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**REFERENCE:** National Guard Bureau Contract Number W9133L-14-D-0007, Task Order 0009, Fiscal Year 2017 Phase IV Regional Site Inspections for Perfluorinated Compounds at Multiple Air National Guard Installations, Project #ANGH20177153

**SUBJECT:** Final Site Inspection Report for Perfluorooctane Sulfonate and Perfluorooctanoic Acid at McEntire Joint National Guard Base, 169<sup>th</sup> Fighter Wing, Eastover, South Carolina, April 2019

Dear Mr. Danielsen,

Attached, please find one hard copy and one compact disc (CD) with the PDF version of the above-referenced document for your records per Task 9.3 of Task Order 0009. This report documents results of the site inspection at McEntire Joint National Guard Base, South Carolina.

Should you have any questions, please do not hesitate to contact me at 865-405-8332 or by email at [poligonem@leidos.com](mailto:poligonem@leidos.com). Thank you.

Sincerely,

**LEIDOS**

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**SITE INSPECTION REPORT  
FOR  
PERFLUOROOCTANE SULFONATE AND  
PERFLUOROOCTANOIC ACID  
AT  
MCENTIRE JOINT NATIONAL GUARD BASE,  
SOUTH CAROLINA**



**169<sup>th</sup> Fighter Wing  
McEntire Joint National Guard Base  
Eastover, South Carolina**

**April 2019**

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**FINAL**

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**169<sup>th</sup> Fighter Wing  
McEntire Joint National Guard Base  
Eastover, South Carolina**

April 2019

Contract Number W9133L-14-D-0007  
Task Order Number 0009

Prepared for

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## ACRONYMS

AFFF	aqueous film-forming foam
ANG	Air National Guard
ARFF	aircraft rescue and firefighting
BB&E	BB&E, Inc.
BGS	below ground surface
COC	chemical of concern
DI	deionized
DoD	U.S. Department of Defense
DPT	direct-push technology
DQO	data quality objective
EPA	U.S. Environmental Protection Agency
°F	degrees Fahrenheit
FSS	fire suppression system
ft	foot or feet
ft <sup>2</sup>	square feet
FTA	fire training area
FW	Fighter Wing
gal	gallon
HA	health advisory
HDPE	high-density polyethylene
HEF	high-expansion foam
hr	hour
IDW	investigation-derived waste
in.	inch
IRP	Installation Restoration Program
JNGB	Joint National Guard Base
JP-4	jet propulsion fuel 4
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
mgd	million gallons per day
mg/kg	milligrams per kilogram
min	minute
mL	milliliter
NFA	no further action
ng/L	nanograms per liter
NPDES	National Pollutant Discharge Elimination System
OWS	oil/water separator
oz.	ounce
%	percent
PA	preliminary assessment
PCB	polychlorinated biphenyl
PFBS	perfluorobutane sulfonate
PFHpA	perfluoroheptanoic acid
PFHxS	perfluorohexane sulfonate
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate

POL	petroleum, oil, and lubricants
PRL	potential release location
QA	quality assurance
QC	quality control
RI	remedial investigation
RSL	regional screening level
SCDHEC	South Carolina Department of Health and Environmental Control
SI	site inspection
SVOC	semivolatile organic compound
SWPPP	Surface Water Pollution Prevention Plan
TCLP	Toxicity Characteristic Leaching Procedure
TestAmerica	TestAmerica Analytical Laboratories, Inc.
UCMR3	third Unregulated Contaminant Monitoring Rule
UFP-QAPP	Uniform Federal Policy Quality Assurance Project Plan
VOC	volatile organic compound
WP	Work Plan
WWTP	waste water treatment plant

## EXECUTIVE SUMMARY

Leidos was contracted to conduct Phase IV regional site inspections (SIs) for perfluorinated compounds at multiple Air National Guard Bases. This report documents SI activities conducted between June 25 and July 19, 2018, at 17 potential release locations (PRLs) at the 169<sup>th</sup> Fighter Wing of the South Carolina Joint National Guard at McEntire Joint National Guard Base in Eastover, South Carolina. The primary objective of the SI was to determine the presence or absence of perfluorinated compounds, more specifically per- and polyfluoroalkyl substances, including the third Unregulated Contaminant Monitoring Rule (UCMR3; EPA 2012) constituents perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), perfluorobutane sulfonate (PFBS), perfluorononanoic acid (i.e., PFNA), perfluoroheptanoic acid (i.e., PFHpA), and perfluorohexane sulfonate (i.e., PFHxS), herein collectively referred to as PFOS/PFOA, at each PRL, and based on the findings:

- determine if PFOS/PFOA-contaminated groundwater has reached the Installation boundary,
- provide a defensible no further action (NFA) decision for qualifying PRLs, and
- develop data quality objectives (DQOs) for additional investigation for PRLs not meeting NFA criteria or an interim response action if appropriate.

To meet the objectives, Leidos performed SIs at the following 17 PRLs:

- PRL 2: Installation Restoration Program (IRP) Site 2 – Former Fire Training Area (FTA) 5;
- PRL 3: IRP Site 8 – Former FTAs 2, 3, and 4;
- PRL 4: Building 62 – Current Fire Station;
- PRL 5: Building 253 – Main Hangar and Phase Dock;
- PRL 6: Building 1046 – Fuels Hangar and Corrosion Control;
- PRL 9: Vehicle Maintenance Yard;
- PRL 10: Building 1160 - Petroleum, Oil, and Lubricants;
- PRL 11: Nozzle Testing Area;
- PRL 12: Aircraft Parking Apron;
- PRL 13: IRP Site 6 – C-141 Spill Area;
- PRL 14: Waste Water Treatment Plant (WWTP);
- PRL 15: Outfall 001;
- PRL 16: Outfall 002;
- PRL 17: Outfall 003;
- PRL 18: Outfall 006;
- PRL 19: Outfall 010; and
- PRL 20: WWTP Outfall.

Based on recommendations from the preliminary assessment and site visit conducted by BB&E, Inc. in February 2016, soil, groundwater, and sediment and surface water (where available) samples were collected from 17 PRLs. Collected samples were analyzed for PFOS/PFOA compounds during this SI. The detected PFOS/PFOA concentrations were compared against screening criteria for PFOS, PFOA, and PFBS, including the U.S. Environmental Protection Agency (EPA) lifetime drinking water health advisory for PFOS and PFOA; the EPA regional screening level for PFBS in tap water; and calculated screening levels using the EPA screening level calculator for PFOS, PFOA, and PFBS in soil and sediment, as shown in Table ES-1.

Comparison of analytical data to screening criteria in Table ES-1 indicates exceedances of the above criteria for groundwater and surface water media, and detected concentrations of PFOS/PFOA in all media. Therefore, Leidos recommends further investigations at all 17 PRLs. The recommendations are summarized in Table ES-2 and described briefly below:

- Conduct further investigation at all 17 PRLs to determine the nature and extent of PFOS/PFOA contamination due to detectable levels at all PRLs.
- Develop an expanded conceptual site model that considers localized groundwater and surface water flow paths to select future sampling locations.
- Complete the nature and extent evaluation of PFOS/PFOA as part of an expanded SI or a remedial investigation that could consist of:
  - An expanded soil and sediment sampling program to define the vertical and horizontal extents of PFOS/PFOA detections in soil beyond the Installation boundary, particularly in exit pathway areas associated with stormwater outfalls.
  - Additional soil sampling and analysis of an expanded list of PFOS/PFOA constituents (in addition to the six UCMR3 constituents) for the purpose of determining if significant source areas related to precursor substances are present. Precursor substances have been demonstrated to oxidize into PFOS and PFOA and, thus, could provide a lingering source of these compounds to soil and groundwater.
  - An expanded groundwater sampling program to complete horizontal and vertical delineation of the PFOS/PFOA impacts. Further groundwater investigation at and beyond the Base boundary is recommended due to the presence of PFOS/PFOA in groundwater at concentrations equal to or exceeding the respective screening levels in all sampled wells.
  - Expanded surface water and sediment sampling at and downstream of stormwater outfalls to determine the potential and extent of off-Base migration of contamination.
- Conduct preliminary site-specific risk assessment calculations to identify chemicals of potential concern in all media and establish preliminary remedial goals for screening purposes.

DQOs are proposed based on the results of the SI and are presented in Table ES-2. In general, additional samples are required at each PRL to establish the nature and extent of PFOS/PFOA constituents for each applicable medium and to determine if there is a complete receptor pathway. For soil, additional samples are recommended to determine if a defined source area exists, and if so, what the vertical and horizontal extents for both the vadose and saturated zones are. Additional groundwater sampling is recommended to determine the extent of PFOS/PFOA impacts beyond the Installation boundary. Additional surface water and sediment samples should be collected beyond the Installation boundary at Outfalls 001, 003, 004, 006, and 010 and the WTP Outfall if sufficient water is available to sample.

**Table ES-1. PFOS/PFOA SI Screening Criteria**

<b>Parameter</b>	<b>Chemical Abstract Service Number</b>	<b>EPA RSL for Tap Water<sup>a</sup> (ng/L)</b>	<b>EPA HA<sup>b</sup> (ng/L)</b>	<b>Residential Risk-based Soil Screening Level<sup>c</sup> (µg/kg)</b>
PFOS	1763-23-1	NA	70.0 <sup>d</sup>	1,260
PFOA	335-67-1	NA		1,260
PFBS	375-73-5	400,000 <sup>c</sup>	NA	1,260,000

<sup>a</sup> EPA RSL for tap water, May 2018.

<sup>b</sup> *Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA)* (EPA 2016a) and *Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS)* (EPA 2016b).

<sup>c</sup> Residential risk-based soil screening levels determined by using the EPA RSL calculator ([https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl\\_search](https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search)) and the May 2018 EPA RSL tables (<https://epa.gov/risk/regional-screening-levels-rsls-generic-tables-may-2018>) for soil and sediment.

<sup>d</sup> When PFOA and PFOS are both present, the combined detected concentrations of the compounds are compared with the 70-ng/L HA value.

<sup>e</sup> Analytical results for groundwater and stormwater have been compared to the tap water screening levels.

EPA = U.S. Environmental Protection Agency.

HA = Health advisory.

µg/kg = Micrograms per kilogram.

NA = Not available.

ng/L = Nanograms per liter.

PFBS = Perfluorobutane sulfonate.

PFOA = Perfluorooctanoic acid.

PFOS = Perfluorooctane sulfonate.

RSL = Regional screening level.

SI = Site inspection.

**Table ES-2. SI Recommendation Summary Table**

<b>PRL Number</b>	<b>PRL Description</b>	<b>Constituents Above Screening Criteria</b>	<b>Sampling Recommendations and Objectives</b>
2	IRP Site 2 – Former FTA 5	<u>Groundwater:</u> PFOS, PFOA, PFOS+PFOA	<u>Soil:</u> Although screening criteria were not exceeded, additional surface and subsurface soil samples are recommended to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater exceedances downgradient of PRL 2 <u>Groundwater:</u> Determine the nature and extent (both vertically and horizontally) through the sampling of additional existing and new monitoring wells located up- and downgradient of PRL 2
3	IRP Site 8 – Former FTAs 2, 3, and 4	<u>None</u>	<u>Soil:</u> Although screening criteria were not exceeded, additional surface and subsurface soil samples are recommended to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater detections downgradient of PRL 3 <u>Groundwater:</u> Determine the nature and extent of PFOS/PFOA detections in groundwater (both laterally and vertically) through sampling of additional existing and new monitoring wells located both up- and downgradient of PRL 3
4	Building 62 – Current Fire Station	<u>None</u>	<u>Soil:</u> Although screening criteria were not exceeded, additional surface and subsurface soil samples are recommended to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to detected PFOS/PFOA in groundwater downgradient of PRL 4 <u>Groundwater:</u> Determine the nature and extent (both laterally and vertically) of PFOS/PFOA observed in downgradient groundwater well MW-MMT04-01 through sampling of additional existing and new monitoring wells located both up- and downgradient of PRL 4
5	Building 253 – Main Hangar and Phase Dock	<u>Groundwater:</u> PFOS, PFOA, PFOS+PFOA in co-located downgradient well MW-MMT-06-01	<u>Soil:</u> Although screening criteria were not exceeded, additional surface and subsurface soil samples are recommended to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater exceedances downgradient of PRL 5 <u>Groundwater:</u> Determine the nature and extent (both vertically and horizontally) through the sampling of additional existing and new monitoring wells located up- and downgradient of PRL 8
6	Building 1046 – Fuels Hangar and Corrosion Control	<u>Groundwater:</u> PFOS, PFOA, PFOS+PFOA	<u>Soil:</u> Although screening criteria were not exceeded, additional surface and subsurface soil samples are recommended to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater exceedances downgradient of PRL 6 <u>Groundwater:</u> Determine the nature and extent (both vertically and horizontally) through the sampling of additional existing and new monitoring wells located up- and downgradient of PRL 6
9	Vehicle Maintenance Yard	<u>Groundwater:</u> PFOS, PFOA, PFOS+PFOA	<u>Soil:</u> Although screening criteria were not exceeded, additional surface and subsurface soil samples are recommended to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater exceedances in PRL 9 wells <u>Groundwater:</u> Determine the nature and extent (both vertically and horizontally) through the sampling of additional existing and new monitoring wells located up- and downgradient of PRL 9

**Table ES-2. SI Recommendation Summary Table (continued)**

<b>PRL Number</b>	<b>PRL Description</b>	<b>Constituents Above Screening Criteria</b>	<b>Sampling Recommendations and Objectives</b>
10	Building 1160 – POL	<u>Groundwater:</u> PFOS, PFOS+PFOA	<u>Soil:</u> Although screening criteria were not exceeded, additional surface and subsurface soil samples are recommended to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater exceedances downgradient of PRL 10 <u>Groundwater:</u> Determine the nature and extent (both vertically and horizontally) through the sampling of additional existing and new monitoring wells located up- and downgradient of PRL 10
11	Nozzle Testing Area	<u>Groundwater:</u> PFOS, PFOA, PFOS+PFOA in co-located downgradient well MW-MMT02-01	<u>Soil:</u> Although screening criteria were not exceeded, additional surface and subsurface soil samples are recommended to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater exceedances downgradient of PRL 11 <u>Groundwater:</u> Determine the nature and extent of PFOS/PFOA in groundwater (both laterally and vertically) through sampling of additional existing and new monitoring wells located both up- and downgradient of PRL 11
12	Aircraft Parking Apron	<u>Groundwater:</u> PFOS, PFOA, PFOS+PFOA in co-located down-gradient wells MW-MMT05-01 and MW-MMT06-01	<u>Soil:</u> Although screening criteria were not exceeded, additional surface and subsurface soil samples are recommended to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater exceedances downgradient of PRL 12 <u>Groundwater:</u> Determine the nature and extent (both laterally and vertically) of PFOS/PFOA observed in co-located PRL 5 and PRL 6 groundwater wells through sampling of additional existing and new monitoring wells located both up- and downgradient of PRL 12
13	IRP Site 6 – C-141 Spill Area	<u>Groundwater:</u> PFOS, PFOS+PFOA	<u>Soil:</u> Although screening criteria were not exceeded, additional surface and subsurface soil samples are recommended to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater exceedances downgradient of PRL 13 <u>Groundwater:</u> Determine the nature and extent (both vertically and horizontally) through the sampling of additional existing and new monitoring wells located up- and downgradient of PRL 13
14	WWTP	<u>Groundwater:</u> PFOS, PFOS+PFOA	<u>Soil:</u> Although screening criteria were not exceeded, additional surface and subsurface soil samples are recommended to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater exceedances in downgradient PRL 14 wells <u>Groundwater:</u> Determine the nature and extent (both vertically and horizontally) through the sampling of additional existing and new monitoring wells located up- and downgradient of PRL 14

**Table ES-2. SI Recommendation Summary Table (continued)**

<b>PRL Number</b>	<b>PRL Description</b>	<b>Constituents Above Screening Criteria</b>	<b>Sampling Recommendations and Objectives</b>
15	Outfall 001	<u>None</u>	<u>Sediment:</u> Although screening criteria were not exceeded, additional sediment samples are recommended to determine if PFOS/PFOA has migrated off-Base from Outfall 004 and to define the source that is contributing to surface water detections at this outfall
16	Outfall 003	<u>None</u>	<u>Sediment:</u> Although screening criteria were not exceeded, additional sediment samples are recommended to determine the nature and extent of PFOS/PFOA detections in sediment at Outfall 003
17	Outfall 004	<u>None</u>	<u>Sediment:</u> Although screening criteria were not exceeded, additional sediment samples are recommended to determine if PFOS/PFOA has migrated off-Base from Outfall 004 and to define the source that is contributing to surface water detections at this outfall <u>Surface Water:</u> Although screening criteria were not exceeded, additional surface water sampling downstream of Stormwater Outfall 004 to determine if PFOS/PFOA observed in surface water at the Installation boundary extends to downstream locations
18	Outfall 006	<u>Surface water:</u> PFOS, PFOS+PFOA,	<u>Sediment:</u> Although screening criteria were not exceeded, additional sediment samples are recommended to determine if PFOS/PFOA has migrated off-Base from Outfall 004 and to define the source that is contributing to surface water detections at this outfall <u>Surface Water:</u> Surface water sampling downstream of Stormwater Outfall 006 to determine if PFOS/PFOA observed in surface water on the Installation boundary extends to downstream locations
19	Outfall 010	<u>None</u>	<u>Sediment:</u> Although screening criteria were not exceeded, additional sediment samples are recommended to determine if PFOS/PFOA has migrated from Outfall 010 and to define the source that is contributing to surface water exceedances at this outfall
20	WWTP 001	<u>Surface water:</u> PFOS, PFOS+PFOA,	<u>Sediment:</u> Although screening criteria were not exceeded, additional sediment samples are recommended to determine if PFOS/PFOA has migrated from WWTP 001 and to define the source that is contributing to surface water exceedances at this outfall <u>Surface Water:</u> Surface water sampling downstream of the WWTP Outfall to determine if PFOS/PFOA exceedances in surface water at this location extend downstream

FTA = Fire training area.  
 IRP = Installation Restoration Program.  
 PFOA = Perfluorooctanoic acid.  
 PFOS = Perfluorooctane sulfonate.  
 POL = Petroleum, oil, and lubricants.  
 PRL = Potential release location.  
 SI = Site inspection.  
 WWTP = Waste water treatment plant.



## 1.0 INTRODUCTION

Leidos has prepared this Site Inspection (SI) Report to satisfy the requirements of Task Order 0009 of National Guard Bureau Contract Number W9133L-14-D-0007. Under this Task Order, Leidos was contracted to conduct Phase IV regional SIs for perfluorinated compounds at multiple Air National Guard (ANG) Bases. This report documents SI activities conducted between June 25 and July 19, 2018, at 17 potential release locations (PRLs) at the 169<sup>th</sup> Fighter Wing (FW) of the South Carolina Joint National Guard at McEntire Joint National Guard Base (JNGB) in Eastover, South Carolina, herein referred to as McEntire JNGB, the Installation, or the Base (Figure 1). All field activities were conducted in accordance with the *Work Plan for Fiscal Year 2017 Phase IV Regional Site Inspections for Perfluorooctane Sulfonate and Perfluorooctanoic Acid at McEntire Joint National Guard Base, South Carolina* (Leidos 2018).

### 1.1 PROJECT OBJECTIVES AND SCOPE

The primary objective of the SI was to determine the presence or absence of perfluorinated compounds, more specifically per- and polyfluoroalkyl substances, including the third Unregulated Contaminant Monitoring Rule (UCMR3) constituents perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), perfluorobutane sulfonate (PFBS), perfluorononanoic acid (PFNA), perfluoroheptanoic acid (PFHpA), and perfluorohexane sulfonate (PFHxS), herein collectively referred to as PFOS/PFOA.

Surface and subsurface soil, groundwater (downgradient of the PRL), and surface water and sediment (if available) were sampled and analyzed to determine the presence or absence of PFOS/PFOA in environmental media at the PRLs identified during the 2016 preliminary assessment (PA) (BB&E 2016) and to:

- determine if PFOS/PFOA-contaminated groundwater has reached the Installation boundary,
- provide a defensible no further action (NFA) decision for qualifying PRLs, and
- develop data quality objectives (DQOs) for additional investigation for PRLs not meeting the NFA criteria or an interim response action if appropriate.

The scope of work consisted of three inter-related tasks: (1) prepare an SI Work Plan (WP), (2) conduct SI and data collection activities, and (3) evaluate data from the field effort and applicable historical information to present conclusions and recommendations in an SI Report.

All sampling was performed on ANG property, and only PRLs located on ANG property were included in the project scope. Sampling of drinking water sources (other than the on-Base potable water supply that was used for decontamination activities) was not included, and determination of nature and extent of any identified contamination was not within the scope of this SI.

Twenty-one PRLs were evaluated in the BB&E, Inc. (BB&E) PA. BB&E recommended 18 of these for SI activities based upon the PA and site visit conducted in February 2016 and reported in the *Perfluorinated Compounds Preliminary Assessment Site Visit Report, McEntire Joint National Guard Base, Eastover, South Carolina* (Table 1; BB&E 2016). Based on the Leidos site walk conducted during the Installation kickoff meeting on September 13, 2017, and review of the Surface Water Pollution Prevention Plan (SWPPP), Leidos concluded that there is not an Oil/Water Separator (OWS) Outfall, simply an OWS. Therefore, PRL 21 (OWS Outfall) was not investigated during the SI. The 17 PRLs included in this SI Report are depicted in Figure 2. This SI Report briefly summarizes the PA, describes

SI field activities, presents analytical results of environmental sampling, and provides recommendations for each PRL.

## 1.2 REGULATORY OVERVIEW AND SCREENING CRITERIA

In 2012, the U.S. Environmental Protection Agency (EPA) published UCMR3 (EPA 2012), which required public water supplies across the country to sample for a list of 30 unregulated contaminants, including 6 chemicals of concern (COCs) relevant to this SI (PFOS, PFOA, PFBS, PFNA, PFHpA, and PFHxS; i.e., PFOS/PFOA). Results of UCMR3-required sampling indicated detections of PFOS/PFOA at numerous locations, including several near U.S. Department of Defense (DoD) facilities. PFOS/PFOA detections at DoD facilities are often linked to the use of aqueous film-forming foam (AFFF), which may contain one or more of these chemicals. AFFF is a firefighting agent used to suppress fires involving petroleum hydrocarbons.

Detected concentrations of PFOS/PFOA in environmental samples collected during the McEntire JNGB SI were compared against soil and water screening criteria for PFOS, PFOA, and PFBS, as described below and listed in Table 2. There are currently no screening criteria for PFNA, PFHpA, and PFHxS.

The May 2018 EPA generic regional screening level (RSL) table lists a residential risk-based screening level for tap water for PFBS of 400 micrograms per liter ( $\mu\text{g/L}$ ) (400,000 nanograms per liter [ $\text{ng/L}$ ]; target hazard quotient = 1). Currently, no legally enforceable federal standards exist for PFOS/PFOA in water. However, under the Safe Drinking Water Act, EPA issued a series of health advisories (HAs) for PFOS/PFOA, including the most recent in May 2016. To provide Americans, including the most sensitive populations, with a margin of protection from a lifetime of exposure to PFOS/PFOA in drinking water, EPA established an HA level for PFOS and PFOA (combined) of 70  $\text{ng/L}$ . The HA of 70  $\text{ng/L}$  applies to PFOS and PFOA individually, as well as combined. If an individual compound is detected  $>70 \text{ ng/L}$ , the screening criterion is exceeded. However, if individual compounds are  $<70 \text{ ng/L}$  but the sum of the compounds is  $>70 \text{ ng/L}$ , the screening criterion is exceeded. For example, if PFOS equals 50  $\text{ng/L}$  and PFOA equals 25  $\text{ng/L}$ , the screening criterion is exceeded. Therefore, screening levels for groundwater and surface water are as follows:

- PFOS and PFOA = 70  $\text{ng/L}$ ; and
- PFBS = 400,000  $\text{ng/L}$ .

There are also no legally enforceable federal standards for PFOS/PFOA in soil or sediment. The May 2018 EPA generic RSL table lists a residential risk-based screening level for soil for PFBS of 1,300 milligrams per kilogram ( $\text{mg/kg}$ ) (1,300,000 micrograms per kilogram [ $\mu\text{g/kg}$ ]). Following the process utilized at other ANG Installations around the country, Leidos used resident risk-based screening levels for soil determined using the EPA RSL calculator and the May 2018 RSL tables (target hazard quotient = 1). The calculated screening value for PFBS is slightly less than the value listed in the generic RSL table. RSLs are only available for three of the six COCs listed above. The calculated screening levels for these three COCs are as follows:

- PFOS = 1,260  $\mu\text{g/kg}$ ;
- PFOA = 1,260  $\mu\text{g/kg}$ ; and
- PFBS = 1,260,000  $\mu\text{g/kg}$ .

As of the preparation of this SI Report, no site-specific soil screening levels have been developed in South Carolina. Furthermore, no site-specific groundwater, surface water, or sediment screening criteria have been established by EPA or the South Carolina Department of Health and Environmental Control (SCDHEC) at this time.

## **2.0 INSTALLATION DESCRIPTION**

### **2.1 LOCATION**

McEntire JNGB is home to the two flagship major commands of South Carolina ANG and serves over 4,000 Citizen Soldiers and Airmen. The Base's 2,389 acres are routinely utilized by a variety of special operations units and law enforcement organizations. In times of emergency, McEntire JNGB becomes the aviation hub for state and federal disaster response. The facility also supports the Army National Guard/Army Aviation Support Facility.

### **2.2 ORGANIZATION AND HISTORY**

Formed in 1946, South Carolina ANG consists today of more than 1,500 Airmen who work and drill at McEntire JNGB. The nearly 2,400-acre Base is located about 12 miles east of Columbia, South Carolina. The Base was named for the late Brigadier General Bernie B. McEntire, Jr., the first commander of South Carolina ANG and its first general officer. McEntire died in 1961 when he rode his malfunctioning F-104 into the Susquehanna River to avoid crashing in densely populated Harrisburg, Pennsylvania. The Base previously was known as Congaree Air Base and was used in World War II as a U.S. Marine Corps training base.

DoD began investigations at military bases under the Installation Restoration Program (IRP) with the goal of identifying, evaluating, and remediating areas of contamination (the program is now referred to as the Environmental Restoration Program). Under this program, the earliest investigations contained in the Air Force Administrative Record (AFCEC 2018) for McEntire JNGB is a Phase II Confirmation/Quantification Stage 1 investigation in 1986. Subsequent investigations have included PAs, site investigations, removal action investigations, and remedial investigations (RIs). Prior to the BB&E 2016 PA, potential releases of PFOS/PFOA from use and storage of AFFF had not been evaluated at McEntire JNGB.

Base operations that could have contributed to contamination of soil, groundwater, sediment, and surface water include fire training areas (FTAs) and non-FTAs. FTA PRLs are sites where AFFF was likely used for fire suppression during training activities. Former FTA 1 – IRP Site 1 (PRL 1) was recommended for NFA by BB&E; however, IRP Site 2 – Former FTA 5 (PRL 2) and IRP Site 8 – (Former) FTAs 2, 3, and 4 (PRL 3) were recommended for SI with a focus on soil and groundwater. Non-FTA PRLs identified at McEntire JNGB are sites where AFFF was stored, released, and/or likely to have been released, and include the fire station (PRL 4); hangars (PRLs 5 and 6); vehicle maintenance (PRL 9); the petroleum, oil, and lubricants (POL) building (PRL 10); the nozzle testing area (PRL 11); an aircraft parking apron (PRL 12); IRP Site 6 – C-141 Spill Area (PRL 13); the waste water treatment plant (WWTP) (PRL 14); and surface water drainage features and outfalls (PRLs 15, 16, 17, 18, 19, and 20) (BB&E 2016).

When AFFF is released to the environment, PFOS/PFOA can migrate into soil and groundwater. The amount of PFOS/PFOA that migrates to groundwater depends on the type and amount of AFFF used, where it was used, the type of soil, and other factors. PFOS/PFOA may migrate readily from soil to groundwater. The primary exposure pathway for PFOS/PFOA is the ingestion of contaminated drinking water.

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## **3.0 ENVIRONMENTAL SETTING**

### **3.1 CLIMATE**

McEntire JNGB is in Richland County, South Carolina, and is situated in a temperate climate with mild winters with little to no snow and hot summers. The Base is approximately 14 miles southeast of Columbia, South Carolina. The average annual temperature in Richland County is 63 degrees Fahrenheit (°F), with an average monthly maximum of 93°F in July and an average monthly low of 56°F in January. Richland County has an average annual precipitation of 44 inches (in.). Rainfall is heaviest from June to August and lightest in fall and spring. The average yearly snowfall is 1.5 in. (USA.com 2017).

### **3.2 TOPOGRAPHY**

The Base is located in the Atlantic Coastal Plain physiographic province that extends along the east coast for 2,200 miles. Prior to the deposition of Atlantic Coastal Plain sediments, a nearly featureless plain existed that gently dipped towards the east. Continental movement during the early Cretaceous tilted the plain and created a wedge-shaped basin. This basin collected sediment through a sequence of transgressions and regressions of sea level. This region today has low relief and gently inclined terraces separated by scarps. The elevation at the Base varies approximately 100 feet (ft) from 175 to 275 ft above mean sea level (PEER 2004).

### **3.3 GEOLOGY**

McEntire JNGB lies within the Lower Coastal Plain sub-province of the Atlantic Coast Plain. Generally, the oldest sediments of the Tuscaloosa Formation outcrop at the surface along the western margin of the Coastal Plain, and the younger terrace sediments are present at the surface along the eastern margin of the Coastal Plain. The Tuscaloosa Formation is characterized by light gray, white, or buff sand with minor amounts of gravel, generally cross-bedded with inter-fingered lenses of white, pink, and purplish clay. The portion of the Tuscaloosa Formation that underlies the Base is estimated to be less than 300 ft thick. Logs of wells and the logs of water wells drilled on, and close to, the Base indicate the presence of Miocene-aged terrace deposits that overlie the Tuscaloosa Formation. The terrace deposits and Tuscaloosa Formation are contiguous, have similar lithologic and stratigraphic characteristics, and can be viewed as one hydrogeologic unit. Within the uppermost units of the Tuscaloosa Formation, groundwater occurs under unconfined water table conditions (<50 ft below ground surface [BGS]). Within the deeper sandy beds of the Tuscaloosa Formation, groundwater is typically confined by clay and silt beds (>150 ft BGS) (PEER 2004).

### **3.4 SOIL**

Soils at the Base consist of mostly loam from marine parent material. According to the U.S. Department of Agriculture Soil Survey of Richland County, the soil at the Installation consists primarily of well-drained, moderately permeable, Orangeburg loamy sand formed in thick loamy marine sediment. Only minor amounts of other soils are found, including poorly drained Cantey loam, Coxville fine sandy loam, and Johnston loam (USDA 2017).

Soils encountered in McEntire JNGB borings during the Leidos SI typically consisted of interbedded sandy silt; silty clay; sandy clay; sand; silty, clayey sand; silty clay; and clay.

### 3.5 SURFACE WATER HYDROLOGY

The Base lies in the Congaree River drainage basin. Runoff from the Base flows directly into Cedar Creek or Dry Branch, which both feed into the Congaree River. Cedar Creek runs along the western boundary of the Base, while Dry Branch runs close to parallel along the eastern portion of the Base approximately 1.5 miles from the boundary (ANG 2009).

Stormwater runoff at the Base flows directly, or through the stormwater drainage systems, into Cedar Creek and Dry Branch. The Base's SWPPP discusses 10 industrial-related drainage basins that discharge through a network of ditches and in-ground conveyances, which drain to 10 outfalls (ANG 2009).

Five of the 10 outfalls collect surface water and/or stormwater from potentially impacted areas, including Outfall 001 (PRL 15), Outfall 003 (PRL 16), Outfall 004 (PRL 17), Outfall 006 (PRL 18), and Outfall 010 (PRL 19). Sediment samples were collected from all five outfalls during the SI, but surface water was only present at Outfalls 004 and 006. In addition, surface water and sediment samples were also collected from the WWTP Outfall (PRL 20).

### 3.6 HYDROGEOLOGY

Historical reports indicate shallow groundwater is observed at depths between 27 ft BGS in the southwest corner of the Base to 47 ft BGS along the south-central portion of the Base. The direction of shallow groundwater on the Base is southwest towards Cedar Creek and occurs under unconfined conditions (PEER 2004).

Nine new groundwater wells were installed and sampled during the SI. Shallow groundwater was encountered at depths ranging from 10.20 ft BGS at MW-MMT14-01 located in the southwest corner of the Base to 48.41 ft BGS at MW-MMT10-01, located in the south-central portion of the Base. The well survey for the nine new monitoring wells was completed in September 2018, confirming the historic groundwater flow noted in the *Remedial Investigation Report for Sites 2, 5, 6, 7, 8, 11, and 12, McEntire Air National Guard Station, Richland County, Eastover, South Carolina* (PEER 2004). The draft well survey report, dated October 19, 2018, is included in Appendix D.

The Middendorf Aquifer of the Tuscaloosa Formation (>150 ft BGS) is the primary water-bearing unit in the area. Regional groundwater flow within this aquifer is from west to east and follows the near-horizontal orientation of bedding. Groundwater within this aquifer occurs in confined water table conditions. Wells within the Tuscaloosa Formation have been reported to yield as much as 2,000 gallons (gal) per minute (min) (PEER 2004).

The Base is currently supplied by municipal water, but previously, acquired its water from wells installed in sand lenses located in the deeper portion of the Middendorf Aquifer at approximately 90 to 100 ft BGS (PEER 2004).

### 3.7 CRITICAL HABITATS AND ENDANGERED/THREATENED SPECIES

According to the U.S. Fish and Wildlife Service (USFWS 2017a), the following federally listed threatened, endangered, or proposed species are known to or are believed to occur in Richland County, South Carolina:

- Amphibians:
  - Chamberlain's Dwarf salamander (*Eurycea chamberlaini*) – Under Review.



- Birds:
  - Bald eagle (*Haliaeetus leucocephalus*) – Recovery,
  - Red-cockaded woodpecker (*Picoides borealis*) – Endangered,
  - Wood stork (*Mycteria americana*) – Threatened, and
  - Golden-winged warbler (*Vermivora chrysoptera*) – Under Review.
- Clams:
  - Carolina heelsplitter (*Lasmigona decorata*) – Endangered.
- Flowering plants:
  - Smooth coneflower (*Echinacea laevigata*) – Endangered,
  - Rough-leaved loosestrife (*Lysimachia asperulaefolia*) – Endangered,
  - Canby's dropwort (*Oxypolis canbyi*) – Endangered, and
  - Spathulate seedbox (*Ludwigia spathulata*) – Under Review.

The potential for these species to occur in Richland County does not mean they are present at McEntire JNGB.

The U.S. Fish and Wildlife Service National Wetlands Inventory indicates the occurrences of freshwater forested/shrub wetland, freshwater ponds, several streams, and freshwater emergent wetlands on the property (USFWS 2017b). The eastern boundary of the Base (stretching from northeast to southeast) contains approximately 98.73 acres of freshwater forested/shrub wetland and three freshwater ponds with areas of 9.46, 0.55, and 6.05 acres. The western boundary contains a freshwater pond that spans 0.96 acres as well as a 0.46-acre stream that flows through the freshwater pond and beyond the Base boundary to the northeast. Between the three major runways in the northern part of the Base, there are 47.24 acres of freshwater forested/shrub wetland and 0.95 acres of streams that flow into this freshwater forested/shrub wetland. To the north and northeast (east of the easternmost runway), there are approximately 2.0 acres of riverine, some of which flow through the 0.96-acre freshwater pond and into the freshwater forested/shrub wetland to the east. In the north to northwest portion of the Base, there are 1.74 acres of streams that flow off-Base to the northeast and northwest. At the southern boundary of the Base is a 0.42-acre freshwater pond that is also recognized as an area on the National Wetland Inventory. Scattered throughout the Base are 5.04 acres of emergent freshwater wetland.

### 3.8 WATER WELLS

The PA Report (BB&E 2016) indicates that no drinking water wells are located at the Base and no public water system wells exist within a 1-mile radius of McEntire JNGB. There are four U.S. Geological Survey wells, one test well, and five privately owned water wells within a 1-mile radius. The two municipal water systems in Richland County serve the city of Columbia and the town of Eastover. Columbia pumps an average of 62 million gal per day (mgd) from the Broad River Canal (34 mgd) and Lake Murray (28 mgd). Eastover's pumpage is about 0.1 mgd and is obtained from wells (Newcome 2003).

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## 4.0 PRELIMINARY ASSESSMENT

In 2016, BB&E conducted a PA to identify potential sites of historic environmental releases of PFOS/PFOA related to AFFF usage and storage at McEntire JNGB (BB&E 2016). The PA evaluated a total of 21 PRLs and recommended 18 of these for further investigation under an SI (Table 1; see also Figure 1). However, based on the Leidos site walk in September 2017 and review of the SWPPP, it was concluded that there is no OWS Outfall, simply an OWS. The location of PRL 21 in the PA Report is the location of the actual OWS, not an outfall. Details provided in the SWPPP indicate that the OWS drains to the WWTP, which in turn, discharges to the WWTP Outfall (PRL 20). At the time of the 2016 PA, no documentation was available showing that soil, groundwater, sediment, and surface water at McEntire JNGB had previously been tested for PFOS/PFOA; therefore, these compounds could be present in media at any of these PRLs.

BB&E researched the potential existence of any documented FTAs or any other use or release of AFFF. There are four current or former FTAs that utilized AFFF located within the footprint of the McEntire JNGB site boundary.

The PA site visit included on-site interviews with active and former personnel from the ANG Installation and other parties with relevant historical site knowledge. According to Base personnel, 3 percent (%) and 6% AFFF has been used at McEntire JNGB since approximately 1966. AFFF is currently used at the Fire Station and in firefighting activities. In addition, AFFF is used in various buildings at McEntire JNGB, and multiple incidences of AFFF discharge have been documented.

The sections below briefly describe the operational history, waste characteristics, and release history of the PRLs included in this SI, as was presented in the PA Report (BB&E 2016). PRL numbers correspond to the area of concern designation used in the PA Report.

### 4.1 POTENTIAL RELEASE LOCATION 2: INSTALLATION RESTORATION PROGRAM SITE 2 – FORMER FIRE TRAINING AREA 5

IRP Site 2 is Former FTA 5, which was used for emergency firefighting exercises from 1970 until 1984. IRP Site 2 is located in the southeast portion of the Base and consists of an oval- to round-shaped pit that is approximately 1 ft in depth and 60 by 75 ft in dimension, with an area of approximately 4,500 square feet (ft<sup>2</sup>). Groundwater is present beneath the site at approximately 48 ft BGS and flows toward the southwest (PEER 2009).

Between 1970 and 1984, an estimated 63,000 gal of waste oil, solvent, jet propulsion fuel 4 (JP-4), brake fluid, transmission fluid, paint thinners or strippers, hydraulic fluid, and other combustible water materials were burned at this site for fire training exercises. IRP Site 2 was identified as an IRP site during the Phase I Records Search (PEER 2009).

Several investigations and response actions have been conducted at IRP Site 2, including a Phase II Confirmation/Quantification Stage 1 Investigation and an RI/feasibility study (SAIC 1990). Soil and groundwater samples were collected and analyzed for volatile organic compounds (VOCs), metals, total petroleum hydrocarbons, semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and pesticides. Based on the results of the RI and the associated risk assessment, NFA was recommended. An NFA Record of Decision was prepared in July 2009 (PEER 2009). SCDHEC concurred with NFA for IRP Site 2 in 2005 (SCDHEC 2008).

The ground surface in the vicinity of IRP Site 2 is relatively flat with no distinct drainage pathways. There are no surface water bodies or outfalls in the vicinity of the site.

Based on the time period Former FTA 5 was active, AFFF may have been utilized at the site. There is no documentation that AFFF sampling occurred at this location.

## **4.2 POTENTIAL RELEASE LOCATION 3: INSTALLATION RESTORATION PROGRAM SITE 8 – (FORMER) FIRE TRAINING AREAS 2, 3, AND 4**

IRP Site 8 consists of three distinct, non-contiguous FTAs (2, 3, and 4). IRP Site 8 was identified as an IRP site during the Phase I Records Search (PEER 2009).

Former FTA 2 is located in the north-central portion of the Base and was used from the mid-1950s until 1967. Former FTA 2 consists of an oval-shaped area surrounded by a discontinuous low berm, which is approximately 0.5 to 1 ft in height. It is approximately 150 by 114 ft in size and covers an area of approximately 17,000 ft<sup>2</sup>. Groundwater is present beneath the site at approximately 48 ft BGS and likely flows toward the southwest. Approximately 20 exercises occurred at this site, using a total of 6,000 gal of mixed oils, fuels, and solvents (PEER 2009).

Several investigations and response actions have been conducted at FTA 2, including a Phase II Confirmation/Quantification Stage 1 Investigation and an RI (PEER 2003). Soil and groundwater samples were collected and analyzed for VOCs, metals, SVOCs, PCBs, and pesticides. Based on the results of the RI and the associated risk assessment, NFA was recommended. An NFA Record of Decision was prepared in July 2009 (PEER 2009). SCDHEC concurred with NFA for IRP Site 8 – FTA 2 in 2005 (SCDHEC 2008).

Former FTA 3 is located in a cleared area between Building 90 and the aircraft wash racks. Former FTA 3 was used from 1967 to 1969. Approximately eight exercises were conducted at this location, using about 2,400 gal of fuels and waste oils. Former FTA 3 consists of a circular area approximately 30 to 50 ft in diameter and had a raised earthen berm (HAZWRAP 1996).

Former FTA 4 is located in a field across Mississippi Road from Building 225. Former FTA 4 was used from 1969 to 1970 for a total of four exercises, using a total of 1,200 gal of waste oil and fuel. Former FTA 4 consists of a circular area approximately 30 to 50 ft in diameter and had a raised earthen berm (HAZWRAP 1996).

During the SI, samples were analyzed for VOCs, SVOCs, and metals. NFA was recommended for both Former FTAs 3 and 4 after the SI (HAZWRAP 1996), and subsequent IRP Site 8 investigations focused only on Former FTA 2.

Base drawings indicate the fire suppression system (FSS) at Building 253 (Main Hangar) has been on Base since 1966. Based on the time period that Former FTAs 2, 3, and 4 were active, AFFF may have been utilized at these sites. No documentation of AFFF sampling was located during the PA.

Leidos determined, based on PA-provided coordinates, that Former FTAs 2, 3, and 4 are not shown in the correct location on the figure included in the PA Report (BB&E 2016). The three FTAs are in three separate locations across the site. Although the PA Report suggested that AFFF usage is possible at all three FTAs, the report later indicates that AFFF usage at Former FTAs 2 and 3 is unlikely. Given the time period Former FTAs 2 and 3 were utilized (mid-1950s to 1967 and 1967 to 1969), Leidos concludes that AFFF usage is unlikely. Therefore, no samples were collected from Former FTAs 2 and 3.

Due to the likely usage of AFFF at Former FTA 4, soil and groundwater samples were collected. Based on the size (30 to 50 ft in diameter) of Former FTA 4, one soil boring was installed to assess the presence or absence of PFOS/PFOA.

#### **4.3 POTENTIAL RELEASE LOCATION 4: BUILDING 62 – CURRENT FIRE STATION**

Building 62 was built in 1986 and is the current and only Fire Station that the Base has had. Prior to 1986, the Base did not have a Fire Station, but had a Fire Chief and an augmented Fire Department instead. Certain buildings (e.g., motor pools and avionics) would have a fire truck stationed there. Base personnel believed the Base had two 9-4 aircraft rescue and firefighting (ARFF) vehicles containing AFFF prior to 1986.

The Fire Station is located in the northwest portion of the Base along the flight line, in Drainage Basin 006. The Fire Station was built with a 300-gal AFFF tank and piping system with overhead fill stations. Base personnel interviewed stated the tank is located on the roof and is difficult to access. According to Base personnel, there have been no known leaks from the AFFF piping system.

The Base Fire Department uses AFFF in ARFF vehicles, which are stored within Building 62. Historically, the Fire Department had two P-19 vehicles that carried 130 gal each of AFFF. Some of the AFFF in these vehicles was transferred from the P-19 vehicles, using the Fire Department's transfer pump, to the AFFF tank. The remainder of the AFFF was placed into containers, which are currently stored at Building 269. At the time of the BB&E PA, the following vehicles containing AFFF were located at the Fire Station, along with their AFFF storage tank capacity:

- Crash 7 (210 gal),
- Crash 5 and 6 (each 56 gal),
- Engine 4 (180 gal), and
- Foam Trailer (350 gal).

According to Base personnel, all ARFF vehicles have been known to leak. Additionally, personnel remember spraying foam that had been in the trucks too long in the field north of the Fire Station. Maintenance on the ARFF vehicles is done at the Motor Pool. Vehicles are washed outside on both sides of the Fire Department. The runoff drains to the stormwater system. The area surrounding the Fire Station discharges through a series of catch basins and trench drains and discharges to Outfall 006 (ANG 2009). Trench drains within the Fire Station are connected to an OWS that is connected to the Base sanitary sewer and discharges to the Base WWTP.

There are no records of AFFF leaks or nozzle tests; however, according to Base personnel, nozzle testing with AFFF was conducted on ARFF vehicles initially after receiving a new vehicle and following major service on a vehicle. Nozzle testing with AFFF was last conducted in January 2016 on Crash 5, 6, and 7 ARFF vehicles. Approximately 1 gal of AFFF was discharged to the ground and left to dissipate. Nozzle testing was conducted at the end of Runway Road by Former FTA 5. Routine nozzle testing was conducted annually outside of the Fire Station with water only.

#### **4.4 POTENTIAL RELEASE LOCATION 5: BUILDING 253 – MAIN HANGAR AND PHASE DOCK**

Building 253 consists of the Main Hangar and the Phase Dock. This building hangar supports the maintenance efforts for F-16 aircraft. Work is primarily performed indoors, although some minor maintenance may take place outdoors on the apron. The Main Hangar was built in 1966, while the Phase Dock was added in 2003. Base drawings of the Main Hangar indicate that the hangar was built with an FSS containing AFFF. The original FSS was an overhead FSS, but was modified in the 1990s to an underwing system. The Main Hangar and Phase Dock FSSs held 900 and 200 gal of AFFF, respectively. AFFF was stored in a tank (size unknown) in the AFFF Room (Room 147). The AFFF FSS was retrofitted for use of high expansion foam (HEF) in the spring of 2013. During the HEF retrofit, AFFF

was pumped out and sent offsite for reuse by Fire Systems, Inc. Documents of this transfer are included in Appendix C of the PA Report (BB&E 2016).

There are no records of AFFF testing or releases within Building 253. According to Base personnel, no testing has been done on the FSS and no leaks or releases have occurred since the AFFF system was in place. A trench located along the hangar doors prevents spills indoors from flowing outdoors. Additional floor drains are located elsewhere in the hangar area. The drains are connected to two OWSs that serve the hangar area. The discharge from the OWSs is permitted through a separate National Pollutant Discharge Elimination System (NPDES) permit (ANG 2009). According to Base personnel, the OWSs are kept closed and must be manually pumped out or discharged to the stormwater sewer and eventually to Cedar Creek.

#### **4.5 POTENTIAL RELEASE LOCATION 6: BUILDING 1046 – FUELS HANGAR AND CORROSION CONTROL**

At Fuels Hangar and Corrosion Control Building 1046, personnel maintain aircraft fuel systems, coat aircraft and parts to prevent corrosion, remove coatings prior to non-destructive inspections, and wash aircraft. Work is performed indoors. The Corrosion Control Building was initially built in 1990 with an underwing AFFF FSS. A washrack was added to the hangar in 1999 (ANG 2009). The Fuels Hangar was added in 2004 and was also built with an underwing AFFF FSS. The combined system was equipped with AFFF, which was stored in a 300-gal tank located in a locked room (Room 120) that served both areas of the building. Two smaller, portable AFFF tanks were available in the building (ANG 2009). The FSS was retrofitted for the use of HEF in the spring of 2013.

There are no records of AFFF testing or releases within Building 1046. According to Base personnel, no testing has been done on the FSS and no leaks or releases have occurred since the AFFF system was in place. Hangar trench drains are located in the front and down the center of both the Fuels Hangar and Corrosion Control. The hangar area drains to an 8,000-gal holding tank, which is pumped out as necessary. The wash rack drains through an OWS to the sanitary sewer (ANG 2009).

#### **4.6 POTENTIAL RELEASE LOCATION 9: VEHICLE MAINTENANCE YARD**

The Vehicle Maintenance facility (Building 210) has a Vehicle Maintenance Yard on the southwest side of the building that is used for the general maintenance of ground vehicles, including ARFF vehicles. The facility and yard are located in Basin 003. According to Base personnel, in 2010 or 2011, an accidental release of AFFF from an ARFF vehicle occurred during maintenance in the Vehicle Maintenance Yard. The AFFF flowed from the yard into Outfall 003. The amount of AFFF released is unknown and was left to dissipate. Records of this spill could not be located during the PA.

#### **4.7 POTENTIAL RELEASE LOCATION 10: BUILDING 1160 – PETROLEUM, OIL, AND LUBRICANTS**

According to the SWPPP (ANG 2009), an FSS located in Building 1160 – POL contains AFFF and is maintained by the Fire Department. Base personnel interviewed during the PA site visit indicated that the POL building did not use or store AFFF; however, Fire Department personnel responded to a questionnaire following the PA site visit, stating “POL would utilize 3% from our vehicles.”

Building 1160 could not be located on current maps of the Base during the 2016 PA site visit. The PA recommended this be further investigated during the SI (BB&E 2016). Stormwater drainage at this facility from areas outside of those that discharge within the POL building is directed by perimeter drains away from this facility to minimize run-on to the facility. Stormwater drainage at this facility discharges through Outfall 004 (ANG 2009).

Building 1160 was located during the September 13, 2017, Leidos Installation kickoff meeting and site walk.

#### **4.8 POTENTIAL RELEASE LOCATION 11: NOZZLE TESTING AREA**

According to Base personnel, nozzle testing was conducted at the end of Runway Road by Former FTA 5 (IRP Site 2) when a new AFFF vehicle was brought on-Base or after a major service. Typically, less than 1 gal of 3% AFFF was released onto the ground and left to dissipate. Nozzle testing was last done in January 2016 for ARFF vehicles Crash 5, 6, and 7. Approximately 1 gal of AFFF was discharged to the ground and left to dissipate.

As stated in Section 4.1, the ground surface in the vicinity of IRP Site 2 is relatively flat, with no distinct drainage pathways. There are no surface water bodies or outfalls in the vicinity of the site (PEER 2009).

#### **4.9 POTENTIAL RELEASE LOCATION 12: AIRCRAFT PARKING APRON**

The Aircraft Parking Apron is located along the flight line and is used for parking, fueling, and occasional maintenance of the F-16 aircraft. The apron is located within Basins 1 and 10. On March 7, 1982, a C-141 aircraft caught fire and released approximately 9,000 gal of JP-4 onto the aircraft ramp area. According to Base personnel, AFFF was used to extinguish the fire. The exact location of the original spill and the amount of AFFF used is not known, but Base personnel indicated that the burning aircraft was located in front of the Main Hangar.

Stormwater runoff from the apron is directed via the slope of the apron surface (sheet flow) generally to the northeast and southwest and enters either a series of catch basins or drains into the adjacent grassy areas, which drain to either Outfall 001 or Outfall 010 (ANG 2009). During the aircraft fire event, fuel and AFFF entered underground storm sewers and flowed into the open drainage ditch (IRP Site 6, Section 4.10).

#### **4.10 POTENTIAL RELEASE LOCATION 13: INSTALLATION RESTORATION PROGRAM SITE 6 – C-141 SPILL AREA**

IRP Site 6 included an open drainage ditch that ran parallel to Mississippi Road. Fuel released from a burning C-141 aircraft entered underground storm sewers and flowed into the open drainage ditch (IRP Site 6). (Refer to Section 4.9 for a description of the C-141 aircraft fire and treatment with AFFF.) Most of the fuel was consumed in the fire, but some of it entered underground storm sewers and flowed into an open drainage ditch on IRP Site 6 that runs parallel to Mississippi Road. As the fuel burned, an earthen dam was constructed across the drainage ditch, which is located approximately 0.5 miles from the spill site, immediately upstream of the confluence with a second drainage ditch. The fire was extinguished that evening, and residual fuel downstream of the dam and behind the dam was collected using absorbent pads. After consultation with SCDHEC, the majority of the remaining fuel was burned (by Base personnel), and the rest was absorbed. Less than 5% (450 gal) of the original spill was estimated to



remain at the site due to the burning and cleanup efforts. An inspection performed by an SCDHEC representative confirmed that no fuel migrated off-Base. After the original earthen dam was broken, a straw dike was constructed and remained in place for several weeks to absorb any remaining fuel. No visible traces of hydrocarbon contamination were evident in the water, sediments, or adjacent vegetation during subsequent investigation activities at the site (PEER 2007).

As of May 2000, the site had been altered extensively. The drainage ditch was re-routed through a concrete pipeline, which is approximately 12 ft BGS and covered with soil to grade. Soils at the site, especially in the vicinity of the former ditch, were excavated and re-deposited at various areas around IRP Site 6. The quantity of soil excavated from the ditch and re-deposited around the site is unknown. A 34,000-ft<sup>2</sup> building was constructed in the vicinity of the former ditch. Reportedly, no soil staining or petroleum odors were encountered during construction of the new building (PEER 2007).

A Phase II Confirmation/Quantification Stage 1 Investigation was conducted at IRP Site 6 in 1985 and 1986. The investigation included the installation of three shallow groundwater monitoring wells and the collection and analysis of sediment and groundwater samples. The Phase II Report recommended no further activities at the site (PEER 2007). In 1995, a Management Action Plan was developed for the Base, which recommended NFA for IRP Site 6. However, SCDHEC later determined that soil in the vicinity of the drainage ditch and site groundwater should be investigated (PEER 2007). From 2001 to 2003, an RI was conducted at IRP Site 6, which included two rounds of groundwater samples collected from IRP Site 6. The RI identified no contaminants of potential concern for the groundwater at IRP Site 6. Therefore, the report for the 2001 to 2003 RI recommended NFA for IRP Site 6 (PEER 2007). SCDHEC concurred with the NFA recommendation (SCDHEC 2005) and, in 2007, a No Further Response Action Planned Decision Document (PEER 2007) was prepared.

According to Base personnel, AFFF was used to extinguish the fire and would have flowed with the fuel to the open drainage ditch (IRP Site 6). No documentation of AFFF sampling was located during the 2016 PA.

#### **4.11 POTENTIAL RELEASE LOCATION 14: WASTE WATER TREATMENT PLANT**

Waste water generated by McEntire JNGB is collected in pipelines throughout the Installation and treated at Building 220, an on-site WWTP. Waste water at McEntire JNGB is collected in a gravity sanitary sewer system. The system consists of approximately 14,300 linear ft of polyvinyl chloride pipe; 400 linear ft of cast iron pipe; 2,100 linear ft of vitrified clay pipe; and 14,000 linear ft of concrete reinforced pipe buried up to 14 ft deep. The diameter of the pipe ranges from 6 to 10 in. Portions of the lines were slip-lined in 1986. There are also 40 brick manholes up to 10 ft deep and 55 concrete pre-cast manholes up to 14 ft deep. The WWTP is rated at 20,000 gal per day, with an average throughput of 15,000 gal per day. It utilizes the sequence batch reactor process and consists of two oxidation tanks with fill and draw process, chlorination treatment, and three sludge drying tanks with covered roofs (Defense Energy Support Center 2001). Sludge from the drying tanks is disposed of offsite.

Treated effluent is monitored for contaminants, and the condition of the effluent is determined before it is released into an unnamed ditch that leads to Cedar Creek (ANG 2012). The discharge from the WWTP is permitted through a separate NPDES permit. The WWTP receives all of the waste water from the sanitary sewers, including floor drain discharges and waste water from the Fire Station and Fuels Hangar and Corrosion Control.

#### **4.12 POTENTIAL RELEASE LOCATION 15: OUTFALL 001**

Drainage Basin 001 is comprised of the central portion of the 169<sup>th</sup> FW area and encompasses a portion of the Aircraft Parking Apron. Stormwater runoff from the apron is directed via the slope of the apron (sheet flow) generally to the northeast and southwest and enters either a series of catch basins or drains to the adjacent grassed areas, which are either discharged to Outfall 001 or Outfall 010. The outfall for Basin 001 is situated near the Security Police facility and is located within an open channel.

PRL 15 (Outfall 001) is shown on the PA Report figure at the location of Outfall 005. Further review of Installation references indicates that Outfall 001 is west of PRL 13; therefore, that is the location that was evaluated in this SI. Outfall 005 was not identified as a PRL and was not evaluated under this SI.

#### **4.13 POTENTIAL RELEASE LOCATION 16: OUTFALL 003**

Drainage Basin 003 is located along the southern boundary of the Base and includes the Vehicle Maintenance Building (Building 210) and the Vehicle Maintenance Yard (PRL 9). The outfall is a concrete pipe crossing the Base boundary near the jogging trail and recreation area (ANG 2009). An accidental release of AFFF in 2010 or 2011 that occurred in the Vehicle Maintenance Yard flowed to Outfall 003 (see Section 4.6).

#### **4.14 POTENTIAL RELEASE LOCATION 17: OUTFALL 004**

Drainage Basin 004 is located along the southern Base boundary and includes the POL facility, which according to the Base SWPPP, has an FSS containing AFFF (see Section 4.7). The building mentioned in the SWPPP, Building 1160, could not be located on a current map during the 2016 PA; therefore, further investigation of this PRL is recommended. Outfall 004 is a plastic pipe crossing the Base boundary just south of the POL facility.

Refer to Section 4.7 for details on the stormwater drainage at the POL building (Building 1160). As indicated in Section 4.7, the location of Building 1160 was located during the September 13, 2017, Leidos Installation kickoff meeting and site walk.

#### **4.15 POTENTIAL RELEASE LOCATION 18: OUTFALL 006**

Drainage Basin 006 encompasses part of the center section of the airfield, including Building 62 (the Current Fire Station). Outfall 006 is a large concrete pipe crossing South Carolina Road in the field across from the Fire Station. The Fire Station contains indoor floor and trench drains that connect with an OWS and sanitary sewer. The runoff from the area surrounding the Fire Station discharges through a series of catch basins and trench drains and discharges to Outfall 006.

#### **4.16 POTENTIAL RELEASE LOCATION 19: OUTFALL 010**

Drainage Basin 010 includes a large section of the southeast region of the Base, including part of the Aircraft Parking Apron and the Fuel Cell Hangar. Stormwater runoff from the Aircraft Parking Apron is directed via the slope of the apron surface (sheet flow) generally to the northeast and southwest and enters either a series of catch basins or drains to the adjacent grassed areas, which are either discharged to Outfall 001 or Outfall 010. Outfall 010 is two concrete pipes crossing a perimeter road near the southeast corner of the Base (ANG 2009).

#### **4.17 POTENTIAL RELEASE LOCATION 20: WASTE WATER TREATMENT PLANT OUTFALL**

The discharge from the WWTP is permitted through a separate NPDES permit. Treated effluent is monitored for contaminants, and the condition of the effluent is determined before it is released into an unnamed ditch that leads to Cedar Creek (ANG 2012). The location of the outfall is believed to be west of the WWTP; however, an EPA website (EPA 2016c) has the location of the outfall listed further downstream. Follow-on conversations with Base personnel during the 2016 PA indicated that the original location is correct. The location of the WWTP Outfall was confirmed during the SI.



## 5.0 SITE INSPECTION FIELD PROGRAM

This chapter summarizes the SI field activities, including soil, groundwater, sediment, and surface water sampling, at McEntire JNGB. Analytical results for each PRL are presented and identify the presence or absence of PFOS/PFOA and results for PFOS, PFOA, and PFBS that exceed screening criteria shown in Table 2 and described in Section 1.2 of this SI Report.

All sampling and analytical activities were conducted in accordance with the procedures specified in the Final SI WP (Leidos 2018). Boring logs and monitoring well construction logs are provided in Appendix A, groundwater sampling logs are provided in Appendix B, and SI field activity photographs are provided in Appendix C. The groundwater monitoring survey report is included in Appendix D. The data validation report is provided in Appendix E. A copy of the waste manifest is included as Appendix F. The full data package is provided in Appendix G.

### 5.1 GENERAL APPROACH

#### 5.1.1 Field Sampling

SI field activities included the following:

- surface and subsurface soil sampling at 11 PRLs;
- installation and sampling of groundwater from nine new monitoring wells located downgradient from the PRLs and/or at the Installation boundary;
- sediment sampling from six outfalls;
- surface water sampling from three outfalls; and
- Global Positioning System survey of soil borings, sediment, and surface water locations (the horizontal location and elevation of all newly installed wells were surveyed by a professional licensed surveyor).

Sampling locations were based on known historical or potential releases and site conditions as observed during the PA. Table 3 summarizes the SI sampling activities at McEntire JNGB. Figure 2 shows an overview of the McEntire SI sample locations. Prior to intrusive activities, an underground utility locator marked and cleared all boring locations.

A total of 22 soil borings were installed. Borings were installed in grassy areas adjacent to hangars and other features, including the aircraft parking apron. Borings were advanced using a combination of hand augers and Geoprobe drilling and split spoon sampling to a depth of 20 ft BGS. At least one soil boring from each PRL was continuously logged for soil lithology. Boring logs are included in Appendix A. Two grab soil samples were collected from each boring—one from within the 0 to 2-ft BGS interval, and one from within the 19.5- to 20-ft BGS interval.

All soil samples were screened by a photoionization detector as a health and safety precaution due to the potential presence of VOCs. Following collection of soil samples, boreholes not co-located with monitoring wells were abandoned by backfilling with bentonite.

Nine new monitoring wells were installed to monitor groundwater conditions downgradient of the PRLs. Several of these wells (e.g., MW-MMT03-01, MW-MMT10-01, and MW-MMT14-01) are also located near the downgradient Installation boundary to evaluate the possibility of PFOS/PFOA groundwater leaving the Base. New wells were developed and sampled following ANG guidance, as prescribed in the SI WP (Leidos 2018). Well construction details are shown in Table 4.

Sediment and surface water sampling locations were based on the presence of stormwater outfalls. Sediment samples were collected from five outfalls (Outfalls 001, 003, 004, 006, and 010) and the WWTP Outfall. Surface water samples were collected from Outfall 004 (PRL 17), Outfall 006 (PRL 18), and the WWTP Outfall (PRL 20). Additional details on the field activities for each PRL are provided in Section 5.3.

### **5.1.2 Deviations from the Work Plan**

The following minor deviations were observed during field activities:

- The SI WP indicated all borings would be drilled to 20 ft BGS, and then advanced another 2 ft to collect the subsurface soil grab sample from within the 20- to 22-ft BGS interval. However, because GeoProbe soil cores are collected in 5-ft increments, it was determined that collecting a grab sample from within the bottom 0.5 ft of the 15- to 20-ft interval would be sufficient.
- Three planned surface water samples were not collected due to insufficient water at the time of sediment sampling. These include surface water locations MMT15-SW1 (PRL 15), MMT16-SW1 (PRL 16), and MMT19-SW1 (PRL 19).
- Wells MW-MMT09-01 and MW-MMT10-01 were installed with 20 ft of screen to capture the perched aquifer located about 10 ft above the main aquifer.
- Well MW-MMT04-01 was installed with an extra 3 ft of sand below the well plug to protect the well from the swelling clays located at and below the aquifer at that location.

### **5.1.3 Data Analysis**

#### **5.1.3.1 Laboratory**

Environmental samples were submitted to TestAmerica Analytical Laboratories, Inc. (TestAmerica), in West Sacramento, California. TestAmerica is accredited under the DoD Environmental Laboratory Accreditation Program and maintains a National Environmental Laboratory Accreditation Program certification.

#### **5.1.3.2 Screening criteria**

Analytical data for detected concentrations of PFOS, PFOA, and PFBS were compared to appropriate HA or risk-based screening criteria (Section 1.2 and Table 1) to qualitatively define DQOs for further investigation. There are currently no HA or RSL criteria for PFHpA, PFHxS, or PFNA.

### 5.1.3.3 Data validation

A Uniform Federal Policy Quality Assurance Project Plan (UFP-QAPP) was developed for this project as Appendix A of the SI WP (Leidos 2018). The UFP-QAPP was written to apply to all 14 Installations included in the scope of the Phase IV SI contract. Specifics on the number and type of samples to be collected in characterizing the site, and the number and type of quality assurance/quality control (QA/QC) samples to be used to evaluate the quality of the data obtained, were included in the SI WP. Soil samples were collected in one, 4-ounce (oz.), high-density polyethylene (HDPE) container with HDPE cap. Groundwater and surface water samples were collected in two, 250-milliliter (mL), HDPE containers with HDPE caps. Solid investigation-derived waste (IDW) samples were collected in 8-oz. glass jars, and liquid IDW samples were collected in three, unpreserved, 40-mL vials. IDW samples were analyzed for Toxicity Characteristic Leaching Procedure (TCLP) VOCs. Analytical results for PFOS/PFOA and TCLP VOCs were used for characterization of generated IDW. The following samples were collected during the McEntire SI:

- 44 soil samples,
- 5 soil field duplicates,
- 9 groundwater samples,
- 1 groundwater field duplicate,
- 3 surface water samples,
- 1 surface water field duplicate,
- 6 sediment samples,
- 1 sediment field duplicate,
- 1 reagent blank,
- 2 equipment rinsates,
- 2 field blanks, and
- 2 IDW samples – 1 each for solid waste and waste water.

The results of the data quality evaluation indicate that the overall quality of the data is acceptable to confirm the presence or absence of contamination. Through data verification, validation, and review, the analytical information has been qualified as appropriate. Data are considered usable if it is unqualified or qualified as estimated. For groundwater, 100% of the data was considered usable. For surface water, 100% of the data was considered usable. For soil, 100% of the data was considered usable. For sediment, 100% of the data was considered usable. The overall quality of the data meets or exceeds the established project objectives.

### *Field QC*

Eight field duplicate samples were collected, including five for soil, one for sediment, one for surface water, and one for groundwater. Field duplicate analytical results were consistent with their associated regular sample analytical results for all duplicate pairs, indicating no issues with field and laboratory precision. The field duplicate pairs had relative percent difference values below the UFP-QAPP guidelines of 50% for all detected analytes greater than five times the limit of quantitation. Two equipment rinsate samples, one each for soil and groundwater, were collected and analyzed for PFOS/PFOA. There were no PFOS/PFOA detections in the equipment rinsate samples. One reagent blank was collected following the procedure outlined in the SI WP (Leidos 2018). There were no PFOS/PFOA detections in the reagent blank. Field blank sample MMT-FB-01 was collected from the deionized (DI) water used for decontamination activities. There were no PFOS/PFOA detections in the DI field blank. MMT-FB-02 was collected from the on-site potable water source. MMT-FB-02 had PFOS/PFOA

detections; however, no field sample data were qualified because field equipment undergoes a final DI water rinse, which had no PFOS/PFOA detections.

### ***PFOS/PFOA***

Some PFOS/PFOA compounds were qualified as estimated (J) due to minor QC outliers. Five PFOS/PFOA compounds were qualified as non-detect (U) due to continuing calibration blank contamination. Two PFOS/PFOA compounds were qualified as estimated (J/UJ) due to low surrogate recoveries. Two PFOS/PFOA compounds were qualified as estimated (J) due to high matrix spike/matrix spike duplicate recoveries, and one PFOS/PFOA compound was qualified as estimated (J) due to low matrix spike/matrix spike duplicate recoveries. Twenty-three PFOS/PFOA compounds were qualified as estimated (J) due to injection internal standard recovery outliers. No other QC outliers resulted in qualification of the data during the data validation process.

Overall, data produced for this investigation demonstrate that it can withstand scientific scrutiny; are appropriate for its intended purpose; are technically defensible; and are of known and acceptable sensitivity, precision, and accuracy. Data integrity has been documented through proper implementation of QA and QC measures. The environmental information presented has an established confidence that allows utilization for the project objectives and provides data for future needs.

## **5.2 INVESTIGATION-DERIVED WASTE**

IDW was managed in compliance with the Final SI WP (Leidos 2018). Forty-two drums of non-hazardous soil IDW and eight drums of non-hazardous water IDW were transported to a designated drum staging area located onsite. IDW samples were collected for TCLP VOC analysis on July 2, 2018, (solids) and July 5, 2018 (liquids). PFOS/PFOA results from soil and sediment and groundwater and surface water samples collected during this SI were also used for IDW waste characterization. The waste drums were picked up for disposal by Veolia Environmental Services for disposal at the VLS Recovery Services Facility in Mauldin, South Carolina, on November 8, 2018, under manifest number ZZ 00784113 (see Appendix F).

## **5.3 POTENTIAL RELEASE LOCATION 2: FORMER FIRE TRAINING AREA 5**

Due to the small size of Former FTA 5 (60 to 75 ft in diameter), one boring was advanced for this PRL in accordance with the SI WP (Leidos 2018). Based on historical records, the location of PRL 2 (Figure 3) is slightly different from the area depicted in the PA Report (BB&E 2016). Records indicate Former FTA 5 was located east-southeast of PRL 11 and west-southwest of the drainage swale that runs approximately northwest/southeast. Groundwater downgradient of PRL 2 is evaluated by a new well (MW-MMT02-01) installed southwest of Former FTA 5 along the eastern side of the concrete access road (Figure 4). Analytical results from MW-MMT02-01 will also be utilized to evaluate groundwater conditions downgradient of co-located PRL 11.

### **5.3.1 Sampling Activities**

#### **5.3.1.1 Soil sampling**

Soil boring MMT02-SB1 (Figure 3) was installed on June 29, 2018. The soil boring was advanced using a Geoprobe direct-push technology (DPT) rig. The boring was advanced to a total depth of 20 ft BGS. Grab soil samples were collected from within the following depth intervals: 0.0 to 2.0 ft BGS and 19.5 to 20 ft

BGS. Soil lithology descriptions were logged on the soil boring log (Appendix A). A total of two soil samples were collected and analyzed for PFOS/PFOA.

#### **5.3.1.2 Groundwater well installation and sampling**

New well MW-MMT02-01 was installed to a depth of 52.5 ft BGS on June 29, 2018, approximately 300 ft southwest of the MMT02-SB1 boring. The well was constructed as shown on the well construction log (Appendix A). MW-MMT02-01 was developed on July 2, 2018, in accordance with the SI WP (Leidos 2018).

MW-MMT02-01 was sampled on July 3, 2018. Water levels are shown in Table 5, and water quality parameters are shown in Table 6. Groundwater sample MW-MMT02-01-01 was collected and analyzed for PFOS/PFOA. The Groundwater Micro Purge Sheets and Groundwater Purge Logs are included in Appendix B.

The newly installed monitoring well was surveyed by a licensed surveyor in September 2018, and the draft survey report, dated October 19, 2018, is included in Appendix D.

### **5.3.2 Analytical Results**

#### **5.3.2.1 Soil**

Two grab soil samples (one surface soil and one subsurface soil) were collected and analyzed from soil boring MMT02-SB1, as described in Section 5.3.1.1. All six PFOS/PFOA compounds were detected in both the surface soil and subsurface soil sample from boring MMT02-SB1. PFOS, PFOA, PFHxS, and PFNA were detected above the laboratory detection limit in the surface soil sample, and detections of all PFOS/PFOA compounds except PFNA were detected in the subsurface soil sample.

All the detected concentrations were well below the screening levels of 1,260 µg/kg for PFOS and PFOA and of 1,260,000 µg/kg for PFBS. There are no screening criteria for PFHpA, PFHxS, and PFNA. Soil analytical results for PRL 2 are presented in Table 7 and shown on Figure 3.

#### **5.3.2.2 Groundwater**

Groundwater sample MW-MMT02-01-01 was collected and analyzed, as described in Section 5.3.1.2. All six PFOS/PFOA compounds were detected above laboratory detection limits, and PFOS and PFOA exceeded the 70-ng/L EPA drinking water HA (EPA 2016a) at a combined concentration of 1,650 ng/L. Both PFOS (1,100 ng/L) and PFOA (550 ng/L) also individually exceeded the EPA HA. Groundwater analytical results for MW-MMT02-01-01 are presented in Table 8 and shown on Figure 4.

### **5.4 POTENTIAL RELEASE LOCATION 3: FORMER FIRE TRAINING AREAS 2, 3, AND 4**

The PA Report (BB&E 2016) indicated that AFFF usage is unlikely at Former FTAs 2 and 3 due to the time period the FTAs were utilized (mid-1950s to 1967 and 1967 to 1969). Therefore, no borings were proposed for these FTAs. Due to the likely usage of AFFF at Former FTA 4, soil sampling was conducted. Based on the size (30 to 50 ft in diameter) of Former FTA 4, in accordance with the SI WP (Leidos 2018), one soil boring was advanced to assess the presence or absence of PFOS/PFOA. New well MW-PRL03-01 was installed downgradient of PRL 3 and is also located near the Installation boundary.

## **5.4.1 Sampling Activities**

### **5.4.1.1 Soil sampling**

MMT03-SB1 was installed in the location shown on Figure 5 on June 29, 2018. The soil boring was advanced using a Geoprobe DPT rig. The boring was advanced to a total depth of 20 ft BGS. Grab soil samples were collected from within the following depth intervals: 0.0 to 2.0 ft BGS and 19.5 to 20 ft BGS. Soil lithology descriptions were logged on the soil boring logs (Appendix A). A total of two soil samples were collected and analyzed for PFOS/PFOA.

### **5.4.1.2 Groundwater well installation sampling**

Well MW-MMT03-01 was installed to a depth of 53.5 ft BGS on July 1, 2018, 250 ft southwest of the MMT03-SB1 boring. The well was constructed as shown on the well construction log (Appendix A). MW-MMT03-01 was developed on July 2, 2018, in accordance with the SI WP (Leidos 2018).

MW-MMT03-01 was sampled on July 4, 2018. Water levels are shown in Table 5, and water quality parameters are shown in Table 6. Groundwater sample MW-MMT03-01-01 was collected and analyzed for PFOS/PFOA. The Groundwater Micro Purge Sheets and Groundwater Purge Logs are included in Appendix B.

The newly installed monitoring well was surveyed by a licensed surveyor in September 2018, and the draft survey report, dated October 19, 2018, is included in Appendix D.

## **5.4.2 Analytical Results**

### **5.4.2.1 Soil**

A total of two soil samples were collected and analyzed from PRL 3, as described in Section 5.4.1.1. Five of the six PFOS/PFOA compounds were detected in the surface soil sample, and there were no detections above the laboratory reporting limit for the subsurface soil sample.

None of the detections for PFOS, PFOA, or PFBS exceeded screening criteria. There are no screening criteria for PFHpA, PFHxS, or PFNA. PRL 3 soil analytical results are presented in Table 7 and shown on Figure 5.

### **5.4.2.2 Groundwater**

Groundwater sample MW-MMT03-01-01 was collected and analyzed, as described in Section 5.4.1.2. PFOS, PFBS, and PFHxS were detected above laboratory detection limits. PFOA, PFHpA, and PFNA were not detected. The combined PFOS+PFOA concentration is estimated at 3.85 ng/L, less than the 70-ng/L EPA drinking water HA (EPA 2016a). PFBS (1 ng/L) is well below the 400,000-ng/L EPA tap water RSL. There is no screening criterion for PFHpA. Groundwater analytical results for MW-MMT03-01-01 are presented in Table 8 and shown on Figure 6.

## **5.5 POTENTIAL RELEASE LOCATION 4: BUILDING 62 – CURRENT FIRE STATION**

Soil borings are located in grassy areas northeast and east of Building 62, based on surface drainage from the paved areas along the eastern side of the Fire Station, which flows north and/or east. New monitoring well GW-MMT04-01 was installed west of the Fire Station.



## **5.5.1 Sampling Activities**

### **5.5.1.1 Soil sampling**

Soil borings MMT04-SB1 and MMT04-SB2 (Figure 7) were installed on June 27, 2018. The soil borings were advanced using a Geoprobe DPT rig. The borings were both advanced to a total depth of 20 ft BGS. Grab soil samples were collected from within the following depth intervals: 0.0 to 2.0 ft BGS and 19.5 to 20 ft BGS. Soil lithology descriptions from MMT04-SB1 were logged on the soil boring logs (Appendix A). A total of four soil samples were collected and analyzed for PFOS/PFOA.

### **5.5.1.2 Groundwater well installation and sampling**

Well MW-MMT04-01 was installed to a depth of 50 ft BGS on July 17, 2018, approximately 785 ft west of the MMT04-SB2 boring. The well was constructed as shown on the well construction log (Appendix A). Well MW-MMT04-01 was installed with an extra 3 ft of sand below the well plug to protect the well from the swelling clays located at and below the aquifer at this location, bringing the depth to the bottom of the sump to 46.5 ft BGS. MW-MMT04-01 was developed on July 18, 2018, in accordance with the SI WP (Leidos 2018).

MW-MMT04-01 was sampled on July 19, 2018. Water levels are shown in Table 5, and water quality parameters are shown in Table 6. Groundwater sample MW-MMT04-01-01 was collected and analyzed for PFOS/PFOA. The Groundwater Micro Purge Sheets and Groundwater Purge Logs are included in Appendix B.

The newly installed monitoring well was surveyed by a licensed surveyor in September 2018, and the draft survey report, dated October 19, 2018, is included in Appendix D.

## **5.5.2 Analytical Results**

### **5.5.2.1 Soil**

Four soil samples (two surface soil and two subsurface soil) were collected and analyzed from PRL 4, as described in Section 5.5.1.1. All six PFOS/PFOA compounds were detected in both the surface soil and subsurface soil samples from MMT04-SB1 and MMT04-SB2. The MMT04-SB1 boring is located northeast of the current Fire Station. MMT04-SB2 is located east of the current Fire Station.

None of the detected concentrations of PFOS, PFOA, or PFBS exceeded screening criteria. There is no screening criterion for PFHpA, PFHxS, or PFNA. Soil analytical results for PRL 4 are presented in Table 7 and shown on Figure 7.

### **5.5.2.2 Groundwater**

Groundwater sample MW-MMT04-01-01 was collected and analyzed, as described in Section 5.5.1.2. All six PFOS/PFOA compounds were detected above laboratory detection limits. None of the detections exceeded the 70-ng/L EPA drinking water HA for PFOS and PFOA (EPA 2016a) or the EPA tap water RSL for PFBS. Groundwater analytical results for MW-MMT04-01 are presented in Table 8 and shown on Figure 8.

## **5.6 POTENTIAL RELEASE LOCATION 5: BUILDING 253 – MAIN HANGAR AND PHASE DOCK**

Soil boring MMT05-SB1 targets the grass swale along the north corner of the hangar. Surface drainage from the paved area northeast of Building 253 flows northwest and/or southeast. Soil boring MMT05-SB2 targets the grass swale along the northeast corner of the hangar. Surface drainage from the paved area northeast of Building 253 flows northwest and/or southeast. A new well is located in the grass median area along the western side of the parking lot southwest of PRL 5. This well also serves as a downgradient well for co-located PRL 12.

### **5.6.1 Sampling Activities**

#### **5.6.1.1 Soil sampling**

Soil borings MMT05-SB1 and MMT05-SB2 (Figure 9) were installed on June 26, 2018. The soil borings were advanced using a Geoprobe DPT rig. The borings were both advanced to a total depth of 20 ft BGS. Grab soil samples were collected from within the following depth intervals: 0.0 to 2.0 ft BGS and 19.5 to 20 ft BGS. Soil lithology descriptions were logged on the soil boring logs (Appendix A). A total of four soil samples were collected and analyzed for PFOS/PFOA.

#### **5.6.1.2 Groundwater well installation and sampling**

Well MW-MMT05-01 was installed to a depth of 54.5 ft BGS on June 30, 2018, approximately 300 ft southwest of the MMT05-SB1 boring (Figure 10). The well was constructed as shown on the well construction log (Appendix A). MW-MMT05-01 was developed on July 1, 2018, in accordance with the SI WP (Leidos 2018).

MW-MMT05-01 was sampled on July 2, 2018. Water levels are shown in Table 5, and water quality parameters are shown in Table 6. Groundwater sample MW-MMT05-01-01 was collected and analyzed for PFOS/PFOA. The Groundwater Micro Purge Sheets and Groundwater Purge Logs are included in Appendix B.

The newly installed monitoring well was surveyed by a licensed surveyor in September 2018, and the draft survey report, dated October 19, 2018, is included in Appendix D.

### **5.6.2 Analytical Results**

#### **5.6.2.1 Soil**

Four soil samples (two surface soil and two subsurface soil) were collected and analyzed from PRL 5, as described in Section 5.6.1.1. PFOS and PFHxS were detected in the surface soil sample and five of the six PFOS/PFOA compounds were detected in the subsurface soil sample from MMT05-SB1. This boring is located at the north corner of the hangar. Four of the six PFOS/PFOA compounds were detected in the surface soil sample and the subsurface soil sample from MMT05-SB2, located on the east side of the hangar.

None of the detected concentrations of PFOS, PFOA, or PFBS exceeded screening criteria. There is no screening criterion for PFHpA, PFHxS, or PFNA. Soil analytical results for PRL 5 are presented in Table 7 and shown on Figure 9.



### **5.6.2.2 Groundwater**

Groundwater sample MW-MMT05-01-01 was collected and analyzed, as described in Section 5.6.1.2. All six PFOS/PFOA compounds were detected above laboratory detection limits, and PFOS and PFOA exceeded the 70-ng/L EPA drinking water HA (EPA 2016a) at a combined concentration of 5,700 ng/L. Both PFOS (5,400 ng/L) and PFOA (300 ng/L) also individually exceeded the EPA HA. Groundwater analytical results for MW-MMT05-01-01 are presented in Table 8 and shown on Figure 10.

## **5.7 POTENTIAL RELEASE LOCATION 6: BUILDING 1046 – FUELS HANGAR AND CORROSION CONTROL**

Soil boring MMT06-SB1 is located in the grassy area along the north corner of the building. Soil boring MMT06-SB2 is located in the grassy area along the northeast side of the building. Surface drainage from the paved area northeast of Building 1046 flows north and/or northeast (Figure 9). A new well is located in the grassy area southwest of Building 1046. This well will also serve as a downgradient well for co-located PRL 12.

### **5.7.1 Sampling Activities**

#### **5.7.1.1 Soil sampling**

Soil borings MMT06-SB1 and MMT06-SB2 (Figure 9) were installed on June 26, 2018. The soil borings were advanced using a Geoprobe DPT rig. The borings were both advanced to a total depth of 20 ft BGS. Grab soil samples were collected from within the following depth intervals: 0.0 to 2.0 ft BGS and 19.5 to 20 ft BGS. Soil lithology descriptions for MMT06-SB2 were logged on the soil boring logs (Appendix A). A total of four soil samples were collected and analyzed for PFOS/PFOA.

#### **5.7.1.2 Groundwater well installation and sampling**

Well MW-MMT06-01 was installed to a depth of 54.5 ft BGS on June 27, 2018, approximately 350 ft southwest of the MMT06-SB1 boring as shown on the well construction log (Appendix A). MW-MMT06-01 was developed on June 30, 2018, in accordance with the SI WP (Leidos 2018).

MW-MMT06-01 was sampled on July 2, 2018. Water levels are shown in Table 5, and water quality parameters are shown in Table 6. Groundwater sample MW-MMT06-01-01 was collected and analyzed for PFOS/PFOA. The Groundwater Micro Purge Sheets and Groundwater Purge Logs are included in Appendix B.

The newly installed monitoring well was surveyed by a licensed surveyor in September 2018, and the draft survey report, dated October 19, 2018, is included in Appendix D.

### **5.7.2 Analytical Results**

#### **5.7.2.1 Soil**

Four soil samples (two surface soil and two subsurface soil) were collected and analyzed from PRL 6, as described in Section 5.7.1.1. Five of the six PFOS/PFOA compounds were detected in the surface soil samples and four of the six PFOS/PFOA compounds were detected in the subsurface soil samples from MMT06-SB1 and MMT06-SB2. These borings are located at the northeast side of Building 1046.

None of the detected concentrations of PFOS, PFOA, or PFBS exceeded screening criteria. There is no screening criterion for PFHpA, PFHxS, or PFNA. Soil analytical results for PRL 6 are presented in Table 7 and shown on Figure 9.

### **5.7.2.2 Groundwater**

Groundwater sample MW-MMT06-01-01 was collected and analyzed, as described in Section 5.7.1.2. All six PFOS/PFOA compounds were detected above laboratory detection limits, and PFOS and PFOA exceeded the 70-ng/L EPA drinking water HA (EPA 2016a) at a combined concentration of 350 ng/L. Both PFOS (220 ng/L) and PFOA (130 ng/L) also individually exceeded the EPA HA. The result for PFBS (77 ng/L) is well below the EPA tap water RSL (400,000 ng/L). Groundwater analytical results for MW-MMT06-01 are presented in Table 8 and shown on Figure 10.

## **5.8 POTENTIAL RELEASE LOCATION 9: VEHICLE MAINTENANCE YARD**

Soil boring MMT09-SB1 is located in the grass swale southeast of the maintenance yard. This swale receives runoff from the yard. Soil boring MMT09-SB2 is located in the grass swale southeast of the maintenance yard, downgradient from MMT09-SB1. This swale receives runoff from the yard. New well MW-MMT09-01 is co-located with MMT09-SB2.

### **5.8.1 Sampling Activities**

#### **5.8.1.1 Soil sampling**

Soil borings MMT09-SB1 and MMT09-SB2 (Figure 5) were installed on June 29 and June 28, 2018, respectively. The soil borings were advanced using a Geoprobe DPT rig. The borings were both advanced to a total depth of 20 ft BGS. Grab soil samples were collected from within the following depth intervals: 0.0 to 2.0 ft BGS and 19.5 to 20 ft BGS. Soil lithology descriptions for MMT09-SB2 were logged on the soil boring logs (Appendix A). A total of four soil samples were collected and analyzed for PFOS/PFOA.

#### **5.8.1.2 Groundwater well installation and sampling**

After collecting soil samples from MMT09-SB2 (Figure 5), well MW-MMT09-01 was installed in the soil boring on June 30, 2018. It was soon determined that the well was not producing water and the well was subsequently abandoned on July 16, 2018, and a replacement well was drilled within 3 ft of the original location. The replacement well was drilled to 60.5 ft BGS and set with a 20-ft screen, as shown on the construction log (Appendix A). Well MW-MMT-09-01 was developed on July 17, 2018, in accordance with the SI WP (Leidos 2018).

MW-MMT09-01 was sampled on July 18, 2018. Water levels are shown in Table 5, and water quality parameters are shown in Table 6. Groundwater sample MW-MMT09-01-01 was collected and analyzed for PFOS/PFOA. The Groundwater Micro Purge Sheets and Groundwater Purge Logs are included in Appendix B.

The newly installed monitoring well was surveyed by a licensed surveyor in September 2018, and the draft survey report, dated October 19, 2018, is included in Appendix D.

## **5.8.2 Analytical Results**

### **5.8.2.1 Soil**

Four soil samples (two surface soil and two subsurface soil) were collected and analyzed from PRL 9, as described in Section 5.8.1.1. Four of the six PFOS/PFOA compounds were detected in the surface soil sample and only PFHxS was detected in the subsurface soil sample from MMT09-SB1. This boring is located in the grass swale southeast of the maintenance yard. PFOS, PFOA, and PFHxS were detected in the surface soil sample from MMT09-SB2. There were no detections in the subsurface soil sample from MMT09-SB2, located in the grass swale southeast of the maintenance yard.

None of the detected concentrations of PFOS, PFOA, or PFBS exceeded screening criteria. There is no screening criterion for PFHpA, PFHxS, or PFNA. Soil analytical results for PRL 9 are presented in Table 7 and shown on Figure 5.

### **5.8.2.2 Groundwater**

Groundwater sample MW-MMT09-01-01 was collected and analyzed, as described in Section 5.8.1.2. All six PFOS/PFOA compounds were detected above laboratory detection limits, and PFOS and PFOA exceeded the 70-ng/L EPA drinking water HA (EPA 2016a) at a combined concentration of 9,890 ng/L. Both PFOS (9,500 ng/L) and PFOA (390 ng/L) also individually exceeded the EPA HA. The PFOS and PFOA detected at MW-MMT09-01 are the highest concentrations measured in the groundwater at McEntire JNGB. Groundwater analytical results for MW-MMT09-01-01 are presented in Table 8 and shown on Figure 6.

## **5.9 POTENTIAL RELEASE LOCATION 10: BUILDING 1160 – PETROLEUM, OIL, AND LUBRICANTS**

Soil boring MMT10-SB1 is located in the grassy area along the northeast side of the POL area. Surface drainage from the area flows northeast and/or northwest in this area. Soil boring MMT10-SB2 is located in the grassy area along northeast side of the POL area. Surface drainage from the area flows northeast and/or northwest in this area. A new well, MW-MMT10-01, is located in the grassy area southwest of the POL area. The groundwater gradient trends southwest in this area. This well is also located near the Installation boundary and is used to evaluate impacts to groundwater at the Installation boundary.

### **5.9.1 Sampling Activities**

#### **5.9.1.1 Soil sampling**

MMT10-SB1 and MMT10-SB2 were installed in the locations shown on Figure 3 on June 29, 2018. The soil borings were advanced using a Geoprobe DPT rig. The borings were both advanced to a total depth of 20 ft BGS. Grab soil samples were collected from within the following depth intervals: 0.0 to 2.0 ft BGS and 19.5 to 20 ft BGS. Soil lithology descriptions for MMT10-SB1 were logged on the soil boring logs (Appendix A). A total of four soil samples were collected and analyzed for PFOS/PFOA.

#### **5.9.1.2 Groundwater well installation sampling**

Well MW-MMT10-01 was initially installed on June 29, 2018, approximately 500 ft west-southwest of the MMT-SB2 boring. It was soon determined that the well was not producing water and the well was subsequently abandoned on July 17, 2018, and a replacement well was drilled within 3 ft of the original location. The replacement well was drilled to a depth of 60.5 ft BGS and set with a 20-ft screen, as shown

on the well construction log (Appendix A). Replacement well MW-MMT-10-01 was developed on July 18, 2018, in accordance with the SI WP (Leidos 2018).

MW-MMT10-01 was sampled on July 19, 2018. Water levels are shown in Table 5, and water quality parameters are shown in Table 6. Groundwater sample MW-MMT10-01-01 was collected and analyzed for PFOS/PFOA. The Groundwater Micro Purge Sheets and Groundwater Purge Logs are included in Appendix B.

The newly installed monitoring well was surveyed by a licensed surveyor in September 2018, and the draft survey report, dated October 19, 2018, is included in Appendix D.

## **5.9.2 Analytical Results**

### **5.9.2.1 Soil**

A total of four soil samples were collected and analyzed from PRL 10, as described in Section 5.9.1.1. Four of the six PFOS/PFOA compounds were detected in two of those samples. Three of the six PFOS/PFOA compounds were detected in the surface soil sample from MMT10-SB1, and three PFOS/PFOA compounds were detected in the surface soil sample from MMT10-SB2. There were no detections in either subsurface soil sample from PRL 10. PFBS was not detected in any of the PRL 10 soil samples.

None of the detections of PFOS or PFOA exceeded screening criteria. There is no screening criterion for PFHpA, PFHxS, or PFNA. PRL 10 soil analytical results are presented in Table 7 and shown on Figure 3.

### **5.9.2.2 Groundwater**

Groundwater sample MW-MMT10-01-01 was collected and analyzed, as described in Section 5.9.1.2. All six PFOS/PFOA compounds were detected above laboratory detection limits. The combined PFOS+PFOA concentration was 101 ng/L, exceeding the 70-ng/L EPA drinking water HA (EPA 2016a). Only PFOS (85 ng/L) individually exceeds the EPA HA. PFBS (26 ng/L) is well below the 400,000-ng/L EPA tap water RSL. There is no screening criterion for PFHpA, PFHxS, or PFNA. Groundwater analytical results for MW-MMT10-01 are presented in Table 8 and shown on Figure 4.

## **5.10 POTENTIAL RELEASE LOCATION 11: NOZZLE TESTING AREA**

Soil boring MMT11-SB1 is located in the grassy area north of the paved access road. Localized surface drainage flows to the north and south of the paved access road. Soil boring MMT11-SB2 is located in the grassy area south of the paved access road. Localized surface drainage flows to the north and south of the paved access road. Groundwater at PRL 11 is evaluated with results from new monitoring well MW-MMT02-01, which is co-located with PRL 2.

### **5.10.1 Sampling Activities**

#### **5.10.1.1 Soil sampling**

Soil borings MMT11-SB1 and MMT11-SB2 (Figure 3) were installed on June 29, 2018. The soil borings were advanced using a Geoprobe DPT rig. The borings were both advanced to a total depth of 20 ft BGS. Grab soil samples were collected from within the following depth intervals: 0.0 to 2.0 ft BGS and 19.5 to 20 ft BGS. Soil lithology descriptions for MMT11-SB1 were logged on the soil boring logs (Appendix A). A total of four soil samples were collected and analyzed for PFOS/PFOA.

### **5.10.1.2 Groundwater sampling**

Based on historical groundwater data, groundwater flows to the southwest toward co-located groundwater well MW-MMT02-01. Please refer to Section 5.3.1.2 for a discussion on the installation and sampling of this new monitoring well.

## **5.10.2 Analytical Results**

### **5.10.2.1 Soil**

Four soil samples (two surface soil and two subsurface soil) were collected and analyzed from PRL 11, as described in Section 5.10.1.1. Five of the six PFOS/PFOA compounds were detected in surface soil samples from both MMT11-SB1 and MMT11-SB2 and the subsurface sample from MMT11-SB2. Two of the six PFOS/PFOA compounds were detected in the subsurface sample from MMT11-SB1. These borings were located in the grassy area in the nozzle testing area.

None of the detected concentrations of PFOS, PFOA, or PFBS exceeded screening criteria. There is no screening criterion for PFHpA, PFHxS, or PFNA. Soil analytical results for PRL 11 are presented in Table 7 and shown on Figure 3.

### **5.10.2.2 Groundwater**

Please refer to Section 5.3.2.2 for a discussion of the analytical results for co-located PRL 2 well MW-MMT02-01.

## **5.11 POTENTIAL RELEASE LOCATION 12: AIRCRAFT PARKING APRON**

Soil borings MMT12-SB1, MMT12-SB2, and MMT12-SB3 are located in the grassy areas southwest of the apron (southwestern side of the apron), northeast along the northeast side of the apron, and northeast along the southeast side of the apron, respectively. The aircraft apron is also evaluated by four co-located borings: MMT05-SB1, MMT05-SB2, MMT06-SB1 and MMT06-SB2. PRL 12 groundwater is evaluated by the new wells co-located with PRLs 5 and 6 (MW-MMT05-01 and MW-MMT06-01).

### **5.11.1 Sampling Activities**

#### **5.11.1.1 Soil sampling**

Soil borings MMT12-SB1, MMT12-SB2, and MMT12-SB3 (Figure 9) were installed on June 26, 2018. The soil borings were advanced using a Geoprobe DPT rig and were all advanced to a total depth of 20 ft BGS. Grab soil samples were collected from within the following depth intervals: 0.0 to 2.0 ft BGS and 19.5 to 20 ft BGS. Soil lithology descriptions for MMT12-SB1 were logged on the soil boring logs (Appendix A). A total of six soil samples were collected and analyzed for PFOS/PFOA.

In addition, co-located soil borings from PRL 5 (MMT05-SB1 and MMT05-SB2) and PRL 6 (MMT06-SB1 and MMT06-SB2) are used to evaluate the Aircraft Parking Apron. Please refer to Sections 5.6.1.1 and 5.7.1.1, respectively, for a discussion of the sampling of these soil borings.

### **5.11.1.2 Groundwater sampling**

Groundwater flows from the Aircraft Parking Apron to the southwest toward co-located groundwater wells MW-MMT05-01 and MW-MMT06-01. Please refer to Sections 5.6.1.1 and 5.7.1.1, respectively, for a discussion on the installation and sampling of these new monitoring wells.

## **5.11.2 Analytical Results**

### **5.11.2.1 Soil**

Six soil samples (three surface soil and three subsurface soil) were collected and analyzed from PRL 12, as described in Section 5.11.1.1. All six PFOS/PFOA compounds were detected in boring MMT12-SB1. This boring also contained the highest concentrations of the three PRL 12 borings. This boring is located in the grassy area southwest of the apron. Four PFOS/PFOA compounds were detected in the surface soil sample, and five were detected in the subsurface soil sample. PFOS and PFNA were detected in the surface soil samples from MMT12-SB2 and MMT12-SB3. PFHxS was detected in the subsurface soil sample from MMT12-SB3; there were no detections in the subsurface soil sample from MMT12-SB2, located along the northeast side of the apron.

None of the detected concentrations of PFOS, PFOA, or PFBS exceeded screening criteria. There is no screening criterion for PFHpA, PFHxS, or PFNA. Soil analytical results for PRL 12 are presented in Table 7 and shown on Figure 9.

Co-located samples from MMT05-SB1 and MMT05-SB2 and MMT06-SB1 and MMT06-SB2 are also used to evaluate the Aircraft Parking Apron. Please refer to Sections 5.6.2.1 and 5.7.2.1, respectively, for a discussion of the analytical results from these samples.

### **5.11.2.2 Groundwater**

Please refer to Section 5.6.1.2 and 5.7.1.2 for a discussion of the analytical results for co-located PRL 5 well MW-MMT05-01 and PRL 6 well MW-MMT06-01.

## **5.12 POTENTIAL RELEASE LOCATION 13: INSTALLATION RESTORATION PROGRAM SITE 6 – C-141 SPILL AREA**

Soil borings MMT13-SB1, MMT13-SB2, and MMT13-SB3 are located in the western, central, and eastern portions, respectively, of the grassy area encompassing the former drainage trench. New monitoring well MW-MMT13-01 was installed in the grassy area adjacent to the parking lot southwest of the former drainage trench.

### **5.12.1 Sampling Activities**

#### **5.12.1.1 Soil sampling**

Soil borings MMT13-SB1, MMT13-SB2, and MMT13-SB3 (Figure 5) were installed on June 28, 2018. The soil borings were advanced using a Geoprobe DPT rig. All three borings were advanced to a total depth of 20 ft BGS. Grab soil samples were collected from within the following depth intervals: 0.0 to 2.0 ft BGS and 19.5 to 20 ft BGS. Soil lithology descriptions for MMT13-SB2 were logged on the soil boring logs (Appendix A). A total of six soil samples were collected and analyzed for PFOS/PFOA.



### **5.12.1.2 Groundwater well installation and sampling**

Well MW-MMT13-01 was installed to a depth of 43.5 ft BGS on July 1, 2018, approximately 300 ft southwest of the MMT13-SB1 boring. The well was constructed as shown on the well construction log (Appendix A). MW-MMT13-01 was developed on July 2, 2018, in accordance with the SI WP (Leidos 2018).

MW-MMT13-01 was sampled on July 3, 2018. Water levels are shown in Table 5, and water quality parameters are shown in Table 6. Groundwater sample MW-MMT13-01-01 was collected and analyzed for PFOS/PFOA. The Groundwater Micro Purge Sheets and Groundwater Purge Logs are included in Appendix B.

The newly installed monitoring well was surveyed by a licensed surveyor in September 2018, and the draft survey report, dated October 19, 2018, is included in Appendix D.

## **5.12.2 Analytical Results**

### **5.12.2.1 Soil**

Six soil samples (three surface soil and three subsurface soil) were collected and analyzed from PRL 13, as described in Section 5.12.1.1. Five of the six PFOS/PFOA compounds were detected in all of the samples collected at MMT13-SB2 and the subsurface sample from MMT13-SB3. These two boreholes are located in the center and east portions, respectively, of the former drainage trench. Four of the six PFOS/PFOA compounds were detected in the surface soil sample at MMT13-SB1 and MMT13-SB3. Only PFHxS was detected in the subsurface soil sample from MMT13-SB1, located on the western portion of the former drainage ditch.

None of the detected concentrations of PFOS, PFOA, or PFBS exceeded screening criteria. There is no screening criterion for PFHpA, PFHxS, or PFNA. Soil analytical results for PRL 13 are presented in Table 7 and shown on Figure 5.

### **5.12.2.2 Groundwater**

Groundwater sample MW-MMT13-01-01 was collected and analyzed, as described in Section 5.12.1.2. All of the six PFOS/PFOA compounds were detected above laboratory detection limits. The combined PFOS+PFOA concentration was 973 ng/L, exceeding the 70-ng/L EPA drinking water HA (EPA 2016a). Only PFOS (950 ng/L) individually exceeds the EPA HA. PFBS (22 ng/L) is well below the 400,000-ng/L EPA tap water RSL. There is no screening criterion for PFHpA, PFHxS, or PFNA. Groundwater analytical results for MW-MMT13-01 are presented in Table 8 and shown on Figure 6.

## **5.13 POTENTIAL RELEASE LOCATION 14: WASTE WATER TREATMENT PLANT**

Soil boring MMT14-SB1 is located in the grassy area along the northern portion of the western edge of the WWTP, and MMT14-SB2 is located in the grassy area along the central portion of the western edge of the WWTP. A new downgradient monitoring well is located in the grassy area beyond the tree line to the west of the WWTP.

### **5.13.1 Sampling Activities**

#### **5.13.1.1 Soil sampling**

MMT14-SB1 and MMT14-SB2 were installed in the locations shown on Figure 11 on June 28, 2018. The soil borings were advanced using a Geoprobe DPT rig. Both borings were advanced to a total depth of 20 ft BGS. Grab soil samples were collected from within the following depth intervals: 0.0 to 2.0 ft BGS and 19.5 to 20 ft BGS. Soil lithology descriptions for MMT14-SB2 were logged on the soil boring logs (Appendix A). A total of four soil samples were collected and analyzed for PFOS/PFOA.

#### **5.13.1.2 Groundwater well installation sampling**

Well MW-MMT14-01 was installed to a depth of 18.5 ft BGS on June 28, 2018, approximately 200 ft west-southwest of MMT14-SB2. The well was constructed as shown on the well construction log (Appendix A). MW-MMT14-01 was developed on July 2, 2018, in accordance with the SI WP (Leidos 2018).

MW-MMT14-01 was sampled on July 3, 2018. Water levels are shown in Table 5, and water quality parameters are shown in Table 6. Groundwater sample MW-MMT14-01-01 was collected and analyzed for PFOS/PFOA. The Groundwater Micro Purge Sheets and Groundwater Purge Logs are included in Appendix B.

The newly installed monitoring well was surveyed by a licensed surveyor in September 2018, and the draft survey report, dated October 19, 2018, is included in Appendix D.

### **5.13.2 Analytical Results**

#### **5.13.2.1 Soil**

A total of four soil samples were collected and analyzed from PRL 14, as described in Section 5.13.1.1. The highest concentration, and five of the six PFOS/PFOA compounds, were detected in the surface sample of MMT14-SB2 and four of the six compounds were detected in the subsurface sample. The boring is located on the western side of the WWTP. MMT14-SB1 is located in the northwest corner of the WWTP, and four of the six PFOS/PFOA compounds were detected in the surface sample and three compounds in the subsurface sample. None of the detections for PFOS or PFOA exceeded screening criteria. There is no screening criterion for PFHpA, PFHxS, or PFNA.

#### **5.13.2.2 Groundwater**

Groundwater sample MW-MMT14-01-01 was collected and analyzed, as described in Section 5.13.1.2. All six PFOS/PFOA compounds were detected above laboratory detection limits. The combined PFOS+PFOA concentration was 446 ng/L, greater than the 70-ng/L EPA drinking water HA (EPA 2016a). PFBS (70 ng/L) is well below the 400,000-ng/L EPA tap water RSL. There are no screening criteria for PFHpA or PFHxS. Groundwater analytical results for MW-MMT14-01-01 are presented in Table 8 and shown on Figure 12.



## **5.14 POTENTIAL RELEASE LOCATION 15: STORMWATER OUTFALL 001**

Outfall 001, located west of PRL 13, is the discharge point for surface water from Drainage Basin 001. This drainage basin is comprised of the central portion of the 169<sup>th</sup> FW area and encompasses a portion of the Aircraft Parking Apron (PRL 12). Stormwater runoff from the apron travels via sheet flow to catch basins or drains to the adjacent grassy areas, which are discharged to Outfalls 001 and 010.

### **5.14.1 Sampling Activities**

#### **5.14.1.1 Surface water sampling**

There was insufficient surface water to collect a sample from this location.

#### **5.14.1.2 Sediment sampling**

Sediment sample MMT15-SD1-01 was collected on July 1, 2018, from approximately 0.0 to 0.1 ft below the top of sediment, in the location shown on Figure 5. The sample was collected using the sample container to scoop the sediment. The sediment sample is described as loose, dry, poorly sorted, medium brown silty soil. Sample MMT15-SD1-01 was analyzed for PFOS/PFOA.

### **5.14.2 Analytical Results**

#### **5.14.2.1 Surface water**

There was insufficient surface water to collect a sample from this location; therefore, no analytical results are available.

#### **5.14.2.2 Sediment**

Sediment sample MMT15-SD1-01 was collected and analyzed, as described in Section 5.14.1.2. PFOS, PFBS, and PFHxS each exceeded the laboratory detection limit; however, no compounds exceeded the screening criteria in the sediment sample at PRL 5. PRL 5 sediment analytical results are presented in Table 7 and shown on Figure 5.

## **5.15 POTENTIAL RELEASE LOCATION 16: STORMWATER OUTFALL 003**

Outfall 003 is located along the southern Installation boundary and is the discharge point for Drainage Basin 003, which includes the Vehicle Maintenance Yard (PRL 9). The outfall is a concrete pipe crossing the Base boundary near the jogging trail and recreation area. In 2010 or 2011, an accidental release of AFFF occurred in the Vehicle Maintenance Yard and flowed to Outfall 003.

### **5.15.1 Sampling Activities**

#### **5.15.1.1 Surface water sampling**

There was insufficient surface water to collect a sample from this location.

#### **5.15.1.2 Sediment sampling**

Sediment sample MMT16-SD1-01 was collected on July 2, 2018, from approximately 0.0 to 0.1 ft below the top of sediment, in the location shown on Figure 5. The sample was collected using the sample container to scoop the sediment. The sediment sample is described as loose, moist, poorly sorted, medium brown silty soil. Sample MMT16-SD1-01 was analyzed for PFOS/PFOA.

### **5.15.2 Analytical Results**

#### **5.15.2.1 Surface water**

There was insufficient surface water to collect a sample from this location; therefore, no analytical results are available.

#### **5.15.2.2 Sediment**

Sediment sample MMT16-SD1-01 was collected and analyzed, as described in Section 5.15.1.2. PFOS, PFHpA, PFHxS, and PFNA each exceeded the laboratory detection limit; however, no compounds exceeded the screening criteria in the sediment sample at PRL 16. PRL 16 sediment analytical results are presented in Table 7 and shown on Figure 5.

### **5.16 POTENTIAL RELEASE LOCATION 17: STORMWATER OUTFALL 004**

Outfall 004 is located along the southern Installation boundary and serves as the discharge point for Drainage Area 004, which includes the Building 1160 – POL (PRL 10). Outfall 004 is a plastic pipe crossing the Installation boundary just south of the POL facility.

#### **5.16.1 Sampling Activities**

##### **5.16.1.1 Surface water sampling**

Surface water sample MMT17-SW1-01 was collected on July 1, 2018, from the location shown on Figure 3. Water quality parameters were measured as shown in Table 6.

Meteorological conditions at the time of sampling were noted to be partly cloudy, with a temperature of 94°F and wind at about 5 to 10 miles per hour (hr). The most recent precipitation event prior to sample collection was a trace amount of rain on June 29, 2018.

##### **5.16.1.2 Sediment sampling**

Following collection of the surface water sample, sediment sample MMT17-SD1-01 was collected from approximately 0.0 to 0.1 ft below the top of sediment, in the same location the surface water sample was collected (Figure 3). The top of the sediment was approximately 0.6 ft below the top of water. The sample was collected using the sample container to scoop the sediment. The sediment sample is described as saturated, poorly sorted, black, organic silty clay. Sample MMT17-SD1-01 was analyzed for PFOS/PFOA.

## **5.16.2 Analytical Results**

### **5.16.2.1 Surface water**

Surface water sample MMT17-SW1-01 was collected and analyzed, as described in Section 5.16.1.1. Five of the six PFOS/PFOA compounds were detected at concentrations exceeding the laboratory detection limit, with PFNA not detected. There were no screening level exceedances in this sample. PFOS+PFOA (41.7 ng/L) was below the EPA drinking water HA screening level of 70 ng/L. PRL 17 surface water analytical results are presented in Table 8 and shown on Figure 4.

### **5.16.2.2 Sediment**

Sediment sample MMT17-SD1-01 was collected and analyzed, as described in Section 5.16.1.2. PFOS, PFOA, and PFHxS each exceeded the laboratory detection limit; however, no compounds exceeded the screening criteria in the sediment sample at PRL 17. PRL 17 sediment analytical results are presented in Table 7 and shown on Figure 3.

## **5.17 POTENTIAL RELEASE LOCATION 18: STORMWATER OUTFALL 006**

Outfall 006 is the discharge point for Drainage Basin 006, which encompasses part of the center section of the airfield including the Current Fire Station (PRL 4). Outfall 006 is a large concrete pipe crossing South Carolina Road in the field across from the Fire Station. The Fire Station contains indoor floor and trench drains that connect with an OWS and sanitary sewer. The runoff from the area surrounding the Fire Station discharges through a series of catch basins and trench drains and discharges to Outfall 006.

### **5.17.1 Sampling Activities**

#### **5.17.1.1 Surface water sampling**

Surface water sample MMT18-SW1-01 was collected on July 2, 2018, from the location shown on Figure 8. Water quality parameters were measured as shown in Table 6.

Meteorological conditions at the time of sampling were noted to be clear, with a temperature of 86°F and wind at about 5 miles per hr. The most recent precipitation event prior to sample collection was a trace amount of rain on June 29, 2018.

#### **5.17.1.2 Sediment sampling**

Following collection of the surface water sample, sediment sample MMT18-SD1 was collected from approximately 0.0 to 0.1 ft below the top of sediment, in the same location the surface water sample was collected (Figure 7). The top of the sediment was approximately 0.25 ft below the top of water. The sample was collected using the sample container to scoop the sediment. The sediment sample is described as tight, saturated, poorly sorted, dark brown, organic silty clay. Sample MMT18-SD1-01 was analyzed for PFOS/PFOA.

## **5.17.2 Analytical Results**

### **5.17.2.1 Surface water**

Surface water sample MMT18-SW1-01 was collected and analyzed, as described in Section 5.17.1.1. All six PFOS/PFOA compounds were detected at concentrations exceeding the laboratory detection limit, and

concentrations of PFOS and PFOS+PFOA exceeded the EPA drinking water HA screening level of 70 ng/L. The combined PFOS/PFOA concentration in sample MMT18-SW1-01 was 1,152 ng/L. PRL 18 surface water analytical results are presented in Table 8 and shown on Figure 8.

#### **5.17.2.2 Sediment**

Sediment sample MMT18-SD1-01 was collected and analyzed, as described in Section 5.17.1.2. PFOS, PFOA, PFHxS, and PFNA each exceeded the laboratory detection limit; however, no compounds exceeded the screening criteria in the sediment sample at PRL 18. PRL 18 sediment analytical results are presented in Table 7 and shown on Figure 7.

### **5.18 POTENTIAL RELEASE LOCATION 19: STORMWATER OUTFALL 010**

Outfall 010 is the discharge point for Drainage Basin 010, which includes a large section of the southeast region of the Base, including part of the Aircraft Parking Apron (PRL 12) and the Fuels Hangar and Corrosion Control (PRL 6).

#### **5.18.1 Sampling Activities**

##### **5.18.1.1 Surface water sampling**

There was insufficient surface water to collect a sample from this location.

##### **5.18.1.2 Sediment sampling**

Sediment sample MMT19-SD1-01 was collected on July 1, 2018, from approximately 0.0 to 0.1 ft below the top of sediment, in the location shown on Figure 3. The top of the sediment was approximately 0.25 ft below the top of water. The sample was collected using the sample container to scoop the sediment. The sediment sample is described as loose, moist, poorly sorted, medium brown, organic silty soil. Sample MMT19-SD1-01 was analyzed for PFOS/PFOA.

#### **5.18.2 Analytical Results**

##### **5.18.2.1 Surface water**

There was insufficient surface water to collect a sample from this location; therefore, no analytical results are available.

##### **5.18.2.2 Sediment**

Sediment sample MMT19-SD1-01 was collected and analyzed, as described in Section 5.18.1.2. PFOS and PFHxS exceeded the laboratory detection limit; however, no compounds exceeded the screening criteria in the sediment sample at PRL 19. PRL 19 sediment analytical results are presented in Table 7 and shown on Figure 3.

### **5.19 POTENTIAL RELEASE LOCATION 20: WASTE WATER TREATMENT PLANT OUTFALL**

Samples were collected at the WWTP Outfall. The discharge from the WWTP is permitted through a separate NPDES permit. Treated effluent is monitored for contaminants, and the condition of the effluent is determined before it is released into an unnamed ditch that leads to Cedar Creek. There is no indication that the effluent has been analyzed for PFOS/PFOA compounds.

### **5.19.1 Sampling Activities**

#### **5.19.1.1 Surface water sampling**

Surface water sample MMT20-SW1-01 was collected on June 28, 2018, from the location shown on Figure 12. Water quality parameters were measured as shown in Table 6.

Meteorological conditions at the time of sampling were noted to be partly cloudy, with a temperature of 92°F and wind at about 5 miles per hr. The most recent precipitation event prior to sample collection was 0.16 in. of rain on June 27, 2018.

#### **5.19.1.2 Sediment sampling**

Following collection of the surface water sample, sediment sample MMT20-SD1 was collected from approximately 0.0 to 0.1 ft below the top of sediment, in the same location the surface water sample was collected (Figure 11). The top of the sediment was approximately 0.5 ft below the top of water. The sample was collected using the sample container to scoop the sediment. The sediment sample is described as compact, wet, poorly sorted, dark brown clay. Sample MMT20-SD1-01 was analyzed for PFOS/PFOA.

### **5.19.2 Analytical Results**

#### **5.19.2.1 Surface water**

Surface water sample MMT20-SW1-01 was collected and analyzed, as described in Section 5.19.1.1. Five of the six PFOS/PFOA compounds were detected at concentrations exceeding the laboratory detection limit, with PFNA not detected. Concentrations of PFOS and PFOS+PFOA exceeded the EPA drinking water HA screening level of 70 ng/L. The combined PFOS/PFOA concentration in sample MMT20-SW1-01 was 432 ng/L. PRL 20 surface water analytical results are presented in Table 8 and shown on Figure 12.

#### **5.19.2.2 Sediment**

Sediment sample MMT20-SD1-01 was collected and analyzed, as described in Section 5.19.1.2. PFOS and PFHxS exceeded the laboratory detection limit; however, no compounds exceeded the screening criteria in the sediment sample at PRL 20. PRL 20 sediment analytical results are presented in Table 7 and shown on Figure 11.

## **5.20 BOUNDARY WELLS**

Three of the nine new wells installed during the SI are located at or close to the Installation boundary. These wells include MW-MMT03-01, MW-MMT10-01, and MW-MMT14-01. These wells are also located downgradient of their respective PRLs (e.g., PRLs 3, 10, and 14). Analytical results are discussed in Sections 5.4.2.2, 5.9.2.2, and 5.13.2.2, respectively. MW-MMT03-01 is located just on-Base at the southwest boundary of the Base at the former FTA. The analytical results for this well contain the lowest concentrations of the six UCMR3 chemicals detected at McEntire JNGB. The combined concentration of PFOS and PFOA in sample MW-MMT03-01-01 was below the laboratory reporting limit and the EPA drinking water HA screening level of 70 ng/L. MW-MMT10-01 is located 500 ft northeast of the southwest boundary and southwest of the POL facility. The combined concentration in sample MW-MMT10-01-01 was 101 ng/L, which is just above the drinking water HA screening limit. The

northwest boundary well near the WWTP, MW-MMT14-01, had a PFOS+PFOA result of 446 ng/L. The three boundary wells had some of the lowest concentrations of PFOS+PFOA detected in the nine monitoring wells (Table 8 and Figures 6, 4, and 12 respectively).

## **6.0 CONCLUSIONS AND RECOMMENDATIONS**

### **6.1 CONCLUSIONS**

This section presents the SI conclusions and recommendations for each PRL. The recommended DQOs are based on data collected by Leidos during this SI and an evaluation of both the presence of detected concentrations of PFOS/PFOA and comparison of the analytical results to applicable screening criteria.

#### **6.1.1 Potential Release Location 2: Former Fire Training Area 5**

All six PFOS/PFOA compounds were detected in PRL 2 soil samples. Evaluation of soil analytical data compared to soil screening criteria indicates there are no calculated residential risk-based screening level exceedances for PFOS, PFOA, or PFBS for PRL 2 soil.

All six PFOS/PFOA compounds were present above the laboratory detection limit in groundwater from new well MW-MMT02-01. Evaluation of groundwater data compared to screening criteria indicates an exceedance of the EPA HA (70 ng/L) for PFOS and PFOA both individually and combined, with a combined concentration of 1,650J ng/L. This well is also co-located with the Nozzle Testing Area (PRL 11).

Based on the SI results, the following DQOs are recommended for PRL 2:

- Additional surface and subsurface soil samples to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater exceedances downgradient of PRL 2.
- Additional investigation to determine the nature and extent of PFOS/PFOA in groundwater (both laterally and vertically) through sampling of additional existing or new monitoring wells located both up- and downgradient of PRL 2.

#### **6.1.2 Potential Release Location 3: (Former) Fire Training Areas 2, 3, and 4**

Five PFOS/PFOA compounds were detected above the laboratory detection limit in PRL 3 surface soil samples; PFNA was not detected. There were no detections in the subsurface soil sample. Evaluation of soil analytical data compared to soil screening criteria indicates there are no calculated residential risk-based screening level exceedances for PFOS, PFOA, or PFBS for PRL 3 soil samples.

Four PFOS/PFOA compounds were present above the laboratory detection limit in groundwater from new well MW-MMT03-01. Evaluation of groundwater data compared to screening criteria indicates the concentrations of PFOS and PFOA individually and combined are below the EPA HA (70 ng/L). This well is located adjacent to the Installation boundary (see Section 6.1.18).

Based on the SI results, the following DQOs are recommended for PRL 3:

- Additional surface and subsurface soil samples to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater detections downgradient of PRL 3.

- Additional investigation to determine the nature and extent of PFOS/PFOA detections in groundwater (both laterally and vertically) through sampling of additional existing or new monitoring wells located both up- and downgradient of PRL 3.

#### **6.1.3 Potential Release Location 4: Building 62 – Current Fire Station**

All six PFOS/PFOA compounds were detected in PRL 4 soil samples. Evaluation of soil analytical data compared to soil screening criteria indicates there are no calculated residential risk-based screening level exceedances for PFOS, PFOA, or PFBS for PRL 4 soil samples.

Six PFOS/PFOA compounds were present above the laboratory detection limit in groundwater from new well MW-MMT04-01. Evaluation of groundwater data compared to screening criteria indicates the concentrations of PFOS and PFOA individually and combined are below the EPA HA (70 ng/L).

Based on the SI results, the following DQOs are recommended for PRL 4:

- Additional surface and subsurface soil samples to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to detected PFOS/PFOA in groundwater downgradient of PRL 4.
- Additional investigation to determine the nature and extent of PFOS/PFOA in groundwater (both laterally and vertically) through sampling of additional existing or new monitoring wells located both up- and downgradient of PRL 4.

#### **6.1.4 Potential Release Location 5: Building 253 – Main Hangar and Phase Dock**

Five PFOS/PFOA compounds were detected in PRL 5 soil samples. PFNA was not present above the laboratory detection limit in any PRL 5 soil sample. Evaluation of soil analytical data compared to soil screening criteria indicates there are no calculated residential risk-based screening level exceedances for PFOS, PFOA, or PFBS for PRL 5 soil samples.

All six PFOS/PFOA compounds were present above the laboratory detection limit in groundwater from new well MW-MMT05-01. Evaluation of groundwater data compared to screening criteria indicates the concentrations of PFOS and PFOA both individually and combined exceed the EPA HA (70 ng/L). The combined concentration is 5,700 ng/L. This well is also co-located with the Aircraft Parking Apron (PRL 12).

Based on the SI results, the following DQOs are recommended for PRL 5:

- Additional surface and subsurface soil samples to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater exceedances downgradient of PRL 5.
- Additional investigation to determine the nature and extent of PFOS/PFOA in groundwater (both laterally and vertically) through sampling of additional existing or new monitoring wells located both up- and downgradient of PRL 5.



### **6.1.5 Potential Release Location 6: Building 1046 – Fuels Hangar and Corrosion Control**

Five of the six PFOS/PFOA compounds were detected in PRL 6 soil samples. PFBS was not detected in any soil sample from PRL 6. Evaluation of soil analytical data compared to soil screening criteria indicates there are no calculated residential risk-based screening level exceedances for PFOS, PFOA, or PFBS for PRL 6 soil samples.

All six PFOS/PFOA compounds were present above the laboratory detection limit in groundwater from new well MW-MMT06-01. Evaluation of groundwater data compared to screening criteria indicates the concentrations of PFOS and PFOA both individually and combined exceed the EPA HA (70 ng/L). The combined concentration is 350 ng/L. This well is also co-located with the Aircraft Parking Area (PRL 12).

Based on the SI results, the following DQOs are recommended for PRL 6:

- Additional surface and subsurface soil samples to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater exceedances downgradient of PRL 6.
- Additional investigation to determine the nature and extent of PFOS/PFOA in groundwater (both laterally and vertically) through sampling of additional existing or new monitoring wells located both up- and downgradient of PRL 6.

### **6.1.6 Potential Release Location 9: Vehicle Maintenance Yard**

Four of the six PFOS/PFOA compounds were detected in PRL 9 soil samples. PFBS and PFNA were not detected in any soil samples from PRL 9. Evaluation of soil analytical data compared to soil screening criteria indicates there are no calculated residential risk-based screening level exceedances for PFOS, PFOA, or PFBS for PRL 9 soil samples.

All six PFOS/PFOA compounds were present above the laboratory detection limit in groundwater from MW-MMT09-01. Evaluation of groundwater data compared to screening criteria indicates the concentrations of PFOS and PFOA both individually and combined exceed the EPA HA (70 ng/L). The combined concentration is 9,890 ng/L. This was the maximum PFOS+PFOA concentration detected at McEntire JNGB.

Based on the SI results, the following DQOs are recommended for PRL 9:

- Additional surface and subsurface soil samples to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater exceedances downgradient of PRL 9.
- Additional investigation to determine the nature and extent of PFOS/PFOA in groundwater (both laterally and vertically) through sampling of additional existing or new monitoring wells located both up- and downgradient of PRL 9.

### **6.1.7 Potential Release Location 10: Building 1160 – Petroleum, Oil, and Lubricants**

Four of the six PFOS/PFOA compounds were detected in PRL 10 soil samples. PFBS was not detected in any soil samples from PRL 10. Evaluation of soil analytical data compared to soil screening criteria indicates there are no calculated residential risk-based screening level exceedances for PFOS, PFOA, or PFBS for PRL 10 soil samples.

All six PFOS/PFOA compounds were present above the laboratory detection limit in groundwater from MW-MMT10-01. Evaluation of groundwater data compared to screening criteria indicates the concentrations of PFOS individually and PFOS+PFOA combined exceed the EPA HA (70 ng/L). The combined concentration is 101 ng/L. MW-MMT10-01 is also located adjacent to the Installation boundary. Concentrations of PFOS/PFOA were slightly above the HA, but this well had the third lowest combined PFOS/PFOA concentration of the nine wells sampled.

Based on the SI results, the following DQOs are recommended for PRL 10:

- Additional surface and subsurface soil samples to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater exceedances downgradient of PRL 10.
- Additional investigation to determine the nature and extent of PFOS/PFOA in groundwater (both laterally and vertically) through sampling of additional existing or new monitoring wells located both up- and downgradient of PRL 10.

#### **6.1.8 Potential Release Location 11: Nozzle Testing Area**

All of the six PFOS/PFOA compounds were detected in PRL 11 soil samples. Evaluation of soil analytical data compared to soil screening criteria indicates there are no calculated residential risk-based screening level exceedances for PFOS, PFOA, or PFBS for PRL 11 soil samples.

All six PFOS/PFOA compounds were present above the laboratory detection limit in groundwater from co-located PRL 2 well MW-MMT02-01. Evaluation of groundwater data compared to screening criteria indicates the concentrations of PFOS and PFOA both individually and combined exceed the EPA HA (70 ng/L). The combined concentration is 1,650 ng/L.

Based on the SI results, the following DQOs are recommended for PRL 11:

- Additional surface and subsurface soil samples to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater exceedances downgradient of PRL 11.
- Additional investigation to determine the nature and extent of PFOS/PFOA in groundwater (both laterally and vertically) through sampling of additional existing or new monitoring wells located both up- and downgradient of PRL 11.

#### **6.1.9 Potential Release Location 12: Aircraft Parking Apron**

All of the six PFOS/PFOA compounds were detected in PRL 12 soil samples. Evaluation of soil analytical data compared to soil screening criteria indicates there are no calculated residential risk-based screening level exceedances for PFOS, PFOA, or PFBS for PRL 12 soil samples.

Additionally, soil samples from co-located borings in PRLs 5 and 6 were used to further evaluate PRL 12. Five PFOS/PFOA compounds were detected in PRL 5 soil samples. PFNA was not present above the laboratory detection limit in any PRL 5 soil sample. Five of the six PFOS/PFOA compounds were detected in PRL 6 soil samples. PFBS was not detected in any soil sample from PRL 6. Evaluation of soil analytical data compared to soil screening criteria indicates there are no calculated residential risk-based screening level exceedances for PFOS, PFOA, or PFBS for PRL 5 or PRL 6 soil samples.

All six PFOS/PFOA compounds were present above the laboratory detection limit in groundwater from co-located PRL 5 well MW-MMT05-01 and PRL 6 well MW-MMT06-01. Evaluation of groundwater data compared to screening criteria indicates the concentrations of PFOS and PFOA both individually and combined exceed the EPA HA (70 ng/L) in both wells. The combined concentration in MW-MMT05-01 is 5,700 ng/L, and the combined concentration in MW-MMT06-01 is 350 ng/L.

Based on the SI results, the following DQOs are recommended for PRL 12:

- Additional surface and subsurface soil samples to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater exceedances downgradient of PRL 12.
- Additional investigation to determine the nature and extent of PFOS/PFOA in groundwater (both laterally and vertically) through sampling of additional existing or new monitoring wells located both up- and downgradient of PRL 12.

#### **6.1.10 Potential Release Location 13: Installation Restoration Program Site 6 – C-141 Spill Area**

All of the six PFOS/PFOA compounds were detected in PRL 13 soil samples. Evaluation of soil analytical data compared to soil screening criteria indicates there are no calculated residential risk-based screening level exceedances for PFOS, PFOA, or PFBS for PRL 13 soil samples.

All six PFOS/PFOA compounds were present above the laboratory detection limit in groundwater from MW-MMT13-01. Evaluation of groundwater data compared to screening criteria indicates the concentrations of PFOS and combined PFOS and PFOA exceed the EPA HA (70 ng/L). The combined concentration is 973 ng/L.

Based on the SI results, the following DQOs are recommended for PRL 13:

- Additional surface and subsurface soil samples to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater exceedances downgradient of PRL 13.
- Additional investigation to determine the nature and extent of PFOS/PFOA in groundwater (both laterally and vertically) through sampling of additional existing or new monitoring wells located both up- and downgradient of PRL 13.

#### **6.1.11 Potential Release Location 14: Waste Water Treatment Plant**

All of the six PFOS/PFOA compounds were detected in PRL 14 soil samples. Evaluation of soil analytical data compared to soil screening criteria indicates there are no calculated residential risk-based screening level exceedances for PFOS, PFOA, or PFBS for PRL 14 soil samples.

All six PFOS/PFOA compounds were present above the laboratory detection limit in groundwater from MW-MMT14-01. Evaluation of groundwater data compared to screening criteria indicates the concentrations of PFOS and combined PFOS and PFOA exceed the EPA HA (70 ng/L). The combined concentration is 446 ng/L.

Based on the SI results, the following DQOs are recommended for PRL 14:

- Additional surface and subsurface soil samples to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater exceedances downgradient of PRL 14.
- Additional investigation to determine the nature and extent of PFOS/PFOA in groundwater (both laterally and vertically) through sampling of additional existing or new monitoring wells located both up- and downgradient of PRL 14.

#### **6.1.12 Potential Release Location 15: Outfall 001**

Three of the six PFOS/PFOA compounds were detected in sediment sample MMT15-SD1-01. Evaluation of soil analytical data compared to soil screening criteria indicates there are no calculated residential risk-based screening level exceedances for PFOS or PFBS in the sediment sample from PRL 15.

Surface water was not present at Outfall 001; therefore, no sample was collected.

Based on the SI results, the following DQO is recommended for PRL 15:

- Additional sediment samples to determine if PFOS/PFOA has migrated off-Base from Outfall 004 and to define the source that is contributing to surface water detections at this outfall.

#### **6.1.13 Potential Release Location 16: Outfall 003**

Four PFOS/PFOA compounds were detected in sediment sample MMT16-SD1-01. Evaluation of soil analytical data compared to soil screening criteria indicates there are no calculated residential risk-based screening level exceedances for PFOS, PFOA, or PFBS in the sediment sample from PRL 16.

Surface water was not present at Outfall 003; therefore, no sample was collected.

Based on the SI results, the following DQO is recommended for PRL 16:

- Additional sediment samples to determine if PFOS/PFOA has migrated off-Base from Outfall 003.

#### **6.1.14 Potential Release Location 17: Outfall 004**

Three PFOS/PFOA compounds were detected in sediment sample MMT17-SD1-01. Evaluation of sediment analytical data compared to soil screening criteria indicates there are no calculated residential risk-based screening level exceedances for PFOS, PFOA, or PFBS for the sediment sample from PRL 17.

Five of the six PFOS/PFOA compounds were detected in surface water sample MMT17-SW1-01. Evaluation of surface water data compared to screening criteria indicates there are no exceedances of the screening criteria. The combined PFOS+PFOA concentration was 41.7 ng/L.

Based on the SI results, the following DQOs are recommended for PRL 17:

- Additional sediment samples to determine if PFOS/PFOA has migrated off-Base from Outfall 004 and to define the source that is contributing to surface water detections at this outfall.

- Additional surface water sampling downstream of Stormwater Outfall 004 to determine if PFOS/PFOA observed in surface water at the Installation boundary extends to downstream locations.

#### **6.1.15 Potential Release Location 18: Outfall 006**

Four PFOS/PFOA compounds were detected in PRL 18 sediment sample MMT18-SD1-01. Evaluation of sediment analytical data compared to soil screening criteria indicates there are no calculated residential risk-based screening level exceedances for PFOS, PFOA, or PFBS for the sediment sample from PRL 18.

All six PFOS/PFOA compounds were detected above the laboratory detection limit in surface water sample MMT18-SW1-01. Evaluation of groundwater data compared to screening criteria indicates the concentrations of PFOS and combined PFOS and PFOA exceeded the EPA HA (70 ng/L). The combined concentration for PFOA+PFOA was 1,152J ng/L. This was the highest reported concentration in surface water. PRL 18 is directly downgradient of the current Fire Station.

Based on the SI results, the following DQOs are recommended for PRL 18:

- Additional sediment samples to determine if PFOS/PFOA has migrated off-Base from Outfall 004 and to define the source that is contributing to surface water detections at this outfall.
- Additional surface water sampling downstream of Stormwater Outfall 004 to determine if PFOS/PFOA observed in surface water on the Installation boundary extends to downstream locations.

#### **6.1.16 Potential Release Location 19: Outfall 010**

PFOS and PFHxS were detected in PRL 19 sediment sample MMT19-SD1-01. Evaluation of sediment analytical data compared to soil screening criteria indicates there are no calculated residential risk-based screening level exceedances for PFOS for the sediment sample from PRL 19.

Surface water was not present at Outfall 010; therefore, no sample was collected.

Based on the SI results, the following DQO is recommended for PRL 19:

- Additional sediment samples to determine if PFOS/PFOA has migrated off-Base from Outfall 010.

#### **6.1.17 Potential Release Location 20: Waste Water Treatment Plant Outfall**

PFOS and PFHxS were detected in sediment sample MMT20-SD1-01. Evaluation of sediment analytical data compared to soil screening criteria indicates there are no calculated residential risk-based screening level exceedances for PFOS for the sediment sample from PRL 20.

All PFOS/PFOA compounds except PFNA were detected above the laboratory detection limit in surface water sample MMT120-SW1-01. Evaluation of surface water data compared to screening criteria indicates the concentrations of PFOS and the combined PFOS and PFOA exceeded the EPA HA (70 ng/L). The combined concentration for PFOA+PFOA was 432J ng/L.

Based on the SI results, the following DQOs are recommended for PRL 20:

- Additional sediment samples to determine if PFOS/PFOA has migrated from Outfall 004 and to define the source that is contributing to surface water exceedances at this outfall.

- Additional surface water sampling downstream of the WWTP Outfall to determine if PFOS/PFOA exceedances in surface water at this location extends downstream.

#### **6.1.18 Boundary Wells**

Three new wells were installed near the southwestern (most downgradient) Installation boundary during the SI. MW-MMT03-01 is located just on-Base of the most downgradient edge of the Installation boundary. The analytical results for this well contain the lowest concentrations of the six UCMR3 chemicals detected at McEntire JNGB. The combined PFOS+PFOA concentration was 3.85 ng/L, significantly below the EPA HA of 70 ng/L. PFOS+PFOA concentrations in MW-MMT10-01 (101 ng/L) were slightly above the HA, but represent the third lowest concentrations observed in the nine wells sampled during the SI; concentrations in MW-MMT14-01 (PFOS+PFOA concentration was 446 ng/L) were higher (Table 8 and Figures 6, 4, and 12 respectively).

Although the concentrations in the boundary wells are among the lowest reported from the nine McEntire JNGB SI monitoring wells, the presence of PFOS/PFOA at detectable concentrations provides basis for additional investigations of groundwater to determine if PFOS/PFOA is present beyond the Installation boundary, as well as to define the nature and extent (vertical and horizontal) of PFOS/PFOA within the Installation.

## **6.2 SUMMARY AND RECOMMENDATIONS**

In summary, additional investigations are recommended for all media in 17 PRLs at McEntire JNGB. The recommendations are described briefly below:

- Conduct further investigation at all 17 PRLs to determine the nature and extent of PFOS/PFOA contamination due to detectable levels at all PRLs.
- Develop an expanded conceptual site model that considers localized groundwater and surface water flow paths to select future sampling locations.
- Complete the nature and extent evaluation of PFOS/PFOA as part of an expanded SI or an RI that could consist of:
  - An expanded soil and sediment sampling program to define the vertical and horizontal extents of PFOS/PFOA detections in soil beyond the Installation boundary, particularly in exit pathway areas associated with Stormwater Outfalls.
  - Additional soil sampling and analysis of an expanded list of PFOS/PFOA constituents (in addition to the six UCMR3 constituents) for the purpose of determining if significant source areas related to precursor substances are present. Precursor substances have been demonstrated to oxidize into PFOS and PFOA and, thus, could provide a lingering source of these compounds to soil and groundwater.
  - An expanded groundwater sampling program to complete horizontal and vertical delineation of the PFOS/PFOA impacts. Further groundwater investigation at and beyond the Base boundary is recommended due to the presence of PFOS/PFOA in groundwater at concentrations equal to or exceeding the respective screening levels in all sampled wells.

- Expanded surface water and sediment sampling at and downstream of Stormwater Outfalls to determine the potential and extent of off-Base migration of contamination.
- Conduct preliminary site-specific risk assessment calculations to identify chemicals of potential concern in all media and establish preliminary remedial goals for screening purposes.

DQOs are proposed based on the results of the SI and are presented in Table 9. In general, additional samples are required at each PRL to establish the nature and extent of PFOS/PFOA constituents for each applicable medium and to determine if there is a complete receptor pathway. For soil, additional samples are recommended to determine if a defined source area exists, and if so, what the vertical and horizontal extents for both the vadose and saturated zones are. Additional groundwater sampling is recommended to determine the extent of PFOS/PFOA within the Installation and potential impacts beyond the Installation boundary. Additional surface water and sediment samples should be collected beyond the Installation boundary at Outfalls 001, 003, 004, 006, and 010 and the WTP Outfall if sufficient water is available to sample.

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## TABLES

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**Table 1. PA Report Summary and Recommendations, McEntire JNGB, South Carolina**

<b>PRL Number</b>	<b>Potential AFFF PRL</b>	<b>Rationale</b>	<b>Recommendation</b>
1	IRP Site 1 – Former FTA 1	FTA from 1947 to 1955. Unlikely that AFFF was utilized at FTA 1	NFA
2	IRP Site 2 – Former FTA 5	FTA from 1970 to 1984. Suspected that AFFF was utilized at FTA 5. <b>Note:</b> historical records indicate that IRP Site 2 is located slightly southwest of the area depicted in the PA Report	Proceed to SI, focus on soil and groundwater. Confirm surface drainage pattern
3	IRP Site 8 – (Former) FTAs 2, 3, and 4	FTA 2 from 1950 to 1967. FTA 3 from 1967 to 1969. FTA 4 from 1969 to 1970. Unlikely that AFFF was utilized at FTAs 2 and 3. Possible that AFFF was utilized at FTA 4	Proceed to SI for FTAs 2, 3, and 4. Focus on soil and groundwater. Confirm surface drainage pattern
4	Building 62 – Current Fire Station	300-gal AFFF tank and piping system with overhead fill stations. ARFF vehicles have been known to leak. Personnel remember spraying foam that had been in trucks too long into the field to the north of the Fire Station. Vehicles are washed outside on both sides of the Fire Department. Floor drains discharge to an OWS prior to the sanitary sewer. Wash water outdoors would enter the storm sewer	Proceed to SI. Focus on soil and groundwater in and around the building and the field to the north of the Fire Station
5	Building 253 – Main Hangar and Phase Dock	FSS was supplied by a 1,100-gal AFFF [tank]. Discharges from the system entered an OWS that was manually pumped out or discharged to the storm sewer	Proceed to SI. Focus on soil and groundwater
6	Building 1046 – Fuels Hangar and Corrosion Control	FSS was supplied by a 300-gal AFFF [tank]. The hangar area drains to an 8,000-gal holding tank that is pumped out as necessary. The wash rack drains through an OWS to the sanitary sewer	Proceed to SI. Focus on soil and groundwater
7	Building 269 – Warehouse	Current AFFF storage in secondary containment. No building drains. No known spills or signs of leaks	NFA
8	Building 969 – Warehouse	1,300 gal of AFFF is currently stored in secondary containment. No building drains. No known spills or signs of leaks	NFA
9	Vehicle Maintenance Yard	Known release of AFFF from an ARFF vehicle. AFFF flowed from the yard to Outfall 003	Proceed to SI. Focus on soil and groundwater
10	Building 1160 – POL	The POL area could not be located during the PA; however, historical records indicate the POL area was located near IRP Site 9 along the south-central boundary of McEntire JNGB	Confirm the location of this building. Proceed to SI. Focus on soil and groundwater
11	Nozzle Testing Area	Known nozzle testing with AFFF	Proceed to SI. Focus on soil and groundwater. Confirm surface drainage pattern
12	Aircraft Parking Apron	Apron used for parking, fueling, and occasional maintenance of the F-16 aircraft. Known aircraft incident in front of the Main Hangar requiring the use of AFFF	Proceed to SI. Focus on soil and groundwater on the downgradient edges of the Aircraft Parking Apron
13	IRP Site 6 – C-141 Spill Area	AFFF was used to extinguish the fire and would have flowed to the open drainage ditch (IRP Site 6)	Proceed to SI. Focus on soil and groundwater
14	WWTP	Receives waste water from the Base sanitary sewer system, including the Fire Station and Fuels Hangar and Corrosion Control	Proceed to SI. Focus on soil and groundwater. Recommend sampling around the WWTP to assess the competency of underground structures
15	Outfall 001	Collects surface water runoff from the central portion of the 169 <sup>th</sup> FW area, including a portion of the Aircraft Parking Apron	Proceed to SI. Focus on sediments and surface water (if present)

**Table 1. PA Report Summary and Recommendations, McEntire JNGB, South Carolina (continued)**

<b>PRL Number</b>	<b>Potential AFFF PRL</b>	<b>Rationale</b>	<b>Recommendation</b>
16	Outfall 003	Collects surface water runoff from the southern boundary of the Base and includes the Vehicle Maintenance Yard. Known AFFF in Outfall 003 from AFFF release	Proceed to SI. Focus on sediments and surface water (if present)
17	Outfall 004	Collects surface water runoff along the southern Base boundary and includes the POL facility, which according to the Base SWPPP, had an FSS containing AFFF	Proceed to SI. Focus on sediments and surface water (if present)
18	Outfall 006	Collects surface water runoff from part of the center section of the airfield, including the Fire Station	Proceed to SI. Focus on sediments and surface water (if present)
19	Outfall 010	Collects surface water runoff from the south/east region of the Base, including a portion of the Aircraft Parking Apron and Fuels Hangar and Corrosion Control	Proceed to SI. Focus on sediments and surface water (if present)
20	WWTP Outfall	NPDES-permitted discharge of treated waste water from the Base, including floor drain discharges and waste water from the Fire Station and Fuels Hangar and Corrosion Control	Proceed to SI. Focus on sediments and surface water (if present). It is recommended that the location of the WWTP Outfall be confirmed during the SI
21	OWS Outfall	NPDES-permitted discharge of waste water from the Main Hangar floor drains to the stormwater sewer and eventually to Cedar Creek	Proceed to SI. Focus on sediments and surface water (if present). It is recommended that the location of the OWS Outfall be confirmed during the SI

AFFF = Aqueous film-forming foam.  
 ARFF = Aircraft rescue and firefighting.  
 FSS = Fire suppression system.  
 FTA = Fire training area.  
 FW = Fighter Wing.  
 gal = Gallon.  
 IRP = Installation Restoration Program.  
 JNGB = Joint National Guard Base.  
 NFA = No further action.  
 NPDES = National Pollutant Discharge Elimination System.  
 OWS = Oil/water separator.  
 PA = Preliminary assessment.  
 POL = Petroleum, oil, and lubricants.  
 PRL = Potential release location.  
 SI = Site inspection.  
 SWPPP = Storm Water Pollution Prevention Plan.  
 WWTP = Waste water treatment plant.

**Table 2. PFOS/PFOA SI Screening Criteria**

<b>Parameter</b>	<b>Chemical Abstract Service Number</b>	<b>EPA RSL for Tap Water<sup>a</sup> (ng/L)</b>	<b>EPA HA<sup>b</sup> (ng/L)</b>	<b>Residential Risk-based Soil Screening Level<sup>c</sup> (µg/kg)</b>
PFOS	1763-23-1	NA	70.0 <sup>d</sup>	1,260
PFOA	335-67-1	NA		1,260
PFBS	375-73-5	400,000 <sup>c</sup>	NA	1,260,000

<sup>a</sup> EPA RSL for tap water, May 2018.

<sup>b</sup> *Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA)* (EPA 2016a) and *Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS)* (EPA 2016b).

<sup>c</sup> Residential risk-based soil screening levels determined by using the EPA RSL calculator ([https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl\\_search](https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search)) and the May 2018 EPA RSL tables (<https://epa.gov/risk/regional-screening-levels-rsls-generic-tables-may-2018>) for soil and sediment.

<sup>d</sup> When PFOA and PFOS are both present, the combined detected concentrations of the compounds are compared with the 70-ng/L HA value.

<sup>e</sup> Analytical results for groundwater and stormwater have been compared to the tap water screening levels.

EPA = U.S. Environmental Protection Agency.

HA = Health advisory.

µg/kg = Micrograms per kilogram.

NA = Not available.

ng/L = Nanograms per liter.

PFBS = Perfluorobutane sulfonate.

PFOA = Perfluorooctanoic acid.

PFOS = Perfluorooctane sulfonate.

RSL = Regional screening level.

SI = Site inspection.



**Table 3. Summary of SI Activities**

<b>PRL Name</b>	<b>Analyzed Parameters<sup>a</sup></b>	<b>Soil Borings<sup>b</sup></b>	<b>Soil Samples<sup>b</sup></b>	<b>Groundwater Samples<sup>b,c</sup></b>	<b>Surface Water Samples<sup>d</sup></b>	<b>Sediment Samples<sup>d</sup></b>
2. IRP Site 2 – Former FTA 5	PFOS/PFOA	1	2	1	0	0
3. IRP Site 8 – (Former) FTAs 2, 3, and 4	PFOS/PFOA	1	2	1	0	0
4. Building 62 – Current Fire Station	PFOS/PFOA	2	4	1	0	0
5. Building 253 – Main Hangar and Phase Dock	PFOS/PFOA	2	4	3	0	0
6. Building 1046 – Fuels Hangar and Corrosion Control	PFOS/PFOA	2	4	2	0	0
9. Vehicle Maintenance Yard	PFOS/PFOA	2	4	1	0	0
10. Building 1160 – POL	PFOS/PFOA	2	4	1	0	0
11. Nozzle Testing Area	PFOS/PFOA	2	4	1	0	0
12. Aircraft Parking Apron	PFOS/PFOA	7	14	2	0	0
13. IRP Site 6 – C-141 Spill Area	PFOS/PFOA	3	6	1	0	0
14. WWTP	PFOS/PFOA	1	2	1	0	0
15. Outfall 001	PFOS/PFOA	0	0	0	0	1
16. Outfall 003	PFOS/PFOA	0	0	0	0	1
17. Outfall 004	PFOS/PFOA	0	0	0	1	1
18. Outfall 006	PFOS/PFOA	0	0	0	1	1
19. Outfall 010	PFOS/PFOA	0	0	0	0	1
20. WWTP Outfall	PFOS/PFOA	0	0	0	1	1

<sup>a</sup> PFOS/PFOA are used generically in this SI Report to include the following six 2012 third Unregulated Contaminant Monitoring Rule emerging contaminants: PFOS, PFOA, perfluorobutane sulfonate, perfluorononanoic acid, perfluoroheptanoic acid, and perfluorohexane sulfonate. All samples were analyzed for PFOS/PFOA using U.S. Environmental Protection Agency Method 537, revision 1.1.

<sup>b</sup> Totals include both primary samples and co-located borings/samples but do not include duplicates.

<sup>c</sup> Groundwater from PRL 11 is evaluated by the co-located well in PRL 2, and groundwater from PRL 12 is evaluated by the co-located wells in PRLs 5 and 6.

<sup>d</sup> Sediment samples were collected from all outfalls as planned. Surface water was not present at Outfalls 001, 003, or 010.

FTA = Fire training area.

IRP = Installation Restoration Program.

PFOA = Perfluorooctanoic acid.

PFOS = Perfluorooctane sulfonate.

POL = Petroleum, oil, and lubricants.

PRL = Potential release location.

SI = Site inspection.

WWTP = Waste water treatment plant.

**Table 4. Well Construction Details for McEntire JNGB SI**

<b>Monitoring Well</b>	<b>Top of Casing Elevation (ft AMSL)</b>	<b>Ground Elevation (ft AMSL)</b>	<b>Screened Interval (ft BGS)</b>	<b>Total Boring Depth (ft BTOC)</b>	<b>Well Diameter (in.)</b>	<b>Casing Type</b>
<i><b>PRL 2</b></i>						
MW-MMT02-01	232.13	232.60	42 – 52	52.5	2	PVC
<i><b>PRL 3</b></i>						
MW-MMT03-01	217.33	217.76	43 – 53	53.5	2	PVC
<i><b>PRL 4</b></i>						
MW-MMT04-01	231.82	232.04	36 – 46	50	2	PVC
<i><b>PRL 5</b></i>						
MW-MMT05-01	238.88	239.23	44 – 54	54.5	2	PVC
<i><b>PRL 6</b></i>						
MW-MMT06-01	237.71	238.13	44 – 54	54.5	2	PVC
<i><b>PRL 9</b></i>						
MW-MMT09-01	230.15	230.49	40 – 60	60.5	2	PVC
<i><b>PRL 10</b></i>						
MW-MMT10-01	231.75	231.97	40 – 60	60.5	2	PVC
<i><b>PRL 13</b></i>						
MW-MMT13-01	222.44	222.81	33 – 43	43.5	2	PVC
<i><b>PRL 14</b></i>						
MW-MMT14-01	184.76	185.24	8 – 18	18.5	2	PVC

Source: Top of casing elevation and ground surface elevation data are from the monitoring well survey in September 2018 by Black River Land Surveying, LLC, Mayesville, South Carolina (see Appendix D). Screened interval, total depth, and well diameter data in this table were obtained from the well construction diagrams provided in Appendix A and historical documents.

AMSL = Above mean sea level.

BGS = Below ground surface.

BTOC = Below top of casing.

ft = Feet.

in. = Inch.

JNGB = Joint National Guard Base.

PRL = Potential release location.

PVC = Polyvinyl chloride.

SI = Site inspection.

**Table 5. Water Level Measurements**

<b>Monitoring Well Identifier</b>	<b>TOC Elevation (ft AMSL)</b>	<b>Screened Interval (ft BGS)</b>	<b>May 2018</b>	
			<b>Depth to Water (ft BTOC)</b>	<b>Groundwater Elevation (ft AMSL)</b>
MW-MMT02-01	232.13	42 – 52	45.20	186.93
MW-MMT03-01	217.33	43 – 53	41.35	175.98
MW-MMT04-01	231.82	36 – 46	37.22	194.6
MW-MMT05-01	238.88	44 – 54	46.95	191.93
MW-MMT06-01	237.71	44 – 54	45.90	191.81
MW-MMT09-01	230.15	40 – 60	43.78	186.37
MW-MMT10-01	231.75	40 – 60	48.41	183.29
MW-MMT13-01	222.44	33 – 43	38.20	184.24
MW-MMT14-01	184.76	8 – 18	10.20	174.56

Source: TOC elevation data are from the monitoring well survey in September 2018 by Black River Land Surveying, LLC, Mayesville, South Carolina (see Appendix D). Screened interval and depth to water in this table were obtained from the well construction diagrams provided in Appendix A.

AMSL = Above mean sea level.

BGS = Below ground surface.

BTOC = Below top of casing.

ft = Feet.

TOC = Top of casing.

Table 6. Water Quality Parameters

Parameter	Groundwater Identifier					
	MW-MMT02-01-01	MW-MMT03-01-01	MW-MMT04-01-01	MW-MMT05-01-01	MW-MMT06-01-01	MW-MMT09-01-01
Dissolved oxygen (mg/L)	6.14	9.69	8.92	5.94	7.13	9.33
ORP (mV)	245.8	144.0	208.3	84.0	194.2	217.4
pH (S.U.)	5.38	6.00	5.48	5.31	6.63	4.31
Conductivity (mS/cm)	0.025	0.057	0.094	0.051	0.027	0.028
Temperature (°C)	21.88	23.63	21.38	23.02	21.75	21.94
Turbidity (NTU)	27.2	55.4	16.8	22.5	36	15.3
Parameter	Groundwater Identifier			Surface Water Identifier		
	MW-MMT10-01-01	MW-MMT13-01-01	MW-MMT14-01-01	MMT17-SW1-01	MMT18-SW1-01	MMT20-SW1-01
Dissolved oxygen (mg/L)	9.22	6.00	6.74	0.86	2.04	3.26
ORP (mV)	217.4	127.3	219.8	98.8	217.2	212.4
pH (S.U.)	5.22	6.55	6.51	4.86	5.72	7.06
Conductivity (mS/cm)	0.035	0.057	0.039	0.36	121	98
Temperature (°C)	20.23	21.23	19.93	27.72	25.89	25.43
Turbidity (NTU)	10.2	34.3	18.6	55.3	105	19.3

°C = Degrees Celsius.

mg/L = Milligrams per liter.

mS/cm = MilliSiemens per centimeter.

mV = Millivolt.

NTU = Nephelometric turbidity unit.

ORP = Oxidation-reduction potential.

S.U. = Standard unit.

Table 7. Summary of Soil Analytical Results for McEntire JNGB

Analyte						Screening Level						
PRL	Location	Sample Identifier	Sample Date	Sample Depth (ft)	Sample Type	Perfluorooctanesulfonic Acid (PFOS)	Perfluorooctanoic Acid (PFOA)	Perfluorobutanesulfonic Acid (PFBS)	Perfluorohexanoic Acid (PFHpA)	Perfluorohexanesulfonic Acid (PFHxS)	Perfluorononanoic Acid (PFNA)	
						µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	
Soil												
2	MMT02-SB1	MMT02-SB1-01	06/29/18	0 – 2	REG	35 J	0.19 J	0.19 U	0.21 U	1.2	0.21 J	
		MMT02-SB1-02	06/29/18	19.5 – 20	REG	3.4	0.91	0.21 J	0.13 J	8.9	0.23 U	
3	MMT03-SB1	MMT03-SB1-01	06/29/18	0 – 2	REG	6.9	0.88	0.19 J	0.42	1.8	0.24 U	
		MMT03-SB1-02	06/29/18	19.5 – 20	REG	0.65 U	0.26 U	0.23 U	0.26 U	0.26 U	0.26 U	
4	MMT04-SB1	MMT04-SB1-01	06/27/18	0 – 2	REG	220 J	5.9	6.2	3.4	33 J	4.3	
		MMT04-SB1-02	06/27/18	19.5 – 20	REG	43 J	3	2.2	4.2	10	0.67	
	MMT04-SB2	MMT04-SB1-02D	06/27/18	19.5 – 20	FD	36 J	2.5	2	3.4	8.9	0.6	
		MMT04-SB2-01	06/27/18	0 – 2	REG	120 J	1.3	0.21 U	0.9	1.1	1.9	
5	MMT05-SB1	MMT04-SB2-02	06/27/18	19.5 – 20	REG	240 J	4.7	1	3.5	10	2 J	
		MMT05-SB1-01	06/26/18	0 – 2	REG	9.9	0.25 U	0.22 U	0.25 U	0.43	0.25 U	
	MMT05-SB2	MMT05-SB1-02	06/26/18	19.5 – 20	REG	180 J	1.3	1.8	0.4	16	0.23 UJ	
		MMT05-SB2-01	06/26/18	0 – 2	REG	1.7	1.2	0.21 U	2	2.2	0.24 U	
6	MMT06-SB1	MMT05-SB2-02	06/26/18	19.5 – 20	REG	0.6 U	0.14 J	0.13 J	0.57	0.48	0.24 U	
		MMT06-SB1-01	06/26/18	0 – 2	REG	21	2.4	0.21 U	0.68	0.17 J	94 J	
	MMT06-SB2	MMT06-SB1-02	06/26/18	19.5 – 20	REG	0.57 J	0.45	0.21 U	0.58	0.23 U	0.47	
		MMT06-SB2-01	06/26/18	0 – 2	REG	5.1	0.77	0.2 U	0.66	0.13 J	2	
9	MMT09-SB1	MMT06-SB2-01D	06/26/18	0 – 2	FD	4.7	0.6	0.2 U	0.64	0.15 J	1.6	
		MMT06-SB2-02	06/26/18	19.5 – 20	REG	0.57 U	0.76	0.21 U	1.5	0.19 J	0.16 J	
	MMT09-SB2	MMT09-SB1-01	06/29/18	0 – 2	REG	0.68 J	0.3 J	0.19 U	0.14 J	0.4	0.21 U	
		MMT09-SB2-01	06/29/18	19.5 – 20	REG	0.58 U	0.23 U	0.21 U	0.23 U	0.093 J	0.23 U	
10	MMT10-SB1	MMT09-SB2-01	06/28/18	0 – 2	REG	0.64 J	0.14 J	0.21 U	0.23 U	0.2 J	0.23 U	
		MMT10-SB1-01	06/29/18	0 – 2	REG	0.53 U	0.21 U	0.19 U	0.21 U	0.066 U	0.21 U	
		MMT10-SB1-02	06/29/18	19.5 – 20	REG	0.27 J	0.47	0.2 U	0.19 J	0.26 J	0.22 U	
			06/29/18	19.5 – 20	REG	0.6 U	0.24 U	0.22 U	0.24 U	0.24 U	0.24 U	

**Table 7. Summary of Soil Analytical Results for McEntire JNGB (continued)**

Analyte							Perfluorooctanesulfonic Acid (PFOS)	Perfluorooctanoic Acid (PFOA)	Perfluorobutanesulfonic Acid (PFBS)	Perfluorohexptanoic Acid (PFHpA)	Perfluorohexanesulfonic Acid (PFHxS)	Perfluorononanoic Acid (PFNA)
PRL	Location	Sample Identifier	Sample Date	Sample Depth (ft)	Sample Type	Screening Level	1,260 µg/kg	1,260 µg/kg	1,260,000 µg/kg	NA µg/kg	NA µg/kg	NA µg/kg
10	MMT10-SB2	MMT10-SB2-01	06/29/18	0 – 2	REG		3.1	0.38	0.2 U	0.58	0.22 U	0.73
		MMT10-SB2-01D	06/29/18	0 – 2	FD		2.1	0.24 J	0.21 U	0.31 J	0.23 U	0.49
		MMT10-SB2-02	06/29/18	19.5 – 20	REG		0.61 U	0.24 U	0.22 U	0.24 U	0.24 U	0.24 U
11	MMT11-SB1	MMT11-SB1-01	06/29/18	0 – 2	REG		190 J	0.33	0.2 U	0.17 J	0.95	0.82
		MMT11-SB1-02	06/29/18	19.5 – 20	REG		70 J	0.23 U	0.21 U	0.23 U	0.28 J	0.23 U
		MMT11-SB2	06/29/18	0 – 2	REG		23 J	1.5	0.2 U	1.7	4.2 J	0.27 J
12	MMT12-SB1	MMT11-SB2-02	06/29/18	19.5 – 20	REG		0.95 J	0.35 J	0.64	0.43	1.7	0.28 U
		MMT12-SB1-01	06/26/18	0 – 2	REG		11	0.36	0.2 U	0.23 U	0.66	0.26 J
		MMT12-SB1-02	06/26/18	19.5 – 20	REG		1.1	0.24 J	0.13 J	0.16 J	1.1	0.23 U
	MMT12-SB2	MMT12-SB2-01	06/26/18	0 – 2	REG		1.5	0.13 J	0.22 U	0.25 U	0.25 U	0.17 J
		MMT12-SB2-02	06/26/18	19.5 – 20	REG		0.64 U	0.25 U	0.23 U	0.25 U	0.25 U	0.25 U
		MMT12-SB3	06/26/18	0 – 2	REG		3.8	0.27 U	0.24 U	0.27 U	0.27 U	0.17 J
13	MMT13-SB1	MMT12-SB3-02	06/26/18	19.5 – 20	REG		0.57 U	0.23 U	0.21 U	0.23 U	0.12 J	0.23 U
		MMT13-SB1-01	06/28/18	0 – 2	REG		1.7	0.22 J	0.2 U	0.21 J	0.55	0.22 U
		MMT13-SB1-01D	06/28/18	0 – 2	FD		1.3	0.26 U	0.24 U	0.11 J	0.29 J	0.26 U
	MMT13-SB2	MMT13-SB1-02	06/28/18	19.5 – 20	REG		0.57 U	0.23 U	0.2 U	0.23 U	0.1 J	0.23 U
		MMT13-SB2-01	06/28/18	0 – 2	REG		2.5	0.33 J	0.21 U	0.14 J	0.36	0.11 J
		MMT13-SB2-02	06/28/18	19.5 – 20	REG		2.5	0.51	0.34 J	0.12 J	3.8	0.23 U
	MMT13-SB3	MMT13-SB2-02D	06/28/18	19.5 – 20	FD		2.5	0.54	0.37 J	0.14 J	4.2	0.23 U
		MMT13-SB3-01	06/28/18	0 – 2	REG		20	0.24 J	0.2 U	0.23 U	1.8	0.15 J
		MMT13-SB3-02	06/28/18	19.5 – 20	REG		0.88 J	0.35	1.5	0.31 J	5.6	0.24 U
14	MMT14-SB1	MMT14-SB1-01	06/28/18	0 – 2	REG		9.8	0.14 J	0.18 U	0.2 U	0.12 J	0.41
		MMT14-SB1-02	06/28/18	19.5 – 20	REG		0.74 J	0.24 U	0.22 U	0.098 J	0.22 J	0.24 U
		MMT14-SB2	06/28/18	0 – 2	REG		19	0.56	0.22 U	0.78	3.5	0.37
		MMT14-SB2-02	06/28/18	19.5 – 20	REG		0.47 J	0.25 U	0.19 J	0.34 J	1.1	0.25 U

Table 7. Summary of Soil Analytical Results for McEntire JNGB (continued)

PRL	Location	Sample Identifier	Analyte			Screening Level <sup>a</sup>						
			Sample Date	Sample Depth (ft)	Sample Type	Perfluorooctanesulfonic Acid (PFOS)	Perfluorooctanoic Acid (PFOA)	Perfluorobutanesulfonic Acid (PFBS)	Perfluorohexanoic Acid (PFHpA)	Perfluorohexanesulfonic Acid (PFHxS)	Perfluorononanoic Acid (PFNA)	
						µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Sediment												
15	MMT15-SD1	MMT15-SD1-01	07/01/18	NA	REG	4.6	0.25 U	0.08 J	0.25 U	0.46	0.25 U	
16	MMT16-SD1	MMT16-SD1-01	07/02/18	NA	REG	12	0.24 U	0.22 U	0.13 J	0.52	0.13 J	
17	MMT17-SD1	MMT17-SD1-01	07/01/18	NA	REG	22	0.81 J	0.59 U	0.66 U	0.95 J	0.66 U	
		MMT17-SD1-01D	07/01/18	NA	FD	30	0.7 U	0.37 J	0.7 U	2.6	0.36 J	
18	MMT18-SD1	MMT18-SD1-01	07/02/18	NA	REG	9.7	0.22 J	0.25 U	0.28 U	0.82	0.11 J	
19	MMT19-SD1	MMT19-SD1-01	07/01/18	NA	REG	1.8	0.24 U	0.21 U	0.24 U	0.48	0.24 U	
20	MMT20-SD1	MMT20-SD1-01	06/28/18	NA	REG	1.5	0.24 U	0.22 U	0.24 U	0.11 J	0.24 U	

<sup>a</sup> U.S. Environmental Protection Agency (EPA) residential risk-based soil screening level determined using the EPA regional screening level (RSL) calculator and May 2018 EPA RSL tables.

**Bold** denotes detected concentration.

FD = Field duplicate.

ft = Feet.

JNGB = Joint National Guard Base.

µg/kg = Micrograms per kilogram.

NA = Not applicable.

PRL = Potential release location.

REG = Regular.

Data Qualifiers:

J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was not deemed above the reported sample quantitation limit; however, the reported quantitation limit is approximate.



Table 8. Summary of Groundwater and Surface Water Analytical Results at McEntire JNGB

PRL	Location	Sample Identifier	Sample Date	Screened Interval (ft BGS)	Analyte		Perfluorooctane Sulfonate (PFOS) (ng/L)	Perfluorooctanoic Acid (PFOA) (ng/L)	PFOS+PFOA (ng/L) <sup>c</sup>	Perfluorobutane Sulfonate (PFBS) (ng/L)	Perfluorohexanoic Acid (PFHpA) (ng/L)	Perfluorohexane Sulfonate (PFHxS) (ng/L)	Perfluorononanoic Acid (PFNA) (ng/L)
					HA <sup>a</sup>								
					EPA RSL Tap Water <sup>b</sup>								
					Sample Type								
Groundwater													
2	MW-MMT02-01	MW-MMT02-01-01	07/03/18	42 – 52	REG	1,100 J	550 J	1,650 J	250	170	2,100 J	8.1	
3	MW-MMT03-01	MW-MMT03-01-01	07/04/18	43 – 53	REG	2.4 J	2.9 U	3.85 J	1 J	2.9 U	5.2	2.9 U	
4	MW-MMT04-01	MW-MMT04-01-01	07/19/18	36 – 46	REG	45	4.9	49.9	8.8	5.5	91	1.1 J	
5	MW-MMT05-01	MW-MMT05-01-01	07/02/18	44 – 54	REG	5,400 J	300	5,700 J	290	110 J	2,100 J	6.6	
6	MW-MMT06-01	MW-MMT06-01-01	07/02/18	44 – 54	REG	220	130	350	77	420	520 J	31	
		MW-MMT06-01-01D	07/02/18	44 – 54	FD	220	130	350	80	430	540	31	
9	MW-MMT09-01	MW-MMT09-01-01	07/18/18	40 – 60	REG	9,500 J	390 J	9,890 J	310	300	2,800 J	88 J	
10	MW-MMT10-01	MW-MMT10-01-01	07/19/18	40 – 60	REG	85	16	101	26	32	150	1.8 J	
13	MW-MMT13-01	MW-MMT13-01-01	07/03/18	33 – 43	REG	950	23	973	22	16	170	5.8 J	
14	MW-MMT14-01	MW-MMT14-01-01	07/03/18	8 – 18	REG	400	46	446	32	110	430	9.1	
Surface Water													
17	MMT17-SW1	MMT17-SW1-01	07/01/18	NA	REG	38	3.7	41.7	2 J	2 J	15	1.2 U	
		MMT17-SW1-01D	07/01/18	NA	FD	28	2.1	30.1	1.5 J	1.7	10	0.95 U	
18	MMT18-SW1	MMT18-SW1-01	07/02/18	NA	REG	1,100 J	52	1,152 J	34	80	330	18	
20	MMT20-SW1	MMT20-SW1-01	06/28/18	NA	REG	420 J	12	432 J	8.2	11	56	1.7 U	

**Table 8. Summary of Groundwater and Surface Water Analytical Results at McEntire JNGB (continued)**

<sup>a</sup> May 2016 EPA HA for PFOS/PFOA combined.  
<sup>b</sup> May 2018 EPA RSL for tap water.  
<sup>c</sup> If either PFOS or PFOA is non-detect, then one-half the detection limit for that chemical is used to calculate the PFOS+PFOA value.  
**Bold** text denotes detected concentration.  
**Bold highlighted** text denotes concentration that exceeds screening criteria.  
 BGS = Below ground surface.  
 EPA = U.S. Environmental Protection Agency.  
 FD = Field duplicate.  
 ft = Feet.  
 HA = Health advisory.  
 Data Qualifiers:  
 J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.  
 U = The analyte was analyzed for, but was not detected above, the reported sample quantitation limit.

**Table 9. SI Recommendation Summary Table**

<b>PRL Number</b>	<b>PRL Description</b>	<b>Constituents Above Screening Criteria</b>	<b>Sampling Recommendations and Objectives</b>
2	IRP Site 2 – Former FTA 5	<u>Groundwater:</u> PFOS, PFOA, PFOS+PFOA	<u>Soil:</u> Although screening criteria were not exceeded, additional surface and subsurface soil samples are recommended to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater exceedances downgradient of PRL 2 <u>Groundwater:</u> Determine the nature and extent (both vertically and horizontally) through the sampling of additional existing and new monitoring wells located up- and downgradient of PRL 2
3	IRP Site 8 – Former FTAs 2, 3, and 4	<u>None</u>	<u>Soil:</u> Although screening criteria were not exceeded, additional surface and subsurface soil samples are recommended to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater detections downgradient of PRL 3 <u>Groundwater:</u> Determine the nature and extent of PFOS/PFOA detections in groundwater (both laterally and vertically) through sampling of additional existing or new monitoring wells located both up- and downgradient of PRL 3
4	Building 62 – Current Fire Station	<u>None</u>	<u>Soil:</u> Although screening criteria were not exceeded, additional surface and subsurface soil samples are recommended to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to detected PFOS/PFOA in groundwater downgradient of PRL 4 <u>Groundwater:</u> Determine the nature and extent (both laterally and vertically) of PFOS/PFOA in downgradient groundwater well MW-MMT04-01 through sampling of additional existing and new monitoring wells located both up- and downgradient of PRL 4
5	Building 253 – Main Hangar and Phase Dock	<u>Groundwater:</u> PFOS, PFOA, PFOS+PFOA in co-located downgradient well MW-MMT-06-01	<u>Soil:</u> Although screening criteria were not exceeded, additional surface and subsurface soil samples are recommended to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater exceedances downgradient of PRL 5 <u>Groundwater:</u> Determine the nature and extent (both vertically and horizontally) through the sampling of additional existing and new monitoring wells located up- and downgradient of PRL 5
6	Building 1046 – Fuels Hangar and Corrosion Control	<u>Groundwater:</u> PFOS, PFOA, PFOS+PFOA	<u>Soil:</u> Although screening criteria were not exceeded, additional surface and subsurface soil samples are recommended to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater exceedances downgradient of PRL 6 <u>Groundwater:</u> Determine the nature and extent (both vertically and horizontally) through the sampling of additional existing and new monitoring wells located up- and downgradient of PRL 6
9	Vehicle Maintenance Yard	<u>Groundwater:</u> PFOS, PFOA, PFOS+PFOA	<u>Soil:</u> Although screening criteria were not exceeded, additional surface and subsurface soil samples are recommended to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater exceedances in PRL 9 wells <u>Groundwater:</u> Determine the nature and extent (both vertically and horizontally) through the sampling of additional existing and new monitoring wells located up- and downgradient of PRL 9

**Table 9. SI Recommendation Summary Table (continued)**

<b>PRL Number</b>	<b>PRL Description</b>	<b>Constituents Above Screening Criteria</b>	<b>Sampling Recommendations and Objectives</b>
10	Building 1160 – POL	<u>Groundwater:</u> PFOS, PFOS+PFOA	<u>Soil:</u> Although screening criteria were not exceeded, additional surface and subsurface soil samples are recommended to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater exceedances downgradient of PRL 10 <u>Groundwater:</u> Determine the nature and extent (both vertically and horizontally) through the sampling of additional existing and new monitoring wells located up- and downgradient of PRL 10
11	Nozzle Testing Area	<u>Groundwater:</u> PFOS, PFOA, PFOS+PFOA in co-located downgradient well MW-MMT02-01	<u>Soil:</u> Although screening criteria were not exceeded, additional surface and subsurface soil samples are recommended to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater exceedances downgradient of PRL 11 <u>Groundwater:</u> Determine the nature and extent of PFOS/PFOA in groundwater (both laterally and vertically) through sampling of additional existing and new monitoring wells located both up- and downgradient of PRL 11
12	Aircraft Parking Apron	<u>Groundwater:</u> PFOS, PFOA, PFOS+PFOA in co-located down-gradient wells MW-MMT05-01 and MW-MMT06-01	<u>Soil:</u> Although screening criteria were not exceeded, additional surface and subsurface soil samples are recommended to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater exceedances downgradient of PRL 12 <u>Groundwater:</u> Determine the nature and extent (both laterally and vertically) of PFOS/PFOA observed in co-located PRL 5 and PRL 6 groundwater wells through sampling of additional existing and new monitoring wells located both up- and downgradient of PRL 12
13	IRP Site 6 – C-141 Spill Area	<u>Groundwater:</u> PFOS, PFOS+PFOA	<u>Soil:</u> Although screening criteria were not exceeded, additional surface and subsurface soil samples are recommended to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater exceedances downgradient of PRL 13 <u>Groundwater:</u> Determine the nature and extent (both vertically and horizontally) through the sampling of additional existing and new monitoring wells located up- and downgradient of PRL 13
14	WWTP	<u>Groundwater:</u> PFOS, PFOS+PFOA	<u>Soil:</u> Although screening criteria were not exceeded, additional surface and subsurface soil samples are recommended to determine the lateral and vertical extents of PFOS/PFOA detections in soil to define the source that is contributing to groundwater exceedances in downgradient PRL 14 wells <u>Groundwater:</u> Determine the nature and extent (both vertically and horizontally) through the sampling of additional existing and new monitoring wells located up- and downgradient of PRL 14

**Table 9. SI Recommendation Summary Table (continued)**

<b>PRL Number</b>	<b>PRL Description</b>	<b>Constituents Above Screening Criteria</b>	<b>Sampling Recommendations and Objectives</b>
15	Outfall 001	<u>None</u>	<u>Sediment:</u> Although screening criteria were not exceeded, additional sediment samples are recommended to determine if PFOS/PFOA has migrated off-Base from Outfall 004 and to define the source that is contributing to surface water detections at this outfall
16	Outfall 003	<u>None</u>	<u>Sediment:</u> Although screening criteria were not exceeded, additional sediment samples are recommended to determine the nature and extent of PFOS/PFOA detections in sediment at Outfall 003
17	Outfall 004	<u>None</u>	<u>Sediment:</u> Although screening criteria were not exceeded, additional sediment samples are recommended to determine if PFOS/PFOA has migrated off-Base from Outfall 004 and to define the source that is contributing to surface water detections at this outfall <u>Surface Water:</u> Although screening criteria were not exceeded, additional surface water sampling downstream of Stormwater Outfall 004 to determine if PFOS/PFOA observed in surface water at the Installation boundary extends to downstream locations
18	Outfall 006	<u>Surface water:</u> PFOS, PFOS+PFOA,	<u>Sediment:</u> Although screening criteria were not exceeded, additional sediment samples are recommended to determine if PFOS/PFOA has migrated off-Base from Outfall 004 and to define the source that is contributing to surface water detections at this outfall <u>Surface Water:</u> Surface water sampling downstream of Stormwater Outfall 006 to determine if PFOS/PFOA observed in surface water on the Installation boundary extends to downstream locations
19	Outfall 010	<u>None</u>	<u>Sediment:</u> Although screening criteria were not exceeded, additional sediment samples are recommended to determine if PFOS/PFOA has migrated from Outfall 010 and to define the source that is contributing to surface water exceedances at this outfall
20	WWTP 001	<u>Surface water:</u> PFOS, PFOS+PFOA,	<u>Sediment:</u> Although screening criteria were not exceeded, additional sediment samples are recommended to determine if PFOS/PFOA has migrated from WWTP 001 and to define the source that is contributing to surface water exceedances at this outfall <u>Surface Water:</u> Surface water sampling downstream of the WWTP Outfall to determine if PFOS/PFOA exceedances in surface water at this location extend downstream

FTA = Fire training area.  
 IRP = Installation Restoration Program.  
 PFOA = Perfluorooctanoic acid.  
 PFOS = Perfluorooctane sulfonate.  
 POL = Petroleum, oil, and lubricants.  
 PRL = Potential release location.  
 SI = Site inspection.  
 WWTP = Waste water treatment plant.

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## **FIGURES**



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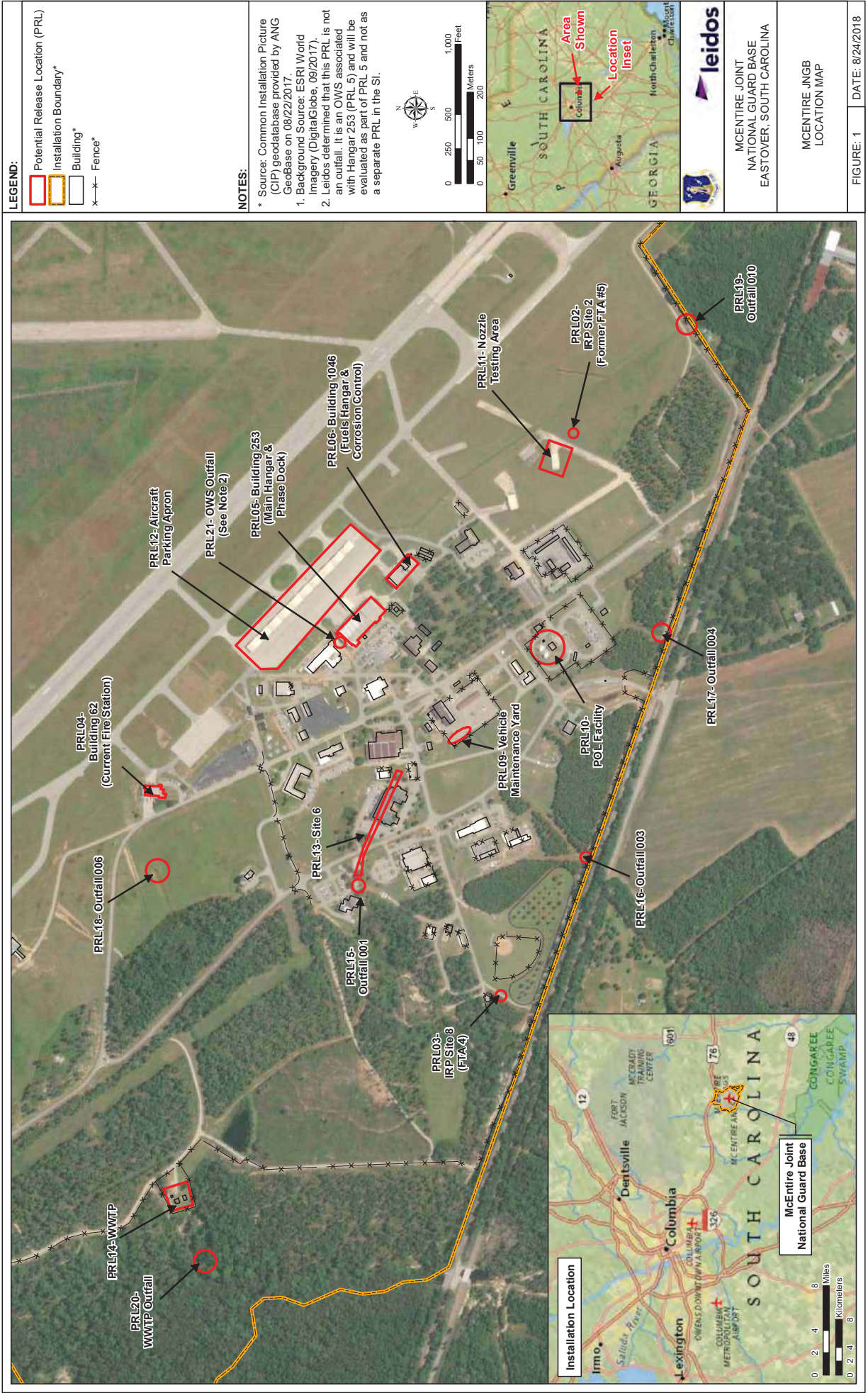
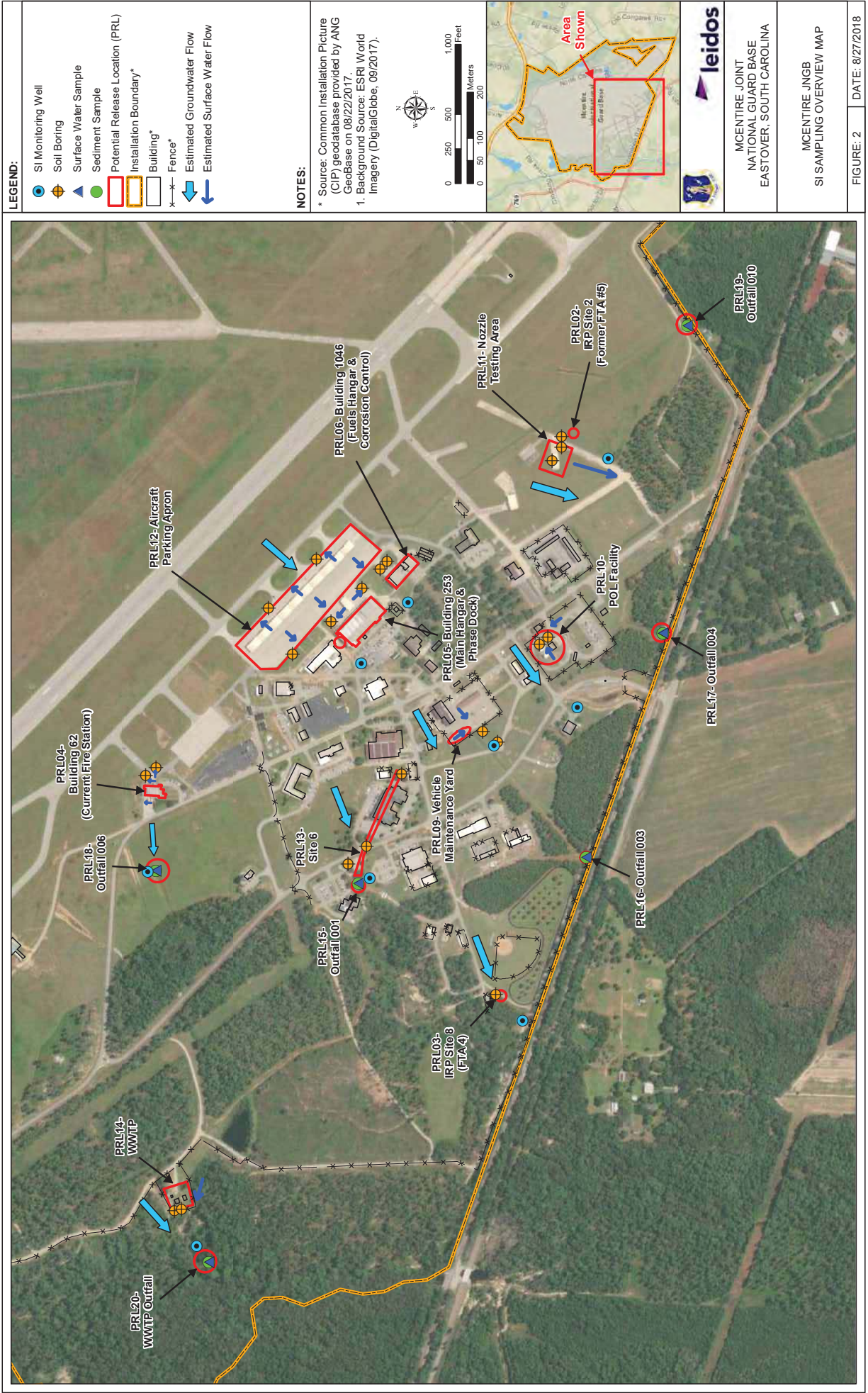


FIGURE 1 DATE: 8/24/2018







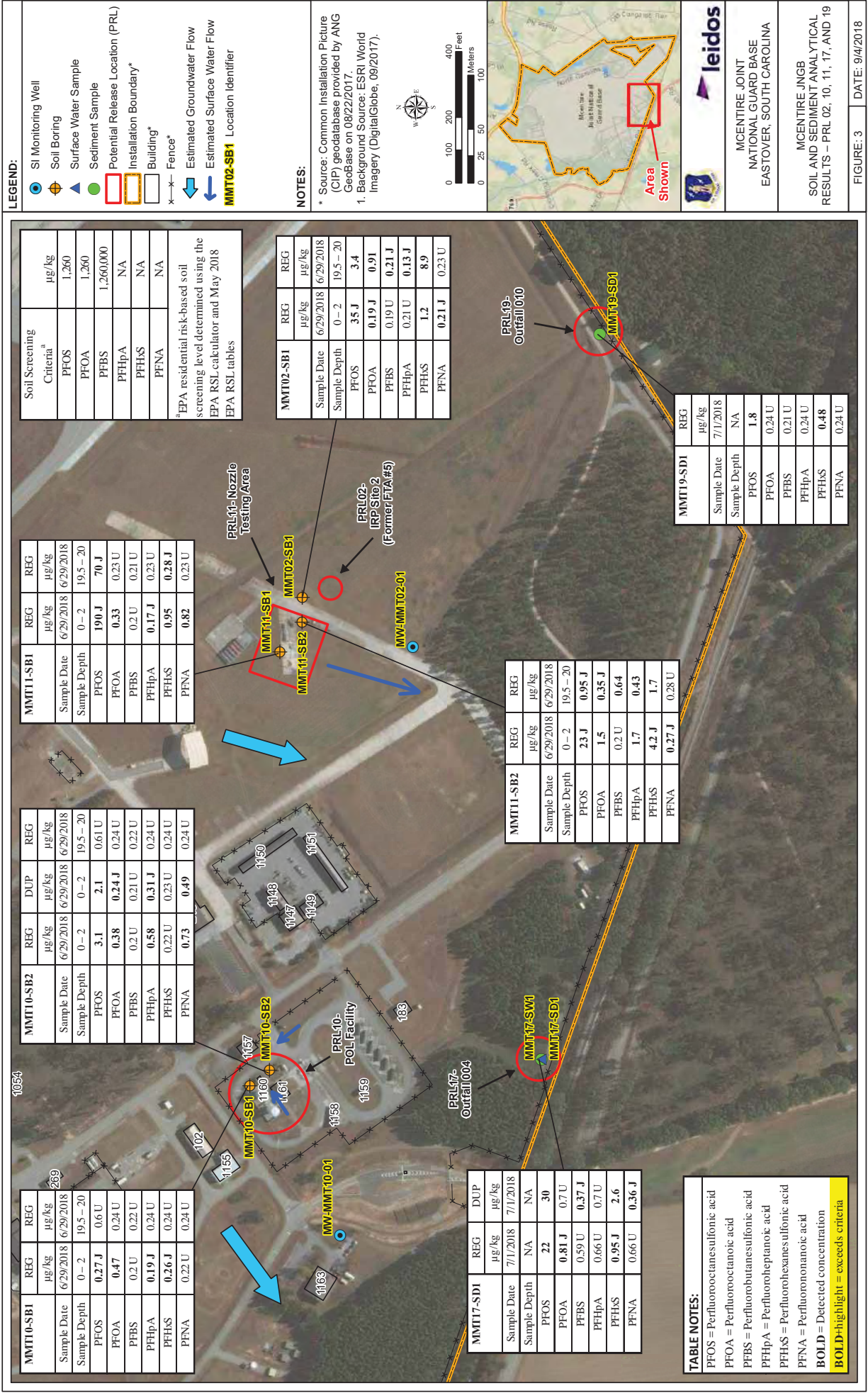
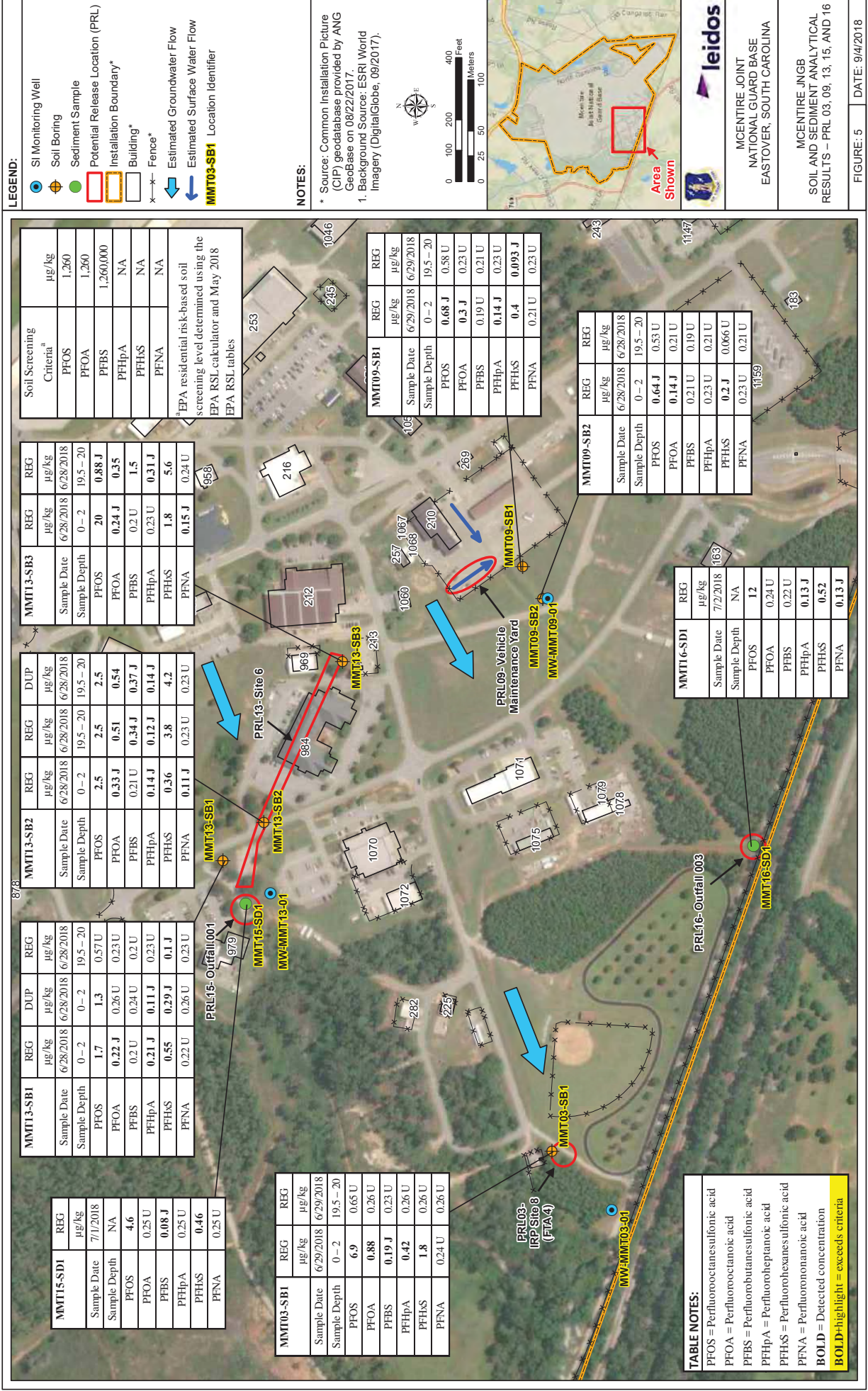


Figure 3. PRLs 2, 10, 11, 17, and 19 SI Soil and Sediment Analytical Result











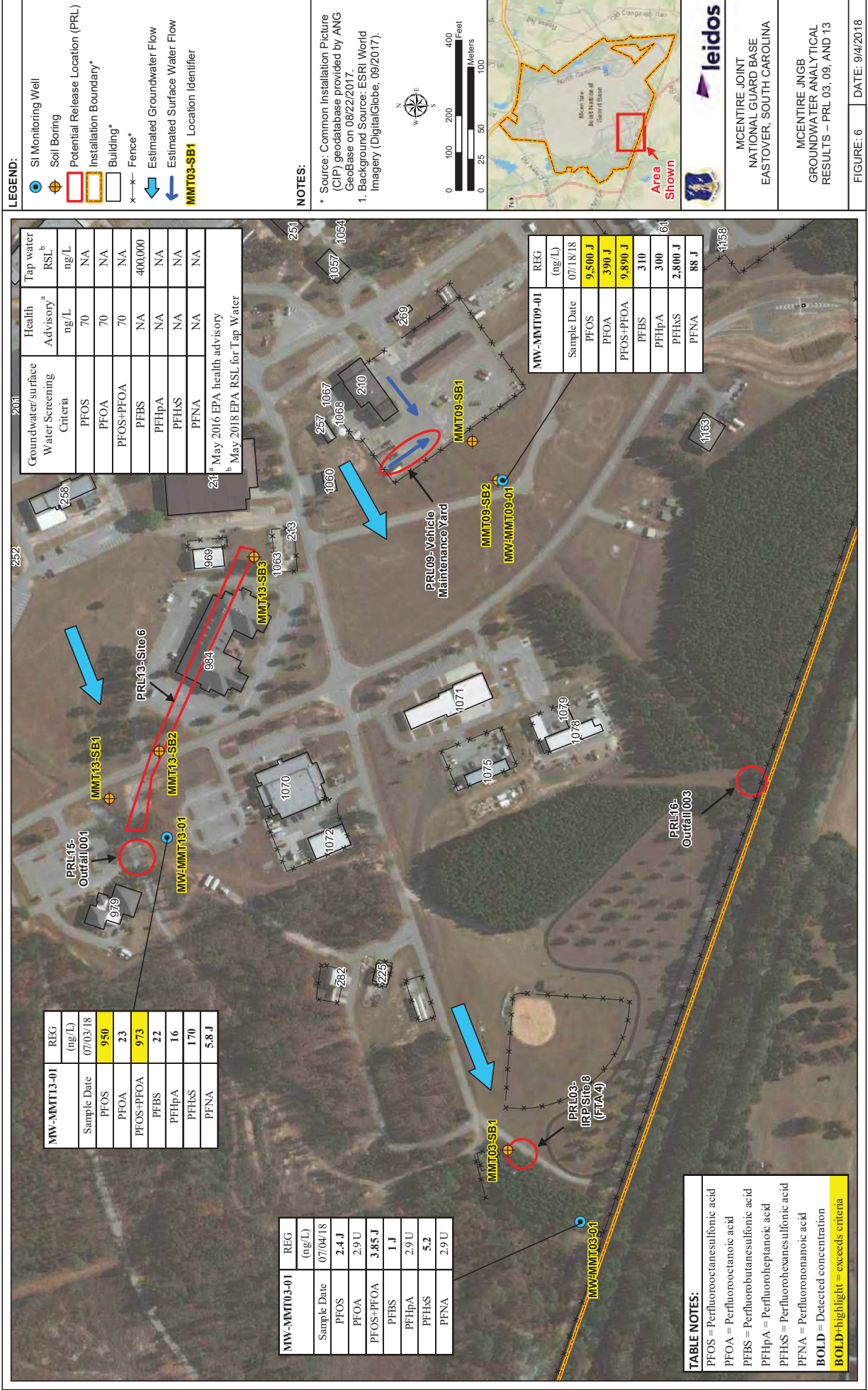
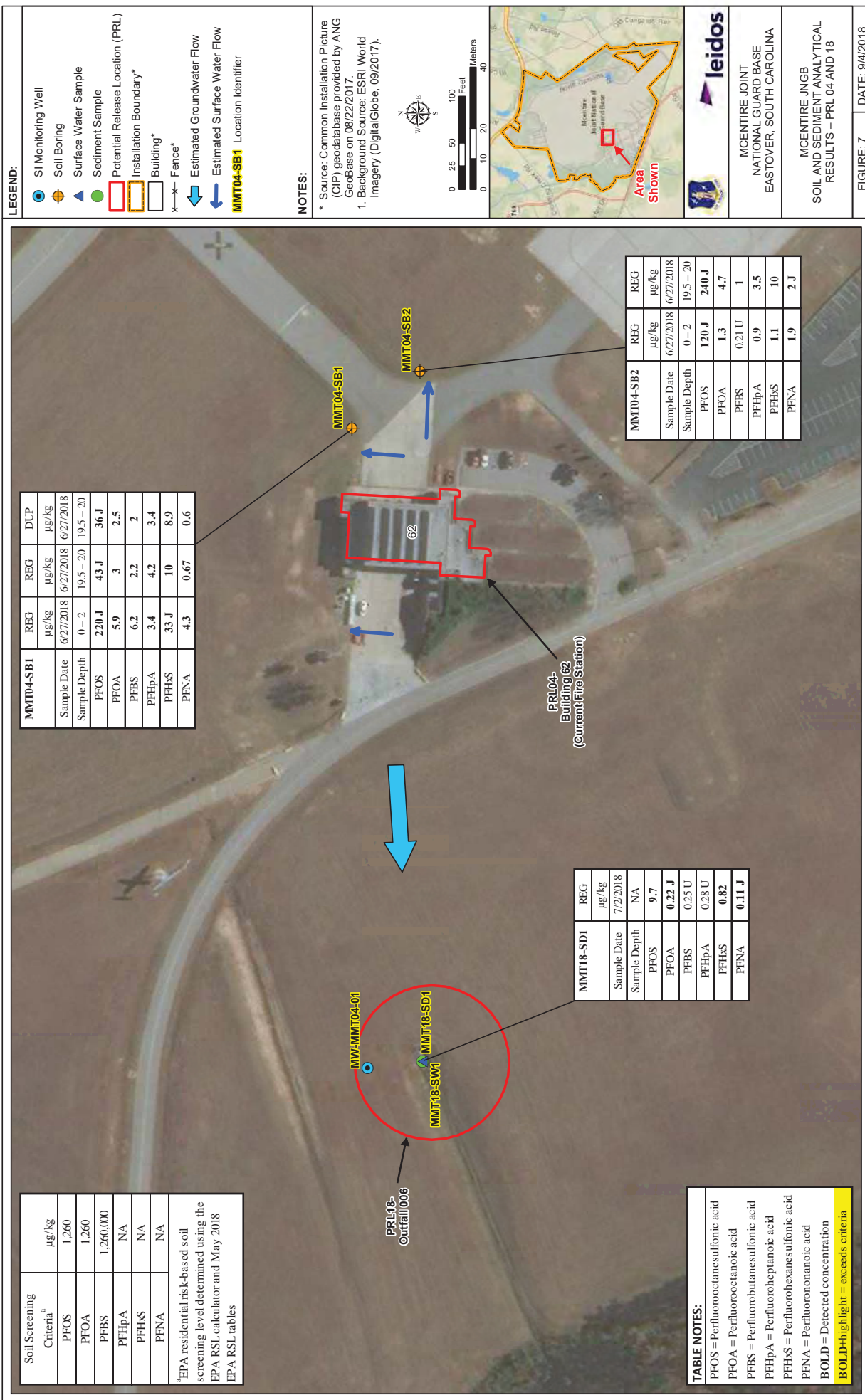
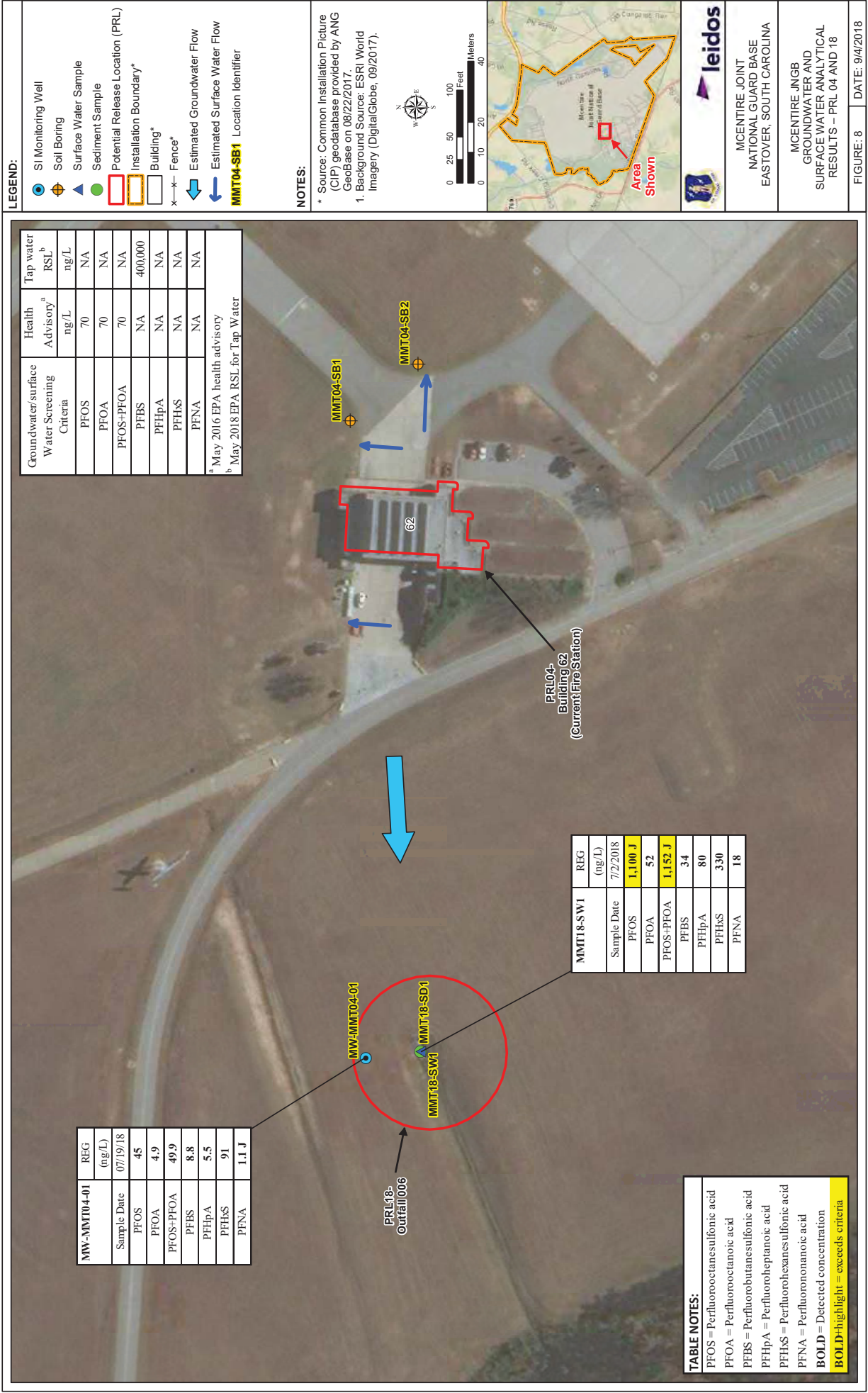


Figure 6. PRLs 3, 9, and 13 Groundwater Analytical Results

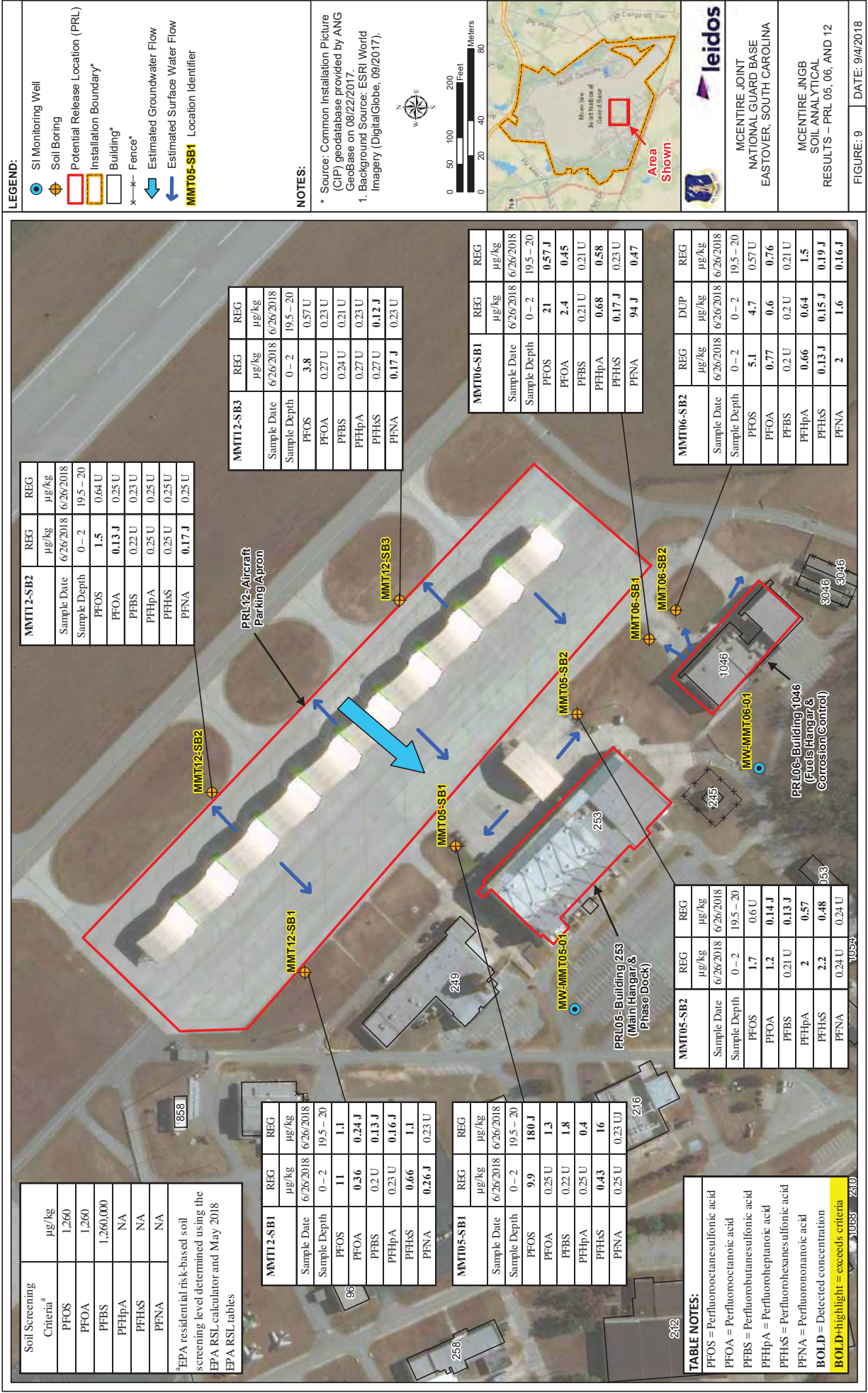


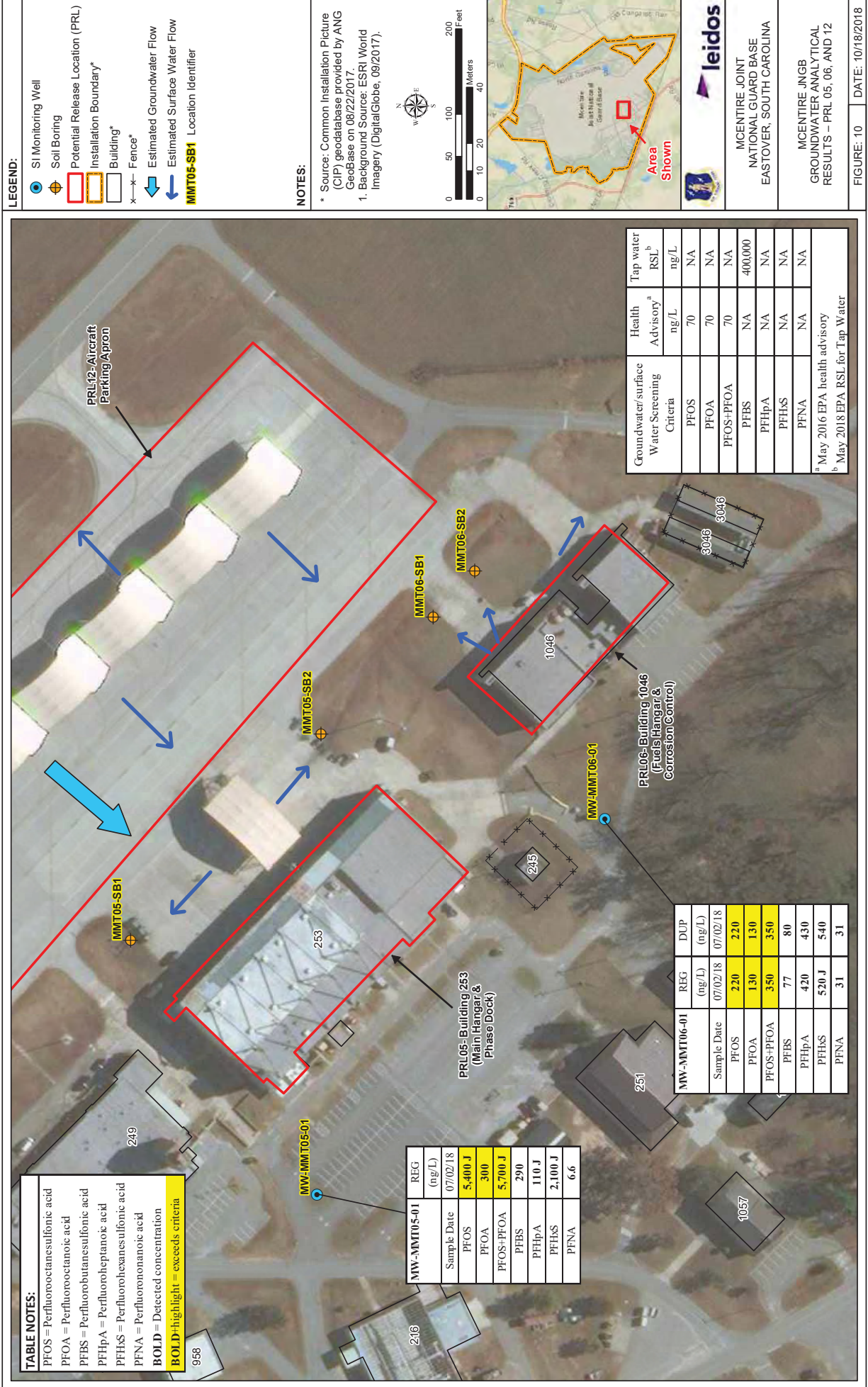


### Figure 7. PRLs 4 and 18 SI Soil and Sediment Analytical Results











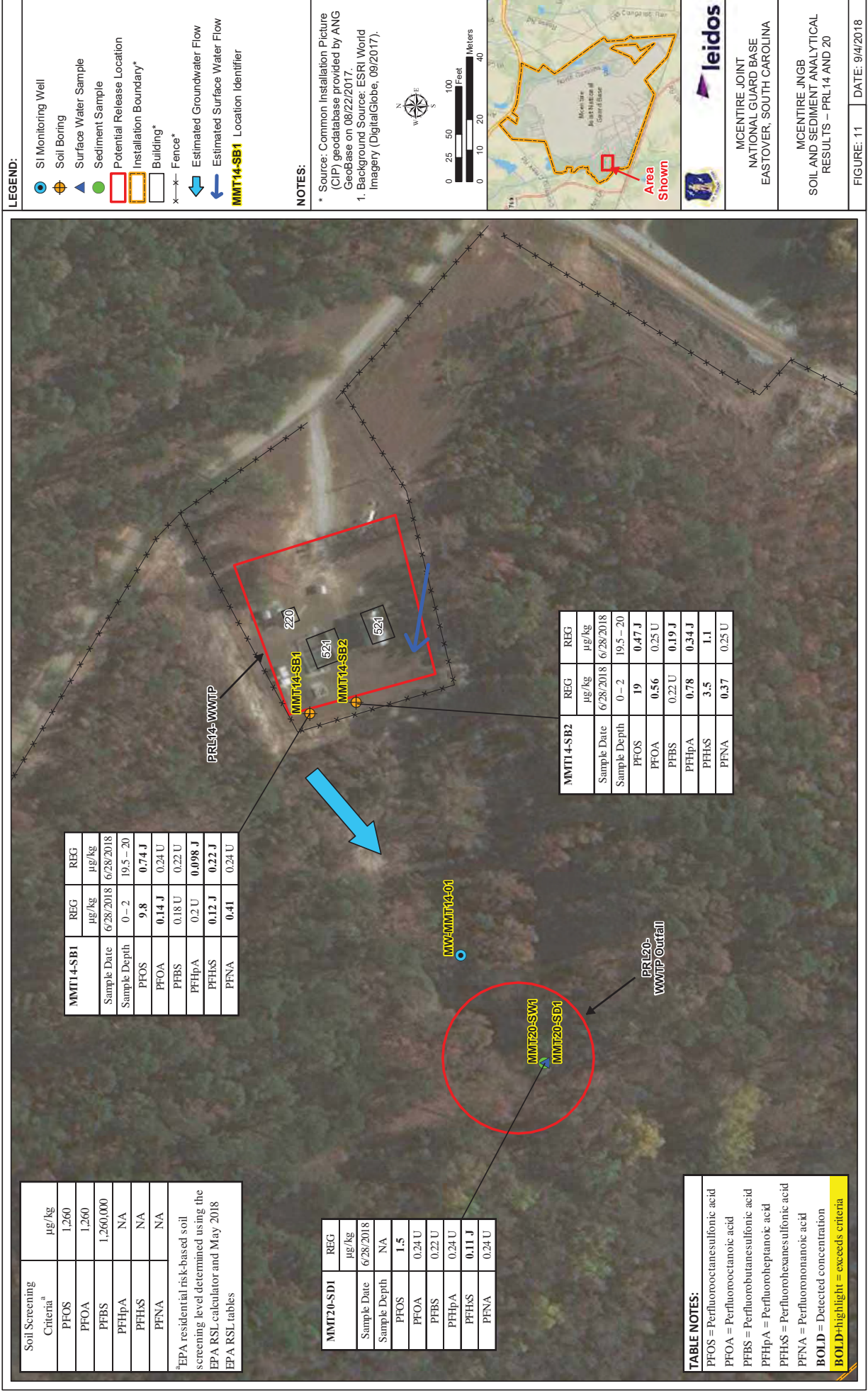


Figure 11. PRLs 14 and 20 SI Soil and Sediment Analytical Results

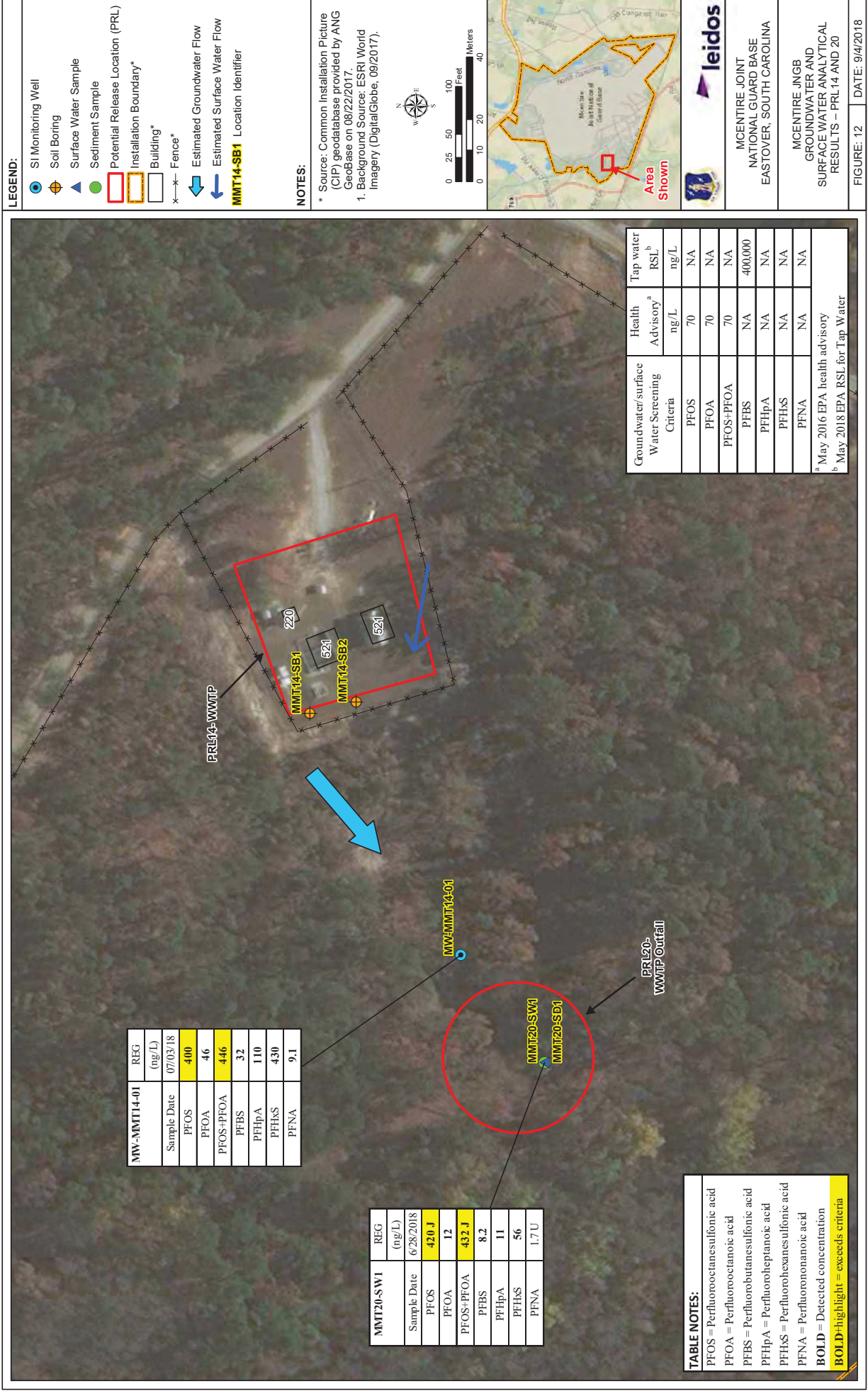


Figure 12. PRLs 14 and 20 SI Groundwater and Surface Water Analytical Results

## **APPENDIX A**

### **SOIL BORINGS AND WELL CONSTRUCTION LOGS**

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Client/Installation ANG/McEntire JNGB		Oversight Contractor Leidos	Borehole Number MW MMT 05-SB 01
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Driller M&W Drilling	Page Page 1 of 6
Sizes and Type of Drilling and Sampling Equipment Geoprobe: 7822 DT Truck mounted Hollow Stem Auger Schram:		Borehole Location Description PRL 05 - SW of B253 in parking lot	
Date/Time Started (MM-DD-YYYY)/(0000) 06/25/2018 1119		Date/Time Finished (MM-DD-YYYY)/(0000) 06/25/2018 1425	
Overburden Thickness 4"	Depth to Groundwater 47'	Total Depth 50'	
Sample for PFOS/PFOA Analysis		Sample for PFOS/PFOA Analysis	
Sample ID: MMT -SB -01 NA		Sample ID: MMT -SB -02 NA	
Sample Interval: 0 to 2 ft		Sample Interval: to ft	
Sample ID: MMT -SB -03 (if required) NA		Sample ID: MMT -SB -04 (if required) NA	
Sample Interval: to ft		Sample Interval: to ft	
Inspector Name Denae Athay		Inspector Signature Denae Athay	
Monitoring Well ID: MW-MMT05-01	Backfill Type NA	Date Backfilled (MM-DD-YYYY) NA	
Latitude 33.91549602°N	Longitude 80.80331124°W	Elevation 252'	
Notes: Drilled well 6/30/2018			
Sketch:			

Client/Installation ANG/McEntire JNGB		Borehole Number MMT 05 SB 01		Page Page 2 of 6	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Danae Athay		Date (MM-DD-YYYY) 06/25/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
0.5	Grass Light brown, loose dry silty clay w/ a little sand 54R 5/4	0.0 ppm	NA		
1					
1.5	same as above but more clay				
2	Brownish-red, moist clay plastic 2.54R 4/4				
2.5					
3	Red clay, moist, very plastic, 10% embedded sands 104R 3/6				
3.5					
4					
4.5					
5					
5.5	Red clay, hard and dry, med. plastic, 10% embedded quartz sands 104R 3/6	0.0 ppm	NA		
6					
6.5					
7					
7.5					
8					
8.5					
9					
9.5					
10					



Client/Installation ANG/McEntire JNGB		Borehole Number MMT <u>05</u> - <u>S8</u> <u>01</u>		Page Page <u>3</u> of <u>6</u>	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Danae Athay		Date (MM-DD-YYYY) <u>06/25/2018</u>	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
10.5 11.0 11.5 12.0 12.5 13.0 13.5 14.0 14.5 15.0	Orange/red hard clay, medium plasticity, 25% embedded sands 2.5 4R 5/6	0.0 ppm ↓	NA	10.5 11.0 11.5 12.0 12.5 13.0 13.5 14.0 14.5 15.0	
15.5 16.0 16.5 17.0 17.5	Same as 10-15'	0.0 ppm ↓	NA	15.5 16.0 16.5 17.0 17.5	
18.0 18.5 19.0 19.5 20.0	Mix of small gravel, sand, and clay. light pink Mix of <del>orange/red</del> 5/4 and tight pink 2.5 4R 5/6 orange/red	0.0 ppm ↓	NA	18.0 18.5 19.0 19.5 20.0	

Client/Installation ANG/McEntire JNGB		Borehole Number MW 05-SB 01		Page Page 4 of 6	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) 06/25/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
20.5	Same as 17.5-20 but greater mix of sand X X X X	0.0 ppm	NA		
21					
21.5					
22					
22.5	Sand, low plasticity : orange 2.54R 5/16 pink 2.54R 6/8 light pink 54R 8/4	0.0 ppm	NA		
23					
23.5					
24					
24.5	Sand, low plasticity : light tan 54R 8/4 white 54R 8/2 salmon 54R 7/4 pink 104R 4/6 light tan 54R 8/4	0.0 ppm	NA		
25					
25.5					
26					
26.5					
27					
27.5					
28					
28.5					
29					
29.5					
30					

Project

Inspector Name

Date (MM-DD-YYYY)

FY17 Phase 4 Regional SI for PFOS/PFOA

Denae Athay

06/25/2018

Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes
30.5	Sandy clay, med plasticity, med hard	D.O ppm		
31				
31.5	mustard 104R 8/6			
32				
32.5			NA	
33				
33.5	Light gray sand			
34	54R 8/1			
34.5	X X	X	X	
35				
35.5	1/4" light grey gravel	D.O ppm		
36	54R 8/1			
36.5	Yellowish clay with pink streaks			
37	2.54R 7/2			
37.5			NA	
38				
38.5	Light grey silty clay, med hard, med plasticity			
39				
39.5	54R 8/1			
40				



Client/Installation		Borehole Number		Page	
ANG/McEntire JNGB		MMT <u>05</u> - <u>58</u> <u>01</u>		Page <u>6</u> of <u>6</u>	
Project		Inspector Name		Date (MM-DD-YYYY)	
FY17 Phase 4 Regional SI for PFOS/PFOA		Denae Athay		06/25/2018	

Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:
41	Sand, low plasticity: light grey 54R 8/1	0.0 ppm		
42	salmon 54R 7/4		NA	
43				
44	light tan 54R 8/4			
45	light tan clay med on low plasticity 54R 8/4	0.0 ppm		
46				
47	wet light tan sand, low plasticity 54R 8/4		NA	
48				
49				
50	END			

Client/Installation ANG/McEntire JNGB		Oversight Contractor Leldos		Borehole Number MW MMT 06-SB 01	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Driller M&W Drilling		Page Page 1 of 6	
Sizes and Type of Drilling and Sampling Equipment Geoprobe 7822 DT Schram				Borehole Location Description PRL 06 - SW of B 1046	
Date/Time Started (MM-DD-YYYY)/(0000) 06/26/2018 0745			Date/Time Finished (MM-DD-YYYY)/(0000) 06/26/2018 0840		
Overburden Thickness 2'		Depth to Groundwater 45'		Total Depth 50'	
Sample for PFOS/PFOA Analysis			Sample for PFOS/PFOA Analysis		
Sample ID: MMT -SB -01 Sample Interval: 0 to 2 ft NA			Sample ID: MMT -SB -02 Sample Interval: to ft NA		
Sample ID: MMT -SB -03 (if required) Sample Interval: to ft NA			Sample ID: MMT -SB -04 (if required) Sample Interval: to ft NA		
Inspector Name Denae Athay			Inspector Signature Denae Athay		
Monitoring Well ID: MW-MMT 06-01		Backfill Type NA		Date Backfilled (MM-DD-YYYY) NA	
Latitude 33.91456476°N		Longitude 80.80186139°W		Elevation 242.14'	
Notes: Drilled well 6/27/2018 w/ Geoprobe					
Sketch:					

Client/Installation ANG/McEntire JNGB		Borehole Number MMT <u>06-58-01</u>		Page Page <u>2</u> of <u>6</u>	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) <u>06/26/2018</u>	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
0.5	<u>grass</u> Medium brown, soft silty clay, slight plasticity 7.54R 5/6	0.0 ppm	NA		
1					
1.5			NA		
2					
2.5			NA		
3					
3.5	Red silty clay, plastic, medium soft, 10% embedded sand 2.54R 3/6		NA		
4					
4.5			NA		
5					
5.5		0.0 ppm	NA		
6	Same as 3-6'				
6.5			NA		
7					
7.5			NA		
8					
8.5		0.0 ppm	NA		
9	Same as 3-6'				
9.5			NA		
10					



Client/Installation ANG/McEntire JNGB		Borehole Number MMT <u>DL-SB 01</u>		Page Page <u>3</u> of <u>6</u>	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) <u>06/26/2018</u>	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
10.5 11.0 11.5 12.0 12.5	orange/red clay, plastic, hard, low moisture, 25% embedded sands 2.54R 4/8	0.0 ppm ↓	NA		
13.0 13.5 14.0 14.5 15.0	Same as 10-12.5 but with 40% embedded sands	0.0 ppm ↓	NA		
15.5 16.0 16.5 17.0 17.5	Same as 12.5-15' but with 1/4" pebbles 10%	0.0 ppm ↓	NA		
18.0 18.5 19.0 19.5 20.0	Mix of clay, sand, small gravel. Color mottles of light gray (54R 8/1), pink (104R 4/6), and orange red (2.54R 6/6)	0.0 ppm ↓	NA		

Client/Installation ANG/McEntire JNGB		Borehole Number MMT 06-SB 01		Page Page 4 of 6	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) 06/26/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
20.5	Same as 17.5-20'	0.0 ppm	NA		
21					
21.5					
22					
22.5	Sand, low plasticity Mix of light grey (54R 8/1), pink (64R 4/6) and orange/red (2.5 4R 6/6)				
23					
23.5					
24					
24.5	Same as 23-25'	0.0 ppm			
25					
25.5					
26					
26.5	sand changing from tan 8/1 (54R 7/8) to light grey (54R 7/4) to light pink (54R 8/4)		NA		
27					
27.5					
28					
28.5	Light pink clay/sand 54R 8/4				
29					
29.5					
30					

ANG/McEntire JNGB		MW MMT 06-58 01		Page 5 of 6	
Project		Inspector Name		Date (MM-DD-YYYY)	
FY17 Phase 4 Regional SI for PFOS/PFOA		Danae Athay		06/26/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
30.5	Light grey pebbles	0.0	NA		
31	1/8-1/4" 54R 8/1	ppm			
31.5	Light grey sand				
32	54R 8/1				
32.5					
33					
33.5					
34					
34.5					
35					
35.5	Light grey sand	0.0	NA		
36	54R 8/1	ppm			
36.5					
37					
37.5					
38					
38.5					
39					
39.5					
40					



Client/Installation		Borehole Number		Page	
ANG/McEntire JNGB		MMT 06-58-01		Page 6 of 6	
Project		Inspector Name		Date (MM-DD-YYYY)	
FY17 Phase 4 Regional SI for PFOS/PFOA		Denae Athay		06/26/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
41	Light grey sand/clay 54R 8/1	0.0 ppm	NA		
42					
43					
44	Light pink sand/clay 54R 8/4	0.0 ppm	NA		
45	Light grey sand/clay 54R 8/1				
46	Wet Light same as 44-55'				
47	Light pink sand 54R 8/4		NA		
48					
49					
50	END				

Client/Installation ANG/McEntire JNGB		Oversight Contractor Leidos		Borehole Number MW MMT 04-SB 01	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Driller M&W Drilling		Page Page 1 of 6	
Sizes and Type of Drilling and Sampling Equipment Geoprobe 7822 DT Schram				Borehole Location Description PRL04-250' West of Building 62	
Date/Time Started (MM-DD-YYYY)/(0000) 06/28/2018 0712			Date/Time Finished (MM-DD-YYYY)/(0000) 06/28/2018 0752		
Overburden Thickness 2"		Depth to Groundwater 40'		Total Depth 45'	
Sample for PFOS/PFOA Analysis			Sample for PFOS/PFOA Analysis		
Sample ID: MMT-SB-01 → NA Sample Interval: 0 to 2 ft			Sample ID: MMT-SB-02 → NA Sample Interval: to ft		
Sample ID: MMT-SB-03 (if required) NA Sample Interval: to ft			Sample ID: MMT-SB-04 (if required) NA Sample Interval: to ft		
Inspector Name Denae Athay			Inspector Signature Denae Athay		
Monitoring Well ID: MW-MMT04-01		Backfill Type Bentonite grout		Date Backfilled (MM-DD-YYYY) July 16, 2018	
Latitude 33.71971891°N		Longitude 80.80824151°W		Elevation 224.92'	
Notes: Originally drilled 7/2/18 with HSA. Plugged 7/10/18. Redrilled 2' North on 7/10/18					
Sketch:					
NP Not To Scale					

Client/Installation ANG/McEntire INGB		Borehole Number MMT 04 -56 01		Page Page 2 of 6	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) 06/28/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes	
0.5	Grass	0.0 ppm	NA		
1	Medium brown, soft, wet, highly plastic clay w/ some silt				
1.5	54R 4/6				
2					
2.5					
3	Red, moist, semi-hard clay, high plasticity				
3.5	2.5 4R 3/6				
4					
4.5					
5					
5.5	Red/orange hard clay, high plasticity, 10% embedded sands	0.0 ppm	NA		
6	2.5 4R 4/8				
6.5					
7					
7.5					
8					
8.5					
9	Same as 5-7.5'				
9.5					
10					



Client/Installation ANG/McEntire JNGB		Borehole Number MMT <u>01</u> <u>SB</u> <u>01</u>		Page Page <u>3</u> of <u>5</u>	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Danae Athay		Date (MM-DD-YYYY) <u>06/28/2018</u>	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
10.5	Orange/tan hard clay, high plasticity 5% embedded sand w/red inclusions 54R 6/6	0.0 ppm	NA		
11.0					
11.5					
12.0					
12.5	Orange/tan hard clay 54R 6/6 with mustard clay in the center 104R 6/6	0.0 ppm	NA		
13.0					
13.5					
14.0					
14.5	Same as 12.5-15'	0.0 ppm	NA		
15.0					
15.5					
16.0					
16.5	Red/orange silty sand 2.54R 4/8	0.0 ppm	NA		
17.0					
17.5	Salmon colored silty sand, medium plasticity 54R 7/4	0.0 ppm	NA		
18.0					
18.5					
19.0					
19.5					
20.0					

Client/Installation ANG/McEntire JNGB		Borehole Number MMT 04-SB 01		Page Page 4 of 6	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) Dec 28 / 2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes	
20.5	Salmon silty sand, med. plasticity 54R 7/4	0.0 ppm	NA		
21					
21.5					
22					
22.5	Light tan silty sand, med. plasticity 54R 8/4				
23					
23.5					
24					
24.5	Light tan clay/sand med plasticity, hard 54R 8/4				
25					
25.5	Same as 24-25'	0.0 ppm	NA		
26					
26.5					
27	Light pink silty sand, medium plasticity 54R 8/4				
27.5					
28					
28.5					
29					
29.5					
30					



Project

Inspector Name

Date (MM-DD-YYYY)

FY17 Phase 4 Regional SI for PFOS/PFOA

Denae Athay

06/28/2018

Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes
20.5	Pink silty sand, medium plasticity	0.0 ppm		
31	104R 4/6			
31.5				
32				
32.5	Hard, dry white clay, low plasticity		NA	
33	104R 8/2			
33.5				
34				
34.5				
35	Light grey sand, low plasticity, moist 54R 8/1			
35.5	Light grey silty sand, medium plasticity	0.0 ppm		
36	54R 8/1			
36.5				
37				
37.5			NA	
38				
38.5				
39				
39.5				
40				

Client/Installation		Borehole Number		Page	
ANG/McEntire JNGB		MMW 04-58 01		Page 6 of 6	
Project		Inspector Name		Date (MM-DD-YYYY)	
FY17 Phase 4 Regional SI for PFOS/PFOA		Danae Athay		06/28/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
40.5	Wet @ 40'	0.0			
41.0	Light grey silty	ppm			
41.5	Sand, wet,				
42.0	low plasticity				
42.5	54R 8/1		NA		
43.0					
43.5					
44.0					
44.5					
45.0	END				

Client/Installation ANG/McEntire JNGB		Oversight Contractor Leidos		Borehole Number MW 13-SB 01	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Driller M&W Drilling		Page Page 1 of 6	
Sizes and Type of Drilling and Sampling Equipment Geoprobe 7822 DT Schram _____				Borehole Location Description PRL13 - North of BID70	
Date/Time Started (MM-DD-YYYY)/(0000) 06/28/2018 1340		Date/Time Finished (MM-DD-YYYY)/(0000) 06/28/2018 1415			
Overburden Thickness 2"		Depth to Groundwater 36'		Total Depth 40'	
Sample for PFOS/PFOA Analysis			Sample for PFOS/PFOA Analysis		
Sample ID: MMT ____ -SB ____ -01 → NA Sample Interval: 0 to 2 ft			Sample ID: MMT ____ -SB ____ -02 → NA Sample Interval: ____ to ____ ft		
Sample ID: MMT ____ -SB ____ -03 (if required) → NA Sample Interval: ____ to ____ ft			Sample ID: MMT ____ -SB ____ -04 (if required) → NA Sample Interval: ____ to ____ ft		
Inspector Name Dense Athay			Inspector Signature Dense Athay		
Monitoring Well ID: MW-MMT13-01		Backfill Type NA		Date Backfilled (MM-DD-YYYY) NA	
Latitude 33.91529841°N		Longitude 80.80845713°W		Elevation 274.30'	
Notes: Well drilled on 7/1/2018 with HSA					
Sketch:					



Client/Installation ANG/McEntire JNGB		Borehole Number MMT 13-58 01		Page Page 2 of 6	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Danae Athay		Date (MM-DD-YYYY) 06/28/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
0.5	Grass Med. brown, soft silty clay, moist, plastic 5YR 4/6	0.0 ppm	NA		
1	Red clay, medium Soft, moist, plastic 2.5 YR 3/6	↓			
1.5					
2					
2.5					
3	Red clay, med soft, moist, plastic, 20% embedded <del>clay</del> sand Sand 5 2.5 YR 3/6	0.0 ppm	NA		
3.5		↓			
4					
4.5					
5					
5.5	↓				
6					
6.5					
7			↓		
7.5					
8					
8.5					
9					
9.5					
10					

Client/Installation ANG/McEntire JNGB		Borehole Number MMT 13-58 01		Page Page 3 of 6	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) 06/28/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
10.5	Same as 5.0-7.5'	0.0 ppm ↓	NA		
11.0					
11.5					
12.0	Light tan <sub>2</sub> clay, moist, medium plasticity 54R 8/4				
12.5					
13.0	Same as 5.0-7.5' with 30% embedded sands	↓			
13.5					
14.0					
14.5					
15.0	Same as 13.5-15.0'	0.0 ppm ↓	NA		
15.5					
16.0					
16.5					
17.0					
17.5					
18.0	Light tan silty sand, med plasticity dry, 1/8-1/4" round pebbles 54R 8/4	↓			
18.5					
19.0					
19.5					
20.0					



Client/Installation ANG/McEntire JNGB		Borehole Number MMT 13-S6 01		Page Page 4 of 6	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) 06/28/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
20.5	Red/orange silty sand, dry, med plasticity 2.5 VR 4/8	0.0 ppm			
21					
21.5					
22					
22.5	Light tan silty sand, dry, low plasticity, 1/8-1/4" round pebbles 5 VR 8/8		NA		
23					
23.5					
24					
24.5	Salmon silty clay, moist, med plasticity 5 VR 7/4	0.0 ppm			
25					
25.5					
26					
26.5	Salmon clay, hard, dry 5 VR 7/4		NA		
27					
27.5					
28					
28.5	Light grey silty sand, dry, low plasticity 5 VR 8/1				
29					
29.5					
30					

ANG/McEntire JNGB		MW MMT 13 -SB 01		Page 5 of 6	
Project		Inspector Name		Date (MM-DD-YYYY)	
FY17 Phase 4 Regional SI for PFOS/PFOA		Denae Athay		06/28/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
30.5	Light grey silty sand, moist, med plasticity 54R 8/1 with interspersed with salmon sand 54R 7/4	0.0 ppm ↓	NA		
31.0					
31.5					
32.0					
32.5					
33.0					
33.5					
34.0					
34.5					
35.0					
35.5	Light grey sand, moist, low plasticity 54R 8/1	0.0 ppm ↓	NA		
36.0	~~~~~ wet ~~~~~				
36.5	Same as 35-36'				
37.0					
37.5	Salmon sand, wet, low plasticity 54R 7/4				
38.0					
38.5	Light tan sand, wet, low plasticity 54R 8/4				
39.0					
39.5					
40.0	END				



Client/Installation ANG/McEntire JNGB		Oversight Contractor Leldos		Borehole Number MW MMT 09-SB 01	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Driller M&W Drilling		Page Page 1 of 6	
Sizes and Type of Drilling and Sampling Equipment Geoprobe 7822-DT				Borehole Location Description PRL09-WSW of B210	
Date/Time Started (MM-DD-YYYY)/(0000) 06/28/2018 1510				Date/Time Finished (MM-DD-YYYY)/(0000) 06/28/2018 1615	
Overburden Thickness 4"		Depth to Groundwater 32'		Total Depth 35'	
Sample for PFOS/PFOA Analysis			Sample for PFOS/PFOA Analysis		
Sample ID: MMT 09-SB 02 -01 @ 1515			Sample ID: MMT 09-SB 2 -02 @ 1542		
Sample Interval: 0 to 2 ft			Sample Interval: to 20 ft		
Sample ID: MMT -SB -03 (if required) NA			Sample ID: MMT -SB 04 (if required) NA		
Sample Interval: to ft			Sample Interval: to ft		
Inspector Name Danae Athay			Inspector Signature Danae Athay		
Monitoring Well ID: MW-MMT09-01		Backfill Type NA		Date Backfilled (MM-DD-YYYY) NA	
Latitude 33.91289668°N		Longitude 80.80529478°W		Elevation 233.32'	
Notes: Original well drilled 6/30/18 with Geoprobe. Replacement well (original was dry) drilled 7/13/18 with HSA					
Sketch:					

Client/Installation ANG/McEntire JNGB		Borehole Number MMT 09-SB 01		Page Page 2 of 6	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) 06/28/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
0.5	Grass	0.0 ppm	MMT-SB2-01 @1515		
1.0	Medium brown, soft silty clay, moist, plastic				
1.5					
2.0	54R 4/6				
2.5			NA		
3.0					
3.5	Red clay, wet, hard, plastic, 10% embedded				
4.0	sands				
4.5	2.54R 3/6				
5.0					
5.5	Red clay, dry, hard, med plasticity, 25% embedded	0.0 ppm			
6.0	sand		NA		
6.5					
7.0	2.54R 3/6				
7.5					
8.0		0.0 ppm			
8.5					
9.0	Same as 5.0-7.5'		NA		
9.5					
10.0					



Client/Installation ANG/McEntire JNGB		Borehole Number MMT 09-SB 01		Page Page 3 of 6	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) 06/28/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
10.5	Same as 5.0-7.5'	0.0 ppm	NA		
11.0					
11.5					
12.0					
12.5	Orange/red, dry, hard clay, 40% embedded sands 2.54R 4/8	0.0 ppm	NA		
13.0					
13.5					
14.0					
14.5	Orange/red clay / sand, low plasticity 2.54R 4/8	0.0 ppm	NA		
15.0					
15.5					
16.0					
16.5	Light tan clay / sand low plasticity 54R 8/4				
17.0					
17.5	Orange/red clay/sand, low plasticity 2.54R 4/8	0.0 ppm	NA		
18.0					
18.5					
19.0					
19.5					
20.0					

MMT 09-SB2-02 @ 1542



Client/Installation ANG/McEntire JNGB		Borehole Number MMT 09-58 01		Page Page 4 of 6	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) 06/28/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
20.5	Orange/red sand, moist, low plasticity 2.54R 4/8	0.0 ppm ↓	NA		
21					
21.5					
22					
22.5	Light tan clay/sand, <del>med</del> low plasticity, med hard 54R 8/4		NA		
23					
23.5					
24					
24.5	Light tan sand, moist, low plasticity 54R 8/4				
25					
25.5					
26					
26.5	Orange/red sand, moist, low plasticity 2.54R 4/8	0.0 ppm ↓			
27					
27.5					
28					
28.5	Hard, dry, white Clay 104R 8/2		NA		
29					
29.5					
30					
30.5	Salmon silty sand, low plasticity, moist 54R 7/4				
31					
31.5					
32					

ANG/McEntire JNGB		MMT <u>09-58-01</u>		Page <u>5</u> of <u>6</u>	
Project		Inspector Name		Date (MM-DD-YYYY)	
FY17 Phase 4 Regional SI for PFOS/PFOA		Denae Athay		<u>06/28/2018</u>	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
20.5	Salmon clay, med hard, moist, plastic	0.0 ppm	NA		
21	54R 7/4				
21.5					
22	Wet				
22.5	Salmon sand, wet, low plasticity				
23	54R 7/4				
23.5					
24					
24.5	Hard, dry, wet clay				
25	104R 8/2				
25.5	END				
26					
26.5					
27					
27.5					
28					
28.5					
29					
29.5					
30					



Client/Installation ANG/McEntire JNGB		Oversight Contractor Leidos		Borehole Number MW MMT 10-SB 01	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Driller M&W Drilling		Page Page 1 of 6	
Sizes and Type of Drilling and Sampling Equipment Geoprobe 7822 BT Schram _____				Borehole Location Description PRL10 - East of B1163	
Date/Time Started (MM-DD-YYYY)/(0000) 06/29/2018 0725			Date/Time Finished (MM-DD-YYYY)/(0000) 06/29/2018 0808		
Overburden Thickness 4"		Depth to Groundwater 35'		Total Depth 35'	
Sample for PFOS/PFOA Analysis			Sample for PFOS/PFOA Analysis		
Sample ID: MMT ____-SB ____-01 → NA Sample Interval: 0 to 2 ft			Sample ID: MMT ____-SB ____-02 → NA Sample Interval: ____ to ____ ft		
Sample ID: MMT ____-SB ____-03 (if required) → NA Sample Interval: ____ to ____ ft			Sample ID: MMT ____-SB ____-04 (if required) → NA Sample Interval: ____ to ____ ft		
Inspector Name Danae Athay			Inspector Signature Danae Athay		
Monitoring Well ID: MW-MMT10-01		Backfill Type NA		Date Backfilled (MM-DD-YYYY) NA	
Latitude 33.91121140°N		Longitude 80.80437517°W		Elevation 235.12'	
Notes:					
Sketch:					

Client/Installation ANG/McEntire JNGB		Borehole Number MW 10 SB 01		Page Page 2 of 6	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) 06/29/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
0.5	Grass	0.0 ppm			
1.0	Medium brown, soft				
1.5	Silty clay, moist,				
2.0	plastic 54R 4/6				
2.5			NA		
3.0					
3.5	Red clay, moist, med				
4.0	soft, plastic, 10%				
4.5	embedded sands				
5.0	2.54R 3/6				
5.5		0.0 ppm			
6.0	Red clay, dry, hard,				
6.5	med. plasticity,		NA		
7.0	25% embedded				
7.5	Sands				
8.0	2.54R 3/6				
8.5		0.0 ppm			
9.0	Same as 5.0-7.5'				
9.5	but with 30%		NA		
10.0	Sands				



Client/Installation ANG/McEntire JNGB		Borehole Number PW 10-58 01		Page Page 3 of 6	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) 06/29/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
10.5 11.0 11.5 12.0 12.5	Red/orange dry, hard clay, low plasticity, 30% embedded sands 2.5 YR 4/8	0.0 ppm ↓	NA		
13.0 13.5 14.0 14.5 15.0	Red/orange dry, hard, crumbly clay with 40% embedded sands 2.5 YR 4/8	0.0 ppm ↓	NA		
15.5 16.0 16.5 17.0 17.5	Same as 12.5-15.0'	0.0 ppm ↓	NA		
18.0 18.5 19.0 19.5 20.0	Same as 12.5-15.0'	0.0 ppm ↓	NA		



Client/Installation ANG/McEntire JNGB		Borehole Number MMT 10 -58 01		Page Page 4 of 6	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) 06/29/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
20.5	Red/orange silty sand, medium plasticity, dry 2.5 4R 4/8	0.0 ppm	NA		
21					
21.5					
22					
22.5					
23					
23.5					
24	Red/orange silty clay, med plasticity, dry 2.5 4R 4/8				
24.5					
25	Same as 20-24'	0.0 ppm	NA		
25.5					
26					
26.5					
27					
27.5					
28	Light grey silty sand w/ 1/8 - 1/4" pebbles, low plasticity 54R 8/1				
28.5					
29	Light tan sand, low plasticity, moist 54R 8/4				
29.5					
30					

ANG/McEntire JNGB		MW MMT 10 -S8 01		Page 5 of 6	
Project		Inspector Name		Date (MM-DD-YYYY)	
FY17 Phase 4 Regional SI for PFOS/PFOA		Denae Athay		06/29/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
20.5	Light tan, hard, dry clay  54R 8/4	D.O ppm  ↓	NA		
21.0					
21.5					
22.0					
22.5					
23.0					
23.5					
24.0					
24.5					
25.0				Wet at 35'	
25.5	END				
26.0					
26.5					
27.0					
27.5					
28.0					
28.5					
29.0					
29.5					
30.0					

Client/Installation ANG/McEntire JNGB		Oversight Contractor Ieldos		Borehole Number MW 02-SB 01	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Driller M&W Drilling		Page Page 1 of 6	
Sizes and Type of Drilling and Sampling Equipment Geoprobe 7822 DT Schram _____				Borehole Location Description PRL 02 SE of B1150/1151	
Date/Time Started (MM-DD-YYYY)/(0000) 06/29/2018 0935		Date/Time Finished (MM-DD-YYYY)/(0000) 06/29/2018 1020			
Overburden Thickness 6"		Depth to Groundwater 45'		Total Depth 45'	
Sample for PFOS/PFOA Analysis			Sample for PFOS/PFOA Analysis		
Sample ID: MMT ____ -SB ____ -01 Sample Interval: 0 to 2 ft NA			Sample ID: MMT ____ -SB ____ -02 Sample Interval: ____ to ____ ft NA		
Sample ID: MMT ____ -SB ____ -03 (if required) Sample Interval: ____ to ____ ft NA			Sample ID: MMT ____ -SB ____ -04 (if required) Sample Interval: ____ to ____ ft NA		
Inspector Name Danae Athay			Inspector Signature <i>Danae Athay</i>		
Monitoring Well ID: MW-MMT02-01		Backfill Type NA		Date Backfilled (MM-DD-YYYY) NA	
Latitude 33.91059630		Longitude 80.79847873		Elevation 229.52	
Notes: Well drilled 7/1/2018 with HSA					
Sketch:					



Client/Installation ANG/McEntire JNGB		Borehole Number MMT <u>02-SB 01</u>		Page Page <u>2</u> of <u>6</u>	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Danae Athay		Date (MM-DD-YYYY) <u>06/29/2018</u>	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
0.5	Grass	0.0	NA		
1	Medium brown, soft	ppm			
1.5	Silty clay, moist,	↓			
2	plastic 54R 4/6				
2.5	Red clay, moist,	↓			
3	med soft, plastic,				
3.5	10% embedded	↓			
4	Sands				
4.5	2.54R 3/6	↓			
5	Red clay, dry,				
5.5	hard, med	0.0	NA		
6	plasticity, 10%				
6.5	embedded sands	↓			
7	2.54R 3/6				
7.5		↓			
8					
8.5		↓			
9					
9.5		↓			
10					

Client/Installation ANG/McEntire JNGB		Borehole Number MMT <u>172-S6 01</u>		Page Page <u>3</u> of <u>6</u>	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Danae Athay		Date (M/M-DD-YYYY) <u>06/29/2018</u>	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
10.5	Red clay, dry and crumbly, low plasticity, 30% embedded sands 2.54R 3/6	0.0 ppm ↓	NA		
11.0					
11.5					
12.0					
12.5					
13.0					
13.5					
14.0					
14.5					
15.0					
15.5	Red/orange silty sand, low plasticity 2.54R 4/8	0.0 ppm ↓	NA		
16.0					
16.5					
17.0					
17.5					
18.0					
18.5					
19.0					
19.5					
20.0					
18.0	Light tan silty sand, low plasticity 54R 8/4	↓			
18.5					
19.0					
19.5					
20.0					



Client/Installation ANG/McEntire JNGB		Borehole Number MW 02-58 01		Page Page 4 of 6	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Danae Athay		Date (MM-DD-YYYY) 06/29/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
20.5	Same as 17.5-20.0'	0.0 ppm	NA		
21					
21.5					
22					
22.5	Light tan clay/sand dry, plastic 54R 8/4 with white clay streaks		NA		
23					
23.5					
24					
24.5	Light tan dry, hard clay 54R 8/4	0.0 ppm	NA		
25					
25.5					
26					
26.5	Light pink dry med hard clay 54R 8/4		NA		
27					
27.5					
28					
28.5	Salmon silty sand, med plastic, med moisture 54R 7/4				
29					
29.5					
30					

ANG/McEntire JNGB		MW MMT 62-58 01		Page 5 of 6	
Project		Inspector Name		Date (MM-DD-YYYY)	
FY17 Phase 4 Regional SI for PFOS/PFOA		Danae Athay		06/29/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
20.5	Salmon silty sand, med plasticity 54R 7/4	0.0 ppm	NA		
31	Light tan hard clay, dry 54R 8/4 with interspersed mustard clay 104R 8/6				
21.5					
32	Light pink hard, dry clay 54R 8/4				
22.5					
33	Light grey hard, dry clay 54R 8/1		NA		
23.5					
34	Salmon sand, moist, low plasticity 54R 7/4				
24.5					
25					
25.5		0.0 ppm	NA		
26	Same as 33.5-35.0'				
26.5					
27					
27.5					
28		0.0 ppm	NA		
28.5	Same as 33.5-35.0'				
29					
29.5					
30					

Client/Installation		Borehole Number		Page	
ANG/McEntire JNGB		MMT 02-SB 01		Page 6 of 6	
Project		Inspector Name		Date (MM-DD-YYYY)	
FY17 Phase 4 Regional SI for PFOS/PFOA		Denae Athay		06/29/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
40.5	Light tan hard dry clay 54R 8/4	0.0 ppm	NA		
41.0	Mustard hard, dry clay 104R 8/6	↓			
41.5	Salmon hard, dry clay 54R 7/4				
42.0					
42.5					
43.0	Light pink sand moist, low plasticity 54R 8/4				
43.5					
44.0					
44.5	Wet				
45.0	END				



Client/Installation ANG/McEntire JNGB		Oversight Contractor Leidos		Borehole Number MW MMT 03-SB 01	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Driller M&W Drilling		Page Page 1 of 6	
Sizes and Type of Drilling and Sampling Equipment Geoprobe 7822 DT Schram _____				Borehole Location Description PAL03- SW of baseball diamond	
Date/Time Started (MM-DD-YYYY)/(0000) 06/29/2018 1345			Date/Time Finished (MM-DD-YYYY)/(0000) 06/29/2018 1510		
Overburden Thickness 2"		Depth to Groundwater 47'		Total Depth 50'	
Sample for PFOS/PFOA Analysis			Sample for PFOS/PFOA Analysis		
Sample ID: MMT ____-SB ____-01 → NA			Sample ID: MMT ____-SB ____-02 → NA		
Sample Interval: 0 to 2 ft			Sample Interval: ____ to ____ ft		
Sample ID: MMT ____-SB ____-03 (if required) → NA			Sample ID: MMT ____-SB ____-04 (if required) → NA		
Sample Interval: ____ to ____ ft			Sample Interval: ____ to ____ ft		
Inspector Name Denae Athay			Inspector Signature Denae Athay		
Monitoring Well ID: MW-MMT03-01		Backfill Type NA		Date Backfilled (MM-DD-YYYY) NA	
Latitude 33.91230831°N		Longitude 80.81178498°W		Elevation 213.69'	
Notes: Well drilled 7/2/2018 with HSA					
Sketch:					



Client/Installation ANG/McEntire JNGB		Borehole Number RW 03-SB 01		Page Page 2 of 6	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) 06/29/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
0.5	Grass	0.0 ppm	NA		
1	Med brown, soft silty clay, moist, plastic 54R 4/6				
1.5	Red clay, moist, med soft, plastic, 10% embedded sand 2.54R 3/6				
2					
2.5					
3					
3.5					
4	Red/orange clay, hard, dry crumbly, 20% sand 2.54R 4/8	0.0 ppm	NA		
4.5					
5					
5.5	Same as 4-5'	0.0 ppm	NA		
6					
6.5					
7					
7.5	Same as 4-5' and white clay streaks				
8	Light tan sand with white 1/8-1/2" pebbles low plasticity 54R 8/4	0.0 ppm	NA		
8.5					
9					
9.5					
10					

Client/Installation ANG/McEntire JNGB		Borehole Number MMT 03-58 01		Page Page 3 of 6	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Danae Athay		Date (MM-DD-YYYY) 06/29/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
10.5	Same as 7.5-10'	0.6 ppm	NA		10.5
11.0					11.0
11.5					11.5
12.0	Same as 7.5-10' but with no pebbles				12.0
12.5					12.5
13.0	Red/orange clay/sand	0.0 ppm	NA		13.0
13.5	1/4-1/8" pebbles				13.5
14.0	low plasticity				14.0
14.5	2.54R 4/8				14.5
15.0					15.0
15.5	Salmon clay/sand	0.0 ppm	NA		15.5
16.0	1/4-1/8" pebbles, low plasticity				16.0
16.5	54R 7/14				16.5
17.0	Mustard clay/sand				17.0
17.5	1/8-1/4" pebbles, low plasticity				17.5
18.0					18.0
18.5	Light tan sand, 1/8-1/4" pebbles, low plasticity	0.0 ppm	NA		18.5
19.0					19.0
19.5	54R 8/14				19.5
20.0					20.0



Client/Installation ANG/McEntire JNGB		Borehole Number MMT 03-SB 01		Page Page 4 of 6	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Danae Athay		Date (MM-DD-YYYY) 06/29/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
20.5	Light tan silty clay, moist, med. plasticity  54R 8/4	0.0 ppm ↓	NA		
21.0					
21.5					
22.0					
22.5					
23.0					
23.5					
24.0					
24.5	Light grey clay/sand med plasticity 54R 8/1	↓			
25.0					
25.5	Light tan sand, low plasticity, moist 54R 8/4	0.0 ppm ↓			
26.0					
26.5	Light grey sand, low plasticity, moist 54R 8/1	↓	NA		
27.0					
27.5	Salmon, moist, soft plastic clay 54R 7/4	↓			
28.0					
28.5	Mustard, med soft, med plastic clay 104R 8/6	↓			
29.0					
29.5					
30.0					

Project

Inspector Name

Date (MM-DD-YYYY)

FY17 Phase 4 Regional SI for PFOS/PFOA

Denae Athay

06/29/2018

Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes
20.5	Light tan clay, dry, hard  54R 8/4	0.0 ppm ↓	NA	20.5
21.0				21.0
21.5				21.5
22.0				22.0
22.5				22.5
23.0				23.0
23.5				23.5
24.0				24.0
24.5	Light grey, moist sand 54R 8/1  Wet  Same  END	0.0 ppm ↓	NA	24.5
25.0				25.0
25.5				25.5
26.0				26.0
26.5				26.5
27.0				27.0
27.5				27.5
28.0				28.0
28.5				28.5
29.0				29.0
29.5				29.5
30.0				30.0



Client/Installation ANG/McEntire JNGB		Oversight Contractor Leidos		Borehole Number MW- MMT 05-SB 01	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Driller M&W Drilling		Page Page 1 of 3	
Size and Type of Drilling and Sampling Equipment Geoprobe 7822DT Schram NA				Borehole Location Description PRL 05 - SW of B253 in parking lot	
Date/Time Started (MM-DD-YYYY)/(0000) 06/25/2018 1119			Date/Time Finished (MM-DD-YYYY)/(0000) 06/25/2018 1425		
Overburden Thickness 4"		Depth to Groundwater 47'		Total Depth 50'	
Sample for PFOS/PFOA Analysis			Sample for PFOS/PFOA Analysis		
Sample ID: MMT____-SB____-01 Sample Interval: 0 to 2 ft NA			Sample ID: MMT____-SB____-02 Sample Interval: ____ to ____ ft NA		
Sample ID: MMT____-SB____-03 (if required) Sample Interval: ____ to ____ ft NA			Sample ID: MMT____-SB____-04 (if required) Sample Interval: ____ to ____ ft NA		
Inspector Name Denae Athay			Inspector Signature <i>Denae Athay</i>		
Monitoring Well ID: MW-MMT05-01		Backfill Type NA		Date Backfilled (MM-DD-YYYY) NA	
Latitude 43.91949602°N		Longitude 80.80331124°W		Elevation 252'	
Notes: Drilled well 6/30/2018 # see logbook 1 pg 11					
Sketch:					

Client/Installation ANG/McEntire JNGB		Borehole Number MMT <u>05-SB 01</u>		Page Page <u>2</u> of <u>3</u>	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Danae Athay		Date (MM-DD-YYYY) <u>06/25/2018</u>	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
0.5	grass Light brown loose dry silty clay w/ a little sand 54R 5/4	0.0	NA		
1					
1.5	same but more clay				
2					
2.5	Brownish-red <del>moist</del> moist clay, plastic 254R 4/4				
3	Red clay, moist, very plastic, 10% embedded quartz sands 104R 3/6				
3.5					
4					
4.5					
5					
5.5	Red clay, hard and dry, med plastic, 10% embedded quartz sands 104R 3/6	0.0			
6					
6.5					
7					
7.5					
8					
8.5					
9					
9.5					
10					



Client/Installation ANG/McEntire JNGB		Borehole Number MMT 05-58 01		Page Page 3 of 3	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Dennae Arthay		Date (MM-DD-YYYY) 06/25/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
10.5	Orange/red hard clay, <sup>mostly</sup> medium plasticity, 25% embedded quartz. sand 2.5 4R 5/6	0.0	NA	20-22.5 0.0 ppm same as 17.5-20 but more sand	
11.0				22.5-25 sand 0.0 ppm orange 2.5 4R 5/6 to pink 2.5 4R 6/8 to lt pink 5 4R 8/4	
11.5				25-30 sand 0.0 ppm lt tan 5 4R 8/4 to white 5 4R 8/2 to salmon 5 4R 7/4 to pink 10 4R 4/6 back to lt tan	
12.0				30-35 0.0 ppm 30-33 sandy clay mustard 10 4R 8/6 33-35 lt grey sand 5 4R 8/1	
12.5	Same as above	↓	↓	35-40 0.0 ppm 35-35.5: small lt grey gravel 5 4R 8/1 35.5-38: yellowish clay w/pink streaks 2.5 4 7/2 38-40: lt grey silty clay 5 4R 8/1	
13.0				40-45 sand 0.0 ppm lt grey 5 4R 8/1 to salmon 5 4R 7/4 to lt tan 5 4R 8/4	
13.5				45-50 wet @ 47' 45-47: lt tan clay 0.0 ppm 5 4R 8/4 47-50: lt tan sand 5 4R 8/4	
14.0				END	
14.5	Mix of small gravel, sand, and clay. Two colors: 5 4R 7/4 and 2.5 4R 5/6 (orange/red and light pink)	↓	↓		
15.0					
15.5					
16.0					
16.5					
17.0					
17.5					
18.0					
18.5					
19.0					
19.5					
20.0					

SPR

Client/Installation ANG/McEntire JNGB		Oversight Contractor Leidos	Borehole Number MW- <sup>on left</sup> MMT 06-SB 01
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Driller M&W Drilling	Page Page 1 of 3
Size and Type of Drilling and Sampling Equipment Geoprobe 7822 DT Schram _____		Borehole Location Description PRL6 - SW of B1046	
Date/Time Started (MM-DD-YYYY)/(0000) 06/26/2018 0745		Date/Time Finished (MM-DD-YYYY)/(0000) 06/26/2018 0840	
Overburden Thickness 2"	Depth to Groundwater 45'	Total Depth 50'	
Sample for PFOS/PFOA Analysis		Sample for PFOS/PFOA Analysis	
Sample ID: MMT ____-SB ____-01 Sample Interval: 0 to 2 ft NA		Sample ID: MMT ____-SB ____-02 Sample Interval: ____ to ____ ft NA	
Sample ID: MMT ____-SB ____-03 (if required) Sample Interval: ____ to ____ ft NA		Sample ID: MMT ____-SB ____-04 (if required) Sample Interval: ____ to ____ ft NA	
Inspector Name Danae Athay		Inspector Signature <i>Danae Athay</i>	
Monitoring Well ID: MW-MMT 06-01	Backfill Type NA	Date Backfilled (MM-DD-YYYY) NA	
Latitude 33.91456476°N	Longitude 80.80186139°W	Elevation 242.14'	
Notes: Drilled well 06/27/2018			
Sketch:			



Client/Installation ANG/McEntire JNGB		Borehole Number MW MMT 06-SB 01		Page Page 2 of 3	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) 06/26/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
0.5	grass Medium brown, soft silty clay, <sup>slight</sup> plasticity	0.0	NA		
1	7.5 4R 5/6				
1.5					
2					
2.5					
3					
3.5	Red silty clay, plastic, medium soft, 10% quartz embedded sand/ gravel 2.5 4R 3/6				
4					
4.5					
5					
5.5		0.0	NA		
6	same as above				
6.5					
7					
7.5					
8		0.0	NA		
8.5	same as above				
9					
9.5					
10					


Client/Installation ANG/McEntire JNGB		Borehole Number MMT <u>06-SB 01</u>		Page Page <u>3</u> of <u>3</u>	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) <u>06/26/2018</u>	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
10.5	Orange/red clay, plastic, hard, low moisture, 25% embedded sands 2.5 YR 4/8	0.0 ↓	NA	20-25 0.0 ppm 20-23: same as 17.5-20 23-25: sand and same colors as 17.5-20	10.5
11.0				25-30 0.0 ppm 25-26.5: same as 23-25 26.5-27: sand color from tan (5YR 7/8) to lt grey (5YR 8/1) to lt pink (5YR 8/4)	11.0
11.5				27-30: lt pink (5YR 8/4) clay/sand	11.5
12.0				30-35 0.0 ppm 30.5-31 lt grey (5YR 8/1) 7/8-1/4" pebbles 31-35 lt grey sand	12.0
12.5	Same as above but with 40% embedded sands	0.0 ↓	NA	35-40 0.0 ppm lt grey sand 5YR 8/1	12.5
13.0				40-45 0.0 ppm 40-43.5: lt grey (5YR 8/1) sand/clay 43.5-44 lt pink (5YR 8/4) 44-45: lt grey sand	13.0
13.5				45-50 0.0 ppm wet at 45 45-47.5 lt grey sand/clay (5YR 8/1)	13.5
14.0				47.5-50 lt pink sand (5YR 8/4)	14.0
14.5	Same as above but with a few larger pebbles (1/4")	0.0 ↓	NA	50 END	14.5
15.0					15.0
15.5					15.5
16.0					16.0
16.5	1/3 mix each of clay, sand, small gravel color mottles of white/lt grey (5YR 8/1), pink (10YR 4/6) and orange/red (2.5YR 6/6)	0.0 ↓	NA		16.5
17.0					17.0
17.5					17.5
18.0					18.0
18.5					18.5
19.0					19.0
19.5					19.5
20.0					20.0



Client/Installation ANG/McEntire JNGB		Oversight Contractor Leidos		Borehole Number MMT 06-SB 2	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Driller M&W Drilling		Page Page 1 of 3	
Size and Type of Drilling and Sampling Equipment Geoprobe 7822-DT Schram			Borehole Location Description PRL06 - NE Side of B1046		
Date/Time Started (MM-DD-YYYY)/(0000) 06/26/2018 0923			Date/Time Finished (MM-DD-YYYY)/(0000) 06/26/2018 1002		
Overburden Thickness 6"		Depth to Groundwater unknown		Total Depth 20'	
Sample for PFOS/PFOA Analysis			Sample for PFOS/PFOA Analysis		
Sample ID: MMT 06-SB 2-01 @ 0925 + Field Dupe			Sample ID: MMT 06-SB 2-02 <del>RA</del> 8/22/18 @ 1002		
Sample Interval: 0 to 2 ft			Sample Interval: 1.5 to 20 ft		
Sample ID: MMT -SB -03 (if required) NA			Sample ID: MMT -SB -04 (if required) NA		
Sample Interval: to ft			Sample Interval: to ft		
Inspector Name Denae Athay			Inspector Signature Denae Athay		
Monitoring Well ID: NA		Backfill Type 3/4" bentonite chips		Date Backfilled (MM-DD-YYYY) 06/26/2018	
Latitude 33.91498501°N		Longitude 80.80090604°W		Elevation 237.68'	
Notes:					
<div style="display: flex; justify-content: space-between;"> <div>Sketch:</div> <div> </div> <div> <div>NA</div> <div>Not to Scale</div> </div> </div>					

Client/Installation ANG/McEntire JNGB		Borehole Number MMT <u>06</u> -SB <u>2</u>		Page Page <u>2</u> of <u>3</u>	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) <u>06/26/2018</u>	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
0.5	Grass / Topsoil	0.0	MMT06-SB2-01 @ 0925 + Field Dupe		
1	Medium brown, soft silty clay, medium plasticity 54R 4/6				
1.5					
2					
2.5					
3					
3.5			NA		
4					
4.5	Red, hard clay, high plasticity, 10% embedded sands 2.54R 3/6				
5					
5.5	Same as 4-5'	0.0			
6					
6.5					
7					
7.5			NA		
8					
8.5					
9					
9.5					
10					



Client/Installation ANG/McEntire JNGB		Borehole Number MMT <u>06</u> -SB <u>2</u>		Page Page <u>3</u> of <u>3</u>	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Danae Athay		Date (MM-DD-YYYY) <u>06/26/2018</u>	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
10.5	Same as 4-10' 			<div style="border: 1px solid black; padding: 5px; display: inline-block;">MMT06-SB1</div> MMT06-SB1-01 0-2' @ 1024 MMT06-SB1-02 -20' @ 1118 + MS/MSD Located NW corner B1046 33.91511647°N 80.80107659°W 282.49'	
11.0					
11.5					
12.0					
12.5	Orange/red hard clay, high plasticity, 40% embedded sands 2.54R 4/8				
13.0					
13.5					
14.0					
14.5	Same as 12.5-15'				
15.0					
15.5					
16.0					
16.5	Same as 12.5-15'				
17.0					
17.5					
18.0					
18.5	Same as 12.5-15'				
19.0					
19.5					
20.0					
END			MMT06-SB2-01 @ 1002		

Client/Installation ANG/McEntire JNGB		Oversight Contractor Leidos		Borehole Number MMT 05-SB 1	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Driller M&W Drilling		Page Page 1 of 3	
Size and Type of Drilling and Sampling Equipment Geoprobe <u>7822-DT</u> Schram _____				Borehole Location Description <u>PRLO5 - NW corner</u> <u>of B253</u>	
Date/Time Started (MM-DD-YYYY)/(0000) <u>06/26/2018 1255</u>			Date/Time Finished (MM-DD-YYYY)/(0000) <u>06/26/2018 1321</u>		
Overburden Thickness <u>6"</u>		Depth to Groundwater <u>unknown</u>		Total Depth <u>20'</u>	
Sample for PFOS/PFOA Analysis			Sample for PFOS/PFOA Analysis		
Sample ID: MMT <u>05</u> -SB <u>1</u> -01 Sample Interval: <u>0</u> to <u>2</u> ft <u>@ 1259</u>			Sample ID: MMT <u>05</u> -SB <u>1</u> -02 Sample Interval: <u>19.5</u> to <u>20</u> ft <u>@ 1321</u> <u>SRA 8/22/18</u>		
Sample ID: MMT _____-SB _____-03 (if required) Sample Interval: _____ to _____ ft <u>NA</u>			Sample ID: MMT _____-SB _____-04 (if required) Sample Interval: _____ to _____ ft <u>NA</u>		
Inspector Name Danae Athay			Inspector Signature <u>Danae Athay</u>		
Monitoring Well ID: <u>NA</u>		Backfill Type <u>3/4" bentonite chips</u>		Date Backfilled (MM-DD-YYYY) <u>06/26/2018</u>	
Latitude <u>33.91609296°N</u>		Longitude <u>80.80232749°W</u>		Elevation <u>238.57'</u>	
Notes:					
<div style="display: flex; align-items: flex-start;"> <div style="flex: 1;"> <p>Sketch:</p> </div> <div style="flex: 1; padding-left: 20px;"> <p>MMT05-SB1</p> <p>apron</p> <p>equipment</p> <p>Building 253</p> <p>NA Not To Scale</p> </div> </div>					

Client/Installation ANG/McEntire JNGB		Borehole Number MMT <u>05</u> -SB <u>1</u>		Page Page <u>2</u> of <u>3</u>	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Danae Athay		Date (MM-DD-YYYY) <u>06/26/2018</u>	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
0.5	Grass / Topsoil	0.0 ppm	MMT05-SB1-01 @1259		
1	Medium brown soft wet silty clay 54R 4/6				
1.5	Red, hard clay, high plasticity, 10% embedded sands 2.5 4R 3/6				
2			NA		
2.5					
3					
3.5					
4			NA		
4.5					
5					
5.5					
6	Orange/red hard clay, high plasticity 40% embedded sands 2.5 4R 4/8	0.0 ppm	NA		
6.5					
7					
7.5					
8					
8.5			NA		
9					
9.5					
10					



Client/Installation ANG/McEntire JNGB		Borehole Number MMT <u>05</u> -SB <u>1</u>		Page Page <u>3</u> of <u>3</u>	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) <u>Dec 26</u> / <u>2018</u>	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
10.5	Same as 5-10'	0.0	NA	<div style="border: 1px solid black; padding: 5px; display: inline-block;">MMT05-SB2</div> MMT05-SB2-01 @ 1145 0.2' MMT05-SB2-02 @ 1157 0.5-20' SRA 8/2/18 Located NE of B253 33.91548004°N 80.80153640°W 238.42'	
11.0					
11.5					
12.0					
12.5					
13.0	Same as 5-10' but with some 1/8 - 1/4" gravel/pebbles	0.0	NA		
13.5					
14.0					
14.5					
15.0					
15.5	Same as 5-10'	0.0	NA		
16.0					
16.5					
17.0					
17.5					
18.0	Same as 5-10'				
18.5					
19.0					
19.5					
20.0					

END

@ 1321



Client/Installation ANG/McEntire INGB		Oversight Contractor Leidos		Borehole Number MMT <u>12</u> -SB <u>1</u>	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Driller M&W Drilling		Page Page <u>1</u> of <u>3</u>	
Sizes and Type of Drilling and Sampling Equipment Geoprobe: <u>7822 DT</u> Schram: _____				Borehole Location Description <u>PRL 12 - NE corner of B249</u>	
Date/Time Started (MM-DD-YYYY)/(0000) <u>06/26/2018</u> <u>1339</u>			Date/Time Finished (MM-DD-YYYY)/(0000) <u>06/26/2018</u> <u>1411</u>		
Overburden Thickness <u>2"</u>		Depth to Groundwater <u>unknown</u>		Total Depth <u>20'</u>	
Sample for PFOS/PFOA Analysis			Sample for PFOS/PFOA Analysis		
Sample ID: MMT <u>12</u> -SB <u>1</u> -01 @ <u>1340</u> Sample Interval: <u>0</u> to <u>2</u> ft			Sample ID: MMT <u>12</u> -SB <u>1</u> -02 @ <u>1411</u> Sample Interval: <u>19.5</u> to <u>20</u> ft <u>SRA 8/22/18</u>		
Sample ID: MMT ____-SB ____-03 (if required) <u>NA</u> Sample Interval: ____ to ____ ft			Sample ID: MMT ____-SB ____-04 (if required) <u>NA</u> Sample Interval: ____ to ____ ft		
Inspector Name Denae Athay			Inspector Signature <u>Denae Athay</u>		
Monitoring Well ID: <u>NA</u>		Backfill Type <u>3/8" bentonite chips</u>		Date Backfilled (MM-DD-YYYY) <u>06/26/2018</u>	
Latitude <u>33.91683839°N</u>		Longitude <u>80.80312627°W</u>		Elevation <u>216.53'</u>	
Notes:					
Sketch:					

Client/Installation ANG/McEntire JNGB		Borehole Number MMT 12-SB 1		Page Page 2 of 3	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Danae Athay		Date (MM-DD-YYYY) 06/26/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
0.5	grass Medium brown, soft, moist silty clay 54R 4/6	0.0 ppm	MMT12- SB1-01 @ 1340		
1					
1.5					
2					
2.5	Red, moist hard clay, high plasticity, 10% embedded sands 2.5 34R 3/6		NA		
3					
3.5					
4					
4.5					
5					
5.5	Same as 2-5'	0.0 ppm			
6					
6.5					
7					
7.5			NA		
8					
8.5					
9					
9.5					
10					



Client/Installation ANG/McEntire JNGB		Borehole Number MMT 12 -SB 1		Page Page 3 of 3	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Danae Athay		Date (MM-DD-YYYY) 06/26/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
10.5	Orange/red hard clay, high plasticity, 40% embedded sands 2.5 YR 4/8	0.0 ppm ↓	NA	<div>MM12-SB2</div> MM12-SB2-01 0-2' @ 1438 19.5-20' @ 1447 <sup>SRA</sup> 02/18 located in grassy area NE of B249 and NE of apron 33.732710N 33.91732716°N 80.80199673°W 235.87'	
11.0					
11.5					
12.0					
12.5	Same as -above- 10-12.5'	0.0 ppm ↓	NA		
13.0					
13.5					
14.0					
14.5	Same as 10-12.5'	0.0 ppm ↓	NA		
15.0					
15.5					
16.0					
16.5	Same as 10-12.5'	0.0 ppm ↓	NA	<div>MM12-SB3</div> MM12-SB3-01 0-2' @ 1505 20' @ 1511 MM12-SB3-02 19.5-20' @ 1515 <sup>SRA</sup> 02/18 located in grassy area NE of B253 and NE of apron 33.91637465°N 80.80083951°W 236.09'	
17.0					
17.5					
18.0					
18.5	Same as 10-12.5'	0.0 ppm ↓	NA		
19.0					
19.5					
20.0					

END

@ 1411

SRA





Client/Installation ANG/McEntire JNGB		Borehole Number MMT <u>04</u> -SB <u>1</u>		Page Page <u>2</u> of <u>3</u>	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) <u>06/27/2018</u>	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
0.5	<del>grass</del> Med. brown, soft moist silty clay 54R 4/6	0.0 ppm	MMT04-SBI-01 @ 1620		
1	Red, moist, hard clay, high plasticity, 10% embedded sand 2.5 YR 3/6				
1.5					
2					
2.5					
3					
3.5			NA		
4					
4.5					
5					
5.5	<del>same as</del> Red, moist, hard clay, high plasticity, 20% embedded sand 2.5 YR 3/6	0.0 ppm	NA		
6					
6.5					
7					
7.5					
8					
8.5					
9					
9.5					
10					

Client/Installation ANG/McEntire JNGB		Borehole Number MMT 04-SB 1		Page Page 3 of 3	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) 06/27/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
10.5 11.0 11.5 12.0 12.5	Same as 5-10' ↓	0.0 ppm ↓	NA	<div style="border: 1px solid black; padding: 2px; display: inline-block;">MMT04-SB2</div> MMT04-SB2-01 0-2' @ 1600 MMT04-SB2-02 15-20' @ 1616 SEA 8/22/18 located east of B62 Coordinates 33.91954958°N 80.80575949°W 246.79'	10.5 11.0 11.5 12.0 12.5
13.0 13.5 14.0 14.5 15.0	Orange/Red Hard Clay, high plasticity, 10% embedded sands 2.5 YR 4/8	0.0 ppm ↓	NA		13.0 13.5 14.0 14.5 15.0
15.5 16.0 16.5 17.0 17.5	Same as 12.5-15' but w/40% embedded sands	0.0 ppm ↓	NA		15.5 16.0 16.5 17.0 17.5
18.0 18.5 19.0 19.5 20.0	Orange/Red Hard Clay, high plasticity, light tan streaks, 20% embedded sands 2.5 YR 4/8  END	0.0 ppm ↓	NA	MMT04-SB1-02 @ 1642 + Field Dupe	18.0 18.5 19.0 19.5 20.0



Client/Installation ANG/McEntire JNGB		Oversight Contractor Leidos		Borehole Number MW MMT 04-SB 01	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Driller M&W Drilling		Page Page 1 of 3	
Sizes and Type of Drilling and Sampling Equipment Geoprobe 7822 DT Schram _____				Borehole Location Description PRL 04 - 250' West of Building 62	
Date/Time Started (MM-DD-YYYY)/(0000) 06/28/2018 0712			Date/Time Finished (MM-DD-YYYY)/(0000) 06/28/2018 0752		
Overburden Thickness 2"		Depth to Groundwater 40'		Total Depth 45'	
Sample for PFOS/PFOA Analysis			Sample for PFOS/PFOA Analysis		
Sample ID: MMT ____ -SB ____ -01 Sample Interval: 0 to 2 ft NA			Sample ID: MMT ____ -SB ____ -02 Sample Interval: ____ to ____ ft NA		
Sample ID: MMT ____ -SB ____ -03 (if required) Sample Interval: ____ to ____ ft NA			Sample ID: MMT ____ -SB ____ 04 (if required) Sample Interval: ____ to ____ ft NA		
Inspector Name Denae Athay			Inspector Signature Denae Athay		
Monitoring Well ID: MW - MMT04 - 01		Backfill Type NA		Date Backfilled (MM-DD-YYYY) NA	
Latitude 33.91971891°N		Longitude 80.80824151°W		Elevation 224.92'	
Notes: Drilled 7/2/2018 with HSA					
Sketch:					

Client/Installation ANG/McEntire JNGB		Borehole Number MMT <u>04-SB-01</u>		Page Page <u>2</u> of <u>3</u>	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Danae Athay		Date (MM-DD-YYYY) <u>06/28/2015</u>	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
0.5	Grass	0.0 ppm	NA		
1.0	Medium brown, soft, wet, highly plastic clay w/some silt				
1.5	54R 4/6				
2.0					
2.5					
3.0	Red, moist, semi-hard clay, high plasticity,				
3.5	10% embedded sands				
4.0	2.5 4R 3/6				
4.5					
5.0					
5.5	Red, moist, semi-hard clay	0.0 ppm	NA		
6.0	Red/orange hard clay, high plasticity, 10% embedded sands				
6.5	2.5 4R 4/8				
7.0					
7.5					
8.0					
8.5	Same as above				
9.0					
9.5					
10.0					



Client/Installation ANG/McEntire JNGB		Borehole Number MMT <u>04-SB 01</u>		Page Page <u>3</u> of <u>3</u>	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) <u>06/28/2018</u>	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
10.5 11.0 11.5 12.0 12.5	Orange/Tan hard clay, high plasticity 5% embedded sand w/red inclusions 54R 6/6	0.0 ppm ↓	NA	20-25' 0.0ppm 20-22: salmon (54R 7/4) silty sand 22-24: light tan (54R 8/4) silty sand 24-25: light tan clay sand 25-30' 0.0ppm 25-26: lt tan (54R 8/4) clay sand 26-30: lt pink (54R 8/4) silty sand	10.5 11.0 11.5 12.0 12.5
13.0 13.5 14.0 14.5 15.0	Orange/Tan hard clay with 54R 6/6 With mustard clay in the middle 104R 6/6	0.0 ppm ↓	NA	30-35' 0.0ppm 30-32: pink (104R 4/6) silty sand 32-34.5: white clay (104R 8/2) 34.5-35: lt gray sand (54R 8/1)	13.0 13.5 14.0 14.5 15.0
15.5 16.0 16.5 17.0 17.5	Same as 12.5-15'	0.0 ppm ↓	NA	35-40' 0.0ppm light gray silty sand (54R 8/1)	15.5 16.0 16.5 17.0 17.5
18.0 18.5 19.0 19.5 20.0	Red/Orange silty Sand 2.5 4R 4/8	0.0 ppm ↓	NA	40-45' 0.0ppm Wet @ 40' light gray silty sand (54R 8/1) END	18.0 18.5 19.0 19.5 20.0
	Salmon colored silty sand, med. plasticity 54R 7/4	0.0 ppm ↓	NA		

22A

Client/Installation ANG/McEntire JNGB		Oversight Contractor Leidos		Borehole Number MMT <u>14</u> -SB <u>2</u>	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Driller M&W Drilling		Page Page <u>1</u> of <u>3</u>	
Size and Type of Drilling and Sampling Equipment Geoprobe <u>7822DT</u> Schram _____				Borehole Location Description <u>West side</u> <u>PRL 14 - NW<sup>200</sup> corner of</u> <u>WWTP fenced area</u>	
Date/Time Started (MM-DD-YYYY)/(0000) <u>06/28/2018</u> <u>0912</u>			Date/Time Finished (MM-DD-YYYY)/(0000) <u>06/28/2018</u> <u>0928</u>		
Overburden Thickness <u>2"</u>		Depth to Groundwater <u>UNKNOWN</u>		Total Depth <u>20'</u>	
Sample for PFOS/PFOA Analysis			Sample for PFOS/PFOA Analysis		
Sample ID: MMT <u>14</u> -SB <u>2</u> -01 @ <u>0914</u>			Sample ID: MMT <u>14</u> -SB <u>2</u> -02 @ <u>0928</u>		
Sample Interval: <u>0</u> to <u>2</u> ft			Sample Interval: <u>15</u> to <u>20</u> ft <u>SRA 8/22/18</u>		
Sample ID: MMT ____-SB ____-03 (if required) <u>NA</u>			Sample ID: MMT ____-SB ____-04 (if required) <u>NA</u>		
Sample Interval: ____ to ____ ft			Sample Interval: ____ to ____ ft		
Inspector Name Denae Athay			Inspector Signature <u>Denae Athay</u>		
Monitoring Well ID: <u>NA</u>		Backfill Type <u>3/8" bentonite chips</u>		Date Backfilled (MM-DD-YYYY) <u>06/28/2018</u>	
Latitude <u>33.91906988°N</u>		Longitude <u>80.81624360°W</u>		Elevation <u>195.73'</u>	
Notes:					
Sketch:					



Client/Installation ANG/McEntire JNGB		Borehole Number MMT 14 -SB 2		Page Page 2 of 3	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Danae Athay		Date (MM-DD-YYYY) 06/28/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
0.5	Grass Med. Brown, moist, soft clay very plastic 54R 4/6	0.0 ppm	MMT14-SB2-01 @ 0914		
1	Light brown clay, high plasticity 54R 5/6				
2					
2.5					
3	Red/orange semi-hard clay, high plasticity 2.54R 4/8		NA		
3.5					
4					
4.5					
5					
5.5	Light brown clay, high plasticity, 10% sands 54R 5/6	0.0 ppm	NA		
6					
6.5					
7					
7.5					
8		0.0 ppm	NA		
8.5	Same as 5-7.5'				
9					
9.5					
10					

SRA

Client/Installation ANG/McEntire JNGB		Borehole Number MMT 14-SB 2		Page Page 3 of 3	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) 06/28/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
10.5	Same as 5-7.5'	0.0 ppm	NA	<div style="border: 1px solid black; padding: 5px; display: inline-block;">MMT 14-SB1</div> <del>0m</del> MMT14SB1-01 0-2' @ 0855 MMT14-SB1-02 19.5-20' @ 0903 <del>NA</del> 06/28/18 Located at NW corner of WWTP 33.91924147°N 80.81632617°W 202.35'	
11.0					
11.5					
12.0					
12.5	Same as 5-7.5'	0.0 ppm	NA		
13.0	Light tan silty clay, hard, <del>to</del> med. plasticity 54R 6/6				
13.5					
14.0					
14.5	Light tan silty clay hard clay, med. plasticity with white streaks 54R 6/6	0.0 ppm	NA		
15.0					
15.5					
16.0					
16.5	Same as 15-17.5'	0.0 ppm	NA		
17.0					
17.5					
18.0					
18.5	END	0.0 ppm			
19.0					
19.5					
20.0					

SRA



Client/Installation ANG/McEntire JNGB		Oversight Contractor Leidos		Borehole Number MW MMT 14-SB 01	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Driller M&W Drilling		Page Page 1 of 3	
Sizes and Type of Drilling and Sampling Equipment Geoprobe 7822 DT Schram				Borehole Location Description PRL14 - Located west of WWTP	
Date/Time Started (MM-DD-YYYY)/(0000) 06/28/2018 0950			Date/Time Finished (MM-DD-YYYY)/(0000) 06/28/2018 1005		
Overburden Thickness none		Depth to Groundwater 11'		Total Depth 12.5'	
Sample for PFOS/PFOA Analysis			Sample for PFOS/PFOA Analysis		
Sample ID: MMT ____ -SB ____ -01 Sample Interval: 0 to 2 ft NA			Sample ID: MMT ____ -SB ____ -02 Sample Interval: ____ to ____ ft NA		
Sample ID: MMT ____ -SB ____ -03 (if required) Sample Interval: ____ to ____ ft NA			Sample ID: MMT ____ -SB ____ -04 (if required) Sample Interval: ____ to ____ ft NA		
Inspector Name Danae Athay			Inspector Signature Danae Athay		
Monitoring Well ID: MW-MMT14-01		Backfill Type NA		Date Backfilled (MM-DD-YYYY) NA	
Latitude 33.91876675		Longitude 80.81712592		Elevation 181.53'	
Notes:					
Sketch:					

SRA

Client/Installation ANG/McEntire JNGB		Borehole Number MW 14-SB 01		Page Page 2 of 3	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Danae Athay		Date (MM-DD-YYYY) 06/28/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
0.5	Dark grey sand 5Y 2.5/1	0.0 ppm	NA		
1	Lt tan sand 5YR 6/6				
1.5	Medium brown, Silty clay, soft, Plastic 5YR 5/6				
2					
2.5					
3					
3.5					
4					
4.5					
5					
5.5	Red/orange silty clay, soft, plastic 2.5YR 4/8	0.0 ppm	NA		
6					
6.5					
7					
7.5					
8					
8.5					
9					
9.5	Red/orange silty clay, Soft, plastic 2.5YR 4/8 w/white streaks				
10					

Client/Installation ANG/McEntire JNGB		Borehole Number MW MMT 14-58 01		Page Page 3 of 3	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Danae Athay		Date (MM-DD-YYYY) 06/28/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
10.5	Light grey 8 <sup>m</sup> clay Soft, plastic 54R 8/1	0.0 ppm	NA		
11.0	WET				
11.5	Light tan sand 54R 8/4				
12.0					
12.5	END				
13.0					
13.5					
14.0					
14.5					
15.0					
15.5					
16.0					
16.5					
17.0					
17.5					
18.0					
18.5					
19.0					
19.5					
20.0					



Client/Installation ANG/McEntire JNGB		Oversight Contractor Leidos		Borehole Number MMT <u>13-SB 2</u>	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Driller M&W Drilling		Page Page <u>1</u> of <u>3</u>	
Sizes and Type of Drilling and Sampling Equipment Geoprobe <u>7822 DT</u> Schram _____				Borehole Location Description <u>PRL13 - East of B9779</u> <u>West of B984</u>	
Date/Time Started (MM-DD-YYYY)/(0000) <u>06/28/2018</u> <u>1255</u>			Date/Time Finished (MM-DD-YYYY)/(0000) <u>06/28/2018</u> <u>1310</u>		
Overburden Thickness <u>4"</u>		Depth to Groundwater <u>unknown</u>		Total Depth <u>20'</u>	
Sample for PFOS/PFOA Analysis Sample ID: MMT <u>13-SB 2</u> -01 <u>@ 1315</u> Sample Interval: <u>0</u> to <u>2</u> ft			Sample for PFOS/PFOA Analysis Sample ID: MMT <u>13-SB 2</u> -02 <u>@ 1330 + Field</u> Sample Interval: <u>19.5</u> to <u>20</u> ft <u>92A 8/22/18 Dupe</u>		
Sample ID: MMT _____ -SB _____ -03 (if required) <u>NA</u> Sample Interval: _____ to _____ ft			Sample ID: MMT _____ -SB _____ -04 (if required) <u>NA</u> Sample Interval: _____ to _____ ft		
Inspector Name Denae Athay			Inspector Signature <u>Denae Athay</u>		
Monitoring Well ID: <u>NA</u>		Backfill Type <u>3/8" bentonite chips</u>		Date Backfilled (MM-DD-YYYY) <u>6/28/2018</u>	
Latitude <u>33.91539317° N</u>		Longitude <u>80.80765806° W</u>		Elevation <u>227.77</u>	
Notes:					
Sketch:					



Client/Installation ANG/McEntire JNGB		Borehole Number MMT <u>13</u> SB <u>2</u>		Page Page <u>2</u> of <u>3</u>	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Danae Athay		Date (MM-DD-YYYY) <u>06/28/2018</u>	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
0.5	<u>Grass</u> Medium brown soft silty clay, plastic 54R 4/6	0.0 ppm	MMT13-SB2-01 0-2' @ B15		
1					
1.5					
2					
2.5	Red clay, dry, plastic medium <del>clay</del> 7, hard 2.54R 3/6				
3					
3.5			NA		
4					
4.5					
5					
5.5	Red/orange hard <sup>QA</sup> moist soft clay 25% embedded sand 2.54R 4/8	0.0 ppm			
6					
6.5					
7					
7.5			NA		
8					
8.5	Red clay, semi-moist, semi-hard 20% <del>emb</del> embedded sand 2.54R 3/6				
9					
9.5					
10					

SEA

Client/Installation ANG/McEntire JNGB		Borehole Number MMT 13-SB 2		Page Page 3 of 3	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Dense Athay		Date (MM-DD-YYYY) 06/28/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
10.5	Red/orange hard dry clay, med. plastic 2.54R 4/8	0.0 ppm ↓	NA	MMT 13-SB1	
11.0				MMT13-SB1-01	
11.5				0-2' @ 1315	
12.0				MMT13-SB1-02	
12.5				19.5-20' @ 1307	
13.0				SEA 8/22/18	
13.5				Located east of	
14.0				B979	
14.5				33.91575712° N	
15.0				80.80806222° W	
15.5	Light tan silty sand with intermittent white clay streaks 54R 8/4	0.0 ppm ↓	NA	MMT13-SB3	
16.0				MMT13-SB3-01	
16.5				0-2' @ 1445	
17.0				MMT13-SB3-02	
17.5				19.5-20' @ 1458	
18.0				SEA 8/22/18	
18.5				Located south	
19.0				of B969	
19.5				33.91471090° N	
20.0				80.80588282° W	
18.0	Light tan mostly sand, low plasticity 54R 8/4 red/orange sand mixed 2.54R 4/8	0.0 ppm ↓	NA		
18.5					
19.0					
19.5					
20.0	END			MMT13-SB2-02 @ 1330 +FD	



Client/Installation ANG/McEntire JNGB		Oversight Contractor Leidos		Borehole Number MW MMT 13-SB 01	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Driller M&W Drilling		Page Page 1 of 3	
Sizes and Type of Drilling and Sampling Equipment Geoprobe 7822-DT Schram				Borehole Location Description PRL 13 - North of B1070	
Date/Time Started (MM-DD-YYYY)/(0000) 06/28/2018 1340			Date/Time Finished (MM-DD-YYYY)/(0000) 06/28/2018 1415		
Overburden Thickness 2"		Depth to Groundwater 36'		Total Depth 40'	
Sample for PFOS/PFOA Analysis			Sample for PFOS/PFOA Analysis		
Sample ID: MMT ____-SB ____-01 Sample Interval: 0 to 2 ft NA			Sample ID: MMT ____-SB ____-02 Sample Interval: ____ to ____ ft NA		
Sample ID: MMT ____-SB ____-03 (if required) Sample Interval: ____ to ____ ft NA			Sample ID: MMT ____-SB ____-04 (if required) Sample Interval: ____ to ____ ft NA		
Inspector Name Denae Athay			Inspector Signature Denae Athay		
Monitoring Well ID: MW-MMT13-01		Backfill Type NA		Date Backfilled (MM-DD-YYYY) NA	
Latitude 33.91329841 °N		Longitude 80.80845713 °W		Elevation 274.30'	
Notes: See Logbook/ pg 35-39 for full borelog.					
Sketch:					

Client/Installation ANG/McEntire JNGB		Borehole Number MMT <u>13-S5 01</u>		Page Page <u>2</u> of <u>3</u>	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) <u>06/28/2018</u>	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
0.5	Grass Med. brown, soft silty clay, moist, plastic 5.4R 4/6	0.0 ppm			
1	Red clay, med. soft, <sup>wet</sup> med moisture, plastic 2.5 4R 3/6		NA		
1.5					
2					
2.5					
3					
3.5					
4					
4.5					
5	Red clay, med. soft, moist, plastic, 20% embedded sands 2.5 4R 3/6	0.0 ppm	NA		
5.5					
6					
6.5					
7					
7.5					
8	Same as 5-7.5'	0.0 ppm	NA		
8.5					
9					
9.5					
10					

SEA



Client/Installation ANG/McEntire JNGB		Borehole Number NW MMT 13-SB 01		Page Page 3 of 3	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) 06/28/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
10.5	Same as 5-7.5'	0.0 ppm	NA	20-25': 0.0 ppm	
11.0				20-22: red/orange silty sand 54R 4/8	
11.5				22-25: lt tan silty sand w/ 1/8-1/4" pebbles 54R 8/8	
12.0	Light tan clay, moist, med. plasticity			25-30' 0.0 ppm	
12.5	54R 8/4			25-27: salmon silty clay 54R 7/4	
13.0				27-28: salmon clay 54R 7/4	
13.5				28-30: light grey silty sand 54R 8/1	
14.0	Same as 5-7.5' but 30% embedded sands			30-35' 0.0 ppm	
14.5				light grey silty sand 54R 8/1 with salmon bands interspersed	
15.0				35-40' 0.0 ppm	
15.5	Same as 13.5-15'	0.0 ppm	NA	wet @ 36'	
16.0				35-37: light grey sand 54R 8/1	
16.5				37-38: salmon sand 54R 7/4	
17.0				38-40: lt tan sand 54R 8/4	
17.5				END	
18.0					
18.5	Light tan silty sand with 1/8-1/4" pebbles 54R 8/4				
19.0					
19.5					
20.0					

SPA

Client/Installation ANG/McEntire JNGB		Oversight Contractor Leidos		Borehole Number MMT 09 -SB 2	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Driller M&W Drilling		Page Page 1 of 3	
Sizes and Type of Drilling and Sampling Equipment Geoprobe 7822 DT Schram _____				Borehole Location Description PRL09- WSW of B210	
Date/Time Started (MM-DD-YYYY)/(0000) 06/28/2018 1510			Date/Time Finished (MM-DD-YYYY)/(0000) 06/28/2018 1615		
Overburden Thickness 4"		Depth to Groundwater 32'		Total Depth 35'	
Sample for PFOS/PFOA Analysis			Sample for PFOS/PFOA Analysis		
Sample ID: MMT 09 -SB 2 -01 @ 1515 Sample Interval: 0 to 2 ft			Sample ID: MMT 09 -SB 2 -02 @ 1542 Sample Interval: 1.5 to 2.0 ft -SB 1 8/22/18		
Sample ID: MMT ____ -SB ____ -03 (if required) NA Sample Interval: ____ to ____ ft			Sample ID: MMT ____ -SB ____ 04 (if required) NA Sample Interval: ____ to ____ ft		
Inspector Name Denae Athay			Inspector Signature <i>Denae Athay</i>		
Monitoring Well ID: MW-MMT09-01		Backfill Type NA		Date Backfilled (MM-DD-YYYY) NA	
Latitude 33.91289668°N		Longitude 80.80529478°W		Elevation 233.32'	
Notes: Drilled well on 6/30/2018 Replacement well drilled 7/16/18 See Logbook 1 pg 41-46 for full logs					
Sketch:					



Client/Installation ANG/McEntire JNGB		Borehole Number MMT 09 -SB 2		Page Page 2 of 3	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) 06/28/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
0.5	Grass	0.0 ppm	MMT - SB2-01 @ 1515	MMT09-SB1	
1	Medium brown, soft silty clay, moist, plastic	↓	NA	MMT09-SB1-01 6/29/2018 0-2' @ 0700	
1.5	54R 4/6			MMT09-SB1-02 6/29/2018	
2				15-20' @ 0709 SEA 8/22/18	
2.5				33.913100.00°N	
3				80.80494516°W	
3.5	Red clay, wet, hard, plastic, 10% embedded sands			225.67'	
4					
4.5	2.54R 3/6				
5					
5.5	Red clay, dry, hard, med. plasticity, 25% embedded sands	0.0 ppm	NA		
6		↓			
6.5	2.54R 3/6				
7					
7.5					
8	Same as 5-7.5'	0.0 ppm	NA		
8.5		↓			
9					
9.5					
10					

Client/Installation ANG/McEntire JNGB		Borehole Number MMT 09-SB 2 /		Page Page 3 of 3	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay MW-MMT-09-01		Date (MM-DD-YYYY) 06/28/2018 SRA elz 19	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes: ↓ MW-MMT 09-01 here down	
10.5	Red/orange, dry, hard clay, 30% embedded sands med. plasticity 2.5 4R 4/8 same as MA 7.5-10'	0.0 ppm	NA	20-25 0.0ppm	
11.0				20-22: orange/red sand 2.5 4R 4/8	
11.5				22-24: light tan clayey sand 5 4R 8/4	
12.0				24-25: light tan sand 5 4R 8/4	
12.5	Orange/red, dry, hard clay, 40% embedded sands 2.5 4R 4/8	0.0 ppm	NA	25-30 0.0ppm	
13.0				25-27: orange/red sand 2.5 4R 4/8	
13.5				27-28: hard, dry white clay	
14.0				28-30: salmon silty sand 5 4R 7/4	
14.5	Orange/red clayey sand, low plasticity 2.5 4R 4/8	0.0 ppm	NA	30-35 0.0ppm	
15.0				Wet @ 32'	
15.5				30-32: salmon clay 5 4R 7/4	
16.0				32-34: wet salmon sand 5 4R 7/4	
16.5	Light tan clayey sand, low plasticity 5 4R 8/4	0.0 ppm	NA	34-35: hard, dry white clay	
17.0				END	
17.5					
18.0					
18.5	Orange/red clayey sand, low plasticity 2.5 4R 4/8	0.0 ppm	NA		
19.0					
19.5					
20.0					
			MMT 09-SB2-02 @ 1542		



Client/Installation ANG/McEntire JNGB		Oversight Contractor Leidos		Borehole Number MW-MMT 10-SB 01	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Driller M&W Drilling		Page Page 1 of 3	
Size and Type of Drilling and Sampling Equipment Geoprobe 7822 DT Schram				Borehole Location Description PRL 10 East of B1163	
Date/Time Started (MM-DD-YYYY)/(0000) 06/28/18 06/29/2018 0725			Date/Time Finished (MM-DD-YYYY)/(0000) 06/29/2018 0808		
Overburden Thickness 4"		Depth to Groundwater 35'		Total Depth 35'	
Sample for PFOS/PFOA Analysis			Sample for PFOS/PFOA Analysis		
Sample ID: MMT-SB-01 Sample Interval: 0 to 2 ft NA			Sample ID: MMT-SB-02 Sample Interval: to ft NA		
Sample ID: MMT-SB-03 (if required) Sample Interval: to ft NA			Sample ID: MMT-SB-04 (if required) Sample Interval: to ft NA		
Inspector Name Danae Athay			Inspector Signature Danae Athay		
Monitoring Well ID: MW-MMT 10-01		Backfill Type NA		Date Backfilled (MM-DD-YYYY) NA	
Latitude 33.91121140°N		Longitude 80.80437517°W		Elevation 235.12'	
Notes: Original well drilled 7/1/18. Replacement well drilled 7/17/18. See logbook! pg 47-52 for full log					
Sketch:					

Client/Installation ANG/McEntire JNGB		Borehole Number MMT <u>10-SB-01</u>		Page Page <u>2</u> of <u>3</u>	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) <u>06/29/2018</u>	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
0.5	Grass	0.0 ppm			
1	Medium brown, soft silty clay, moist, plastic 54R 4/6				
1.5					
2					
2.5			NA		
3					
3.5	Red clay, moist, med. soft, plastic, 10% embedded sands 2.54R 3/6				
4					
4.5					
5					
5.5	Red clay, dry, hard, med. plasticity, 25% embedded sands 2.54R 3/6	0.0 ppm			
6			NA		
6.5					
7					
7.5					
8	Same as 5-7.5 but 30% embedded sands	0.0 ppm			
8.5			NA		
9					
9.5					
10					



Client/Installation ANG/McEntire JNGB		Borehole Number MMT <u>10-SB-01</u>		Page Page <u>3</u> of <u>3</u>	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) <u>06/29/2018</u>	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
10.5 11.0 11.5 12.0 12.5	Red/orange <del>brown</del> dry, hard clay, low plasticity 2.5 4R 4/8 30% embedded sands	0.0 ppm ↓	NA	20-25' 0.0 ppm 20-24: red/orange silty sand 2.5 4R 4/8 24-25: red/orange silty clay 2.5 4R 4/8 25-30' 0.0 ppm 25-28: red orange silty sand 2.5 4R 4/8 28-29: lt grey <sup>silty</sup> sand + 1/8-1/4" pebbles 5 4R 8/1 29-30: lt tan sand 5 4R 8/4	10.5 11.0 11.5 12.0 12.5
13.0 13.5 14.0 14.5 15.0	Red/orange clay dry, hard, crumbly, low plasticity, 40% embedded sands 2.5 4R 4/8	0.0 ppm ↓	NA	30-35' 0.0 ppm Wet @ 35' lt tan hard dry clay 5 4R 8/4 END	13.0 13.5 14.0 14.5 15.0
15.5 16.0 16.5 17.0 17.5	Same as 12.5-15'	0.0 ppm ↓	NA		15.5 16.0 16.5 17.0 17.5
18.0 18.5 19.0 19.5 20.0	Same as 12.5-15'	0.0 ppm ↓	NA		18.0 18.5 19.0 19.5 20.0

Client/Installation ANG/McEntire JNGB		Oversight Contractor Leidos	Borehole Number MMT 10 -SB 2
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Driller M&W Drilling	Page Page 1 of 3
Size and Type of Drilling and Sampling Equipment Geoprobe 7822DT Schram		Borehole Location Description POL YARD NW corner B1161	
Date/Time Started (MM-DD-YYYY)/(0000) 06/29/2018 0858		Date/Time Finished (MM-DD-YYYY)/(0000) 06/29/2018 0910	
Overburden Thickness 1"	Depth to Groundwater unknown	Total Depth 20'	
Sample for PFOS/PFOA Analysis Sample ID: MMT 10 -SB 2 -01 @0900 + Field Dups Sample Interval: 0 to 2 ft		Sample for PFOS/PFOA Analysis Sample ID: MMT 10 -SB 2 -02 Sample Interval: 19.5 to 20 ft TRA 8/22/18	
Sample ID: MMT -SB -03 (if required) Sample Interval: to ft NA		Sample ID: MMT -SB -04 (if required) Sample Interval: to ft NA	
Inspector Name Denae Athay		Inspector Signature Denae Athay	
Monitoring Well ID: NA	Backfill Type 3/8" bentonite chips	Date Backfilled (MM-DD-YYYY) 06/29/2018	
Latitude 33.91179852°N	Longitude 80.80270550°W	Elevation 237.52'	
Notes:			
Sketch:			



Client/Installation ANG/McEntire JNGB		Borehole Number MMT 10 -SB 2		Page Page 2 of 3	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Danae Athay		Date (MM-DD-YYYY) 06/29/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
0.5	grass Med. brown, soft, moist silty clay 5 1/2 R 4/6	0.0 ppm	MMT 10-SB2-01 @ 0900 + FD		
1	Red/orange hard clay w/ 1/8" - 1/4" pebbles and 10% embedded sand 2.5 1/2 R 4/8				
1.5					
2					
2.5					
3					
3.5			NA		
4					
4.5	Red clay, moist, semi-hard, plastic 2.5 1/2 R 3/6				
5					
5.5	Red silty clay, dry, hard, low plasticity, 10% embedded sands 2.5 1/2 R 3/6	0.0 ppm			
6					
6.5					
7			NA		
7.5					
8					
8.5					
9					
9.5					
10					

Client/Installation ANG/McEntire JNGB		Borehole Number MMT 10-SB 2		Page Page 3 of 3	
Project FY17 Phase 4 Regional SI for PFO5/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) 06/29/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
10.5	Same as 5-10'	0.0 ppm ↓	NA	MMT 10-SB1	
11.0				MMT10-SB1-01	
11.5				0-2' @ 0843	
12.0				MMT10-SB1-02	
12.5				NA 19.5-20' @ 0851	
13.0				JEA 8/22/18	
13.5				33.91198676°N	
14.0				80.8028754°W	
14.5				229.38'	
15.0				Red/orange silty clay, dry, hard 20% embedded sands  2.54R 4/8	
15.5					
16.0					
16.5					
17.0					
17.5					
18.0					
18.5					
19.0					
19.5					
20.0	END		MMT10-SB2-02 @0908		



Client/Installation ANG/McEntire INGB		Oversight Contractor Leidos		Borehole Number MW MMT 02-SB 01	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Driller M&W Drilling		Page Page 1 of 3	
Sizes and Type of Drilling and Sampling Equipment Geoprobe 7822DT Schram _____				Borehole Location Description PRL 02 SE of B 1150/1151	
Date/Time Started (MM-DD-YYYY)/(0000) 06/29/2018 0935			Date/Time Finished (MM-DD-YYYY)/(0000) 06/29/2018 1020		
Overburden Thickness 6"		Depth to Groundwater 45'		Total Depth 45'	
Sample for PFOS/PFOA Analysis			Sample for PFOS/PFOA Analysis		
Sample ID: MMT ____-SB ____-01 Sample Interval: 0 to 2 ft NA			Sample ID: MMT ____-SB ____-02 Sample Interval: ____ to ____ ft NA		
Sample ID: MMT ____-SB ____-03 (if required) Sample Interval: ____ to ____ ft NA			Sample ID: MMT ____-SB ____-04 (if required) Sample Interval: ____ to ____ ft NA		
Inspector Name Danae Athay			Inspector Signature Danae Athay		
Monitoring Well ID: MW-MMT02-01		Backfill Type NA		Date Backfilled (MM-DD-YYYY) NA	
Latitude 33.91059630		Longitude 80.79847873		Elevation 229.52	
Notes: Drilled well 7/1/2018 See logbook pg 53-58 for full log					
Sketch:					

Client/Installation ANG/McEntire JNGB		Borehole Number MW MMT <u>2</u> -SB <u>01</u>		Page Page <u>2</u> of <u>3</u>	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) <u>06/29/2018</u>	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
0.5	Grass	0.0 ppm	NA		
1	Medium brown, soft silty clay, moist, plastic 54R 4/6				
1.5					
2					
2.5					
3	Red clay, moist, med. soft, plastic, 10% embedded sands				
3.5					
4	2.5 4R 3/6				
4.5					
5					
5.5	Red clay, dry, hard, med. plasticity, 10% embedded sands	0.0 ppm	NA		
6	2.5 4R 3/6				
6.5					
7					
7.5					
8					
8.5					
9					
9.5					
10					



Client/Installation ANG/McEntire JNGB		Borehole Number MW MMT 02-SB 01		Page Page 3 of 3	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) 06/29/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
10.5	Red clay, dry and crumbly, low plasticity, 30% embedded sands 2.54R 3/6	0.0 ppm	NA	20-25'	0.0ppm
11.0				20-22.5': same as 17.5-20'	
11.5				22.5-25: clayey sand, light tan 54R 8/4 w/ streaks white clay	
12.0				25-30'	0.0ppm
12.5				25-27': light tan clay 54R 8/4	
13.0	Red/orange silty sand, low plasticity 2.54R 4/8	0.0 ppm	NA	27-28 1/2: light pink clay 54R 8/4	
13.5				28.5-30: salmon silty sand 54R 7/4	
14.0				30-35'	0.0 ppm
14.5				30-30.5: salmon silty sand 54R 7/4	
15.0				30.5-31.5: light tan clay 54R 8/4 with interspersed mustard clay 104R 8/6	
15.5	Light tan silty sand, low plasticity 54R 8/4	0.0 ppm	NA	31.5-32.5: light pink clay 54R 8/4	
16.0				32.5-33.5: light grey clay 54R 8/4	
16.5				33.5-35: salmon sand 54R 7/4	
17.0				35-37.5'	0.0ppm
17.5				same as 33.5-35	
18.0				37.5-40'	0.0ppm
18.5				same as 33.5-35	
19.0				40-45 wet @ 45' 0.0ppm	
19.5				40-41: lt tan clay 54R 8/4	
20.0				41-41.5: mustard clay 104R 8/6	
				41.5-43: salmon clay 54R 7/4	
				43-45: lt pink sand 54R 8/4	

last 4" wet

END

SEA

Client/Installation ANG/McEntire INGB		Oversight Contractor Leidos		Borehole Number MMT 02-SB 1	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Driller M&W Drilling		Page Page 1 of 3	
Sizes and Type of Drilling and Sampling Equipment Geoprobe <u>FB22 DT</u> Schram _____				Borehole Location Description <u>PRL 02</u> <u>East of B1150/1151</u>	
Date/Time Started (MM-DD-YYYY)/(0000) <u>06/29/2018</u> <u>1120</u>			Date/Time Finished (MM-DD-YYYY)/(0000) <u>06/29/2018</u> <u>1135</u>		
Overburden Thickness <u>2"</u>		Depth to Groundwater <u>unknown</u>		Total Depth <u>20'</u>	
Sample for PFOS/PFOA Analysis			Sample for PFOS/PFOA Analysis		
Sample ID: MMT <u>02</u> -SB <u>1</u> -01 Sample Interval: 0 to 2 ft @ <u>1125</u>			Sample ID: MMT <u>02</u> -SB <u>1</u> -02 Sample Interval: <u>15</u> to <u>20</u> ft <u>ORA 8/22/18</u> @ <u>1132</u>		
Sample ID: MMT ____-SB ____-03 (if required) Sample Interval: ____ to ____ ft <u>NA</u>			Sample ID: MMT ____-SB ____-04 (if required) Sample Interval: ____ to ____ ft <u>NA</u>		
Inspector Name Denae Athay			Inspector Signature <u>Denae Athay</u>		
Monitoring Well ID: <u>NA</u>		Backfill Type <u>3/8" bentonite chips</u>		Date Backfilled (MM-DD-YYYY) <u>06/29/2018</u>	
Latitude <u>33.91151910</u>		Longitude <u>80.79796067</u>		Elevation <u>232.72</u>	
Notes:					
Sketch:					
					<u>NA</u> <u>Not To Scale</u>



Client/Installation ANG/McEntire JNGB		Borehole Number MMT <u>02</u> -SB <u>1</u>		Page Page <u>2</u> of <u>3</u>	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) <u>06/29/2018</u>	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
0.5	<u>Grass</u> Medium brown, soft silty clay, moist, plastic 54R 4/6	0.0 ppm	MMT02-SB1-01 @ 1125		
1					
1.5					
2	Red clay, moist, med. soft, plastic 2.54R 3/6				
2.5					
3					
3.5			NA		
4					
4.5					
5					
5.5	Red clay, dry, hard, med. plasticity, 20% embedded sands 2.54R 3/6	0.0 ppm			
6					
6.5					
7					
7.5			NA		
8					
8.5					
9					
9.5					
10					

GRA

Client/Installation ANG/McEntire JNGB		Borehole Number MMT 02-SB 1		Page Page 3 of 3	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) 06/29/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
10.5 11.0 11.5 12.0 12.5 13.0 13.5 14.0 14.5 15.0	Red clay, dry and low plasticity, 20% embedded sands 2.54R 3/6	0.0 ppm ↓	NA		
15.5 16.0 16.5 17.0 17.5	Red/orange clay, dry and hard, 40% embedded sands 2.54R 4/8	0.0 ppm ↓	NA		
18.0 18.5 19.0 19.5 20.0	Red/orange clay, dry, hard & crumbly, 25% embedded sand 2.54R 4/8	0.0 ppm ↓	NA		
	Light tan clay, hard, 40% embedded sand 54R 8/4 END	↓	MMT02-SB1-02		

@ 1132

SEA



Client/Installation ANG/McEntire JNGB		Oversight Contractor Leidos		Borehole Number MMT <u>11</u> -SB <u>1</u>	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Driller M&W Drilling		Page Page <u>1</u> of <u>3</u>	
Size and Type of Drilling and Sampling Equipment Geoprobe <u>7822 DT</u> Schram _____				Borehole Location Description PRL11 - NE corner of B1150/B1151	
Date/Time Started (MM-DD-YYYY)/(0000) <u>06/29/2018</u> <u>1152</u>		Date/Time Finished (MM-DD-YYYY)/(0000) <u>06/29/2018</u> <u>1201<sup>PM</sup></u> <u>1205</u>			
Overburden Thickness <u>4"</u>		Depth to Groundwater <u>unknown</u>		Total Depth <u>20'</u>	
Sample for PFOS/PFOA Analysis			Sample for PFOS/PFOA Analysis		
Sample ID: MMT <u>11</u> -SB <u>1</u> -01 Sample Interval: <u>0</u> to <u>2</u> ft <u>@ 1156</u>			Sample ID: MMT <u>11</u> -SB <u>1</u> -02 Sample Interval: <u>19.5</u> to <u>20</u> ft <u>@ 1205</u> <u>SEA 6/22/18</u>		
Sample ID: MMT _____ -SB _____ -03 (if required) Sample Interval: _____ to _____ ft <u>NA</u>			Sample ID: MMT _____ -SB _____ -04 (if required) Sample Interval: _____ to _____ ft <u>NA</u>		
Inspector Name Denae Athay			Inspector Signature <u>Denae Athay</u>		
Monitoring Well ID: <u>NA</u>		Backfill Type <u>3/8" bentonite chips</u>		Date Backfilled (MM-DD-YYYY) <u>06/29/2018</u>	
Latitude <u>33.91171704 °N</u>		Longitude <u>80.79851240 °W</u>		Elevation <u>226.51'</u>	
Notes:					
Sketch:					
<div style="text-align: right;"> <u>NA</u>            Not To Scale         </div>					

SEA

Client/Installation ANG/McEntire JNGB		Borehole Number MMT 11-SB 1		Page Page 2 of 3	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) 06/29/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
0.5	Grass	0.0 ppm	MMT 11-SB1-01 @ 1156		
1	Medium brown, soft silty clay, plastic	↓	NA		
1.5	54R 4/6				
2					
2.5					
3					
3.5					
4					
4.5	Red clay, moist, med. soft, med. plastic	↓	NA		
5	2.54R 3/6				
5.5	Red clay, dry, hard, med. plasticity, 20% embedded sands	0.0 ppm	NA		
6	2.54R 3/6	↓			
6.5					
7					
7.5					
8					
8.5					
9					
9.5					
10		↓			



Client/Installation ANG/McEntire JNGB		Borehole Number MMT 11-SB 1		Page Page 3 of 3	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) 06/29/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
10.5 11.0 11.5 12.0 12.5	Red clay, dry, hard low plasticity, 10%. embedded sands 2.5YR 3/6	0.0 ppm ↓	NA	<div style="border: 1px solid black; padding: 2px;">MMT 11-SB2</div> MMT11-SB2-01 0-2' @ 1140 MMT11-SB2-02 19.5-20' @ 1147 DPA 8/24/18 33.91151903°N 80.79819889°W 227.61'	
13.0 13.5 14.0 14.5 15.0	Red/orange clay, dry and hard, low plasticity, 30%. embedded sands 2.5YR 4/8	0.0 ppm ↓	NA		
15.5 16.0 16.5 17.0 17.5 18.0 18.5 19.0 19.5 20.0	Light tan sandy clay, low plasticity  5YR 8/4  END	0.0 ppm ↓	NA	MMT 11 - SB1-02 @ 1205	

DA

Client/Installation ANG/McEntire JNGB		Oversight Contractor Leldos		Borehole Number MMT <u>03</u> -SB <u>1</u>	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Driller M&W Drilling		Page Page <u>1</u> of <u>3</u>	
Sizes and Type of Drilling and Sampling Equipment Geoprobe <u>7822 DT</u> Schram _____				Borehole Location Description <u>PRLO3 - west of baseball diamond</u>	
Date/Time Started (MM-DD-YYYY)/(0000) <u>06/29/2018</u> <u>1310</u>			Date/Time Finished (MM-DD-YYYY)/(0000) <u>06/29/2018</u> <u>1327</u>		
Overburden Thickness <u>2"</u>		Depth to Groundwater <u>unknown</u>		Total Depth <u>20'</u>	
Sample for PFOS/PFOA Analysis			Sample for PFOS/PFOA Analysis		
Sample ID: MMT <u>03</u> -SB <u>1</u> -01			Sample ID: MMT <u>03</u> -SB <u>1</u> -02		
Sample Interval: <u>0</u> to <u>2</u> ft @ <u>1314</u>			Sample Interval: <u>4.5</u> to <u>20</u> ft @ <u>1327</u>		
Sample ID: MMT _____ -SB _____ -03 (if required) <u>NA</u>			Sample ID: MMT _____ -SB _____ -04 (if required) <u>NA</u>		
Sample Interval: _____ to _____ ft			Sample Interval: _____ to _____ ft		
Inspector Name Denae Athay			Inspector Signature <u>Denae Athay</u>		
Monitoring Well ID: <u>NA</u>		Backfill Type <u>3/8" bentonite chips</u>		Date Backfilled (MM-DD-YYYY) <u>06/29/2018</u>	
Latitude <u>33.91283066°N</u>		Longitude <u>80.81115925°W</u>		Elevation <u>233.47'</u>	
Notes:					
Sketch:					

32A



Client/Installation ANG/McEntire JNGB		Borehole Number MMT_03-SB_1		Page Page 2 of 3	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) 06/29/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
0.5	Med. brown, soft silty clay, plastic 54R 4/6	0.0 ppm	MMT03-SB1-01 @ 1314		
1	Red dry silty clay 2.54R 3/6				
1.5					
2	Red/orange silty clay with		NA		
2.5	1/8"-1/4" pebbles (10%)				
3	2.54R 3/6				
3.5					
4					
4.5					
5					
5.5	Red/orange clay w/40% embedded sands 2.54R 3/6	0.0 ppm			
6					
6.5					
7			NA		
7.5					
8					
8.5	Light tan sandy clay 54R 8/4				
9					
9.5					
10					

SRH

Client/Installation ANG/McEntire JNGB		Borehole Number MMT 03 SB 1		Page Page 3 of 3	
Project FY17 Phase 4 Regional SI for PFOS/PFOA		Inspector Name Denae Athay		Date (MM-DD-YYYY) 06/29/2018	
Depth	Description of Materials	Headspace Reading	Analytical Sample Interval	Notes:	
10.5 11.0 11.5 12.0 12.5 13.0 13.5 14.0 14.5 15.0	Red /orange silty clay, 20% sand 2.54R 3/6	0.0 ppm ↓	NA		
15.5 16.0 16.5 17.0 17.5	Light tan sand 54R 8/4	0.0 ppm ↓	NA		
18.0 18.5 19.0	Light grey sand 54R 8/1 w/ 1/8" - 1/4" pebbles	0.0 ppm ↓	NA		
19.5 20.0	Light tan sand 54R 8/4 END	↓	MMT03- SB1-02 @ 1327		
10.5 11.0 11.5 12.0 12.5 13.0 13.5 14.0 14.5 15.0 15.5 16.0 16.5 17.0 17.5 18.0 18.5 19.0 19.5 20.0					

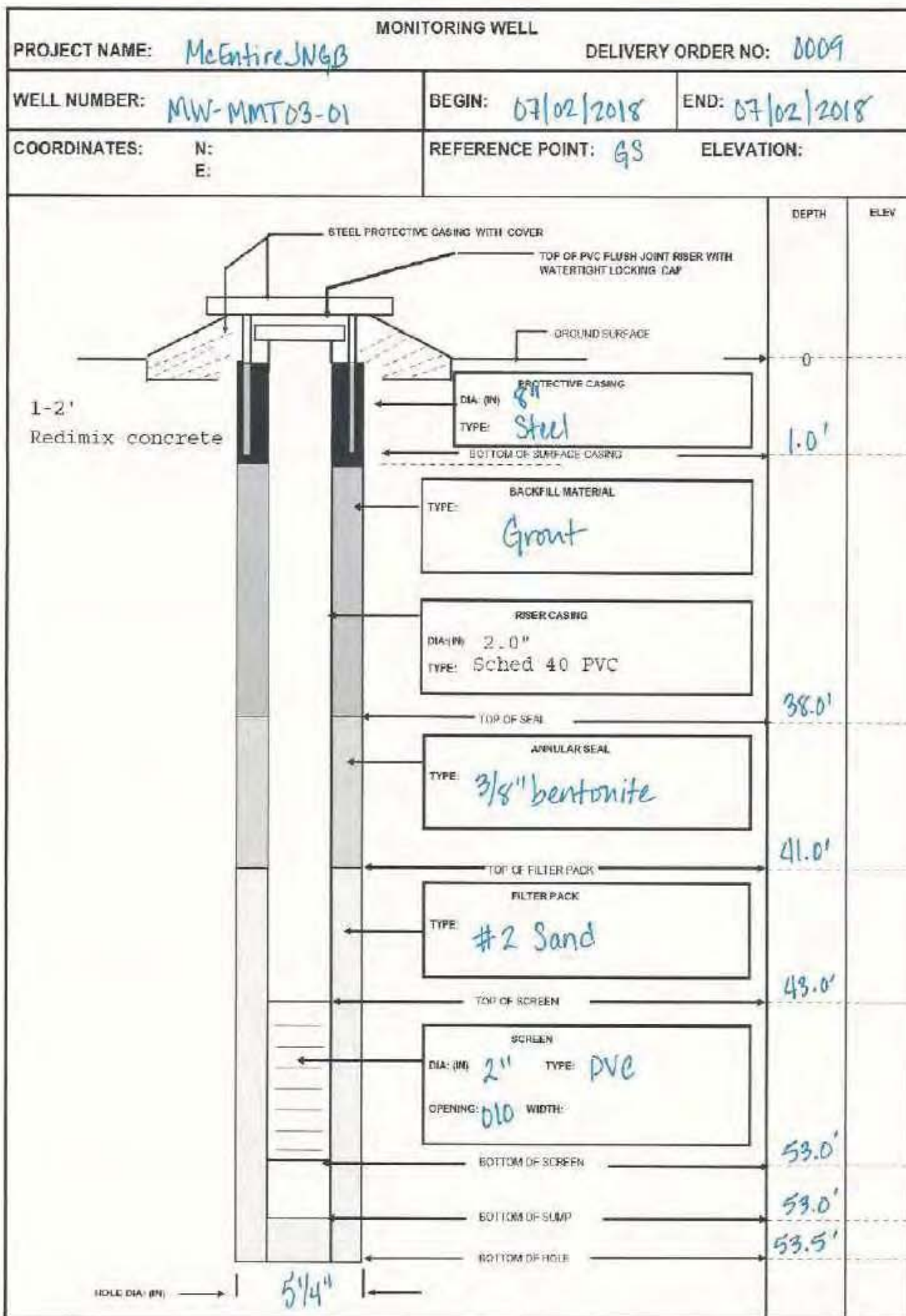
22A

MONITORING WELL			
PROJECT NAME: <i>McEntire JNGB</i>		DELIVERY ORDER NO: <i>0009</i>	
WELL NUMBER: <i>MW-MMT02-01</i>	BEGIN: <i>07/01/2018</i>	END: <i>07/01/2018</i>	
COORDINATES: N: E:	REFERENCE POINT: <i>GS</i>		ELEVATION:

DEPTH	ELEV
0	
1.0'	
37.0'	
40.0'	
42.0	
52.0	
52.0	
52.5	







MONITORING WELL			
PROJECT NAME: <u>McEntire JNB</u>		DELIVERY ORDER NO: <u>0009</u>	
WELL NUMBER: <u>MW-MMT04-01</u>	BEGIN: <u>07/17/2018</u>	END: <u>07/17/2018</u>	
COORDINATES: N: E:	REFERENCE POINT: <u>GS</u>		ELEVATION:

	DEPTH	ELEV
	0	
<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">             PROTECTIVE CASING              DIA: (IN) <u>8"</u>              TYPE: <u>Steel</u> </div>	1.0	
<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">             BACKFILL MATERIAL              TYPE: <u>Grout</u> </div>		
<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">             RISER CASING              DIA: (IN) <u>2.0"</u>              TYPE: <u>Sched 40 PVC</u> </div>	32'	
<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">             ANNULAR SEAL              TYPE: <u>3/8" bentonite</u> </div>	34'	
<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">             FILTER PACK              TYPE: <u>#1 Sand</u> </div>	36'	
<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">             SCREEN              DIA: (IN) <u>2"</u> TYPE: <u>PVC</u>              OPENING: <u>10</u> WIDTH: </div>	46'	
<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">             BOTTOM OF SCREEN </div>	46.5'	
<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">             BOTTOM OF SUMP </div>	50'	
<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">             BOTTOM OF HOLE </div>		
HOLE DIA: (IN) <u>5 1/4"</u>		

MONITORING WELL		DELIVERY ORDER NO: 0009
PROJECT NAME: McEntire JNGB		
WELL NUMBER: MW-MMTOS-01	BEGIN: 06/30/2018	END: 06/30/2018
COORDINATES: N: E:	REFERENCE POINT: GS	ELEVATION:

1-2'  
Redimix concrete

STEEL PROTECTIVE CASING WITH COVER

TOP OF PVC FLUSH JOINT RISER WITH WATERTIGHT LOCKING CAP

GROUND SURFACE

PROTECTIVE CASING  
DIA (IN): 8"  
TYPE: Steel

BACKFILL MATERIAL  
TYPE: Grout

RISER CASING  
DIA (IN): 2.0"  
TYPE: Sched 40 PVC

ANNULAR SEAL  
TYPE: 3/8" bentonite

FILTER PACK  
TYPE: #2 Sand

SCREEN  
DIA (IN): 2" TYPE: PVC  
OPENING: 0.10 WIDTH:

HOLE DIA (IN): 5 1/4"

DEPTH

ELEV

0

1.0

37.0'

40.0'

44.0

54.0

54.0

54.5

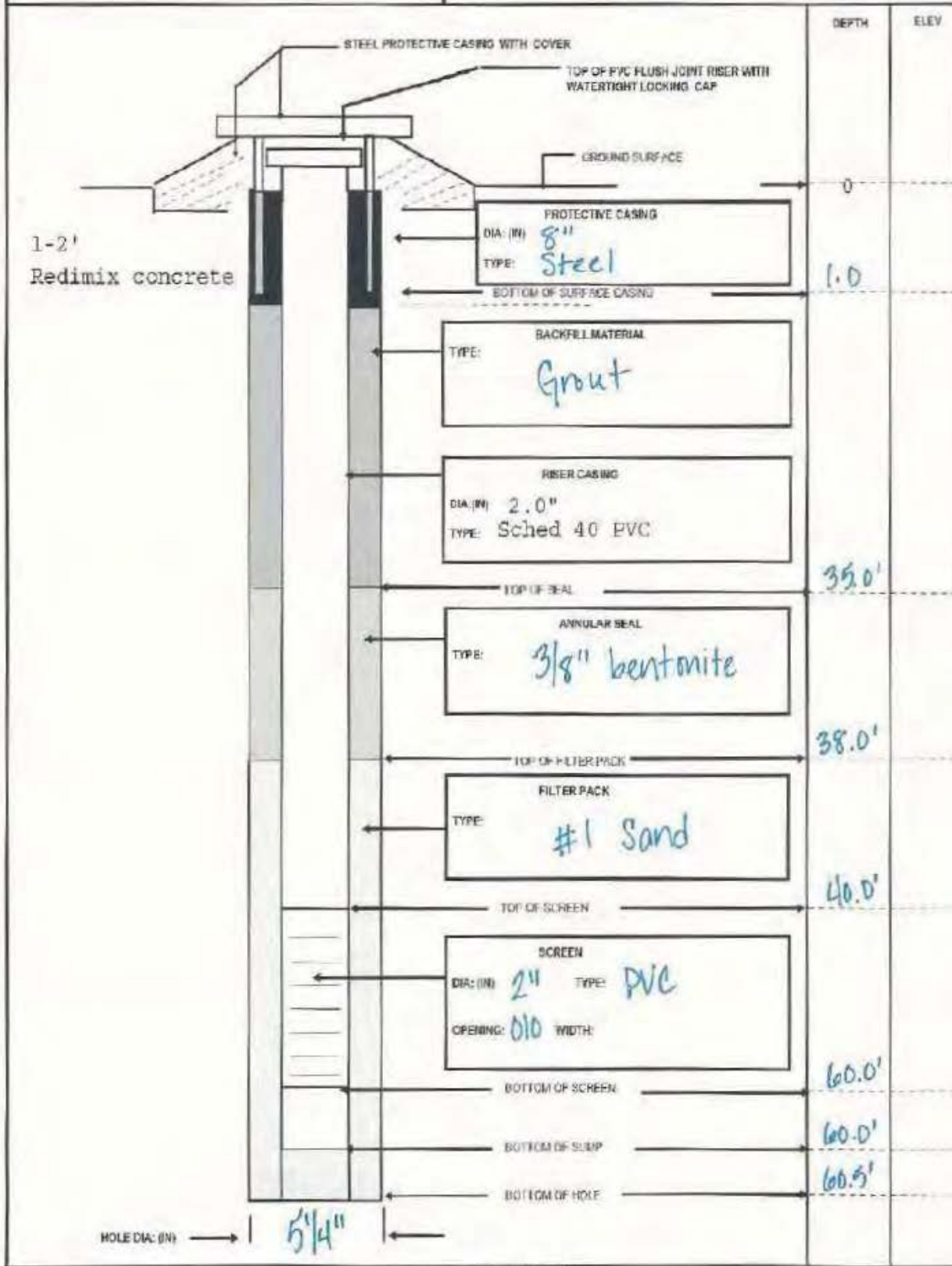
MONITORING WELL		
PROJECT NAME: <u>McEntire JNGB</u>		DELIVERY ORDER NO: <u>0009</u>
WELL NUMBER: <u>MW-MMT06-01</u>	BEGIN: <u>06/27/2018</u>	END: <u>06/27/2018</u>
COORDINATES: N: E:	REFERENCE POINT: <u>GS</u>	ELEVATION:

DEPTH	ELEV
0	
1.0'	
39.0'	
42.0'	
44.0'	
54.0'	
54.0'	
54.5'	



PROJECT NAME: <b>McEntire INGB</b>		DELIVERY ORDER NO: <b>0009</b>	
WELL NUMBER: <b>MW-MMTO9-01</b>	BEGIN: <b>07/16/2018</b>	END: <b>07/16/2018</b>	
COORDINATES: N: E:	REFERENCE POINT: <b>GS</b>	ELEVATION:	

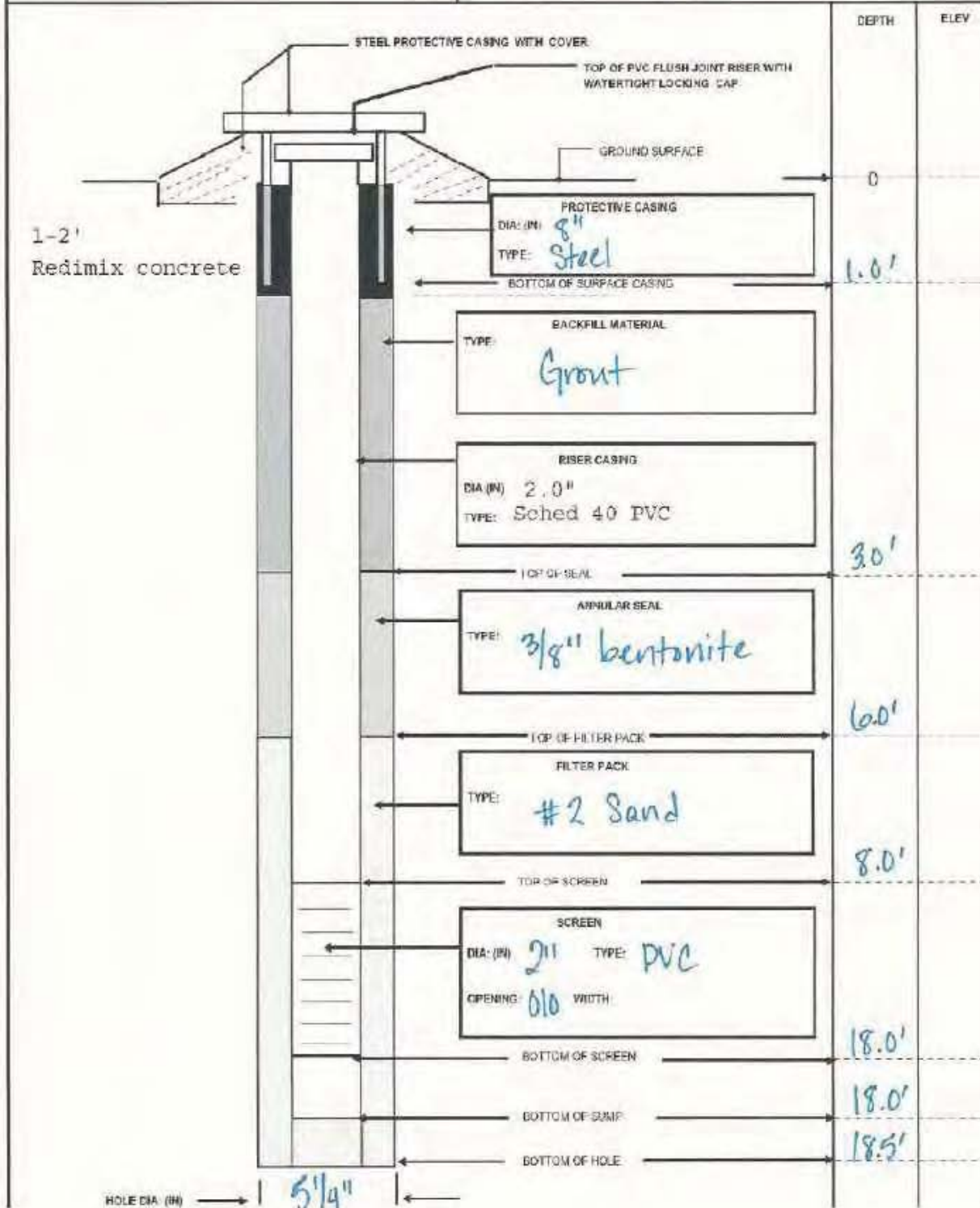








MONITORING WELL			
PROJECT NAME: <u>McEntire JNGB</u>		DELIVERY ORDER NO: <u>0009</u>	
WELL NUMBER: <u>MW-MMT14-01</u>		BEGIN: <u>06/28/2018</u>	END: <u>06/28/2018</u>
COORDINATES: N: E:		REFERENCE POINT: <u>GS</u>	ELEVATION:



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## **APPENDIX B**

### **GROUNDWATER SAMPLING LOGS**

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# GROUND WATER MICRO PURGE SHEET

PROJECT NAME: McEntire JNGB

DELIVERY ORDER 0009

DATE (mm/dd/yy): 07/02/2018 TIME: 11:45

WELL ID NUMBER: NW-UMT06-01 SRH 8/22/18 WELL LOCATION: \_\_\_\_\_

DEPTH OF SCREENED INTERVAL (to notch): 44 ft. to 54 ft.

INNER CASING: TYPE: PVC or Steel ID: 0.75 inches 2 inches 4 inches

WATER QUALITY METER ID: 16863

WATER LEVEL INDICATOR ID: 82501

PUMP ID: 82737

TURBIDITY ID: 82899

PID ID: NA

DEPTH TO WATER: 45.9 FT FROM MEASURE POINT

TOTAL WELL DEPTH: 54 49<sup>ft</sup> FT FROM MEASURE POINT

DEPTH TO PUMP INTAKE: 49 FT FROM MEASURE POINT

PURGE/SAMPLE METHOD: ☐ Bailer ☐ Bladder Pump ☒ Other Pump Type Monsoon Pro

PURGE START TIME: 1120 PURGE END TIME: 1145

TOTAL VOLUME PURGED: 1 gallon + 4500 mL

S&A PLAN SAMPLING PROCEDURE FOLLOWED: ☒ Yes ☐ No IF NO, WHY WAS A DEVIATION NECESSARY: \_\_\_\_\_

RECORDED BY: Ileana Delacruz  
(Signature)

QA CHECKED BY: Kelly Ashman  
(Signature)

# GROUND WATER MICRO PURGE LOG

WELL ID: MW-14106-01 <sup>SPR</sup> 8/22/18  
~~MW-14106-01~~

PROJECT NAME: McEntire JNGB

DELIVERY ORDER 0009

TIME	LITERS REMOVED	PURGE RATE (mL/min)	ORP (mv)	TEMP (Celsius)	pH (s.u.)	COND (RECORD UNITS) $\mu\text{S/cm}$	DO (mg/L)	TURBIDITY (NTU)	DEPTH TO WATER (FT BTOC)	COMMENTS
* initially purged 1 gallon turbid water						ms/cm or S/m				
1127	500	250	204.8	23.81	5.47	34 ms/cm or S/m	9.64	129	46.18	
1129	1000		201.4	22.14	5.84	33 ms/cm or S/m	9.14	84	46.21	
1131	1500		199.8	22.08	5.98	32 ms/cm or S/m	8.94	72	46.24	
1133	2000		197.2	21.99	6.42	31 ms/cm or S/m	8.87	45	46.28	
1135	2500		196.4	21.94	6.62	28 ms/cm or S/m	8.24	43	46.28	
1137	3000		195.6	21.81	6.63	28 ms/cm or S/m	7.19	39	46.28	
1139	3500		194.4	21.76	6.64	27 ms/cm or S/m	7.13	37	46.34	
1141	4000		194.2	21.74	6.63	27 ms/cm or S/m	7.14	36	46.34	
1143	4500	↓	194.2	21.75	6.63	27 ms/cm or S/m	7.13	36	46.34	
1145	→ collect sample					ms/cm or S/m				
						ms/cm or S/m				
						ms/cm or S/m				
						ms/cm or S/m				
						ms/cm or S/m				

RECORDED BY:

Rebecca Anthony

(Signature)

QA CHECKED BY:

Kelly Foster

(Signature)



# GROUND WATER MICRO PURGE SHEET

PROJECT NAME: McEntire JNGB

DELIVERY ORDER 0009

DATE (mm/dd/yy):

07/02/18

TIME:

12 : 45

WELL ID NUMBER:

~~MW-NM105-01~~ ~~MW05-01~~ ~~8/22/18~~

WELL LOCATION:

DEPTH OF SCREENED INTERVAL (to notch):

44

ft.

to

54

ft.

INNER CASING:

TYPE:

PVC

or

Steel

ID:

0.75 inches

2 inches

4 inches

WATER QUALITY METER ID:

16863

WATER LEVEL INDICATOR ID:

82501

PUMP ID:

82737

TURBIDITY ID:

82879

PID ID:

—

DEPTH TO WATER:

46.95

FT FROM MEASURE POINT

TOTAL WELL DEPTH:

54

FT FROM MEASURE POINT

DEPTH TO PUMP INTAKE:

49

FT FROM MEASURE POINT

PURGE/SAMPLE METHOD:

[ ]

Bailer

[ ]

Bladder Pump

[X]

Other Pump Type

Monsoon Pro

PURGE START TIME:

1220

PURGE END TIME:

1245

TOTAL VOLUME PURGED:

2 gallons + 5.4 liters

S&A PLAN SAMPLING PROCEDURE FOLLOWED:

[X] Yes

[ ] No

IF NO, WHY WAS A DEVIATION NECESSARY:

RECORDED BY:

*Denae Dubay*

(Signature)

QA CHECKED BY:

*Gully Arsham*

(Signature)

# GROUND WATER MICRO PURGE LOG

MW-NMT05-01

WELL ID: ~~NMT-MW05-01~~

SP4  
5/22/10

PROJECT NAME: McEntire JNGB

DELIVERY ORDER 0009

TIME	M LITERS REMOVED	PURGE RATE (mL/min)	ORP (mv)	TEMP (Celsius)	pH (s.u.)	COND (RECORD UNITS) $\mu S/cm$	DO (mg/L)	TURBIDITY (NTU)	DEPTH TO WATER (FT BTOC)	COMMENTS
1227	600	300	153.4	23.64	5.64	78 ms/cm or S/m	8.46	46.4	46.84	
1229	1200		153.8	23.46	5.56	74 ms/cm or S/m	7.32	38.2	46.81	
1231	1800		146.4	23.14	5.38	70 ms/cm or S/m	6.44	35.6	46.78	
1233	2400		121.3	23.08	5.35	68 ms/cm or S/m	5.98	31.2	46.94	
1235	3000		98.7	23.05	5.35	52 ms/cm or S/m	5.97	28.4	46.47.18	
1237	3600		91.2	23.04	5.34	49 ms/cm or S/m	5.95	23.8	47.25	
1239	4200		85.9	23.02	5.30	50 ms/cm or S/m	5.91	22.9	47.28	
1241	4800		85.6	23.00	5.31	51 ms/cm or S/m	5.91	22.6	47.31	
1243	5400		84.0	23.02	5.31	51 ms/cm or S/m	5.94	22.5	47.32	
1245	→ sample					ms/cm or S/m				
						ms/cm or S/m				
						ms/cm or S/m				
						107 ms/cm or S/m				
						ms/cm or S/m				
						ms/cm or S/m				

RECORDED BY:

Deane Chisley  
(Signature)

QA CHECKED BY:

Valley Atkinson  
(Signature)

\*initially purged 2 gallons silty water



# GROUND WATER MICRO PURGE SHEET

PROJECT NAME: McEntire JNGB

DELIVERY ORDER 0009

DATE (mm/dd/yy): 07/03/18

TIME: 07:40

WELL ID NUMBER:

MW-MMT02-01  
HMT-HW02-01

8/22/18

WELL LOCATION:

PRLO3

DEPTH OF SCREENED INTERVAL (toc notch):

42 ft.

to

52 ft.

INNER CASING:

TYPE: PVC or Steel

ID: 0.75 inches

2 inches

4 inches

WATER QUALITY METER ID:

16863

WATER LEVEL INDICATOR ID:

82501

PUMP ID:

82737

TURBIDITY ID:

82899

PID ID:

—

DEPTH TO WATER:

45.20

FT FROM MEASURE POINT

TOTAL WELL DEPTH:

52

FT FROM MEASURE POINT

DEPTH TO PUMP INTAKE:

47

FT FROM MEASURE POINT

PURGE/SAMPLE METHOD:

[ ] Bailer

[ ] Bladder Pump

[X] Other Pump Type

Monsoon

PURGE START TIME:

0710

PURGE END TIME:

0740

TOTAL VOLUME PURGED:

1 gallon + 5.6 liters

S&A PLAN SAMPLING PROCEDURE FOLLOWED:

[X] Yes

[ ] No

IF NO, WHY WAS A DEVIATION NECESSARY:

RECORDED BY:

Denise Delas

(Signature)

QA CHECKED BY:

William Asher

(Signature)

# GROUND WATER MICRO PURGE LOG

WELL ID: MW-MMT02-OT SRP 8/22/18

PROJECT NAME: McEntire JNGB

DELIVERY ORDER 0009

TIME	mLITERS REMOVED	PURGE RATE (mL/min)	ORP (mv)	TEMP (Celsius)	pH (s.u.)	COND (RECORD UNITS) $\mu\text{S}/\text{cm}$	DO (mg/L)	TURBIDITY (NTU)	DEPTH TO WATER (FT BTOC)	COMMENTS
* initially purged			1 gal	silty water		<del>46</del> $\text{ms}/\text{cm}$ or $\text{S}/\text{m}$				
0718	0	250	298.3	22.43	5.74	46 $\text{ms}/\text{cm}$ or $\text{S}/\text{m}$	9.46	127	45.94	
0720	500		297.4	22.38	5.72	35 $\text{ms}/\text{cm}$ or $\text{S}/\text{m}$	8.73	99.3	46.24	
0722	1000		296.7	22.15	5.68	29 $\text{ms}/\text{cm}$ or $\text{S}/\text{m}$	7.84	56.8	46.58	
0724	1500		294.4	22.01	5.46	28 $\text{ms}/\text{cm}$ or $\text{S}/\text{m}$	7.46	43.2	46.62	
0726	2000		289.3	21.94	5.42	27 $\text{ms}/\text{cm}$ or $\text{S}/\text{m}$	7.32	38.7	46.68	
0728	2500		284.6	21.91	5.39	28 $\text{ms}/\text{cm}$ or $\text{S}/\text{m}$	6.99	32.4	46.70	
0730	3000		263.8	21.89	5.39	26 $\text{ms}/\text{cm}$ or $\text{S}/\text{m}$	6.86	29.3	46.69	
0732	3500		256.4	21.90	5.38	27 $\text{ms}/\text{cm}$ or $\text{S}/\text{m}$	6.32	28.4	46.71	
0734	4000		245.9	21.89	5.40	26 $\text{ms}/\text{cm}$ or $\text{S}/\text{m}$	6.18	27.4	46.71	
0736	4500		245.7	21.89	5.38	25 $\text{ms}/\text{cm}$ or $\text{S}/\text{m}$	6.17	27.3	46.72	
0738	5000		245.8	21.88	5.38	25 $\text{ms}/\text{cm}$ or $\text{S}/\text{m}$	6.14	27.2	46.72	
0740	5500		245.9	21.89	5.38	25 $\text{ms}/\text{cm}$ or $\text{S}/\text{m}$	6.14	27.1	46.72 <sup>DN</sup>	sample
						$\text{ms}/\text{cm}$ or $\text{S}/\text{m}$				
						$\text{ms}/\text{cm}$ or $\text{S}/\text{m}$				

RECORDED BY:

Alonzo Gelay

(Signature)

QA CHECKED BY:

Gilly Asher

(Signature)



# GROUND WATER MICRO PURGE SHEET

PROJECT NAME: McEntire JNGB

DELIVERY ORDER 0009

DATE (mm/dd/yy):

07/03/2018

TIME:

08 : 50

WELL ID NUMBER:

NW-MMT14-01 SRA 8/22/18  
~~MMT-MWT14-01~~

WELL LOCATION: \_\_\_\_\_

DEPTH OF SCREENED INTERVAL (to notch):

8 ft. to 18 ft.

INNER CASING:

TYPE: PVC or Steel

ID: 0.75 inches

2 inches

4 inches

WATER QUALITY METER ID:

16863

WATER LEVEL INDICATOR ID:

82501

PUMP ID:

82737

TURBIDITY ID:

82899

PID ID:

-

DEPTH TO WATER:

10.20

FT FROM MEASURE POINT

TOTAL WELL DEPTH:

18

FT FROM MEASURE POINT

DEPTH TO PUMP INTAKE:

13

FT FROM MEASURE POINT

PURGE/SAMPLE METHOD:

☐ Bailer

☐ Bladder Pump

☒ Other Pump Type

Monsoon

PURGE START TIME:

PURGE END TIME:

0850

TOTAL VOLUME PURGED:

1/2 gal + 3.5 liters

S&A PLAN SAMPLING PROCEDURE FOLLOWED:

☒ Yes

☐ No

IF NO, WHY WAS A DEVIATION NECESSARY: \_\_\_\_\_

RECORDED BY:

Deanne Atchey

(Signature)

QA CHECKED BY:

Gilly Atchey

(Signature)

NW-HMT 14-01

WELL ID: ~~MMF-MW14-01~~

8/22/18

DELIVERY ORDER 0009

[illegible]

Denise Achary  
(Signature)

*Kelly Ashin*  
(Signature)

B-10



# GROUND WATER MICRO PURGE SHEET

PROJECT NAME: McEntire JNGB

DELIVERY ORDER 0009

DATE (mm/dd/yy): 07/03/18

TIME: 10 : 35

WELL ID NUMBER: MW-MMT13-01

WELL LOCATION: \_\_\_\_\_

DEPTH OF SCREENED INTERVAL (toc notch): 33 ft. to 43 ft.

INNER CASING: TYPE: PVC or Steel ID: 0.75 inches 2 inches 4 inches

WATER QUALITY METER ID: 16863

WATER LEVEL INDICATOR ID: 82501

PUMP ID: 82737

TURBIDITY ID: 82899

PID ID: -

DEPTH TO WATER: 38.2 FT FROM MEASURE POINT

TOTAL WELL DEPTH: 43 FT FROM MEASURE POINT

DEPTH TO PUMP INTAKE: 40 FT FROM MEASURE POINT

PURGE/SAMPLE METHOD: ☐ Bailer ☐ Bladder Pump ☒ Other Pump Type Monsoon

PURGE START TIME: 0950

PURGE END TIME: 1035

TOTAL VOLUME PURGED: 4 gallons + 9 liters

S&A PLAN SAMPLING PROCEDURE FOLLOWED: ☒ Yes ☐ No IF NO, WHY WAS A DEVIATION NECESSARY: \_\_\_\_\_

RECORDED BY: Denise DeLong  
(Signature)

QA CHECKED BY: Kelly Asher  
(Signature)



# GROUND WATER MICRO PURGE LOG

WELL ID: NW-MMT13-01 SEA 8/22/18  
~~MMT NW13-01~~

PROJECT NAME: McEntire JNGB

DELIVERY ORDER 0009

TIME	m LITERS REMOVED	PURGE RATE (mL/min)	ORP (mv)	TEMP (Celsius)	pH (s.u.)	COND (RECORD UNITS) $\mu S/cm$	DO (mg/L)	TURBIDITY (NTU)	DEPTH TO WATER (FT BTOC)	COMMENTS
# initially purged		3/8"		4 gallons	silty water	ms/cm-or-S/m				
0957	0	250	246.3	22.23	7.88	148 ms/cm-or-S/m	11.46	221	38.94	
1059	500		234.6	22.02	7.59	129 ms/cm-or-S/m	10.94	186	39.08	
1001	1000		209.1	21.83	7.45	122 ms/cm-or-S/m	10.46	134	39.23	
1003	1500		202.4	21.69	7.29	101 ms/cm-or-S/m	9.39	112	39.29	
1005	2000		199.7	21.52	7.08	94 ms/cm-or-S/m	8.86	89.6	39.33	
1007	2500		189.1	21.45	6.92	89 ms/cm-or-S/m	9.03	71.4	39.37	
1009	3000		174.2	21.42	6.87	81 ms/cm-or-S/m	8.11	69.2	39.39	
1011	3500		163.8	21.38	6.88	74 ms/cm-or-S/m	7.49	63.8	39.41	
1013	4000		152.9	21.34	6.78	68 ms/cm-or-S/m	7.34	59.6	39.38	
1015	4500		148.7	21.23	6.74	66 ms/cm-or-S/m	6.58	52.3	39.27	
1017	5000		132.3	21.22	6.61	65 ms/cm-or-S/m	6.32	44.6	39.03	
1019	5500		136.2	21.23	6.58	63 ms/cm-or-S/m	6.14	40.2	38.94	
1021	6000		137.2	21.22	6.59	59 ms/cm-or-S/m	6.11	35.6	38.92	
1023	6500	✓	139.6	21.31	6.55	57 ms/cm-or-S/m	6.29	35.1	38.89	

RECORDED BY:

Ronae Ochoy

(Signature)

QA CHECKED BY:

Kelly Asher

(Signature)

# GROUND WATER MICRO PURGE LOG

WELL ID: MW-MHT13-01 DR 8/22/16

PROJECT NAME: McEntire JNGB

DELIVERY ORDER 0009

TIME	LITERS REMOVED	RATE (mL/min)	ORP (mv)	TEMP (Celsius)	pH (s.u.)	COND (RECORD UNITS) $\mu S/cm$	DO (mg/L)	TURBIDITY (NTU)	WATER (FT BTOC)	COMMENTS
1025	7000	250	134.3	21.22	6.56	58 ms/cm or S/m	6.08	34.5	38.85	
1027	7500		127.9	21.19	6.58	58 ms/cm or S/m	6.24	34.3	38.86	
1029	8000		127.4	21.23	6.54	58 ms/cm or S/m	6.07	34.1	38.84	
1031	8500		127.1	21.24	6.55	57 ms/cm or S/m	6.04	34.2	38.85	
1033	9000		127.3	21.23	6.55	57 ms/cm or S/m	6.00	34.3	38.87	
1035						ms/cm or S/m				
						ms/cm or S/m				
						ms/cm or S/m				
						ms/cm or S/m				
						ms/cm or S/m				
						ms/cm or S/m				
						ms/cm or S/m				
						ms/cm or S/m				
						ms/cm or S/m				
						ms/cm or S/m				
						ms/cm or S/m				
						ms/cm or S/m				
						ms/cm or S/m				
						ms/cm or S/m				
						ms/cm or S/m				

RECORDED BY: Alexander A. O'Leary  
(Signature)

QA CHECKED BY: Kelly Foster  
(Signature)



# GROUND WATER MICRO PURGE SHEET

PROJECT NAME: McEntire JNGB

DELIVERY ORDER 0009

DATE (mm/dd/yy):

07/04/18 MW-MMT03-01 (sra 10/16/18)

TIME: 10:23

WELL ID NUMBER:

MW-MMT03-01  
PR-110003-01  
SRA 8/22/18

WELL LOCATION: PRL03

DEPTH OF SCREENED INTERVAL (to notch):

43 ft. to 53 ft.

INNER CASING:

TYPE: PVC or Steel

ID: 0.75 inches 2 inches 4 inches

WATER QUALITY METER ID:

16863

WATER LEVEL INDICATOR ID:

82501

PUMP ID:

82737

TURBIDITY ID:

82899

PID ID:

-

DEPTH TO WATER:

41.35

FT FROM MEASURE POINT

TOTAL WELL DEPTH:

53

FT FROM MEASURE POINT

DEPTH TO PUMP INTAKE:

48

FT FROM MEASURE POINT

PURGE/SAMPLE METHOD:

[ ] Bailer

[ ] Bladder Pump

[X] Other Pump Type

Monsoon

PURGE START TIME:

0920

PURGE END TIME:

1020

TOTAL VOLUME PURGED:

625 liters

S&A PLAN SAMPLING PROCEDURE FOLLOWED:

[X] Yes

[ ] No

IF NO, WHY WAS A DEVIATION NECESSARY:

RECORDED BY:

Shawna L Ewary

(Signature)

QA CHECKED BY:

Shawna L Ewary

(Signature)



# GROUND WATER MICRO PURGE LOG

WELL ID: MW-MMT03-01  
~~MTT-MW03-01~~

PROJECT NAME: McEntire JNGB

DELIVERY ORDER 0009

TIME	* LITERS REMOVED	PURGE RATE (mL/min)	ORP (mv)	TEMP (Celsius)	pH (s.u.)	COND (RECORD UNITS)	DO (mg/L)	TURBIDITY (NTU)	DEPTH TO WATER (FT BTOC)	COMMENTS
0953	3.55	300	153.6	23.40	6.68	0.075 ms/cm or S/m	9.38	199	41.45	
0956	3.85		152.3	23.26	6.46	0.071 ms/cm or S/m	9.53	144	41.45	
0959	4.15		150.7	23.50	6.31	0.069 ms/cm or S/m	9.52	114	41.43	
1002	4.45		149.0	23.40	6.22	0.066 ms/cm or S/m	9.67	204	41.44	
1005	4.75		147.7	23.14	6.10	0.065 ms/cm or S/m	9.77	119	41.45	
1008	5.05		148.3	23.52	6.08	0.064 ms/cm or S/m	9.73	96.3	41.45	
1011	5.35		148.7	23.16	5.95	0.059 ms/cm or S/m	9.96	78.4	41.45	
1014	5.65		142.9	23.27	6.03	0.058 ms/cm or S/m	9.61	59.9	41.45	
1017	5.95		143.1	23.72	6.00	0.056 ms/cm or S/m	9.67	59.3	41.45	
1020	6.25	↓	144.0	23.63	6.00	0.057 ms/cm or S/m	9.69	55.4	41.45	
1023			→ Sample				ms/cm or S/m			→
						ms/cm or S/m				
						ms/cm or S/m				
						22 ms/cm or S/m				
						ms/cm or S/m				

RECORDED BY: Shauna L. Ewey  
(Signature)

QA CHECKED BY: Kelly Abohn  
(Signature)

\* initially purged ~3.5 liters fine silty water

# GROUND WATER MICRO PURGE SHEET

PROJECT NAME: McEntire JNGB

DELIVERY ORDER 0009

DATE (mm/dd/yy): 07/18/2018

TIME: 13:10

WELL ID NUMBER: NW-MMT09-01  
~~MMT-MW09-01~~

SEA 8/22/16

WELL LOCATION: PRL09

DEPTH OF SCREENED INTERVAL (to notch): 40 ft. to 60 ft.

INNER CASING: TYPE: PVC or Steel ID: 0.75 inches 2 inches 4 inches

WATER QUALITY METER ID: 16863

WATER LEVEL INDICATOR ID: 82501

PUMP ID: 82737

TURBIDITY ID: 82899

PID ID: -

DEPTH TO WATER: 43.78 FT FROM MEASURE POINT

TOTAL WELL DEPTH: 60.5 FT FROM MEASURE POINT

DEPTH TO PUMP INTAKE: 50 FT FROM MEASURE POINT

PURGE/SAMPLE METHOD: ☐ Bailer ☐ Bladder Pump ☒ Other Pump Type Monsoon

PURGE START TIME: 1250

PURGE END TIME: 1310

TOTAL VOLUME PURGED: 4.5 liters

S&A PLAN SAMPLING PROCEDURE FOLLOWED: ☒ Yes ☐ No IF NO, WHY WAS A DEVIATION NECESSARY: \_\_\_\_\_

RECORDED BY: Dinae Achay  
(Signature)

QA CHECKED BY: Sally Asher  
(Signature)



# GROUND WATER MICRO PURGE LOG

WELL ID: NW-HMT09-01  
HMT-HW09-01

PROJECT NAME: McEntire JNGB

DELIVERY ORDER 0009

TIME	mL LITERS REMOVED	PURGE RATE (mL/min)	ORP (mv)	TEMP (Celsius)	pH (s.u.)	COND [RECORD UNITS]	DO (mg/L)	TURBIDITY (NTU)	DEPTH TO WATER (FT BTOC)	COMMENTS
1252	0.5	500	206.8	22.03	4.52	0.031 ms/cm or S/m	11.48	66.4	43.94	
1254	1.0		211.1	22.01	4.58	0.030 ms/cm or S/m	11.15	22.8	44.01	
1256	1.5		209.4	21.99	4.51	0.031 ms/cm or S/m	10.98	18.4	44.05	
1258	2.0		207.8	22.04	4.48	0.030 ms/cm or S/m	10.24	16.2	44.10	
1300	2.5		214.2	21.98	4.41	0.029 ms/cm or S/m	9.93	16.9	44.16	
1302	3.0		212.4	21.94	4.38	0.029 ms/cm or S/m	9.62	15.8	44.18	
1304	3.5		218.2	21.93	4.32	0.028 ms/cm or S/m	9.34	15.4	44.18	
1306	4.0		217.8	21.94	4.32	0.028 ms/cm or S/m	9.32	15.4	44.17	
1308	4.5	✓	217.4	21.94	4.31	0.028 ms/cm or S/m	9.33	15.3	44.17	
1310					→ Sample	ms/cm or S/m				→
						ms/cm or S/m				
						ms/cm or S/m				
						0.021 ms/cm or S/m				
						ms/cm or S/m				
						ms/cm or S/m				

RECORDED BY: Almae Baker  
(Signature)

QA CHECKED BY: Kelly Atsken  
(Signature)



# GROUND WATER MICRO PURGE SHEET

PROJECT NAME: McEntire JNGB

DELIVERY ORDER 0009

DATE (mm/dd/yy): 07/19/18

TIME: 07 : 20

WELL ID NUMBER:

MW-MMT-04-D1 SZA 8/22/18  
~~MMT-MW-04-D1~~

WELL LOCATION:

PR L04

DEPTH OF SCREENED INTERVAL (to notch):

36 40<sup>00</sup> ft. to 46<sup>00</sup> 60<sup>00</sup> ft.

INNER CASING:

TYPE: PVC or Steel

ID: 0.75 inches

2 inches 4 inches

WATER QUALITY METER ID:

16863

WATER LEVEL INDICATOR ID:

82501

PUMP ID:

82737

TURBIDITY ID:

82899

PID ID:

—

DEPTH TO WATER:

37.22

FT FROM MEASURE POINT

TOTAL WELL DEPTH:

46.2

FT FROM MEASURE POINT

DEPTH TO PUMP INTAKE:

41 46.2

FT FROM MEASURE POINT

PURGE/SAMPLE METHOD:

[ ] Bailer

[ ] Bladder Pump

[X] Other Pump Type

Monsoon

PURGE START TIME:

0656

PURGE END TIME:

0720

TOTAL VOLUME PURGED:

6 liters

S&A PLAN SAMPLING PROCEDURE FOLLOWED:

[X] Yes

[ ] No

IF NO, WHY WAS A DEVIATION NECESSARY:

RECORDED BY:

Almas Arshad

(Signature)

QA CHECKED BY:

Almas Arshad

(Signature)

# GROUND WATER MICRO PURGE LOG

WELL ID: NW-MMTB4-01 MT-MW04-01 SRA 8/22/18

PROJECT NAME: McEntire JNGB

DELIVERY ORDER 0009

TIME	LITERS REMOVED	PURGE RATE (mL/min)	ORP (mv)	TEMP (Celsius)	pH (s.u.)	COND (RECORD UNITS)	DO (mg/L)	TURBIDITY (NTU)	DEPTH TO WATER (FT BTOW)	COMMENTS
0656	0.5	250	243.9	23.11	6.43	0.211 ms/cm or S/m	9.46	56.3	37.18	
0658	1.0		256.8	23.04	6.39	0.138 ms/cm or S/m	9.41	52.1	37.24	
0700	1.5		244.2	22.91	6.37	0.112 ms/cm or S/m	9.32	49.7	37.28	
0702	2.0		239.4	22.74	6.21	0.101 ms/cm or S/m	9.38	46.8	37.38	
0704	2.5		236.2	22.48	5.92	0.098 ms/cm or S/m	9.12	38.3	37.32	
0706	3.0		222.1	22.14	5.89	0.097 ms/cm or S/m	9.23	23.8	37.33	
0708	3.5		218.3	21.56	5.47	0.095 ms/cm or S/m	8.99	16.7	37.32	
0710	4.0		214.9	21.39	5.48	0.094 ms/cm or S/m	8.96	16.9	37.32	
0712	4.5		211.2	21.38	5.48	0.094 ms/cm or S/m	8.97	17.1	37.32	
0714	5.0		207.4	21.38	5.47	0.094 ms/cm or S/m	8.93	16.7	37.33	
0716	5.5		207.8	21.37	5.46	0.094 ms/cm or S/m	8.93	16.8	37.33	
0718	6.0	↓	208.3	21.38	5.48	0.094 ms/cm or S/m	8.92	16.8	37.34	
0720					→ Sample	ms/cm or S/m				→
						ms/cm or S/m				
						ms/cm or S/m				

RECORDED BY:

Daniel Anthony

(Signature)

QA CHECKED BY:

Kelly Asher

(Signature)