	ELSWH08-003-GW-045	2018/04/26	2018/04/27	2018/05/08	2018/05/09	2018/05/09-10
GOF443	ELSWH08-002-GW-045	2018/04/26	2018/04/27	2018/05/08	2018/05/09	2018/05/09-10
GOF446	ELSWH02-004-SW-001	2018/04/26	2018/04/27	2018/05/08	2018/05/09	2018/05/09-10 & 2018/05/11
GOF447	ELSWH02-004-SW-901	2018/04/26	2018/04/27	2018/05/08	2018/05/09	2018/05/09-10
GOF448	ELSWH02-003-GW-013	2018/04/26	2018/04/27	2018/05/08	2018/05/09	2018/05/09-10

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 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 Pallin

Project Manager- Site Assessr and Remediation/ Ultra Trace

2018/05/17 Date


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rostar Project Manager:	Brian Odom, BOdom@specproenv.com (4	478) 397-4906 865) 483-7904	-	-			0		9	pes:		
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MAXXAM use only	Sample ID +	Date Collected	Time Collected	Sample Type	Matrix	PFAS (see list	27. Stephani B89	Ð		CC (AB, EB)		54
	ELSWH-RS-006	4124/18	1525	N	50	1	=	G		In asso of ELS WHID-DOI-SO-DND Offsyng		
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*	ELS WHOZ-004-SW-001	4/26/18	1440	N	WS	6				X MSIM5D Included		
	ELS WHOZ-004-5W-901	4/26/18	MHO.	FD	WS	2			1			
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Your Project #: M2027.0003 (OMAHA) Site Location: ELLSWORTH AFB Your C.O.C. #: 229

Attention: Jenny Vance

Aerostar SES LLC SES Construction and Fuel Serv 1006 Floyd Culler Court Oak Ridge, TN USA 37830

> Report Date: 2018/05/14 Report #: R5142082 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B897127

Received: 2018/04/27, 14:05

Sample Matrix: Ground Water # Samples Received: 4

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
PFOS and PFOA in water by SPE/LCMS (1)	4	2018/05/08	2018/05/09	CAM SOP-00894	EPA 537 m

Sample Matrix: Soil # Samples Received: 4

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
Moisture	4	N/A	2018/04/30	CAM SOP-00445	Carter 2nd ed 51.2 m
PFOS and PFOA in soil by SPE/LCMS (1)	4	2018/05/07	2018/05/08	CAM SOP-00894	EPA537 m

Sample Matrix: SEDIMENT # Samples Received: 2

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
Moisture	2	N/A	2018/04/30	CAM SOP-00445	Carter 2nd ed 51.2 m
PFOS and PFOA in soil by SPE/LCMS (1)	2	2018/05/07	2018/05/08	CAM SOP-00894	EPA537 m

Sample Matrix: Surface Water # Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
PFOS and PFOA in water by SPE/LCMS (1)	2	2018/05/08	2018/05/09	CAM SOP-00894	EPA 537 m

Sample Matrix: Water

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Reference
PFOS and PFOA in water by SPE/LCMS (1)	3	2018/05/08	2018/05/09	CAM SOP-00894	EPA 537 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca



Your Project #: M2027.0003 (OMAHA) Site Location: ELLSWORTH AFB Your C.O.C. #: 229

Attention: Jenny Vance

Aerostar SES LLC SES Construction and Fuel Serv 1006 Floyd Culler Court Oak Ridge, TN USA 37830

> Report Date: 2018/05/14 Report #: R5142082 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B897127 Received: 2018/04/27, 14:05

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Per- and polyfluoroalkyl substances (PFAS) identified as surrogates on the certificate of analysis represent the extracted internal standard.

Encryption Key

Stephanie Pollen Project Manager 14 May 2018 17:07:58 typh Pallin

Please direct all questions regarding this Certificate of Analysis to your Project Manager. Stephanie Pollen, Project Manager Email: SPollen@maxxam.ca Phone# (905) 817-5700

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total Cover Pages : 2 Page 2 of 31

Validated Sample Result Forms: B8A6782

Sample Name ELSWH02-001-	-GW-035	N	Aatrix T	ype:	R	lesult Typ	e: TRG		
Lab Sample Name: GQI097	Sampl	e Date/Time:	2018-	05-04	12:31		Validatio	on Level: St	age 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	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.015	0.0054	0.015	0.020	ug/L	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	0.021	0.0055	0.015	0.020	ug/L			
PERFLUORODECANE SULFONATE	335-77-3	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.015	0.0061	0.015	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.010	0.0050	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.015	0.0074	0.015	0.020	ug/L	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.015	0.0056	0.015	0.020	ug/L	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	0.023	0.0035	0.010	0.020	ug/L			
PERFLUORONONANOIC ACID	375-95-1	< 0.018	0.0087	0.018	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.010	0.0034	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	< 0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	0.017	0.0075	0.018	0.020	ug/L	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.010	0.0025	0.010	0.020	ug/L	U	U	

Sample Name ELSWH02-002-	N	latrix T	Гуре:	R	esult Typ	e: TRG			
Lab Sample Name: GQI096	Sampl	e Date/Time:	2018-	-05-04	09:31		Validatio	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	0.026	0.0066	0.015	0.020	ug/L			
3:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	0.63	0.0054	0.015	0.020	ug/L			
PERFLUOROBUTANOIC ACID	375-22-4	0.32	0.0055	0.015	0.020	ug/L			
PERFLUORODECANE SULFONATE	335-77-3	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.015	0.0061	0.015	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.010	0.0050	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.14	0.0074	0.015	0.020	ug/L			
PERFLUOROHEXANE SULFONATE	108427-53-8	0.96	0.0056	0.015	0.020	ug/L			
PERFLUOROHEXANOIC ACID	307-24-4	1.3	0.035	0.10	0.20	ug/L			
PERFLUORONONANOIC ACID	375-95-1	< 0.018	0.0087	0.018	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	0.0079	0.0034	0.010	0.020	ug/L	J	J	
PERFLUOROOCTANE SULFONATE	1763-23-1	0.28	0.0060	0.015	0.020	ug/L			
PERFLUOROOCTANOIC ACID	335-67-1	0.78	0.0033	0.010	0.020	ug/L			
PERFLUOROPENTANOIC ACID	2706-90-3	0.44	0.0075	0.018	0.020	ug/L			
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.010	0.0025	0.010	0.020	ug/L	U	U	

Sample Name ELSWH02-006	-GW-030	Ν	latrix T	ype:	R				
Lab Sample Name: GQI099	Sampl	e Date/Time:	2018-	05-04	13:50		Validatio	on Level: St	age 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	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	0.011	0.0054	0.015	0.020	ug/L	J	J	
PERFLUOROBUTANOIC ACID	375-22-4	0.019	0.0055	0.015	0.020	ug/L	J	J	
PERFLUORODECANE SULFONATE	335-77-3	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.015	0.0061	0.015	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.010	0.0050	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.022	0.0074	0.015	0.020	ug/L			
PERFLUOROHEXANE SULFONATE	108427-53-8	0.093	0.0056	0.015	0.020	ug/L			
PERFLUOROHEXANOIC ACID	307-24-4	0.046	0.0035	0.010	0.020	ug/L			
PERFLUORONONANOIC ACID	375-95-1	< 0.018	0.0087	0.018	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.010	0.0034	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	0.074	0.0060	0.015	0.020	ug/L			
PERFLUOROOCTANOIC ACID	335-67-1	0.030	0.0033	0.010	0.020	ug/L			
PERFLUOROPENTANOIC ACID	2706-90-3	0.053	0.0075	0.018	0.020	ug/L			
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.010	0.0025	0.010	0.020	ug/L	U	U	

Analysis Method:	EPA 537 m								
Sample Name ELSWH02-006	5-SO-024	-	Matrix '	Гуре: S	R	Result Typ	e: TRG		
Lab Sample Name: GQI081	Sample	Date/Time	: 2018	-05-01	11:50		Validatio	on Level: St	age 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	< 0.88	0.29	0.88	1.1	ug/kg	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.88	0.36	0.88	1.1	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.55	0.19	0.55	1.1	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.55	0.25	0.55	1.1	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	< 0.88	0.43	0.88	1.1	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.88	0.31	0.88	1.1	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.88	0.31	0.88	1.1	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.55	0.21	0.55	1.1	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.55	0.26	0.55	1.1	ug/kg	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	0.48	0.15	0.55	1.1	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	< 0.55	0.24	0.55	1.1	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	54-91-6	< 0.55	0.15	0.55	1.1	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	1.1	0.29	0.88	1.1	ug/kg	J	J	
PERFLUOROOCTANOIC ACID	335-67-1	< 0.88	0.28	0.88	1.1	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	< 0.88	0.28	0.88	1.1	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.88	0.34	0.88	1.1	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.88	0.36	0.88	1.1	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.88	0.37	0.88	1.1	ug/kg	U	U	

Sample Name ELSWH02-006-	I	Matrix Type: S Result Ty			esult Typ	pe: TRG			
Lab Sample Name: GQI079	Sampl	e Date/Time	ie: 2018-05-01		09:20		Validation Level: Stage 4		
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	<1.0	0.34	1.0	1.3	ug/kg	U	U	
3:2 FLUOROTELOMER SULFONATE	39108-34-4	<1.0	0.43	1.0	1.3	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.65	0.22	0.65	1.3	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	0.60	0.30	0.65	1.3	ug/kg	J	J	
PERFLUORODECANE SULFONATE	335-77-3	<1.0	0.51	1.0	1.3	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	0.58	0.36	1.0	1.3	ug/kg	J	J	
PERFLUORODODECANOIC ACID	307-55-1	<1.0	0.36	1.0	1.3	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.66	0.25	0.65	1.3	ug/kg	J	J	
PERFLUOROHEXANE SULFONATE	108427-53-8	1.1	0.31	0.65	1.3	ug/kg	J	J	
PERFLUOROHEXANOIC ACID	307-24-4	0.65	0.18	0.65	1.3	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	0.93	0.29	0.65	1.3	ug/kg	J	J	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	0.42	0.18	0.65	1.3	ug/kg	J	J	
PERFLUOROOCTANE SULFONATE	1763-23-1	47	0.34	1.0	1.3	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	1.4	0.33	1.0	1.3	ug/kg			
PERFLUOROPENTANOIC ACID	2706-90-3	0.73	0.33	1.0	1.3	ug/kg	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	<1.0	0.40	1.0	1.3	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<1.0	0.43	1.0	1.3	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<1.0	0.44	1.0	1.3	ug/kg	U	U	

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Sample Name ELSWH02-007-	-SS-001	Ι	Matrix [Гуре: S	R	esult Typ	e: TRG		
Lab Sample Name: GQI092	Sampl	e Date/Time:	2018	-05-03	10:40		Validatio	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	0.35	0.29	0.88	1.1	ug/kg	J	J	
3:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.88	0.36	0.88	1.1	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.55	0.19	0.55	1.1	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	0.69	0.25	0.55	1.1	ug/kg	J	J	
PERFLUORODECANE SULFONATE	335-77-3	<0.88	0.43	0.88	1.1	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	0.72	0.31	0.88	1.1	ug/kg	J	J	
PERFLUORODODECANOIC ACID	307-55-1	0.44	0.31	0.88	1.1	ug/kg	J	J	
PERFLUOROHEPTANOIC ACID	375-85-9	0.65	0.21	0.55	1.1	ug/kg	J	J	
PERFLUOROHEXANE SULFONATE	108427-53-8	0.59	0.26	0.55	1.1	ug/kg	J	J	
PERFLUOROHEXANOIC ACID	307-24-4	0.77	0.15	0.55	1.1	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	0.67	0.24	0.55	1.1	ug/kg	J	J	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.55	0.15	0.55	1.1	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	9.1	0.29	0.88	1.1	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	1.4	0.28	0.88	1.1	ug/kg			
PERFLUOROPENTANOIC ACID	2706-90-3	0.88	0.28	0.88	1.1	ug/kg	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	0.40	0.34	0.88	1.1	ug/kg	J	J	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.88	0.36	0.88	1.1	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.88	0.37	0.88	1.1	ug/kg	U	U	

Sample Name ELSWH02-008-	-SS-001	-	Matrix 1	Гуре: S	R	e: TRG			
Lab Sample Name: GQI090	Sampl	e Date/Time	: 2018	-05-02	14:19		Validatio	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.88	0.29	0.88	1.1	ug/kg	U	U	
3:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.88	0.36	0.88	1.1	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.55	0.19	0.55	1.1	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	0.51	0.25	0.55	1.1	ug/kg	J	J	
PERFLUORODECANE SULFONATE	335-77-3	< 0.88	0.43	0.88	1.1	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	0.55	0.31	0.88	1.1	ug/kg	J	J	
PERFLUORODODECANOIC ACID	307-55-1	< 0.88	0.31	0.88	1.1	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.49	0.21	0.55	1.1	ug/kg	J	J	
PERFLUOROHEXANE SULFONATE	108427-53-8	0.56	0.26	0.55	1.1	ug/kg	J	J	
PERFLUOROHEXANOIC ACID	307-24-4	0.54	0.15	0.55	1.1	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	0.51	0.24	0.55	1.1	ug/kg	J	J	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.55	0.15	0.55	1.1	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	4.6	0.29	0.88	1.1	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	0.83	0.28	0.88	1.1	ug/kg	J	J	
PERFLUOROPENTANOIC ACID	2706-90-3	0.60	0.28	0.88	1.1	ug/kg	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.88	0.34	0.88	1.1	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.88	0.36	0.88	1.1	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.88	0.37	0.88	1.1	ug/kg	U	U	

Sample Name ELSWH05-001	-GW-030	N	latrix T	уре:	R	esult Typ	e: TRG		
Lab Sample Name: GQI098	Sampl	e Date/Time:	2018-	05-04	15:26		Validatio	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
3:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	0.015	0.0054	0.015	0.020	ug/L	J	J	
PERFLUOROBUTANOIC ACID	375-22-4	0.041	0.0055	0.015	0.020	ug/L			
PERFLUORODECANE SULFONATE	335-77-3	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.015	0.0061	0.015	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.010	0.0050	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.050	0.0074	0.015	0.020	ug/L			
PERFLUOROHEXANE SULFONATE	108427-53-8	0.23	0.0056	0.015	0.020	ug/L			
PERFLUOROHEXANOIC ACID	307-24-4	0.090	0.0035	0.010	0.020	ug/L			
PERFLUORONONANOIC ACID	375-95-1	0.0097	0.0087	0.018	0.020	ug/L	J	J	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	0.012	0.0034	0.010	0.020	ug/L	J	J	
PERFLUOROOCTANE SULFONATE	1763-23-1	0.34	0.0060	0.015	0.020	ug/L			
PERFLUOROOCTANOIC ACID	335-67-1	0.095	0.0033	0.010	0.020	ug/L			
PERFLUOROPENTANOIC ACID	2706-90-3	0.095	0.0075	0.018	0.020	ug/L			
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.010	0.0025	0.010	0.020	ug/L	U	U	

Sample Name ELSWH05-001-	-SO-028	Ι	Matrix 7	Гуре: S	R	esult Typ	e: TRG		
Lab Sample Name: GQI086	Sampl	e Date/Time:	2018	-05-02	09:45		Validatio	on Level: Stage 2B	
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.77	0.25	0.77	0.96	ug/kg	U	U	
3:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.77	0.32	0.77	0.96	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.48	0.16	0.48	0.96	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	<0.48	0.22	0.48	0.96	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.77	0.37	0.77	0.96	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.77	0.27	0.77	0.96	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.77	0.27	0.77	0.96	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.48	0.18	0.48	0.96	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	<0.48	0.23	0.48	0.96	ug/kg	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	<0.48	0.13	0.48	0.96	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	<0.48	0.21	0.48	0.96	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.48	0.13	0.48	0.96	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	0.37	0.25	0.77	0.96	ug/kg	J	J	
PERFLUOROOCTANOIC ACID	335-67-1	<0.77	0.24	0.77	0.96	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	<0.77	0.24	0.77	0.96	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.77	0.30	0.77	0.96	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.77	0.32	0.77	0.96	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.77	0.33	0.77	0.96	ug/kg	U	U	

Sample Name ELSWH05-001-	-SS-001	N	Matrix T	ype: S	R	esult Typ	e: TRG		
Lab Sample Name: GQI084	Sampl	e Date/Time:	2018-	05-02	07:42		Validatio	on Level: Stage 2B	
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	0.40	0.26	0.80	1.0	ug/kg	J	J	
3:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.80	0.33	0.80	1.0	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.50	0.17	0.50	1.0	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	0.67	0.23	0.50	1.0	ug/kg	J	J	
PERFLUORODECANE SULFONATE	335-77-3	< 0.80	0.39	0.80	1.0	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	0.93	0.28	0.80	1.0	ug/kg	J	J	
PERFLUORODODECANOIC ACID	307-55-1	0.41	0.28	0.80	1.0	ug/kg	J	J	
PERFLUOROHEPTANOIC ACID	375-85-9	0.66	0.19	0.50	1.0	ug/kg	J	J	
PERFLUOROHEXANE SULFONATE	108427-53-8	1.2	0.24	0.50	1.0	ug/kg			
PERFLUOROHEXANOIC ACID	307-24-4	0.78	0.14	0.50	1.0	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	1.2	0.22	0.50	1.0	ug/kg			
PERFLUOROOCTANE SULFONAMIDE	754-91-6	0.44	0.14	0.50	1.0	ug/kg	J	J	
PERFLUOROOCTANE SULFONATE	1763-23-1	68	2.6	8.0	10	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	1.8	0.25	0.80	1.0	ug/kg			
PERFLUOROPENTANOIC ACID	2706-90-3	0.88	0.25	0.80	1.0	ug/kg	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.80	0.31	0.80	1.0	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.80	0.33	0.80	1.0	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	0.44	0.34	0.80	1.0	ug/kg	J	J	

Sample Name ELSWH05-002	-GW-025	Γ	Matrix 7	ype:	R	kesult Typ	e: TRG		
Lab Sample Name: GQI095	Sample	e Date/Time	2018-	05-03	16:30		Validati	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
3:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	0.014	0.0054	0.015	0.020	ug/L	J	J	
PERFLUOROBUTANOIC ACID	375-22-4	0.033	0.0055	0.015	0.020	ug/L			
PERFLUORODECANE SULFONATE	335-77-3	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.015	0.0061	0.015	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.010	0.0050	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.051	0.0074	0.015	0.020	ug/L			
PERFLUOROHEXANE SULFONATE	108427-53-8	0.23	0.0056	0.015	0.020	ug/L			
PERFLUOROHEXANOIC ACID	307-24-4	0.12	0.0035	0.010	0.020	ug/L			
PERFLUORONONANOIC ACID	375-95-1	< 0.018	0.0087	0.018	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	0.018	0.0034	0.010	0.020	ug/L	J	J	
PERFLUOROOCTANE SULFONATE	1763-23-1	0.24	0.0060	0.015	0.020	ug/L			
PERFLUOROOCTANOIC ACID	335-67-1	0.088	0.0033	0.010	0.020	ug/L			
PERFLUOROPENTANOIC ACID	2706-90-3	0.12	0.0075	0.018	0.020	ug/L			
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.010	0.0025	0.010	0.020	ug/L	U	U	

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Sample Name ELSWH05-002-	-SO-020	1	Matrix [Г уре: S	R	esult Typ	e: TRG		
Lab Sample Name: GQI083	Sampl	e Date/Time	2018	-05-01	15:32		Validatio	on Level: St	age 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	<0.73	0.24	0.73	0.91	ug/kg	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.73	0.30	0.73	0.91	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.46	0.15	0.46	0.91	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.46	0.21	0.46	0.91	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.73	0.35	0.73	0.91	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.73	0.25	0.73	0.91	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.73	0.25	0.73	0.91	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.46	0.17	0.46	0.91	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	<0.46	0.22	0.46	0.91	ug/kg	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.46	0.13	0.46	0.91	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	<0.46	0.20	0.46	0.91	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.46	0.13	0.46	0.91	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	<0.73	0.24	0.73	0.91	ug/kg	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	<0.73	0.23	0.73	0.91	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	<0.73	0.23	0.73	0.91	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.73	0.28	0.73	0.91	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.73	0.30	0.73	0.91	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.73	0.31	0.73	0.91	ug/kg	U	U	

Sample Name ELSWH05-002-	-SS-001	Ν	Aatrix 7	Г уре: S	R	esult Typ	e: TRG		
Lab Sample Name: GQI082	Sampl	e Date/Time:	2018	-05-01	13:35		Validatio	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	< 0.96	0.31	0.96	1.2	ug/kg	U	U	
3:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.96	0.40	0.96	1.2	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.60	0.20	0.60	1.2	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	0.53	0.28	0.60	1.2	ug/kg	J	J	
PERFLUORODECANE SULFONATE	335-77-3	<0.96	0.47	0.96	1.2	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.96	0.34	0.96	1.2	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.96	0.34	0.96	1.2	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.50	0.23	0.60	1.2	ug/kg	J	J	
PERFLUOROHEXANE SULFONATE	108427-53-8	0.69	0.29	0.60	1.2	ug/kg	J	J	
PERFLUOROHEXANOIC ACID	307-24-4	0.55	0.17	0.60	1.2	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	<0.60	0.26	0.60	1.2	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	0.41	0.17	0.60	1.2	ug/kg	J	J	
PERFLUOROOCTANE SULFONATE	1763-23-1	11	0.31	0.96	1.2	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	0.62	0.30	0.96	1.2	ug/kg	J	J	
PERFLUOROPENTANOIC ACID	2706-90-3	0.61	0.30	0.96	1.2	ug/kg	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.96	0.37	0.96	1.2	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.96	0.40	0.96	1.2	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.96	0.41	0.96	1.2	ug/kg	U	U	

Sample Name ELSWH05-003-	-SO-009]	Matrix 1	Г уре: S	R	esult Typ	e: TRG		
Lab Sample Name: GQI088	Sampl	e Date/Time	: 2018	-05-02	11:45		Validatio	on Level: Stage 2B	
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	< 0.80	0.26	0.80	1.0	ug/kg	U	U	
3:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.80	0.33	0.80	1.0	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.50	0.17	0.50	1.0	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.50	0.23	0.50	1.0	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	< 0.80	0.39	0.80	1.0	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.80	0.28	0.80	1.0	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.80	0.28	0.80	1.0	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.50	0.19	0.50	1.0	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.50	0.24	0.50	1.0	ug/kg	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.50	0.14	0.50	1.0	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	< 0.50	0.22	0.50	1.0	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.50	0.14	0.50	1.0	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	0.90	0.26	0.80	1.0	ug/kg	J	J	
PERFLUOROOCTANOIC ACID	335-67-1	< 0.80	0.25	0.80	1.0	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	< 0.80	0.25	0.80	1.0	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.80	0.31	0.80	1.0	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.80	0.33	0.80	1.0	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.80	0.34	0.80	1.0	ug/kg	U	U	

Sample Name ELSWH05-003-	-SO-909	I	Matrix 7	Гуре: S	R	esult Typ	e: TRG			
Lab Sample Name: GQI089	Sampl	e Date/Time	2018	-05-02	11:45		Validatio	on Level: Stage 2B		
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code	
5:2 FLUOROTELOMER SULFONATE	27619-97-2	0.30	0.24	0.75	0.94	ug/kg	J	J		
3:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.75	0.31	0.75	0.94	ug/kg	U	U		
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.47	0.16	0.47	0.94	ug/kg	U	U		
PERFLUOROBUTANOIC ACID	375-22-4	0.37	0.22	0.47	0.94	ug/kg	J	J		
PERFLUORODECANE SULFONATE	335-77-3	<0.75	0.37	0.75	0.94	ug/kg	U	U		
PERFLUORODECANOIC ACID	335-76-2	0.38	0.26	0.75	0.94	ug/kg	J	J		
PERFLUORODODECANOIC ACID	307-55-1	0.35	0.26	0.75	0.94	ug/kg	J	J		
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.47	0.18	0.47	0.94	ug/kg	U	U		
PERFLUOROHEXANE SULFONATE	108427-53-8	0.50	0.23	0.47	0.94	ug/kg	J	J		
PERFLUOROHEXANOIC ACID	307-24-4	0.34	0.13	0.47	0.94	ug/kg	J	J		
PERFLUORONONANOIC ACID	375-95-1	< 0.47	0.21	0.47	0.94	ug/kg	U	U		
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.47	0.13	0.47	0.94	ug/kg	U	U		
PERFLUOROOCTANE SULFONATE	1763-23-1	1.4	0.24	0.75	0.94	ug/kg				
PERFLUOROOCTANOIC ACID	335-67-1	0.37	0.24	0.75	0.94	ug/kg	J	J		
PERFLUOROPENTANOIC ACID	2706-90-3	0.36	0.24	0.75	0.94	ug/kg	J	J		
PERFLUOROTETRADECANOIC ACID	376-06-7	0.35	0.29	0.75	0.94	ug/kg	J	J		
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.75	0.31	0.75	0.94	ug/kg	U	U		
PERFLUOROUNDECANOIC ACID	2058-94-8	0.36	0.32	0.75	0.94	ug/kg	J	J		

Sample Name ELSWH05-003-	-SS-001	I	Matrix 1	Гуре: S	R	esult Typ	e: TRG		
Lab Sample Name: GQI087	Sampl	e Date/Time	: 2018	-05-02	10:49		Validatio	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	< 0.88	0.29	0.88	1.1	ug/kg	U	U	
3:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.88	0.36	0.88	1.1	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.55	0.19	0.55	1.1	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	0.79	0.25	0.55	1.1	ug/kg	J	J	
PERFLUORODECANE SULFONATE	335-77-3	<0.88	0.43	0.88	1.1	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	0.70	0.31	0.88	1.1	ug/kg	J	J	
PERFLUORODODECANOIC ACID	307-55-1	0.37	0.31	0.88	1.1	ug/kg	J	J	
PERFLUOROHEPTANOIC ACID	375-85-9	1.2	0.21	0.55	1.1	ug/kg			
PERFLUOROHEXANE SULFONATE	108427-53-8	1.6	0.26	0.55	1.1	ug/kg			
PERFLUOROHEXANOIC ACID	307-24-4	1.3	0.15	0.55	1.1	ug/kg			
PERFLUORONONANOIC ACID	375-95-1	0.99	0.24	0.55	1.1	ug/kg	J	J	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	0.45	0.15	0.55	1.1	ug/kg	J	J	
PERFLUOROOCTANE SULFONATE	1763-23-1	75	2.9	8.8	11	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	3.1	0.28	0.88	1.1	ug/kg			
PERFLUOROPENTANOIC ACID	2706-90-3	1.2	0.28	0.88	1.1	ug/kg			
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.88	0.34	0.88	1.1	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.88	0.36	0.88	1.1	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	0.40	0.37	0.88	1.1	ug/kg	J	J	

Sample Name ELSWH06-002-	-SO-010	I	Matrix 7	ype: S	R	esult Typ	e: TRG		
Lab Sample Name: GQI111	Sampl	e Date/Time	2018-	-05-05	14:15		Validatio	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	< 0.76	0.25	0.76	0.95	ug/kg	U	U	
3:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.76	0.31	0.76	0.95	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.48	0.16	0.48	0.95	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.48	0.22	0.48	0.95	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.76	0.37	0.76	0.95	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.76	0.27	0.76	0.95	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.76	0.27	0.76	0.95	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.48	0.18	0.48	0.95	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.48	0.23	0.48	0.95	ug/kg	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.48	0.13	0.48	0.95	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	< 0.48	0.21	0.48	0.95	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.48	0.13	0.48	0.95	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	0.51	0.25	0.76	0.95	ug/kg	J	J	
PERFLUOROOCTANOIC ACID	335-67-1	< 0.76	0.24	0.76	0.95	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	< 0.76	0.24	0.76	0.95	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.76	0.29	0.76	0.95	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.76	0.31	0.76	0.95	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.76	0.32	0.76	0.95	ug/kg	U	U	

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Sample Name ELSWH06-002-	-SS-001	Ι	Matrix [Гуре: S	R	esult Typ	e: TRG		
Lab Sample Name: GQI110	Sampl	e Date/Time:	2018	-05-05	13:15		Validatio	on Level: St	age 4
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.80	0.26	0.80	1.0	ug/kg	U	U	
3:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.88	0.36	0.88	1.1	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.55	0.19	0.55	1.1	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	0.75	0.25	0.55	1.1	ug/kg	J	J	
PERFLUORODECANE SULFONATE	335-77-3	<0.88	0.43	0.88	1.1	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.88	0.31	0.88	1.1	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.88	0.31	0.88	1.1	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.48	0.21	0.55	1.1	ug/kg	J	J	
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.55	0.26	0.55	1.1	ug/kg	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.55	0.15	0.55	1.1	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	1.0	0.24	0.55	1.1	ug/kg	J	J	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.55	0.15	0.55	1.1	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	6.8	0.29	0.88	1.1	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	0.73	0.28	0.88	1.1	ug/kg	J	J	
PERFLUOROPENTANOIC ACID	2706-90-3	0.78	0.28	0.88	1.1	ug/kg	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.88	0.34	0.88	1.1	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.88	0.36	0.88	1.1	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.88	0.37	0.88	1.1	ug/kg	U	U	

Analysis Method:	EPA 537 m								
Sample Name ELSWH06-003	-SO-054	-	Matrix '	Туре: S	R	Result Typ	e: TRG		
Lab Sample Name: GQI109	Sample	Date/Time	2018	-05-05	11:40		Validatio	on Level: St	age 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	<0.73	0.24	0.73	0.91	ug/kg	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.73	0.30	0.73	0.91	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.46	0.15	0.46	0.91	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	<0.46	0.21	0.46	0.91	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.73	0.35	0.73	0.91	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.73	0.25	0.73	0.91	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.73	0.25	0.73	0.91	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.46	0.17	0.46	0.91	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	<0.46	0.22	0.46	0.91	ug/kg	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	<0.46	0.13	0.46	0.91	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	<0.46	0.20	0.46	0.91	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.46	0.13	0.46	0.91	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	<0.73	0.24	0.73	0.91	ug/kg	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	<0.73	0.23	0.73	0.91	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	<0.73	0.23	0.73	0.91	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.73	0.28	0.73	0.91	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.73	0.30	0.73	0.91	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.73	0.31	0.73	0.91	ug/kg	U	U	

Friday, June 22, 2018

Sample Name ELSWH06-003-	-SS-001	N	Matrix 7	Type: S	R	esult Typ	e: TRG		
Lab Sample Name: GQI107	Sampl	e Date/Time:	2018-	-05-05	08:08		Validatio	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.78	0.25	0.78	0.98	ug/kg	U	U	
3:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.78	0.32	0.78	0.98	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.49	0.17	0.49	0.98	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	0.51	0.23	0.49	0.98	ug/kg	J	J	
PERFLUORODECANE SULFONATE	335-77-3	< 0.78	0.38	0.78	0.98	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.78	0.27	0.78	0.98	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.78	0.27	0.78	0.98	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.44	0.19	0.49	0.98	ug/kg	J	J	
PERFLUOROHEXANE SULFONATE	108427-53-8	0.46	0.24	0.49	0.98	ug/kg	J	J	
PERFLUOROHEXANOIC ACID	307-24-4	0.38	0.14	0.49	0.98	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	0.52	0.22	0.49	0.98	ug/kg	J	J	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.49	0.14	0.49	0.98	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	4.6	0.25	0.78	0.98	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	0.57	0.25	0.78	0.98	ug/kg	J	J	
PERFLUOROPENTANOIC ACID	2706-90-3	0.46	0.25	0.78	0.98	ug/kg	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.78	0.30	0.78	0.98	ug/kg	U	U	
'ERFLUOROTRIDECANOIC ACID	72629-94-8	<0.78	0.32	0.78	0.98	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.78	0.33	0.78	0.98	ug/kg	U	U	

Sample Name ELSWH08-001-	-GW-044	N	latrix T	уре:	R	esult Typ	e: TRG		
Lab Sample Name: GQI094	Sampl	e Date/Time:	2018-	05-01	11:41		Validati	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
3:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.015	0.0054	0.015	0.020	ug/L	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.015	0.0055	0.015	0.020	ug/L	U	U	
PERFLUORODECANE SULFONATE	335-77-3	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.015	0.0061	0.015	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.010	0.0050	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.015	0.0074	0.015	0.020	ug/L	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.015	0.0056	0.015	0.020	ug/L	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.010	0.0035	0.010	0.020	ug/L	U	U	
PERFLUORONONANOIC ACID	375-95-1	< 0.018	0.0087	0.018	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.010	0.0034	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	< 0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	< 0.018	0.0075	0.018	0.020	ug/L	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.010	0.0025	0.010	0.020	ug/L	U	U	

Sample Name ELSWH09-003-	-SO-028	Ν	Aatrix 7	Type: S	R	esult Typ	e: TRG		
Lab Sample Name: GQI101	Sampl	e Date/Time:	2018	-05-04	09:57		Validatio	on Level: Sta	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	< 0.67	0.22	0.67	0.84	ug/kg	U	U	
3:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.67	0.28	0.67	0.84	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.42	0.14	0.42	0.84	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.42	0.19	0.42	0.84	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.67	0.33	0.67	0.84	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.67	0.24	0.67	0.84	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.67	0.24	0.67	0.84	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.42	0.16	0.42	0.84	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.42	0.20	0.42	0.84	ug/kg	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.42	0.12	0.42	0.84	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	< 0.42	0.18	0.42	0.84	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.42	0.12	0.42	0.84	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	< 0.67	0.22	0.67	0.84	ug/kg	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	< 0.67	0.21	0.67	0.84	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	<0.67	0.21	0.67	0.84	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.67	0.26	0.67	0.84	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.67	0.28	0.67	0.84	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.67	0.29	0.67	0.84	ug/kg	U	U	

Analysis Method:	EPA 537 m								
Sample Name ELSWH09-003	3-SS-001		Matrix '	Type: S	F	Result Typ	e: TRG		
Lab Sample Name: GQI093	Sample	Date/Time	e: 2018	3-05-04	08:00		Validatio	on Level: St	age 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	<0.96	0.31	0.96	1.2	ug/kg	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.96	0.40	0.96	1.2	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.60	0.20	0.60	1.2	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.60	0.28	0.60	1.2	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.96	0.47	0.96	1.2	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	2.3	0.34	0.96	1.2	ug/kg			
PERFLUORODODECANOIC ACID	307-55-1	0.78	0.34	0.96	1.2	ug/kg	J	J	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.60	0.23	0.60	1.2	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.60	0.29	0.60	1.2	ug/kg	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	0.45	0.17	0.60	1.2	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	0.60	0.26	0.60	1.2	ug/kg	J	J	
PERFLUOROOCTANE SULFONAMIDE	E 754-91-6	0.41	0.17	0.60	1.2	ug/kg	J	J	
PERFLUOROOCTANE SULFONATE	1763-23-1	3.0	0.31	0.96	1.2	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	1.1	0.30	0.96	1.2	ug/kg	J	J	
PERFLUOROPENTANOIC ACID	2706-90-3	0.48	0.30	0.96	1.2	ug/kg	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	0.48	0.37	0.96	1.2	ug/kg	J	J	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.96	0.40	0.96	1.2	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	0.51	0.41	0.96	1.2	ug/kg	J	J	

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Sample Name ELSWH10-002-	-SO-029	Ν	latrix T	Type: S	R	esult Typ	e: TRG		
Lab Sample Name: GQI106	Sampl	e Date/Time:	2018-	-05-04	17:10		Validatio	on Level: Stage 2B	
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	< 0.88	0.29	0.88	1.1	ug/kg	U	U	
3:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.88	0.36	0.88	1.1	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.55	0.19	0.55	1.1	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.55	0.25	0.55	1.1	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.88	0.43	0.88	1.1	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.88	0.31	0.88	1.1	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.88	0.31	0.88	1.1	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.55	0.21	0.55	1.1	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.55	0.26	0.55	1.1	ug/kg	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.55	0.15	0.55	1.1	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	<0.55	0.24	0.55	1.1	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.55	0.15	0.55	1.1	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	< 0.88	0.29	0.88	1.1	ug/kg	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	< 0.88	0.28	0.88	1.1	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	< 0.88	0.28	0.88	1.1	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.88	0.34	0.88	1.1	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.88	0.36	0.88	1.1	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.88	0.37	0.88	1.1	ug/kg	U	U	

Analysis Method:	EPA 537 m								
Sample Name ELSWH10-002	2-SS-001		Matrix '	Туре: S	R	Result Typ	e: TRG		
Lab Sample Name: GQI105	Sample	Date/Time	2018	-05-04	15:22		Validatio	on Level: St	age 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	<0.96	0.31	0.96	1.2	ug/kg	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.96	0.40	0.96	1.2	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.60	0.20	0.60	1.2	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	0.81	0.28	0.60	1.2	ug/kg	J	J	
PERFLUORODECANE SULFONATE	335-77-3	<0.96	0.47	0.96	1.2	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.96	0.34	0.96	1.2	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.96	0.34	0.96	1.2	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.91	0.23	0.60	1.2	ug/kg	J	J	
PERFLUOROHEXANE SULFONATE	108427-53-8	3.2	0.29	0.60	1.2	ug/kg			
PERFLUOROHEXANOIC ACID	307-24-4	0.73	0.17	0.60	1.2	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	0.75	0.26	0.60	1.2	ug/kg	J	J	
PERFLUOROOCTANE SULFONAMIDE	E 754-91-6	<0.60	0.17	0.60	1.2	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	5.2	0.31	0.96	1.2	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	1.5	0.30	0.96	1.2	ug/kg			
PERFLUOROPENTANOIC ACID	2706-90-3	1.3	0.30	0.96	1.2	ug/kg			
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.96	0.37	0.96	1.2	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.96	0.40	0.96	1.2	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.96	0.41	0.96	1.2	ug/kg	U	U	

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Sample Name ELSWH11-003	-SO-015]	Matrix T	Type: S	R	esult Typ	e: TRG		
Lab Sample Name: GQI103	Sample	e Date/Time	: 2018-	-05-04	13:00		Validatio	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.73	0.24	0.73	0.91	ug/kg	U	U	
:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.73	0.30	0.73	0.91	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.46	0.15	0.46	0.91	ug/kg	U	U	
ERFLUOROBUTANOIC ACID	375-22-4	<0.46	0.21	0.46	0.91	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.73	0.35	0.73	0.91	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.73	0.25	0.73	0.91	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.73	0.25	0.73	0.91	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.46	0.17	0.46	0.91	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	0.69	0.22	0.46	0.91	ug/kg	J	J	
PERFLUOROHEXANOIC ACID	307-24-4	0.34	0.13	0.46	0.91	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	<0.46	0.20	0.46	0.91	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	0.49	0.13	0.46	0.91	ug/kg	J	J	
PERFLUOROOCTANE SULFONATE	1763-23-1	1.0	0.24	0.73	0.91	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	0.42	0.23	0.73	0.91	ug/kg	J	J	
PERFLUOROPENTANOIC ACID	2706-90-3	<0.73	0.23	0.73	0.91	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.73	0.28	0.73	0.91	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.73	0.30	0.73	0.91	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.73	0.31	0.73	0.91	ug/kg	U	U	

Sample Name ELSWH11-003	-SS-001]	Matrix T	ype: S	R	esult Typ	e: TRG		
Lab Sample Name: GQI102	Sampl	e Date/Time	: 2018-	05-04	11:00		Validatio	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	< 0.80	0.26	0.80	1.0	ug/kg	U	U	
3:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.80	0.33	0.80	1.0	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.50	0.17	0.50	1.0	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	0.51	0.23	0.50	1.0	ug/kg	J	J	
PERFLUORODECANE SULFONATE	335-77-3	< 0.80	0.39	0.80	1.0	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.80	0.28	0.80	1.0	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.80	0.28	0.80	1.0	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.50	0.19	0.50	1.0	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	0.44	0.24	0.50	1.0	ug/kg	J	J	
PERFLUOROHEXANOIC ACID	307-24-4	0.38	0.14	0.50	1.0	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	< 0.50	0.22	0.50	1.0	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.50	0.14	0.50	1.0	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	0.46	0.26	0.80	1.0	ug/kg	J	J	
PERFLUOROOCTANOIC ACID	335-67-1	< 0.80	0.25	0.80	1.0	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	0.37	0.25	0.80	1.0	ug/kg	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.80	0.31	0.80	1.0	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.80	0.33	0.80	1.0	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.80	0.34	0.80	1.0	ug/kg	U	U	

Sample Name ELSWH11-005-	-SS-001	Ν	Matrix 7	Type: S	R	esult Typ	e: TRG		
Lab Sample Name: GQI104	Sampl	e Date/Time:	2018-	-05-04	13:15		Validatio	on Level: Sta	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	0.29	0.25	0.77	0.96	ug/kg	J	J	
3:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.77	0.32	0.77	0.96	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.48	0.16	0.48	0.96	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	0.37	0.22	0.48	0.96	ug/kg	J	J	
PERFLUORODECANE SULFONATE	335-77-3	<0.77	0.37	0.77	0.96	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.77	0.27	0.77	0.96	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.77	0.27	0.77	0.96	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.43	0.18	0.48	0.96	ug/kg	J	J	
PERFLUOROHEXANE SULFONATE	108427-53-8	0.44	0.23	0.48	0.96	ug/kg	J	J	
PERFLUOROHEXANOIC ACID	307-24-4	0.38	0.13	0.48	0.96	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	0.54	0.21	0.48	0.96	ug/kg	J	J	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	0.34	0.13	0.48	0.96	ug/kg	J	J	
PERFLUOROOCTANE SULFONATE	1763-23-1	9.6	0.25	0.77	0.96	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	0.59	0.24	0.77	0.96	ug/kg	J	J	
PERFLUOROPENTANOIC ACID	2706-90-3	0.38	0.24	0.77	0.96	ug/kg	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.77	0.30	0.77	0.96	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.77	0.32	0.77	0.96	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.77	0.33	0.77	0.96	ug/kg	U	U	

Sample Name ELSWH-RS-009	9	Ν	Aatrix T	Гуре:	Result Type: TRG					
Lab Sample Name: GQI080	Sampl	e Date/Time:	2018-	-05-01	11:40		Validati	on Level: St	age 2B	
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code	
5:2 FLUOROTELOMER SULFONATE	27619-97-2	< 0.015	0.0066	0.015	0.020	ug/L	U	U		
3:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.015	0.0066	0.015	0.020	ug/L	U	U		
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.015	0.0054	0.015	0.020	ug/L	U	U		
PERFLUOROBUTANOIC ACID	375-22-4	< 0.015	0.0055	0.015	0.020	ug/L	U	U		
PERFLUORODECANE SULFONATE	335-77-3	< 0.015	0.0060	0.015	0.020	ug/L	U	U		
PERFLUORODECANOIC ACID	335-76-2	< 0.015	0.0061	0.015	0.020	ug/L	U	U		
PERFLUORODODECANOIC ACID	307-55-1	< 0.010	0.0050	0.010	0.020	ug/L	U	U		
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.015	0.0074	0.015	0.020	ug/L	U	U		
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.015	0.0056	0.015	0.020	ug/L	U	U		
PERFLUOROHEXANOIC ACID	307-24-4	< 0.010	0.0035	0.010	0.020	ug/L	U	U		
PERFLUORONONANOIC ACID	375-95-1	< 0.018	0.0087	0.018	0.020	ug/L	U	U		
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.010	0.0034	0.010	0.020	ug/L	U	U		
PERFLUOROOCTANE SULFONATE	1763-23-1	< 0.015	0.0060	0.015	0.020	ug/L	U	U		
PERFLUOROOCTANOIC ACID	335-67-1	< 0.010	0.0033	0.010	0.020	ug/L	U	U		
PERFLUOROPENTANOIC ACID	2706-90-3	< 0.018	0.0075	0.018	0.020	ug/L	U	U		
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.010	0.0027	0.010	0.020	ug/L	U	U		
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.010	0.0038	0.010	0.020	ug/L	U	U		
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.010	0.0025	0.010	0.020	ug/L	U	U		

Sample Name ELSWH-RS-01	0	Ν	Aatrix T	ype:	R	esult Typ	e: TRG		
Lab Sample Name: GQI085	Sample Date/Ti		e: 2018-05-02		08:00		Validation Level: Stage 2B		
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
3:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.015	0.0054	0.015	0.020	ug/L	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.015	0.0055	0.015	0.020	ug/L	U	U	
PERFLUORODECANE SULFONATE	335-77-3	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.015	0.0061	0.015	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.010	0.0050	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.015	0.0074	0.015	0.020	ug/L	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.015	0.0056	0.015	0.020	ug/L	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.010	0.0035	0.010	0.020	ug/L	U	U	
PERFLUORONONANOIC ACID	375-95-1	< 0.018	0.0087	0.018	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.010	0.0034	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	< 0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	< 0.018	0.0075	0.018	0.020	ug/L	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.010	0.0025	0.010	0.020	ug/L	U	U	

Sample Name ELSWH-RS-01	1	Ν	Aatrix T	latrix Type:		Result Type: TRG				
Lab Sample Name: GQI091	Sampl	e Date/Time:	2018-	2018-05-03			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	< 0.015	0.0066	0.015	0.020	ug/L	U	U		
8:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.015	0.0066	0.015	0.020	ug/L	U	U		
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.015	0.0054	0.015	0.020	ug/L	U	U		
PERFLUOROBUTANOIC ACID	375-22-4	< 0.015	0.0055	0.015	0.020	ug/L	U	U		
PERFLUORODECANE SULFONATE	335-77-3	< 0.015	0.0060	0.015	0.020	ug/L	U	U		
PERFLUORODECANOIC ACID	335-76-2	< 0.015	0.0061	0.015	0.020	ug/L	U	U		
PERFLUORODODECANOIC ACID	307-55-1	< 0.010	0.0050	0.010	0.020	ug/L	U	U		
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.015	0.0074	0.015	0.020	ug/L	U	U		
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.015	0.0056	0.015	0.020	ug/L	U	U		
PERFLUOROHEXANOIC ACID	307-24-4	< 0.010	0.0035	0.010	0.020	ug/L	U	U		
PERFLUORONONANOIC ACID	375-95-1	< 0.018	0.0087	0.018	0.020	ug/L	U	U		
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.010	0.0034	0.010	0.020	ug/L	U	U		
PERFLUOROOCTANE SULFONATE	1763-23-1	< 0.015	0.0060	0.015	0.020	ug/L	U	U		
PERFLUOROOCTANOIC ACID	335-67-1	< 0.010	0.0033	0.010	0.020	ug/L	U	U		
PERFLUOROPENTANOIC ACID	2706-90-3	< 0.018	0.0075	0.018	0.020	ug/L	U	U		
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.010	0.0027	0.010	0.020	ug/L	U	U		
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.010	0.0038	0.010	0.020	ug/L	U	U		
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.010	0.0025	0.010	0.020	ug/L	U	U		

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Sample Name ELSWH-RS-012	2	Ν	Matrix T	ype:	R	esult Typ	e: TRG		
Lab Sample Name: GQI100	Sample Date/Tir		e: 2018-05-04		09:52		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	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.015	0.0054	0.015	0.020	ug/L	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.015	0.0055	0.015	0.020	ug/L	U	U	
PERFLUORODECANE SULFONATE	335-77-3	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.015	0.0061	0.015	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.010	0.0050	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.015	0.0074	0.015	0.020	ug/L	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.015	0.0056	0.015	0.020	ug/L	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.010	0.0035	0.010	0.020	ug/L	U	U	
PERFLUORONONANOIC ACID	375-95-1	< 0.018	0.0087	0.018	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.010	0.0034	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	< 0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	< 0.018	0.0075	0.018	0.020	ug/L	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.010	0.0025	0.010	0.020	ug/L	U	U	

Sample Name ELSWH-RS-01	3	Matrix Type: Result Typ					e: TRG			
Lab Sample Name: GQI108	Sample Date/Tin		e: 2018-05-05		11:35		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	< 0.015	0.0066	0.015	0.020	ug/L	U	U		
8:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.015	0.0066	0.015	0.020	ug/L	U	U		
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.015	0.0054	0.015	0.020	ug/L	U	U		
PERFLUOROBUTANOIC ACID	375-22-4	< 0.015	0.0055	0.015	0.020	ug/L	U	U		
PERFLUORODECANE SULFONATE	335-77-3	< 0.015	0.0060	0.015	0.020	ug/L	U	U		
PERFLUORODECANOIC ACID	335-76-2	< 0.015	0.0061	0.015	0.020	ug/L	U	U		
PERFLUORODODECANOIC ACID	307-55-1	< 0.010	0.0050	0.010	0.020	ug/L	U	U		
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.015	0.0074	0.015	0.020	ug/L	U	U		
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.015	0.0056	0.015	0.020	ug/L	U	U		
PERFLUOROHEXANOIC ACID	307-24-4	< 0.010	0.0035	0.010	0.020	ug/L	U	U		
PERFLUORONONANOIC ACID	375-95-1	< 0.018	0.0087	0.018	0.020	ug/L	U	U		
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.010	0.0034	0.010	0.020	ug/L	U	U		
PERFLUOROOCTANE SULFONATE	1763-23-1	< 0.015	0.0060	0.015	0.020	ug/L	U	U		
PERFLUOROOCTANOIC ACID	335-67-1	< 0.010	0.0033	0.010	0.020	ug/L	U	U		
PERFLUOROPENTANOIC ACID	2706-90-3	< 0.018	0.0075	0.018	0.020	ug/L	U	U		
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.010	0.0027	0.010	0.020	ug/L	U	U		
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.010	0.0038	0.010	0.020	ug/L	U	U		
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.010	0.0025	0.010	0.020	ug/L	U	U		
Validated Sample Result Forms: B8B1135

Sample Name ELSWH02-005-	-SO-034		Matrix [Гуре: S	R	Result Typ	e: TRG		
Lab Sample Name: GRF770	Sampl	e Date/Time	2018	-05-07	13:05		Validatio	on Level: St	age 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	0.81	0.21	0.66	0.82	ug/kg	J	J	10A
8:2 FLUOROTELOMER SULFONATE	39108-34-4	1.8	0.27	0.66	0.82	ug/kg		J	10A
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.41	0.14	0.41	0.82	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.41	0.19	0.41	0.82	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.66	0.32	0.66	0.82	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.66	0.23	0.66	0.82	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.66	0.23	0.66	0.82	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.52	0.16	0.41	0.82	ug/kg	J	J	10A
PERFLUOROHEXANE SULFONATE	108427-53-8	0.95	0.20	0.41	0.82	ug/kg		J	10A
PERFLUOROHEXANOIC ACID	307-24-4	0.57	0.11	0.41	0.82	ug/kg	J	J	10A
PERFLUORONONANOIC ACID	375-95-1	< 0.41	0.18	0.41	0.82	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.41	0.11	0.41	0.82	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	27	0.21	0.66	0.82	ug/kg		J	10A
PERFLUOROOCTANOIC ACID	335-67-1	<0.66	0.21	0.66	0.82	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	0.30	0.21	0.66	0.82	ug/kg	J	J	10A
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.66	0.25	0.66	0.82	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.66	0.27	0.66	0.82	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.66	0.28	0.66	0.82	ug/kg	U	U	

Sample Name ELSWH03-002-	-GW-017	1	Matrix T	ype: W	R	esult Typ	e: TRG		
Lab Sample Name: GRF780	Sampl	e Date/Time	: 2018-	05-10	14:21		Validati	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	0.042	0.0066	0.015	0.020	ug/L			
3:2 FLUOROTELOMER SULFONATE	39108-34-4	0.024	0.0066	0.015	0.020	ug/L			
PERFLUOROBUTANE SULFONATE	29420-43-3	0.059	0.0054	0.015	0.020	ug/L			
PERFLUOROBUTANOIC ACID	375-22-4	0.068	0.0055	0.015	0.020	ug/L			
PERFLUORODECANE SULFONATE	335-77-3	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.015	0.0061	0.015	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.010	0.0050	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.12	0.0074	0.015	0.020	ug/L			
PERFLUOROHEXANE SULFONATE	108427-53-8	1.2	0.056	0.15	0.20	ug/L			
PERFLUOROHEXANOIC ACID	307-24-4	0.27	0.0035	0.010	0.020	ug/L			
PERFLUORONONANOIC ACID	375-95-1	0.016	0.0087	0.018	0.020	ug/L	J	J	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.010	0.0034	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	1.4	0.060	0.15	0.20	ug/L			
PERFLUOROOCTANOIC ACID	335-67-1	0.12	0.0033	0.010	0.020	ug/L			
PERFLUOROPENTANOIC ACID	2706-90-3	0.19	0.0075	0.018	0.020	ug/L			
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.010	0.0025	0.010	0.020	ug/L	U	U	

Analysis Method:	EPA 537 m								
Sample Name ELSWH03-002	2-SO-011		Matrix '	Type: S	R	esult Typ	e: TRG		
Lab Sample Name: GRF766	Sample	Date/Time	e: 2018	8-05-06	13:50		Validatio	on Level: St	age 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	< 0.80	0.26	0.80	1.0	ug/kg	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.80	0.33	0.80	1.0	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.50	0.17	0.50	1.0	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	<0.50	0.23	0.50	1.0	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.80	0.39	0.80	1.0	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.80	0.28	0.80	1.0	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.80	0.28	0.80	1.0	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.50	0.19	0.50	1.0	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	1.4	0.24	0.50	1.0	ug/kg		J	17
PERFLUOROHEXANOIC ACID	307-24-4	0.49	0.14	0.50	1.0	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	< 0.50	0.22	0.50	1.0	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.50	0.14	0.50	1.0	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	< 0.80	0.26	0.80	1.0	ug/kg	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	< 0.80	0.25	0.80	1.0	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	< 0.80	0.25	0.80	1.0	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.80	0.31	0.80	1.0	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.80	0.33	0.80	1.0	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.80	0.34	0.80	1.0	ug/kg	U	U	

M2027.0003

Thursday, July 12, 2018

Sample Name ELSWH03-002-	SO-911	N	Aatrix 7	Г уре: S	R	esult Typ	e: TRG		
Lab Sample Name: GRF767	Sampl	e Date/Time:	2018-	-05-06	13:50		Validatio	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	< 0.78	0.25	0.78	0.98	ug/kg	U	U	
:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.78	0.32	0.78	0.98	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.49	0.17	0.49	0.98	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	<0.49	0.23	0.49	0.98	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.78	0.38	0.78	0.98	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.78	0.27	0.78	0.98	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.78	0.27	0.78	0.98	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.58	0.19	0.49	0.98	ug/kg	J	J	
PERFLUOROHEXANE SULFONATE	108427-53-8	2.3	0.24	0.49	0.98	ug/kg		J	17
PERFLUOROHEXANOIC ACID	307-24-4	0.57	0.14	0.49	0.98	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	<0.49	0.22	0.49	0.98	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.49	0.14	0.49	0.98	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	0.47	0.25	0.78	0.98	ug/kg	J	J	
PERFLUOROOCTANOIC ACID	335-67-1	<0.78	0.25	0.78	0.98	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	0.38	0.25	0.78	0.98	ug/kg	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.78	0.30	0.78	0.98	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.78	0.32	0.78	0.98	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.78	0.33	0.78	0.98	ug/kg	U	U	

Analysis Method:	EPA 537 m								
Sample Name ELSWH03-003	3-GW-016]	Matrix T	ype: W	R	esult Typ	e: TRG		
Lab Sample Name: GRF779	Sample I	Date/Time	: 2018-	05-10	13:21		Validatio	on Level: St	age 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	0.047	0.0066	0.015	0.020	ug/L			
8:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	0.086	0.0054	0.015	0.020	ug/L			
PERFLUOROBUTANOIC ACID	375-22-4	0.039	0.0055	0.015	0.020	ug/L			
PERFLUORODECANE SULFONATE	335-77-3	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.015	0.0061	0.015	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.010	0.0050	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.081	0.0074	0.015	0.020	ug/L			
PERFLUOROHEXANE SULFONATE	108427-53-8	1.3	0.056	0.15	0.20	ug/L			
PERFLUOROHEXANOIC ACID	307-24-4	0.31	0.0035	0.010	0.020	ug/L			
PERFLUORONONANOIC ACID	375-95-1	0.012	0.0087	0.018	0.020	ug/L	J	J	
PERFLUOROOCTANE SULFONAMIDE	E 754-91-6	< 0.010	0.0034	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	1.3	0.060	0.15	0.20	ug/L			
PERFLUOROOCTANOIC ACID	335-67-1	0.10	0.0033	0.010	0.020	ug/L			
PERFLUOROPENTANOIC ACID	2706-90-3	0.17	0.0075	0.018	0.020	ug/L			
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.010	0.0025	0.010	0.020	ug/L	U	U	

Sample Name ELSWH03-003-	SO-011	N	Aatrix T	Type: S	R	esult Typ	e: TRG		
Lab Sample Name: GRF768	Sampl	e Date/Time:	2018-	05-06	15:03		Validatio	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	< 0.74	0.24	0.74	0.93	ug/kg	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.74	0.31	0.74	0.93	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.47	0.16	0.47	0.93	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.47	0.21	0.47	0.93	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.74	0.36	0.74	0.93	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.74	0.26	0.74	0.93	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.74	0.26	0.74	0.93	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.47	0.18	0.47	0.93	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	0.84	0.22	0.47	0.93	ug/kg	J	J	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.47	0.13	0.47	0.93	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	< 0.47	0.20	0.47	0.93	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.47	0.13	0.47	0.93	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	8.5	0.24	0.74	0.93	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	<0.74	0.23	0.74	0.93	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	<0.74	0.23	0.74	0.93	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.74	0.29	0.74	0.93	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.74	0.31	0.74	0.93	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.74	0.32	0.74	0.93	ug/kg	U	U	

Sample Name ELSWH03-004-	SO-011	Ι	Matrix [Гуре: S	R	esult Typ	e: TRG		
Lab Sample Name: GRF771	Sampl	e Date/Time:	2018	-05-07	16:05		Validatio	on Level: St	age 4
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	< 0.72	0.23	0.72	0.90	ug/kg	U	U	
:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.72	0.30	0.72	0.90	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.45	0.15	0.45	0.90	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	<0.45	0.21	0.45	0.90	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	< 0.72	0.35	0.72	0.90	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.72	0.25	0.72	0.90	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.72	0.25	0.72	0.90	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.45	0.17	0.45	0.90	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	0.41	0.22	0.45	0.90	ug/kg	J	J	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.45	0.13	0.45	0.90	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	< 0.45	0.20	0.45	0.90	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.45	0.13	0.45	0.90	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	5.6	0.23	0.72	0.90	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	< 0.72	0.23	0.72	0.90	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	< 0.72	0.23	0.72	0.90	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.72	0.28	0.72	0.90	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.72	0.30	0.72	0.90	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.72	0.31	0.72	0.90	ug/kg	U	U	

Analysis Method:	EPA 537 m								
Sample Name ELSWH06-001	I-GW-018	I	Matrix T	ype: W	R	esult Typ	e: TRG		
Lab Sample Name: GRF778	Sample	Date/Time	2018-	05-09	11:33		Validatio	on Level: St	age 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	0.090	0.0066	0.015	0.020	ug/L			
8:2 FLUOROTELOMER SULFONATE	39108-34-4	0.018	0.0066	0.015	0.020	ug/L	J	J	
PERFLUOROBUTANE SULFONATE	29420-43-3	0.022	0.0054	0.015	0.020	ug/L			
PERFLUOROBUTANOIC ACID	375-22-4	0.21	0.0055	0.015	0.020	ug/L			
PERFLUORODECANE SULFONATE	335-77-3	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.015	0.0061	0.015	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.010	0.0050	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.70	0.0074	0.015	0.020	ug/L			
PERFLUOROHEXANE SULFONATE	108427-53-8	0.33	0.0056	0.015	0.020	ug/L			
PERFLUOROHEXANOIC ACID	307-24-4	0.46	0.0035	0.010	0.020	ug/L			
PERFLUORONONANOIC ACID	375-95-1	0.030	0.0087	0.018	0.020	ug/L			
PERFLUOROOCTANE SULFONAMIDE	E 754-91-6	< 0.010	0.0034	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	0.40	0.0060	0.015	0.020	ug/L			
PERFLUOROOCTANOIC ACID	335-67-1	0.19	0.0033	0.010	0.020	ug/L			
PERFLUOROPENTANOIC ACID	2706-90-3	0.71	0.0075	0.018	0.020	ug/L			
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.010	0.0025	0.010	0.020	ug/L	U	U	

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Sample Name ELSWH06-001	-SO-012		Matrix T	ype: S	R	esult Typ	e: TRG		
Lab Sample Name: GRF765	Sampl	e Date/Time	2018-	05-06	10:40		Validatio	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.68	0.22	0.68	0.85	ug/kg	U	U	
:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.68	0.28	0.68	0.85	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.43	0.14	0.43	0.85	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.43	0.20	0.43	0.85	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.68	0.33	0.68	0.85	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.68	0.24	0.68	0.85	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.68	0.24	0.68	0.85	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.43	0.16	0.43	0.85	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.43	0.20	0.43	0.85	ug/kg	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.43	0.12	0.43	0.85	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	< 0.43	0.19	0.43	0.85	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.43	0.12	0.43	0.85	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	0.77	0.22	0.68	0.85	ug/kg	J	J	
PERFLUOROOCTANOIC ACID	335-67-1	<0.68	0.21	0.68	0.85	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	< 0.68	0.21	0.68	0.85	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.68	0.26	0.68	0.85	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.68	0.28	0.68	0.85	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.68	0.29	0.68	0.85	ug/kg	U	U	

Analysis Method:	EPA 537 m								
Sample Name ELSWH06-001	-SS-001		Matrix '	Type: S	R	esult Typ	e: TRG		
Lab Sample Name: GRF764	Sample	Date/Time	2018	8-05-06	10:13		Validatio	on Level: St	age 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	0.31	0.23	0.72	0.90	ug/kg	J	J	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.72	0.30	0.72	0.90	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.45	0.15	0.45	0.90	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	0.99	0.21	0.45	0.90	ug/kg			
PERFLUORODECANE SULFONATE	335-77-3	<0.72	0.35	0.72	0.90	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	0.50	0.25	0.72	0.90	ug/kg	J	J	
PERFLUORODODECANOIC ACID	307-55-1	<0.72	0.25	0.72	0.90	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.52	0.17	0.45	0.90	ug/kg	J	J	
PERFLUOROHEXANE SULFONATE	108427-53-8	0.65	0.22	0.45	0.90	ug/kg	J	J	
PERFLUOROHEXANOIC ACID	307-24-4	0.40	0.13	0.45	0.90	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	0.93	0.20	0.45	0.90	ug/kg			
PERFLUOROOCTANE SULFONAMIDE	54-91-6	< 0.45	0.13	0.45	0.90	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	61	2.3	7.2	9.0	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	0.79	0.23	0.72	0.90	ug/kg	J	J	
PERFLUOROPENTANOIC ACID	2706-90-3	0.82	0.23	0.72	0.90	ug/kg	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.72	0.28	0.72	0.90	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.72	0.30	0.72	0.90	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.72	0.31	0.72	0.90	ug/kg	U	U	

Analysis Method:	EPA 537 m								
Sample Name ELSWH06-002	2-GW-018	Ν	Aatrix T	ype: W	R	esult Typ	e: TRG		
Lab Sample Name: GRF776	Sample D	ate/Time:	2018-	05-09	10:35		Validatio	on Level: St	age 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	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.015	0.0066	0.015	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	0.016	0.0054	0.015	0.020	ug/L	J	J	
PERFLUOROBUTANOIC ACID	375-22-4	<0.015	0.0055	0.015	0.020	ug/L	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.015	0.0060	0.015	0.020	ug/L	U	UJ	08B
PERFLUORODECANOIC ACID	335-76-2	<0.015	0.0061	0.015	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.010	0.0050	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.015	0.0074	0.015	0.020	ug/L	J	J	
PERFLUOROHEXANE SULFONATE	108427-53-8	0.015	0.0056	0.015	0.020	ug/L	J	J	
PERFLUOROHEXANOIC ACID	307-24-4	0.042	0.0035	0.010	0.020	ug/L			
PERFLUORONONANOIC ACID	375-95-1	<0.018	0.0087	0.018	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	2 754-91-6	< 0.010	0.0034	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	< 0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	0.060	0.0075	0.018	0.020	ug/L			
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.010	0.0025	0.010	0.020	ug/L	U	U	

Analysis Method:	EPA 537 m								
Sample Name ELSWH06-002	2-GW-918	Ι	Matrix T	ype: W	R	esult Typ	e: TRG		
Lab Sample Name: GRF777	Sample D	ate/Time:	2018-	05-09	10:35		Validatio	on Level: St	age 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	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.015	0.0066	0.015	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	0.015	0.0054	0.015	0.020	ug/L	J	J	
PERFLUOROBUTANOIC ACID	375-22-4	<0.015	0.0055	0.015	0.020	ug/L	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.015	0.0061	0.015	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.010	0.0050	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.014	0.0074	0.015	0.020	ug/L	J	J	
PERFLUOROHEXANE SULFONATE	108427-53-8	0.017	0.0056	0.015	0.020	ug/L	J	J	
PERFLUOROHEXANOIC ACID	307-24-4	0.039	0.0035	0.010	0.020	ug/L			
PERFLUORONONANOIC ACID	375-95-1	<0.018	0.0087	0.018	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	E 754-91-6	< 0.010	0.0034	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	< 0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	0.060	0.0075	0.018	0.020	ug/L			
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.010	0.0025	0.010	0.020	ug/L	U	U	

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Sample Name ELSWH06-003-	-GW-055	N	Aatrix T	ype: W	R	esult Typ	e: TRG		
Lab Sample Name: GRF775	Sampl	e Date/Time:	2018-	05-07	16:21		Validatio	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	0.0092	0.0066	0.015	0.020	ug/L	J	J	
3:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.015	0.0054	0.015	0.020	ug/L	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.015	0.0055	0.015	0.020	ug/L	U	UJ	10A
PERFLUORODECANE SULFONATE	335-77-3	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.015	0.0061	0.015	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.010	0.0050	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.015	0.0074	0.015	0.020	ug/L	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.015	0.0056	0.015	0.020	ug/L	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.010	0.0035	0.010	0.020	ug/L	U	U	
PERFLUORONONANOIC ACID	375-95-1	< 0.018	0.0087	0.018	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.010	0.0034	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	< 0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	< 0.018	0.0075	0.018	0.020	ug/L	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.010	0.0025	0.010	0.020	ug/L	U	U	

Sample Name ELSWH06-004-	-SO-035	Ν	latrix T	ype: S	R	esult Typ	e: TRG		
Lab Sample Name: GRF762	Sampl	e Date/Time:	2018-	05-06	09:10		Validatio	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	< 0.80	0.26	0.80	1.0	ug/kg	U	U	
3:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.80	0.33	0.80	1.0	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.50	0.17	0.50	1.0	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	<0.50	0.23	0.50	1.0	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.80	0.39	0.80	1.0	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.80	0.28	0.80	1.0	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.80	0.28	0.80	1.0	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.50	0.19	0.50	1.0	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.50	0.24	0.50	1.0	ug/kg	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.50	0.14	0.50	1.0	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	< 0.50	0.22	0.50	1.0	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.50	0.14	0.50	1.0	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	< 0.80	0.26	0.80	1.0	ug/kg	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	< 0.80	0.25	0.80	1.0	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	< 0.80	0.25	0.80	1.0	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.80	0.31	0.80	1.0	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.80	0.33	0.80	1.0	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.80	0.34	0.80	1.0	ug/kg	U	U	

Sample Name ELSWH06-004-	-SS-001	N	Matrix [Гуре: S	R	esult Typ	pe: TRG			
Lab Sample Name: GRF760	Sampl	e Date/Time:	2018	-05-06	07:45		Validatio	on Level: Sta	age 2B	
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code	
5:2 FLUOROTELOMER SULFONATE	27619-97-2	< 0.73	0.24	0.73	0.91	ug/kg	U	U		
3:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.73	0.30	0.73	0.91	ug/kg	U	U		
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.46	0.15	0.46	0.91	ug/kg	U	U		
PERFLUOROBUTANOIC ACID	375-22-4	0.62	0.21	0.46	0.91	ug/kg	J	J		
PERFLUORODECANE SULFONATE	335-77-3	< 0.73	0.35	0.73	0.91	ug/kg	U	U		
PERFLUORODECANOIC ACID	335-76-2	< 0.73	0.25	0.73	0.91	ug/kg	U	U		
PERFLUORODODECANOIC ACID	307-55-1	< 0.73	0.25	0.73	0.91	ug/kg	U	U		
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.46	0.17	0.46	0.91	ug/kg	U	U		
PERFLUOROHEXANE SULFONATE	108427-53-8	0.59	0.22	0.46	0.91	ug/kg	J	J		
PERFLUOROHEXANOIC ACID	307-24-4	< 0.46	0.13	0.46	0.91	ug/kg	U	U		
PERFLUORONONANOIC ACID	375-95-1	2.3	0.20	0.46	0.91	ug/kg				
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.46	0.13	0.46	0.91	ug/kg	U	U		
PERFLUOROOCTANE SULFONATE	1763-23-1	29	0.24	0.73	0.91	ug/kg		J	08A	
PERFLUOROOCTANOIC ACID	335-67-1	1.2	0.23	0.73	0.91	ug/kg		J	17	
PERFLUOROPENTANOIC ACID	2706-90-3	0.80	0.23	0.73	0.91	ug/kg	J	J		
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.73	0.28	0.73	0.91	ug/kg	U	U		
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.73	0.30	0.73	0.91	ug/kg	U	U		
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.73	0.31	0.73	0.91	ug/kg	U	U		

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Analysis Method:	EPA 537 m								
Sample Name ELSWH06-004	1-SS-901	-	Matrix '	Type: S	R	Result Typ	e: TRG		
Lab Sample Name: GRF761	Sample	Date/Time	2018	-05-06	07:45		Validatio	on Level: St	age 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	0.25	0.78	0.97	ug/kg	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.78	0.32	0.78	0.97	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.49	0.16	0.49	0.97	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	0.79	0.22	0.49	0.97	ug/kg	J	J	
PERFLUORODECANE SULFONATE	335-77-3	<0.78	0.38	0.78	0.97	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.78	0.27	0.78	0.97	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.78	0.27	0.78	0.97	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.58	0.18	0.49	0.97	ug/kg	J	J	
PERFLUOROHEXANE SULFONATE	108427-53-8	0.71	0.23	0.49	0.97	ug/kg	J	J	
PERFLUOROHEXANOIC ACID	307-24-4	0.45	0.14	0.49	0.97	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	2.6	0.21	0.49	0.97	ug/kg			
PERFLUOROOCTANE SULFONAMIDE	E 754-91-6	<0.49	0.14	0.49	0.97	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	22	0.25	0.78	0.97	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	1.8	0.24	0.78	0.97	ug/kg		J	17
PERFLUOROPENTANOIC ACID	2706-90-3	1.3	0.24	0.78	0.97	ug/kg			
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.78	0.30	0.78	0.97	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.78	0.32	0.78	0.97	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<0.78	0.33	0.78	0.97	ug/kg	U	U	

Sample Name ELSWH07-001	-SO-029	-	Matrix T	ype: S	R	esult Typ	e: TRG		
Lab Sample Name: GRF773	Sampl	e Date/Time	: 2018-	05 - 08	12:56		Validatio	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	< 0.80	0.26	0.80	1.0	ug/kg	U	U	
3:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.80	0.33	0.80	1.0	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.50	0.17	0.50	1.0	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.50	0.23	0.50	1.0	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	< 0.80	0.39	0.80	1.0	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.80	0.28	0.80	1.0	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.80	0.28	0.80	1.0	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.50	0.19	0.50	1.0	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.50	0.24	0.50	1.0	ug/kg	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.50	0.14	0.50	1.0	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	< 0.50	0.22	0.50	1.0	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.50	0.14	0.50	1.0	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	< 0.80	0.26	0.80	1.0	ug/kg	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	< 0.80	0.25	0.80	1.0	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	< 0.80	0.25	0.80	1.0	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.80	0.31	0.80	1.0	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.80	0.33	0.80	1.0	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.80	0.34	0.80	1.0	ug/kg	U	U	

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Sample Name ELSWH07-001	-SS-001	N	Aatrix 7	Type: S	R	esult Typ	e: TRG		
Lab Sample Name: GRF772	Sampl	e Date/Time:	2018-	05-08	08:50		Validatio	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.88	0.29	0.88	1.1	ug/kg	U	U	
3:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.88	0.36	0.88	1.1	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.55	0.19	0.55	1.1	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	0.61	0.25	0.55	1.1	ug/kg	J	J	
PERFLUORODECANE SULFONATE	335-77-3	<0.88	0.43	0.88	1.1	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.88	0.31	0.88	1.1	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.88	0.31	0.88	1.1	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.73	0.21	0.55	1.1	ug/kg	J	J	
PERFLUOROHEXANE SULFONATE	108427-53-8	1.2	0.26	0.55	1.1	ug/kg			
PERFLUOROHEXANOIC ACID	307-24-4	0.61	0.15	0.55	1.1	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	0.66	0.24	0.55	1.1	ug/kg	J	J	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.55	0.15	0.55	1.1	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	18	0.29	0.88	1.1	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	2.6	0.28	0.88	1.1	ug/kg			
PERFLUOROPENTANOIC ACID	2706-90-3	0.80	0.28	0.88	1.1	ug/kg	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.88	0.34	0.88	1.1	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.88	0.36	0.88	1.1	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.88	0.37	0.88	1.1	ug/kg	U	U	

Sample Name ELSWH07-002-	-SS-001	Ι	Matrix 7	Г уре: S	R	esult Typ	e: TRG		
Lab Sample Name: GRF759	Sampl	e Date/Time:	2018	-05-09	14:10		Validatio	on Level: St	age 4
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	< 0.71	0.23	0.71	0.89	ug/kg	U	U	
3:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.71	0.29	0.71	0.89	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.45	0.15	0.45	0.89	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.45	0.20	0.45	0.89	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	< 0.71	0.35	0.71	0.89	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.71	0.25	0.71	0.89	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.71	0.25	0.71	0.89	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.45	0.17	0.45	0.89	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.45	0.21	0.45	0.89	ug/kg	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.45	0.12	0.45	0.89	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	0.41	0.20	0.45	0.89	ug/kg	J	J	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.45	0.12	0.45	0.89	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	18	0.23	0.71	0.89	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	0.36	0.22	0.71	0.89	ug/kg	J	J	
PERFLUOROPENTANOIC ACID	2706-90-3	< 0.71	0.22	0.71	0.89	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.71	0.28	0.71	0.89	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.71	0.29	0.71	0.89	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.71	0.30	0.71	0.89	ug/kg	U	U	

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Sample Name ELSWH07-004-	SO-013	N	latrix T	Type: S	R	esult Typ	e: TRG		
Lab Sample Name: GRF747	Sampl	e Date/Time:	2018-	05-08	14:00		Validatio	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	< 0.65	0.21	0.65	0.81	ug/kg	U	U	
:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.65	0.27	0.65	0.81	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.41	0.14	0.41	0.81	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.41	0.19	0.41	0.81	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.65	0.32	0.65	0.81	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.65	0.23	0.65	0.81	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.65	0.23	0.65	0.81	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.41	0.15	0.41	0.81	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.41	0.19	0.41	0.81	ug/kg	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.41	0.11	0.41	0.81	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	< 0.41	0.18	0.41	0.81	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.41	0.11	0.41	0.81	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	<0.65	0.21	0.65	0.81	ug/kg	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	<0.65	0.20	0.65	0.81	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	<0.65	0.20	0.65	0.81	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.65	0.25	0.65	0.81	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.65	0.27	0.65	0.81	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.65	0.28	0.65	0.81	ug/kg	U	U	

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Sample Name ELSWH07-004-	-SS-001	Ν	Aatrix 7	Г уре: S	R	esult Typ	e: TRG		
Lab Sample Name: GRF774	Sampl	e Date/Time:	2018-	-05-08	13:20		Validatio	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	< 0.80	0.26	0.80	1.0	ug/kg	U	U	
:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.80	0.33	0.80	1.0	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.50	0.17	0.50	1.0	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.50	0.23	0.50	1.0	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	< 0.80	0.39	0.80	1.0	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.80	0.28	0.80	1.0	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.80	0.28	0.80	1.0	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.50	0.19	0.50	1.0	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.50	0.24	0.50	1.0	ug/kg	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.50	0.14	0.50	1.0	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	< 0.50	0.22	0.50	1.0	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.50	0.14	0.50	1.0	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	5.9	0.26	0.80	1.0	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	0.60	0.25	0.80	1.0	ug/kg	J	J	
PERFLUOROPENTANOIC ACID	2706-90-3	< 0.80	0.25	0.80	1.0	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.80	0.31	0.80	1.0	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.80	0.33	0.80	1.0	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.80	0.34	0.80	1.0	ug/kg	U	U	

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Sample Name ELSWH11-001	-SO-012		Matrix 7	Type: S	R	esult Typ	e: TRG		
Lab Sample Name: GRF755	Sample	e Date/Time	2018-	05-09	10:48		Validatio	on Level: St	age 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	< 0.65	0.21	0.65	0.81	ug/kg	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.65	0.27	0.65	0.81	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.41	0.14	0.41	0.81	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.41	0.19	0.41	0.81	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.65	0.32	0.65	0.81	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.65	0.23	0.65	0.81	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.65	0.23	0.65	0.81	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.41	0.15	0.41	0.81	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.41	0.19	0.41	0.81	ug/kg	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.41	0.11	0.41	0.81	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	< 0.41	0.18	0.41	0.81	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.41	0.11	0.41	0.81	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	0.51	0.21	0.65	0.81	ug/kg	J	J	
PERFLUOROOCTANOIC ACID	335-67-1	<0.65	0.20	0.65	0.81	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	< 0.65	0.20	0.65	0.81	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.65	0.25	0.65	0.81	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.65	0.27	0.65	0.81	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.65	0.28	0.65	0.81	ug/kg	U	U	

Sample Name ELSWH11-001	-SS-001		Matrix T	Type: S	R	esult Typ	e: TRG		
Lab Sample Name: GRF754	Sample	e Date/Time	2018-	05-09	10:00		Validatio	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	< 0.68	0.22	0.68	0.85	ug/kg	U	U	
:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.68	0.28	0.68	0.85	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.43	0.14	0.43	0.85	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	<0.43	0.20	0.43	0.85	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.68	0.33	0.68	0.85	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.68	0.24	0.68	0.85	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.68	0.24	0.68	0.85	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.43	0.16	0.43	0.85	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	0.31	0.20	0.43	0.85	ug/kg	J	J	
PERFLUOROHEXANOIC ACID	307-24-4	0.54	0.12	0.43	0.85	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	< 0.43	0.19	0.43	0.85	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.43	0.12	0.43	0.85	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	5.9	0.22	0.68	0.85	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	1.1	0.21	0.68	0.85	ug/kg			
PERFLUOROPENTANOIC ACID	2706-90-3	0.37	0.21	0.68	0.85	ug/kg	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.68	0.26	0.68	0.85	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.68	0.28	0.68	0.85	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.68	0.29	0.68	0.85	ug/kg	U	U	

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Sample Name ELSWH11-002-	-SO-010		Matrix 7	Г уре: S	R	esult Typ	e: TRG		
Lab Sample Name: GRF751	Sample	e Date/Time	: 2018-	05-09	09:35		Validatio	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	< 0.79	0.26	0.79	0.99	ug/kg	U	U	
:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.79	0.33	0.79	0.99	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.50	0.17	0.50	0.99	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.50	0.23	0.50	0.99	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.79	0.39	0.79	0.99	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.79	0.28	0.79	0.99	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.79	0.28	0.79	0.99	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.50	0.19	0.50	0.99	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.50	0.24	0.50	0.99	ug/kg	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.50	0.14	0.50	0.99	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	< 0.50	0.22	0.50	0.99	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.50	0.14	0.50	0.99	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	<0.79	0.26	0.79	0.99	ug/kg	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	<0.79	0.25	0.79	0.99	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	<0.79	0.25	0.79	0.99	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.79	0.31	0.79	0.99	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.79	0.33	0.79	0.99	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.79	0.34	0.79	0.99	ug/kg	U	U	

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Sample Name ELSWH11-002-	-SS-001		Matrix T	Type: S	R	esult Typ	e: TRG		
Lab Sample Name: GRF750	Sample	e Date/Time	2018-	05-09	08:42		Validatio	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.66	0.22	0.66	0.83	ug/kg	U	U	
:2 FLUOROTELOMER SULFONATE	39108-34-4	<0.66	0.27	0.66	0.83	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	<0.42	0.14	0.42	0.83	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.42	0.19	0.42	0.83	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.66	0.32	0.66	0.83	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.66	0.23	0.66	0.83	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	<0.66	0.23	0.66	0.83	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	<0.42	0.16	0.42	0.83	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	0.47	0.20	0.42	0.83	ug/kg	J	J	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.42	0.12	0.42	0.83	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	< 0.42	0.18	0.42	0.83	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	<0.42	0.12	0.42	0.83	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	6.7	0.22	0.66	0.83	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	0.34	0.21	0.66	0.83	ug/kg	J	J	
PERFLUOROPENTANOIC ACID	2706-90-3	<0.66	0.21	0.66	0.83	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.66	0.26	0.66	0.83	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.66	0.27	0.66	0.83	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.66	0.28	0.66	0.83	ug/kg	U	U	

Sample Name ELSWH11-004	-SO-012		Matrix [Гуре: S	R	esult Typ	e: TRG		
Lab Sample Name: GRF757	Sampl	e Date/Time	2018	-05-09	11:25		Validatio	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.88	0.29	0.88	1.1	ug/kg	U	U	
3:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.88	0.36	0.88	1.1	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.55	0.19	0.55	1.1	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.55	0.25	0.55	1.1	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	<0.88	0.43	0.88	1.1	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	<0.88	0.31	0.88	1.1	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.88	0.31	0.88	1.1	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.55	0.21	0.55	1.1	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.55	0.26	0.55	1.1	ug/kg	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.55	0.15	0.55	1.1	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	< 0.55	0.24	0.55	1.1	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.55	0.15	0.55	1.1	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	< 0.88	0.29	0.88	1.1	ug/kg	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	< 0.88	0.28	0.88	1.1	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	< 0.88	0.28	0.88	1.1	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.88	0.34	0.88	1.1	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.88	0.36	0.88	1.1	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.88	0.37	0.88	1.1	ug/kg	U	U	

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Sample Name ELSWH11-004	-SS-001	-	Matrix 7	Г уре: S	R	esult Typ	e: TRG		
Lab Sample Name: GRF756	Sampl	e Date/Time	: 2018-	05-09	11:11		Validatio	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.77	0.25	0.77	0.96	ug/kg	U	U	
3:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.77	0.32	0.77	0.96	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.48	0.16	0.48	0.96	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.48	0.22	0.48	0.96	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	< 0.77	0.37	0.77	0.96	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.77	0.27	0.77	0.96	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.77	0.27	0.77	0.96	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.48	0.18	0.48	0.96	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	0.40	0.23	0.48	0.96	ug/kg	J	J	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.48	0.13	0.48	0.96	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	0.44	0.21	0.48	0.96	ug/kg	J	J	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.48	0.13	0.48	0.96	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	15	0.25	0.77	0.96	ug/kg			
PERFLUOROOCTANOIC ACID	335-67-1	0.59	0.24	0.77	0.96	ug/kg	J	J	
PERFLUOROPENTANOIC ACID	2706-90-3	< 0.77	0.24	0.77	0.96	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.77	0.30	0.77	0.96	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.77	0.32	0.77	0.96	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.77	0.33	0.77	0.96	ug/kg	U	U	

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Sample Name ELSWH11-005-	-SO-013		Matrix T	Г уре: S	R	esult Typ	e: TRG		
Lab Sample Name: GRF758	Sampl	e Date/Time	2018-	05-09	12:45		Validati	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	<0.77	0.25	0.77	0.96	ug/kg	U	U	
3:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.77	0.32	0.77	0.96	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.48	0.16	0.48	0.96	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.48	0.22	0.48	0.96	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	< 0.77	0.37	0.77	0.96	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.77	0.27	0.77	0.96	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.77	0.27	0.77	0.96	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.48	0.18	0.48	0.96	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.48	0.23	0.48	0.96	ug/kg	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.48	0.13	0.48	0.96	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	< 0.48	0.21	0.48	0.96	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.48	0.13	0.48	0.96	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	0.31	0.25	0.77	0.96	ug/kg	J	J	
PERFLUOROOCTANOIC ACID	335-67-1	<0.77	0.24	0.77	0.96	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	< 0.77	0.24	0.77	0.96	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.77	0.30	0.77	0.96	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.77	0.32	0.77	0.96	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.77	0.33	0.77	0.96	ug/kg	U	U	

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Sample Name ELSWH11H-00	2-SO-910		Matrix 1	Гуре: S	R	esult Typ	e: TRG		
Lab Sample Name: GRF752	Sampl	e Date/Time	e: 2018	-05-09	09:35		Validatio	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	< 0.80	0.26	0.80	1.0	ug/kg	U	U	
3:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.80	0.33	0.80	1.0	ug/kg	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.50	0.17	0.50	1.0	ug/kg	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.50	0.23	0.50	1.0	ug/kg	U	U	
PERFLUORODECANE SULFONATE	335-77-3	< 0.80	0.39	0.80	1.0	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.80	0.28	0.80	1.0	ug/kg	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.80	0.28	0.80	1.0	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.50	0.19	0.50	1.0	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.50	0.24	0.50	1.0	ug/kg	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.50	0.14	0.50	1.0	ug/kg	U	U	
PERFLUORONONANOIC ACID	375-95-1	< 0.50	0.22	0.50	1.0	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.50	0.14	0.50	1.0	ug/kg	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	< 0.80	0.26	0.80	1.0	ug/kg	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	< 0.80	0.25	0.80	1.0	ug/kg	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	< 0.80	0.25	0.80	1.0	ug/kg	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.80	0.31	0.80	1.0	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.80	0.33	0.80	1.0	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.80	0.34	0.80	1.0	ug/kg	U	U	

Sample Name ELSWH-RS-014	4]	Matrix T	ype: W	R	esult Typ	e: TRG		
Lab Sample Name: GRF763	Sampl	e Date/Time	: 2018-	05-06	09:05		Validatio	on Level: St	age 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	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.015	0.0054	0.015	0.020	ug/L	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.015	0.0055	0.015	0.020	ug/L	U	U	
PERFLUORODECANE SULFONATE	335-77-3	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.015	0.0061	0.015	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.010	0.0050	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.015	0.0074	0.015	0.020	ug/L	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.015	0.0056	0.015	0.020	ug/L	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.010	0.0035	0.010	0.020	ug/L	U	U	
PERFLUORONONANOIC ACID	375-95-1	< 0.018	0.0087	0.018	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.010	0.0034	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	< 0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	< 0.018	0.0075	0.018	0.020	ug/L	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.010	0.0025	0.010	0.020	ug/L	U	U	

Sample Name ELSWH-RS-01:	5		Matrix T	ype: W	R	esult Typ	e: TRG		
Lab Sample Name: GRF769	Sample	e Date/Time	2018-	05-07	13:01		Validati	on Level: St	age 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	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.015	0.0054	0.015	0.020	ug/L	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.015	0.0055	0.015	0.020	ug/L	U	U	
PERFLUORODECANE SULFONATE	335-77-3	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.015	0.0061	0.015	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.010	0.0050	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.015	0.0074	0.015	0.020	ug/L	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.015	0.0056	0.015	0.020	ug/L	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.010	0.0035	0.010	0.020	ug/L	U	U	
PERFLUORONONANOIC ACID	375-95-1	< 0.018	0.0087	0.018	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.010	0.0034	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	< 0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	< 0.018	0.0075	0.018	0.020	ug/L	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.010	0.0025	0.010	0.020	ug/L	U	U	

Sample Name ELSWH-RS-010	6	-	Matrix T	ype: W	R	esult Typ	e: TRG		
Lab Sample Name: GRF749	Sampl	e Date/Time	: 2018-	05-08	13:55		Validati	on Level: St	age 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	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.015	0.0054	0.015	0.020	ug/L	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.015	0.0055	0.015	0.020	ug/L	U	U	
PERFLUORODECANE SULFONATE	335-77-3	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.015	0.0061	0.015	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.010	0.0050	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.015	0.0074	0.015	0.020	ug/L	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.015	0.0056	0.015	0.020	ug/L	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.010	0.0035	0.010	0.020	ug/L	U	U	
PERFLUORONONANOIC ACID	375-95-1	< 0.018	0.0087	0.018	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.010	0.0034	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	< 0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	< 0.018	0.0075	0.018	0.020	ug/L	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.010	0.0025	0.010	0.020	ug/L	U	U	

Sample Name ELSWH-RS-01	7		Matrix 7	Type: W	R	esult Typ	e: TRG		
Lab Sample Name: GRF753	Sampl	e Date/Time	2018-	05-09	09:30		Validati	on Level: St	age 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	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.015	0.0054	0.015	0.020	ug/L	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.015	0.0055	0.015	0.020	ug/L	U	U	
PERFLUORODECANE SULFONATE	335-77-3	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.015	0.0061	0.015	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.010	0.0050	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.015	0.0074	0.015	0.020	ug/L	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.015	0.0056	0.015	0.020	ug/L	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.010	0.0035	0.010	0.020	ug/L	U	U	
PERFLUORONONANOIC ACID	375-95-1	< 0.018	0.0087	0.018	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.010	0.0034	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	< 0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	< 0.018	0.0075	0.018	0.020	ug/L	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.010	0.0025	0.010	0.020	ug/L	U	U	

Sample Name ELSWH-RS-01	8	-	Matrix T	ype: W	R	kesult Typ	e: TRG		
Lab Sample Name: GRF781	Sampl	e Date/Time	: 2018-	05-10	12:15		Validati	on Level: St	age 2B
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
3:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.015	0.0054	0.015	0.020	ug/L	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.015	0.0055	0.015	0.020	ug/L	U	U	
PERFLUORODECANE SULFONATE	335-77-3	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.015	0.0061	0.015	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.010	0.0050	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.015	0.0074	0.015	0.020	ug/L	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.015	0.0056	0.015	0.020	ug/L	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.010	0.0035	0.010	0.020	ug/L	U	U	
PERFLUORONONANOIC ACID	375-95-1	< 0.018	0.0087	0.018	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.010	0.0034	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	< 0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	< 0.018	0.0075	0.018	0.020	ug/L	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.010	0.0025	0.010	0.020	ug/L	U	U	

Sample Name ELSWH-SB-00	1	-	Matrix T	Type: W	R	esult Typ	e: TRG		
Lab Sample Name: GRF748	Sampl	e Date/Time	: 2018-	05-08	14:15		Validati	on Level: St	age 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	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
8:2 FLUOROTELOMER SULFONATE	39108-34-4	< 0.015	0.0066	0.015	0.020	ug/L	U	U	
PERFLUOROBUTANE SULFONATE	29420-43-3	< 0.015	0.0054	0.015	0.020	ug/L	U	U	
PERFLUOROBUTANOIC ACID	375-22-4	< 0.015	0.0055	0.015	0.020	ug/L	U	U	
PERFLUORODECANE SULFONATE	335-77-3	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	< 0.015	0.0061	0.015	0.020	ug/L	U	U	
PERFLUORODODECANOIC ACID	307-55-1	< 0.010	0.0050	0.010	0.020	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	< 0.015	0.0074	0.015	0.020	ug/L	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	< 0.015	0.0056	0.015	0.020	ug/L	U	U	
PERFLUOROHEXANOIC ACID	307-24-4	< 0.010	0.0035	0.010	0.020	ug/L	U	U	
PERFLUORONONANOIC ACID	375-95-1	< 0.018	0.0087	0.018	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	< 0.010	0.0034	0.010	0.020	ug/L	U	U	
PERFLUOROOCTANE SULFONATE	1763-23-1	< 0.015	0.0060	0.015	0.020	ug/L	U	U	
PERFLUOROOCTANOIC ACID	335-67-1	< 0.010	0.0033	0.010	0.020	ug/L	U	U	
PERFLUOROPENTANOIC ACID	2706-90-3	< 0.018	0.0075	0.018	0.020	ug/L	U	U	
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.010	0.0027	0.010	0.020	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.010	0.0038	0.010	0.020	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.010	0.0025	0.010	0.020	ug/L	U	U	

Validated Sample Result Forms: B8C0381

Sample Name ELSWH01-001-	-GW-015	I	Matrix '	Гуре:	Result Type: TRG				
Lab Sample Name: GTF558	Sampl	e Date/Time	: 2018	-05-20	09:25		Validati	on Level: St	age 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	63	0.66	1.5	2.0	ug/L			
8:2 FLUOROTELOMER SULFONATE	39108-34-4	0.68	0.066	0.15	0.20	ug/L			
PERFLUOROBUTANE SULFONATE	29420-43-3	13	0.54	1.5	2.0	ug/L			
PERFLUOROBUTANOIC ACID	375-22-4	14	0.55	1.5	2.0	ug/L			
PERFLUORODECANE SULFONATE	335-77-3	< 0.15	0.060	0.15	0.20	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	0.12	0.061	0.15	0.20	ug/L	J	J	
PERFLUORODODECANOIC ACID	307-55-1	< 0.10	0.050	0.10	0.20	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	7.1	0.074	0.15	0.20	ug/L			
PERFLUOROHEXANE SULFONATE	108427-53-8	86	0.56	1.5	2.0	ug/L			
PERFLUOROHEXANOIC ACID	307-24-4	99	0.35	1.0	2.0	ug/L		J	17
PERFLUORONONANOIC ACID	375-95-1	0.56	0.087	0.18	0.20	ug/L			
PERFLUOROOCTANE SULFONAMIDE	754-91-6	0.10	0.034	0.10	0.20	ug/L	J	J	
PERFLUOROOCTANE SULFONATE	1763-23-1	41	0.60	1.5	2.0	ug/L			
PERFLUOROOCTANOIC ACID	335-67-1	9.7	0.033	0.10	0.20	ug/L			
PERFLUOROPENTANOIC ACID	2706-90-3	29	0.75	1.8	2.0	ug/L		J	17
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.10	0.027	0.10	0.20	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.10	0.038	0.10	0.20	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.10	0.025	0.10	0.20	ug/L	U	U	
Sample Name ELSWH01-001-	-GW-915	Ν	Aatrix '	Гуре:	R	Result Typ	e: TRG		
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Lab Sample Name: GTF559	Sample	e Date/Time:	Date/Time: 2018-05-		05-20 09:25		Validation Level: Stage 2B		
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	52	0.66	1.5	2.0	ug/L			
3:2 FLUOROTELOMER SULFONATE	39108-34-4	0.77	0.066	0.15	0.20	ug/L			
PERFLUOROBUTANE SULFONATE	29420-43-3	9.9	0.054	0.15	0.20	ug/L			
PERFLUOROBUTANOIC ACID	375-22-4	11	0.55	1.5	2.0	ug/L			
PERFLUORODECANE SULFONATE	335-77-3	<0.15	0.060	0.15	0.20	ug/L	U	U	
PERFLUORODECANOIC ACID	335-76-2	0.12	0.061	0.15	0.20	ug/L	J	J	
PERFLUORODODECANOIC ACID	307-55-1	< 0.10	0.050	0.10	0.20	ug/L	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	5.4	0.074	0.15	0.20	ug/L			
PERFLUOROHEXANE SULFONATE	108427-53-8	73	0.56	1.5	2.0	ug/L			
PERFLUOROHEXANOIC ACID	307-24-4	70	0.35	1.0	2.0	ug/L		J	17
PERFLUORONONANOIC ACID	375-95-1	0.52	0.087	0.18	0.20	ug/L			
PERFLUOROOCTANE SULFONAMIDE	754-91-6	0.096	0.034	0.10	0.20	ug/L	J	J	
PERFLUOROOCTANE SULFONATE	1763-23-1	44	0.60	1.5	2.0	ug/L			
PERFLUOROOCTANOIC ACID	335-67-1	8.3	0.033	0.10	0.20	ug/L			
PERFLUOROPENTANOIC ACID	2706-90-3	21	0.75	1.8	2.0	ug/L		J	17
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.10	0.027	0.10	0.20	ug/L	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.10	0.038	0.10	0.20	ug/L	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.10	0.025	0.10	0.20	ug/L	U	U	

Analysis Method:	EPA 537 m									
Sample Name ELSWH01-001	-SO-013	Γ	Matrix [Г уре: S	R	esult Typ	e: TRG			
Lab Sample Name: GTF550	Sample	Date/Time:	e: 2018-05-17		09:47		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	93	2.2	6.7	8.4	ug/kg				
8:2 FLUOROTELOMER SULFONATE	39108-34-4	8.0	0.28	0.67	0.84	ug/kg				
PERFLUOROBUTANE SULFONATE	29420-43-3	0.71	0.14	0.42	0.84	ug/kg	J	J		
PERFLUOROBUTANOIC ACID	375-22-4	1.3	0.19	0.42	0.84	ug/kg				
PERFLUORODECANE SULFONATE	335-77-3	< 0.67	0.33	0.67	0.84	ug/kg	U	U		
PERFLUORODECANOIC ACID	335-76-2	0.41	0.24	0.67	0.84	ug/kg	J	J		
PERFLUORODODECANOIC ACID	307-55-1	< 0.67	0.24	0.67	0.84	ug/kg	U	U		
PERFLUOROHEPTANOIC ACID	375-85-9	0.80	0.16	0.42	0.84	ug/kg	J	J		
PERFLUOROHEXANE SULFONATE	108427-53-8	4.0	0.20	0.42	0.84	ug/kg				
PERFLUOROHEXANOIC ACID	307-24-4	8.8	0.12	0.42	0.84	ug/kg				
PERFLUORONONANOIC ACID	375-95-1	0.31	0.18	0.42	0.84	ug/kg	J	J		
PERFLUOROOCTANE SULFONAMIDE	754-91-6	0.28	0.12	0.42	0.84	ug/kg	J	J		
PERFLUOROOCTANE SULFONATE	1763-23-1	72	2.2	6.7	8.4	ug/kg				
PERFLUOROOCTANOIC ACID	335-67-1	1.4	0.21	0.67	0.84	ug/kg				
PERFLUOROPENTANOIC ACID	2706-90-3	3.0	0.21	0.67	0.84	ug/kg				
PERFLUOROTETRADECANOIC ACID	376-06-7	< 0.67	0.26	0.67	0.84	ug/kg	U	U		
PERFLUOROTRIDECANOIC ACID	72629-94-8	< 0.67	0.28	0.67	0.84	ug/kg	U	U		
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.67	0.29	0.67	0.84	ug/kg	U	U		

Sample Name ELSWH01-001	-SO-913	Ν	latrix T	ype: S	R	esult Typ	e: TRG		
Lab Sample Name: GTF551	Sample Date/Tim		e: 2018-05-17		09:47		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	100	2.2	6.7	8.4	ug/kg		J	10A
8:2 FLUOROTELOMER SULFONATE	39108-34-4	7.9	0.28	0.67	0.84	ug/kg			
PERFLUOROBUTANE SULFONATE	29420-43-3	0.82	0.14	0.42	0.84	ug/kg	J	J	
PERFLUOROBUTANOIC ACID	375-22-4	1.1	0.19	0.42	0.84	ug/kg			
PERFLUORODECANE SULFONATE	335-77-3	<0.67	0.33	0.67	0.84	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	0.52	0.24	0.67	0.84	ug/kg	J	J	
PERFLUORODODECANOIC ACID	307-55-1	<0.67	0.24	0.67	0.84	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	0.77	0.16	0.42	0.84	ug/kg	J	J	
PERFLUOROHEXANE SULFONATE	108427-53-8	4.4	0.20	0.42	0.84	ug/kg			
PERFLUOROHEXANOIC ACID	307-24-4	7.1	0.12	0.42	0.84	ug/kg			
PERFLUORONONANOIC ACID	375-95-1	<0.42	0.18	0.42	0.84	ug/kg	U	U	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	0.35	0.12	0.42	0.84	ug/kg	J	J	
PERFLUOROOCTANE SULFONATE	1763-23-1	70	2.2	6.7	8.4	ug/kg		J	10A
PERFLUOROOCTANOIC ACID	335-67-1	1.2	0.21	0.67	0.84	ug/kg			
PERFLUOROPENTANOIC ACID	2706-90-3	2.2	0.21	0.67	0.84	ug/kg			
PERFLUOROTETRADECANOIC ACID	376-06-7	<0.67	0.26	0.67	0.84	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<0.67	0.28	0.67	0.84	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	< 0.67	0.29	0.67	0.84	ug/kg	U	U	

Sample Name ELSWH01-001-	-SS-001	N	latrix [Гуре: S	Result Type: TRG				
Lab Sample Name: GTF547	Sample Date/Tim		e: 2018-05-17		08:33		Validation Level: Stage 2B		
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code
5:2 FLUOROTELOMER SULFONATE	27619-97-2	14	2.5	7.8	9.7	ug/kg		J	17
3:2 FLUOROTELOMER SULFONATE	39108-34-4	16	3.2	7.8	9.7	ug/kg		J	17
PERFLUOROBUTANE SULFONATE	29420-43-3	4.9	1.6	4.9	9.7	ug/kg	J	J	
PERFLUOROBUTANOIC ACID	375-22-4	8.2	2.2	4.9	9.7	ug/kg	J	J	
PERFLUORODECANE SULFONATE	335-77-3	<7.8	3.8	7.8	9.7	ug/kg	U	U	
PERFLUORODECANOIC ACID	335-76-2	4.8	2.7	7.8	9.7	ug/kg	J	J	
PERFLUORODODECANOIC ACID	307-55-1	<7.8	2.7	7.8	9.7	ug/kg	U	U	
PERFLUOROHEPTANOIC ACID	375-85-9	<4.9	1.8	4.9	9.7	ug/kg	U	U	
PERFLUOROHEXANE SULFONATE	108427-53-8	18	2.3	4.9	9.7	ug/kg		J	17
PERFLUOROHEXANOIC ACID	307-24-4	5.4	1.4	4.9	9.7	ug/kg	J	J	
PERFLUORONONANOIC ACID	375-95-1	5.0	2.1	4.9	9.7	ug/kg	J	J	
PERFLUOROOCTANE SULFONAMIDE	754-91-6	3.5	1.4	4.9	9.7	ug/kg	J	J	
PERFLUOROOCTANE SULFONATE	1763-23-1	1900	25	78	97	ug/kg		J	10A;17
PERFLUOROOCTANOIC ACID	335-67-1	4.1	2.4	7.8	9.7	ug/kg	J	J	17
PERFLUOROPENTANOIC ACID	2706-90-3	6.7	2.4	7.8	9.7	ug/kg	J	J	
PERFLUOROTETRADECANOIC ACID	376-06-7	<7.8	3.0	7.8	9.7	ug/kg	U	U	
PERFLUOROTRIDECANOIC ACID	72629-94-8	<7.8	3.2	7.8	9.7	ug/kg	U	U	
PERFLUOROUNDECANOIC ACID	2058-94-8	<7.8	3.3	7.8	9.7	ug/kg	U	U	

Sample Name ELSWH01-001	-SS-901	Ν	latrix [Гуре: S	R	Result Type: TRG					
Lab Sample Name: GTF548	Sample Date/Tim		e: 2018-05-17		08:33		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	150	2.5	7.8	9.7	ug/kg		J	10A;17		
8:2 FLUOROTELOMER SULFONATE	39108-34-4	28	3.2	7.8	9.7	ug/kg		J	10A;17		
PERFLUOROBUTANE SULFONATE	29420-43-3	4.1	1.6	4.9	9.7	ug/kg	J	J	10A		
PERFLUOROBUTANOIC ACID	375-22-4	5.8	2.2	4.9	9.7	ug/kg	J	J	10A		
PERFLUORODECANE SULFONATE	335-77-3	<7.8	3.8	7.8	9.7	ug/kg	U	U			
PERFLUORODECANOIC ACID	335-76-2	3.8	2.7	7.8	9.7	ug/kg	J	J	10A		
PERFLUORODODECANOIC ACID	307-55-1	<7.8	2.7	7.8	9.7	ug/kg	U	U			
PERFLUOROHEPTANOIC ACID	375-85-9	<4.9	1.8	4.9	9.7	ug/kg	U	U			
PERFLUOROHEXANE SULFONATE	108427-53-8	85	2.3	4.9	9.7	ug/kg		J	10A;17		
PERFLUOROHEXANOIC ACID	307-24-4	4.4	1.4	4.9	9.7	ug/kg	J	J	10A		
PERFLUORONONANOIC ACID	375-95-1	8.1	2.1	4.9	9.7	ug/kg	J	J	10A		
PERFLUOROOCTANE SULFONAMIDE	754-91-6	4.3	1.4	4.9	9.7	ug/kg	J	J	10A		
PERFLUOROOCTANE SULFONATE	1763-23-1	3300	25	78	97	ug/kg		J	10A;17		
PERFLUOROOCTANOIC ACID	335-67-1	15	2.4	7.8	9.7	ug/kg		J	10A;17		
PERFLUOROPENTANOIC ACID	2706-90-3	5.5	2.4	7.8	9.7	ug/kg	J	J	10A		
PERFLUOROTETRADECANOIC ACID	376-06-7	<7.8	3.0	7.8	9.7	ug/kg	U	U			
PERFLUOROTRIDECANOIC ACID	72629-94-8	<7.8	3.2	7.8	9.7	ug/kg	U	U			
PERFLUOROUNDECANOIC ACID	2058-94-8	<7.8	3.3	7.8	9.7	ug/kg	U	U			

Sample Name ELSWH01-002-	-SO-012	N	latrix T	Г уре: S	R	esult Typ	e: TRG			
Lab Sample Name: GTF543	Sample Date/Tim		e: 2018-05-16		13:30		Validation Level: Stage 2B			
Analyte	CAS No	Result Value	DL	LOD	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Validation Reason Code	
5:2 FLUOROTELOMER SULFONATE	27619-97-2	29	2.1	6.6	8.2	ug/kg				
3:2 FLUOROTELOMER SULFONATE	39108-34-4	4.0	2.7	6.6	8.2	ug/kg	J	J		
PERFLUOROBUTANE SULFONATE	29420-43-3	2.5	1.4	4.1	8.2	ug/kg	J	J		
PERFLUOROBUTANOIC ACID	375-22-4	<4.1	1.9	4.1	8.2	ug/kg	U	U		
PERFLUORODECANE SULFONATE	335-77-3	<6.6	3.2	6.6	8.2	ug/kg	U	U		
PERFLUORODECANOIC ACID	335-76-2	2.7	2.3	6.6	8.2	ug/kg	J	J		
PERFLUORODODECANOIC ACID	307-55-1	<6.6	2.3	6.6	8.2	ug/kg	U	U		
PERFLUOROHEPTANOIC ACID	375-85-9	2.9	1.6	4.1	8.2	ug/kg	J	J		
PERFLUOROHEXANE SULFONATE	108427-53-8	12	2.0	4.1	8.2	ug/kg				
PERFLUOROHEXANOIC ACID	307-24-4	7.4	1.1	4.1	8.2	ug/kg	J	J		
PERFLUORONONANOIC ACID	375-95-1	5.0	1.8	4.1	8.2	ug/kg	J	J		
PERFLUOROOCTANE SULFONAMIDE	754-91-6	1.9	1.1	4.1	8.2	ug/kg	J	J		
PERFLUOROOCTANE SULFONATE	1763-23-1	630	21	66	82	ug/kg				
PERFLUOROOCTANOIC ACID	335-67-1	4.1	2.1	6.6	8.2	ug/kg	J	J		
PERFLUOROPENTANOIC ACID	2706-90-3	6.6	2.1	6.6	8.2	ug/kg	J	J		
PERFLUOROTETRADECANOIC ACID	376-06-7	<6.6	2.5	6.6	8.2	ug/kg	U	U		
PERFLUOROTRIDECANOIC ACID	72629-94-8	<6.6	2.7	6.6	8.2	ug/kg	U	U		
PERFLUOROUNDECANOIC ACID	2058-94-8	<6.6	2.8	6.6	8.2	ug/kg	U	U		