DRAFT FINAL REPORT
FY16 PHASE 1 REGIONAL SITE INSPECTIONS FOR PERFLUORINATED COMPOUNDS

TRUAX FIELD AIR NATIONAL GUARD BASE
MADISON, WISCONSIN

Contract #: W9133L-14-D-0002
Delivery Order 0006

Amec Foster Wheeler Project #: 2-9133-0006

February 2019

THIS PAGE INTENTIONALLY LEFT BLANK.

FY16 Phase 1 Regional Site Inspections For Perfluorinated Compounds

Wisconsin Air National Guard
Truax Air National Guard Base
Madison, WI

Prepared for:
National Guard Bureau
Operations Division, Restoration Branch
Joint Base Andrews, MD 20762-5157

Prepared by:
Amec Foster Wheeler
Environment & Infrastructure, Inc.
511 Congress St.
Portland, ME 04101

Project No.: 291330006.019
February 2019

Prepared by:

John Ralston
Regional Base Lead

Reviewed by:

Kerry Tull, LSP
Project Manager

Jean Firth, CG, PG
Technical Reviewer

THIS PAGE INTENTIONALLY LEFT BLANK.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

THIS PAGE INTENTIONALLY LEFT BLANK.

ACRONYMS AND ABBREVIATIONS

A4OR	Operations Restoration Branch
AFFF	Aqueous Film Forming Foam
Amec Foster Wheeler	Amec Foster Wheeler Environment & Infrastructure, Inc.
ANG	Air National Guard
BB&E	BB&E Inc.
bgs	Below Ground Surface
BRAC	Base Realignment and Closure
COC	Constituent of Concern
DCRA	Dane County Regional Airport
DO	Delivery Order
DoD	Department of Defense
DPT	Direct Push Technology
°F	degrees Fahrenheit
ft.	Feet/foot
FSP	Field Sampling Plan
FTA	Fire Training Area
FW	Fighter Wing
Gal	Gallons
HA	Health Advisory
HEF	High Expansion Foam
IRP	Installation Restoration Program
MS	Matrix Spike
MSD	Matrix Spike Duplicate
µg/kg	Micrograms per Kilogram
mg/kg	Milligrams per Kilogram
µg/L	Micrograms per Liter
mL/min	Milliliter per Minute
NFA	No Further Action
NGB	National Guard Bureau
OWS	Oil-Water Separator
ORP	Oxidaton Reduction Potential
PA	Preliminary Assessment
PFBS	Perfluorobutanesulfonc Acid
PFC	Perflourinated Compound
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
POC	Point of Contact
POL	Petroleum, Oil, Lubricant

PRL	Potential Release Location
PVC	Polyvinyl Chloride
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RSL	Regional Screening Level
SB	Soil Boring (designation)
SD	Sediment (sample designation)
SHSP	Site Health and Safety Plan
SI	Site Inspection
SOP	Standard Operating Procedure
SW	Surface Water sample designation)
TW	Temporary Well (sample designation)
UCMR3	Third Unregulated Contaminant Monitoring Rule
USAF	United States Air Force
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
UST	Underground Storage Tank
VISTA	Vista Analytical Laboratories
WDNR	Wisconsin Department of Natural Resources
WIANG	Wisconsin Air National Guard

EXECUTIVE SUMMARY

Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler) was contracted by the National Guard Bureau (NGB) Operations Restoration Branch (A4OR) under Contract # W9133L-14-D-0002, Delivery Order (DO) 0006 to conduct Phase 1 Regional Site Inspections (SIs) for Perfluorinated Compounds (PFCs) at multiple Air National Guard (ANG) Installations. This report has been prepared for SIs conducted at on-Base Potential Release Locations (PRLs) identified on the Truax Field Air National Guard Base (the Base/Truax Field), Wisconsin Air National Guard (WIANG), Madison, WI. This Report presents the results and recommendations from the 2017 SI field activities conducted in November 2017 at Truax Field. The objectives of the SI were to determine the presence or absence of PFCs at each PRL and the Base Boundary, and based on the findings:

1) Determine if PRL is eligible for a decision of No Further Action (NFA);
2) Assess if PFCs are migrating off-Base; and
3) Provide data which can be used for developing Data Quality Objectives if further investigations are recommended.

To meet the objectives, Amec Foster Wheeler performed SIs at the following nine PRLs and along the Base Boundary:

- PRL 1: Building 430 (Current Fire Station)
- PRL 2: Building 430 Nozzle Test Area 1
- PRL 3: Building 430 Nozzle Test Area 2
- PRL 4: Former Building 403 (Former Fire Station)
- PRL 5: Hangar 400
- PRL 6: Hangar 406
- PRL 7: Hangar 414
- PRL 8: Fuel Spill Ditch
- PRL 9: Building 503 Parking Lot

Based on recommendations from the Preliminary Assessment (PA) conducted by BB&E, Inc. (BB&E) in February 2016, soil and groundwater samples were collected and analyzed for the PFCs listed on the United States Environmental Protection Agency's (USEPA) Third Unregulated Contaminant Monitoring Rule (UCMR3) list (USEPA, 2012). The detected PFC concentrations

were compared against screening criteria for perfluorooctanoic acid (PFOA), perfluorooctane sulfonate (PFOS), and perfluorobutane sulfonate (PFBS) including: the USEPA lifetime drinking water Health Advisory (HA) for PFOS (USEPA, 2016a) and HA for PFOA (USEPA, 2016b); the USEPA Regional Screening Level (RSL) table for PFBS in residential soil (USEPA, 2017); the USEPA RSL for PFBS in tap water; and calculated screening levels using the USEPA screening level calculator for PFOA and PFBS in soil and sediment. These screening criteria are presented in **Table ES-1** below.

Table ES-1: SI Screening Criteria

Parameter	Chemical Abstract Number	USEPA Regional Screening Level Table (May 2018)[a]		Air Force Guidance for Soils and Sediments[b] (µg/kg)	USEPA Health Advisory Drinking Water (Surface Water or Groundwater) (µg/L)[c]
		Residential Soil (µg/kg)	Tap Water (µg/L)		
Perfluorobutane sulfonate (PFBS)	375-73-5	1,300,000[d]	400	NL	NL
Perfluorooctanoic acid (PFOA)	335-67-1	NL	NL	1,260	0.07[e]
Perfluorooctane sulfonate (PFOS)	1763-23-1	NL	NL	1,260	

[a] USEPA Regional Screening Levels (USEPA, 2018).

[b] Screening levels calculated using the USEPA Regional Screening Level calculator [https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search]. A toxicity hazard quotient (THQ) of 1.0 was used. The toxicity value input for the calculator is the Tier 3 value reference dose of 0.00002 mg/kg/day derived by USEPA in their Drinking Water Health Advisories for both PFOS (USEPA, 2016a) and PFOA (USEPA, 2016b).

[c] USEPA, 2016b. *Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA)* and USEPA, 2016a. *Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS).*

[d] PFBS RSL for Residential Soil concentration presented in Work Plan was 1,600,000 µg/kg based on the May 2016 RSL values. This table has been updated to include the more recent RSL values published in May 2018.

[e] Note: When PFOA and PFOS are both present, the combined detected concentrations of the compounds are compared with the 0.07 µg/L health advisory value. Only groundwater was sampled during the SI, but analytical results have been compared to the tap water screening levels.

USEPA = United States Environmental Protection Agency
µg/kg = Micrograms per Kilogram
µg/L = Micrograms per Liter
NL = not listed

Based on comparison of analytical data to the screening criteria in **Table ES-1** above, Amec Foster Wheeler recommends further investigations of each of the nine PRLs as a result of groundwater and/or soil exceedances. Amec Foster Wheeler also recommends that further

investigations include analysis of additional compounds, including precursor compounds, to supplement the UCMR3 list. Precursor compounds have potential to result in increased concentrations downgradient and can serve as a lingering source. An overview of conclusions from SI activities and recommendations for future investigations are presented on **Table ES-2**.

Table ES-2: Screening Criteria Exceedances and Recommendations

PRL	Screening Criteria Exceedance		Recommendations
	Soil	GW	
1	X	X	Soil investigation to determine the extent of PFC contamination. GW investigation to determine the nature and extent of the confirmed PFC release.
2	X	X	Soil investigation to determine the extent of PFC contamination. GW investigation to determine the nature and extent of the confirmed PFC release.
3		X	GW investigation to determine the nature and extent of the confirmed PFC release. Soil investigation, including soils in the saturated zone, to determine if the soil may be a contributing source to GW.
4		X	GW investigation to determine the nature and extent of the confirmed PFC release. Soil investigation, including soils in the saturated zone, to determine if the soil may be a contributing source to GW.
5		X	GW investigation to determine the nature and extent of the confirmed PFC release. Soil investigation, including soils in the saturated zone, to determine if the soil may be a contributing source to GW.
6		X	GW investigation to determine the nature and extent of the confirmed PFC release. Soil investigation, including soils in the saturated zone, to determine if the soil may be a contributing source to GW.
7		X	GW investigation to determine the nature and extent of the confirmed PFC release. Soil investigation, including soils in the saturated zone, to determine if the soil may be a contributing source to GW.
8		X	GW investigation to determine the nature and extent of the confirmed PFC release. Soil investigation, including soils in the saturated zone, to determine if the soil may be a contributing source to GW.
9		X	GW investigation to determine the nature and extent of the confirmed PFC release. Soil investigation, including soils in the saturated zone, to determine if the soil may be a contributing source to GW.
Base Boundary		X	GW investigation both upgradient and downgradient of the Base boundary to determine if PFCs are migrating onto the Base from off-Base sources and to determine the nature and extent of the PFC contamination migrating off-Base.

Notes:
GW - Groundwater
Inc. - Inconclusive based on results of SI
X - Screening criteria exceedance
PFC - Perfluorinated Compound
PRL - Potential Release Location
NFA - No Further Action

NGB/A4OR

A review of groundwater data compared to screening criteria indicates exceedances of the USEPA Drinking Water HA in two of the three Base Boundary wells installed to assess the conditions of groundwater migrating across the Base Boundary. This determination was made based on concentrations observed in TWBB01 and TWBB02. Given that groundwater flow is to the east/southeast and that samples at the Base Boundary have exceedances, groundwater with PFC concentrations above applicable screening criteria is very likely present off-Base to the south and east.

1.0 INTRODUCTION

Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler) was contracted by the National Guard Bureau (NGB) Operations Restoration Branch (A4OR) under Contract # W9133L-14-D-0002, Delivery Order (DO) 0006, to conduct Phase 1 Regional Site Inspections (SIs) for Perfluorinated Compounds (PFCs) at multiple Air National Guard (ANG) Installations. The scope of the DO includes preparation of this SI report for potential release locations (PRLs) identified at the Truax Field Air National Guard Base (the Base/Truax Field), Wisconsin Air National Guard (WIANG), in Madison, Wisconsin. This SI Report describes the objectives, procedures, and activities which were completed, and presents Amec Foster Wheeler's findings and recommendations. The Base location is shown in **Figure 1**, and the Base and area features are shown on **Figure 2**.

The SI was conducted in general accordance with the standards and practices prescribed by the *Interim AF Guidance on Sampling and Response Actions for Perfluorinated Compounds at Active and Base Realignment and Closure (BRAC) Installations* (United States Air Force [USAF], 2012).

1.1 Background

The Department of Defense (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). The WIANG is located at Truax Field at the Dane County Regional Airport (DCRA) in south-central Wisconsin approximately 6 miles northeast of the city of Madison (**Figures 1 and 2**) and is the home of the 115th Fighter Wing (FW).

BB&E, Inc. (BB&E) conducted a Preliminary Assessment (PA) site visit for the ANG at WIANG during August 10-11, 2015 to identify potential locations of historic environmental releases of Aqueous Film Forming Foam (AFFF) from usage and storage (BB&E, 2015). The PA site visit process included a review of any documented Fire Training Areas (FTAs) in operation since 1970, and any other use or release of AFFF, and the completion of a site reconnaissance. The goal of the PA site visit was to determine if a site posed a potential threat to human health and the environment and required additional inspection.

Based on past use and storage of AFFF at the Base, the PA identified nine PRLs where releases

of PFCs might have occurred, including hangars, fire stations, storage areas, firefighting equipment testing areas, etc. No former or current FTAs were identified on the Base. The findings of AFFF use and storage at each of the PRLs are documented in the December 2015 PFC PA Site Visit Report (BB&E, 2015). **Table 1** presents the identified PRLs and associated recommendations based on the PA completed by BB&E.

1.2 Purpose and Scope

The purpose of the SI is to determine the presence/absence of constituents of concern (COCs), i.e. perfluorooctanoic acid (PFOA), perfluorooctane sulfonate (PFOS), and perfluorobutane sulfonate (PFBS) in soil and groundwater at each of the PRLs and in groundwater at the Base Boundary. Samples were analyzed for the PFCs listed on the United States Environmental Protection Agencies (USEPA's) Third Unregulated Contaminant Monitoring Rule (UCMR3) list (USEPA, 2012); however, the SI focus is primarily on evaluation and discussion of PFOA, PFOS, and PFBS. This data has been used to develop recommendations for appropriate paths forward to either provide a No Further Action (NFA) conclusion or recommendations for remedial investigation phases.

The SI activities completed in accordance with *Air National Guard Investigation Guidance*, *Environmental Restoration Program* (ANG, 2009), include the following:

- 30 soil borings to a maximum depth of 15 feet (ft.) below ground surface (bgs), or first encountered groundwater, at the PRLs using direct-push technology (DPT) methods. Two soil samples were collected from each of the 27 borings associated with PRLs.
- 12 temporary monitoring wells were installed hydraulically downgradient of the PRL areas and at the downgradient Base Boundary using DPT methods. One groundwater sample was collected at each temporary well.

BB&E identified ten PRLs based on locations where AFFF was potentially discharged or stored. One PRL (PRL 10, Building 510 [Supply]) warranted NFA based on the findings of no known AFFF release and is not included in the scope of this SI. The PRLs are illustrated on **Figure 3** and **Table 1** presents each identified PRL and associated recommendations based on the PA completed by BB&E.

Field activities were conducted in accordance with the Final SI Work Plan, Quality Assurance Project Plan (QAPP), Field Sampling Plan (FSP), and Site Health and Safety Plan (SHSP) (Amec, 2017). The scope of the SI is outlined in the following sections.

THIS PAGE INTENTIONALLY LEFT BLANK.

2.0 INSTALLATION DESCRIPTION

Section 2.1 describes the location and environs of the Base. A brief history of the Base is provided in **Section 2.2**.

2.1 Location

Truax Field ANG Base is located at the DCRA in south-central Wisconsin approximately 6 miles northeast of the city of Madison (**Figure 1** and **Figure 2**). The Base is the home of the 115th FW. The PRLs that were evaluated during this SI are in the southeast portion of the Base (**Figure 3**). The Base is zoned for airport district usage and is surrounded by properties zoned for industrial, residential, and business use.

2.2 Organization and History

The installation was originally constructed in 1942 as an Army Air Base and occupied 2,050 acres. At the end of World War II, the City of Madison assumed control of the facility from the War Assets Administration. Truax Field was reactivated in 1951 and occupied by the USAF through 1968, and subsequently by the WIANG. In 1981, the WIANG installation at Truax Field became the 128th Tactical FW, and later the 128th FW. In October 1995, the unit at Truax Field was re-designated the 115th FW with no change in mission or aircraft. Since its inception in 1942, aircraft housed at Truax Field have varied but have predominantly been fighter/attack aircraft. The Base has stored petroleum and various types of hazardous materials throughout its history in support of its missions. Although some of the Base's historical operations have resulted in the storage and use of petroleum and hazardous materials, not all of these operations relate to PRL Sites 1 through 9. The USAF leases the 115th FW property from Dane County. The lease expires on October 3, 2050.

THIS PAGE INTENTIONALLY LEFT BLANK.

3.0 ENVIRONMENTAL SETTING

The following sections provide information on the environmental setting at the Base. This information is summarized from the Compliance Restoration Program Preliminary Assessment/Site Investigation prepared by Leidos in February 2015 (Leidos, 2015).

3.1 Climate

Truax Field has a humid continental climate, which is characterized by variable weather patterns and a large seasonal temperature variance. Winter temperatures can be well below freezing, with moderate to occasionally heavy snowfall and temperatures reaching 0°F (-18°C). High temperatures in summer average in the lower 80s°F (27 to 28°C), often accompanied by high humidity levels. The mean annual rainfall is 34.42 inches (87.43 centimeters) (National Oceanic and Atmospheric Administration, 2013).

3.2 Topography

The Base is located in south-central Wisconsin approximately 6 miles northeast of the city of Madison. The Base is located on predominantly level ground near the western margin of the Great Lakes Section of the Central Lowlands Physiographic Province. This section is characterized by numerous lakes with associated lacustrine plains, prominent end moraines, poorly integrated drainage, and a still-partially exposed cuestaform topography (PEER, 1988). Three lakes are located near the Base: Lake Mendota to the southwest and Lakes Monona and Waubesa to the south. The Base is located at an elevation of approximately 890 ft. (271 meters) above mean sea level.

3.3 Geology

The Base is located in the Central Lowlands Physiographic Province, which is characterized by mostly Paleozoic bedrock with some cretaceous rocks underlying the western boundary. Much of this province also exhibits flat to gently inclined rock strata and widespread topographic effects of glaciation. Structurally, regional dips are controlled by numerous domes and uplifts. With the exception of the southern border, the entire province is bordered by topography that is higher in elevation (PEER, 1988). Glacial deposits in southern Wisconsin ranges in thickness from only a few ft. to several hundred ft. The Base is located directly above a thick (approximately 300 ft.)

section of glacial drift; thus, several geologic layers encountered elsewhere in the region do not occur beneath the Base; instead, directly beneath the glacial till lies approximately 350 ft. of Mt. Simon Sandstone bedrock.

3.4 Soil

At the time of the PA site visit, no documentation was available showing that soils at the Base have been tested for COCs; therefore, it is unknown whether COCs are present in the soil. However, based on historical practices, COCs may be present in the soil due to known or potential AFFF use at the following locations:

- Area surrounding Building 430 (Current Fire Station);
- Grassy areas northwest and southwest of Building 430 where Fire Department vehicles have conducted AFFF system nozzle testing every six months;
- Area surrounding former Building 403 (Former Fire Station);
- Area surrounding Hangars 400, 406, and 414;
- Ditch between Hangar 414 and Hangar 400 where foam was used as a precaution during a fuel spill in 1981; and
- Area surrounding parking lot west of Building 503, where runoff may have occurred from the soil excavated from the 1981 fuel spill.

3.5 Surface Water Hydrology

Surface water drainage from the Base ultimately drains west into Starkweather Creek, which surrounds the Base on the north, west, and south sides. Starkweather Creek empties into Lake Monona approximately 2 miles to the south. Surface water flow around the Base is directed by man-made ditches and culverts which connect to Starkweather Creek. Because much of the Base is paved, infiltration and evapotranspiration of surface water are negligible.

3.6 Hydrogeology

Regionally, groundwater is found in the unconsolidated glacial deposits and underlying bedrock formations including sandstone of the Trempealeau Group, the deeper Tunnel City Group, and the underlying Elk Mound Group. These bedrock aquifers comprise the principal water supply aquifers in Dane County. The Mt. Simon Sandstone underlying the glacial deposits in the vicinity of the Base is the lowermost formation of the Elk Mound Group.

Based on information collected during 2017 investigation activities at the IRP sites, monitoring wells within the water table zone indicate shallow groundwater flow is generally toward the south and southeast. The water table at the Base is generally encountered at depths of 5 to 10 ft. bgs. The groundwater flow gradients calculated from IRP investigations indicate groundwater flow velocities of 0.5 to 0.9 ft. per day.

There are currently no known drinking water supply wells at the Base, and the shallow groundwater system in the vicinity of the Base is not used as a source of drinking water Based on information obtain during the IRP investigations, four private wells may have been located in the immediate vicinity of the Base prior to initial construction activities in 1942; however, in light of the extensive development in the area, the four private wells are believed to be abandoned or not in use.

3.7 Critical Habitat and Threatened/Endangered Species

According to the United States Fish and Wildlife Service (USFWS), as of December 2013, the following animals and plants are federally endangered, threatened, proposed, and/or listed as candidate species in Dane County, Wisconsin (USFWS, 2013):

- *Myotis septentrionalis* (Northern Long-eared Bat) – Proposed Endangered
- *Grus americanus* (Whooping Crane) – Non-essential Experimental Population
- *Lampsilis higginsii* (Higgins eye pearly mussel) – Endangered
- *Plethobasus cyphyus* (Sheepnose mussel) – Endangered
- *Bombus affins* (Rusty patched bumblebee) - Endangered
- *Platanthera leucophaea* (Eastern prairie fringed orchid) – Threatened
- *Asclepias meadii* (Mead's milkweed) – Threatened
- *Lespedeza leptostachya* (Prairie bush-clover) – Threatened

None of these species are known to reside or have been sighted at the Base.

3.8 City of Madison Water Supply

Drinking water is supplied to the Base and surrounding residential population by the City of Madison. The City of Madison obtains its public water supply from the Mt. Simon Sandstone from a network of pumping wells.

The Base is provided water via the municipal water distribution system operated by the City of Madison. The nearest municipal water supply wells are located approximately 1.5 miles southwest of the Base.

4.0 PRELIMINARY ASSESSMENT

BB&E conducted a PA site visit for the ANG at the Base during August 10-11, 2015 to identify potential locations of historic environmental releases of PFOA/PFOS/PFBS (i.e. PRLs), specifically from AFFF usage and storage (BB&E, 2015). The PA site visit process included a review of any documented FTAs in operation since 1970, and any other use or release of AFFF, and the completion of a site reconnaissance. The goal of the PA site visit was to determine if a site poses a potential threat to human health and the environment and requires additional inspection.

Based on past use and storage of AFFF at the Base, the PA identified nine PRLs where releases of PFCs might have occurred, including hangars, fire stations, storage areas, firefighting equipment testing areas, etc. No former or current FTAs were identified on the Base. The findings of AFFF use and storage at each of the PRLs are documented in the December 2015 PFC PA Site Visit Report (BB&E, 2015).

The findings of AFFF use and storage at each of the 9 PRLs recommended for inclusion in the SI, as documented in the December 2015 PA Site Visit Report (BB&E, 2015), are summarized below. The PRLs are illustrated on **Figure 3** and **Table 1** presents the identified PRL and associated recommendations based on the PA completed by BB&E.

4.1 PRL 1: Building 430 (Current Fire Station)

At the time of the PA site visit in 2015, AFFF had been used by the Base Fire Department for at least 20 years and had been stored in Building 430 since it was built, circa 1995. In 2015, there were approximately 471 gallons (gal) of AFFF carried in Fire Department trucks and approximately 821 gal of AFFF serving as a backup supply, stored in the fire station. AFFF was transferred from storage to vehicles within the fire station via an overhead fill. Fire Department vehicles were washed within the fire station or in the outside truck bays when necessary. Trench drains are located in the fire station and downgradient of the truck bays; therefore, AFFF releases due to vehicle washing would be captured by the trench drains, which discharge into the sanitary sewer system.

4.2 PRL 2: Building 430 Nozzle Test Area 1

At the time of the PA site visit in 2015, the AFFF nozzle systems on Fire Department vehicles had

been tested every six months in the grassy areas near Building 430. Nozzle Test Area 1 is located southwest of Building 430. AFFF released in porous green spaces has the potential to seep into the subsurface and groundwater.

4.3 PRL 3: Building 430 Nozzle Test Area 2

At the time of the PA site visit in 2015 the AFFF nozzle systems on Fire Department vehicles have been tested every six months in the grassy areas near Building 430. Nozzle Test Area 2 is located northwest of Building 430. AFFF released in porous green spaces has the potential to seep into the subsurface and groundwater.

4.4 PRL 4: Former Building 403 (Former Fire Station)

Prior to relocation to Building 430, the Fire Department was stationed in Building 403, which was demolished in 1995/1996. According to Base personnel, AFFF had been in use since at least 1988 and was stored in Former Building 403. There are no records of AFFF nozzle testing from this time period. It is assumed that AFFF was transferred to fire trucks through an overhead fill using processes comparable to the current fire station's methods. Fire Department vehicles were likely washed within the fire station or outside when necessary. An oil-water separator (OWS) and associated underground storage tank (UST) were removed during demolition; no contamination was reported during removal (Leidos, 2015).

4.5 PRL 5: Hangar 400

Hangar 400 was equipped with an AFFF fire suppression system until approximately 2009, when the system was retrofitted for use of high expansion foam (HEF); the installation date of the AFFF fire suppression system is unknown. According to Base personnel, hangar fire suppression systems have been tested annually; foam is discharged every other year during testing. No records of accidental AFFF releases exist. AFFF releases during testing or accidental release within the hangar would have been routed to trench drains that historically led to an OWS which then discharged into the sanitary sewer system. However, it is possible that AFFF could have been released into the environment during testing through cracks in the floor or through doorways. The OWS was removed in 2009; no contamination was observed during removal (Leidos, 2015).

HEF is currently stored in the mechanical room of Hangar 400. According to Base personnel, AFFF may have been stored in the mechanical room prior to the switch to HEF. Floor drains are

present which likely discharge to the sanitary sewer system.

4.6 PRL 6: Hangar 406

Hangar 406 was equipped with an AFFF fire suppression system until approximately 2006, when the system was retrofitted for use of HEF. According to Base personnel, hangar fire suppression systems have been tested annually; foam is discharged every other year during testing. No records of accidental AFFF releases exist. AFFF releases during testing or accidental release within the hangar would have been routed to trench drains which then discharged into the sanitary sewer system. However, it is possible that AFFF could have been released into the environment during testing through cracks in the floor or through doorways. There were no records available for AFFF fire suppression system testing at Hangar 406.

At the time of the PA site visit in 2015, HEF was stored in the mechanical room of Hangar 406. According to Base personnel, AFFF may have been stored in the mechanical room prior to the switch to HEF. Floor drains were present which likely discharge to the sanitary sewer system.

4.7 PRL 7: Hangar 414

At the time of the PA site visit in 2015, Hangar 414 was equipped with an AFFF fire suppression which was installed in 1994. According to Base personnel, hangar fire suppression systems had been tested annually; foam was discharged every other year during testing. No records of accidental AFFF releases exist. Any AFFF releases during testing or accidental release within the hangar would have been routed to the trench drains which discharge into the sanitary sewer system.

4.8 PRL 8: Fuel Spill Ditch

On March 6, 1981, approximately 2,000 gal of JP-4 jet fuel spilled due to an overflow during refilling at the petroleum, oil, and lubricant (POL) pump house (Building 405). In response to the spill, an existing drainage ditch (approximately 100 ft. long) next to the spill was dammed off (ditch located between Hangars 400 and 414). The fire department foamed the fuel and flushed it toward the ditch, where it soaked into the ground and was covered with straw. By April 9, 1981, as directed by the Wisconsin Department of Natural Resources (WDNR), the affected soil in the bottom of the ditch was removed to a depth of approximately 6 ft. and to the limit of odor detection on side slopes (WDNR, 2013).

The type of foam used during the 1981 fuel spill is not specified on the incident report but may have been AFFF based on its historic use. As PFOA/PFOS/PFBS sampling was not conducted during soil excavation, PFOA/PFOS/PFBS from the foam may still be present in this area, particularly the ditch sidewalls, which were excavated based on odor detection.

4.9 PRL 9: Building 503 Parking Lot

The soil removed from the 1981 POL spill area, as discussed above, was relocated to what is now the parking lot west of Building 503. The soil was placed on four concrete pads, spread at a depth of 6 to 10 inches, and was turned throughout the summer of 1981 to enhance volatilization. In the summer of 1982, the contaminated soil was removed, the area was excavated to a depth of 3 ft. and the materials were transported off-site for disposal. The area was paved the same year (PEER, 1988).

AFFF runoff from this area could have impacted soil and may have impacted groundwater. Although the soil beneath the concrete pads was excavated and disposed off-site, there has not been sampling to confirm the absence of PFCs.

5.0 FIELD PROGRAM METHODS

The following subsections summarize utility clearance and permitting activities; soil boring installation, sampling, and abandonment; and temporary groundwater monitoring well construction, development, and sampling. SI activities were conducted in accordance with the Work Plan and the *ANG Investigation Guidance* (ANG, 2009). The SI field activities were conducted during 06 through 09 November 2017.

5.1 Utility Location and Clearance

Prior to commencement of SI activities, the drilling contractor (Mateco Drilling) provided details of the proposed borehole locations to the Wisconsin Diggers Hotline and drilling locations were pre-marked. Diggers Hotline assigned ticket Nos. 20174409013, 20174409064, 20174409084, 20174409118, 20174409166, and 20174409200 on 01 November 2017. Mateco Drilling cleared the drilling locations using ground-penetrating radar on 06 November 2017 prior to initiating subsurface activities. Utility clearance activities were performed at the direction and oversight of Amec Foster Wheeler. Locations were approved by Base personnel.

5.2 Permits

As described in **Section 5.1**, Amec Foster Wheeler obtained utility clearance permits for the SI activities, including Diggers Hotline clearance. It was determined by the Base Point of Contact (POC), Ms. Susan Gustke, that Federal Aviation Administration permits were not required for performance of SI activities. No other permits were required or obtained.

5.3 Soil Boring Installation

Between 06 and 09 November 2017, 30 soil borings were advanced with 12 temporary monitoring wells installed to investigate potential PFC impacts in soil and groundwater at the Base. The borings were advanced by Mateco Drilling using DPT drilling techniques. Soil borings were advanced from 10 to 15 ft. bgs. Individual borehole depths are provided in the soil boring logs included in **Appendix A**.

Soil boring locations were selected based on PRL use and physical characteristics to target the most probable AFFF release areas. A total of 30 borings were installed, including twenty-seven soil borings advanced in and around nine PRLs and three borings at Base Boundaries, using DPT drilling methods (18 borings were installed for soil sampling only, three borings were installed for temporary monitoring well installation only, and nine borings for combined temporary monitoring

well installation and soil sampling). Soil cores were collected continuously for field screening at 4 to 5ft. intervals in new, dedicated acetate liners. Drilling rods/tools were decontaminated between borings in accordance with protocol described in the Work Plan.

5.4 Soil Sampling

Fifty-nine soil samples (including five duplicates) were collected at the nine PRLs identified on the Base. Shallow soil samples (0.5 to 2.0 ft. bgs or directly beneath asphalt or pavement where present) were collected directly from a decontaminated hand auger. Deep soil samples (4.0 to 9.5 ft. bgs) were collected just above the water table as determined from field observations from within the DPT core barrel. In borings 06-SB03, 09-SB02, and 09-SB03 the shallow samples were taken at depths greater than 2 ft. bgs due to significant sub-concrete/asphalt fill. Each sleeve was opened lengthwise and the soil was examined. Soil characteristics were logged in accordance with the Unified Soil Classification System. Soil was visually inspected for potential impacts. Soil cuttings were containerized in a 55-gallon drum and remained on-site in an area designated by the Base POC (Ms. Susan Gustke) pending analytical results.

5.5 Soil Boring Abandonment

Following the completion of drilling activities, each boring was backfilled with bentonite chips. Surface completions were patched with like materials (topsoil/seed, asphalt, or concrete) in accordance with Base specifications.

5.6 Temporary Monitoring Well Installation and Development

Twelve temporary monitoring wells were installed to investigate potential groundwater impacts at the nine PRLs and at locations along the Base Boundaries. The primary purpose of installing the temporary monitoring wells was to assess groundwater quality downgradient of the PRLs. Although well elevation surveys were not part of this project scope, temporary well locations were determined based on historical groundwater data and topographic contours, historical indications of possible impact, and Base features such as buildings and the Base Boundary. In general, temporary monitoring wells were installed at locations with the greatest potential to intercept PFCs dissolved in groundwater based on available data and might not represent the highest concentrations at each PRL.

Soil cores were collected continuously to verify soil lithology, then inspected, logged, and field screened in accordance with the FSP. Temporary monitoring wells were installed in accordance

with Amec Foster Wheeler's PFC-specific Standard Operating Procedure (SOP) for installation of monitoring wells (AFW-04).

The temporary monitoring well borings were advanced with DPT tools. Temporary monitoring wells were constructed within borings using a one-inch diameter, schedule 40 polyvinyl chloride (PVC) riser with a 5-ft., 0.010-inch slot screened interval with the water table bisecting the well screen. New dedicated well materials were used at each temporary well location. The annulus surrounding each well screen and riser was backfilled with No.1 filter sand, which was placed from the bottom of the borehole to the ground surface. No annular seals were installed. Due to concerns over groundwater availability the decision was made not to develop the wells and instead to immediately take low-flow or grab samples depending on water availability. Equipment inserted into the well was decontaminated following each use.

5.7 Water Level Measurements

Prior to well purging, static water levels measurements were collected with an electronic water level meter. Water levels were measured as a distance below the top of the PVC riser and recorded on field data sheets.

5.8 Groundwater Sampling

Twelve groundwater samples were collected from twelve temporary monitoring wells. Wells were purged with a peristaltic pump, and low-flow sampling was conducted following standard practices, at 10 wells. Grab samples were collected at two base boundary wells (BBW-02 and BBW-03) due to low groundwater yield. The initial water level was recorded using an electronic water level meter prior to purging and sampling activities. The tubing was inserted into the monitoring well to the depth recorded in the sampling logs above the bottom of the well to prevent disturbances and re-suspension of sediment present in the bottom of the well. In general, the pump intake was placed in the middle of the saturated interval. The pump discharge tubing was connected to a flow-through cell containing a multi-parameter Sonde Instrument to record water parameters. The pump rate during purging was between 100 and 300 milliliters per minute (mL/min) with a steady flow rate maintained such that drawdown of the water level within the well did not exceed a maximum allowable drawdown of 0.3 ft. A grab sample was collected in cases where the well ran dry during low-flow monitoring. The following parameters were monitored during purging: temperature, pH, oxidation-reduction potential (ORP), dissolved oxygen, turbidity, temperature, and specific conductivity, at approximately five-minute intervals. The water level was

monitored during this same time interval.

The well was considered stabilized after three consecutive readings as follows:

- +/-0.1 for pH,
- +/-3% millisiemens per centimeter for specific conductance (conductivity),
- +/-10 millivolts for ORP,
- +/-10% milligrams per liter for DO, and
- +/-10% Nephelometric Turbidity Units for turbidity.

Groundwater sampling logs are included in **Appendix B**.

5.9 Temporary Monitoring Well Abandonment

Following the completion of sampling activities, each temporary well was pulled from the ground allowing the formation to collapse into the borehole, with subsequent infill using bentonite chips and sand. Surface completions were patched with like materials (topsoil/seed, asphalt, or concrete) in accordance with Base specifications.

5.10 Decontamination

Field sampling equipment (e.g. water level indicators, pumps, bowls, trowels, shovels, and other downhole equipment) was decontaminated prior to initial use, and between samples. Liquinox® soap diluted with PFC-free bottled water was used to wash sampling equipment with a clean HDPE brush used to remove debris and particulates. PFC-free bottled water was used to rinse soapy water from the sampling equipment. Prior to use, a sample of the water was submitted to Vista Analytical Laboratories (Vista) for analysis of the six PFCs on the UCMR 3 list. Concentrations were reviewed to ensure Amec Foster Wheeler's internal PFC-free criteria were met.

5.11 Investigation Derived Waste Management

Soil from borings was containerized into a single 55-gallon drum. Purge water generated during monitoring well groundwater sampling activities and rinse water were also containerized in a 55-gallon drum. Drums were kept on-site in an area designated by the Base POC (Ms. Susan Gustke) pending the results of laboratory testing. Investigation derived waste manifests are provided in **Appendix C.**

5.12 Laboratory

Samples collected were submitted to Vista, in El Dorado Hills, California. Vista is accredited under the DOD Environmental Laboratory Accreditation Program and maintains a National Environmental Laboratory Accreditation Program certification.

5.13 Field Quality Assurance/Quality Control Sample Results

Quality Assurance and Quality Control (QA/QC) samples, including field duplicates, equipment blanks and matrix spike/matrix spike duplicate (MS/MSD) samples were analyzed for the same PFC parameters as the associated project samples. The analytical results for the field duplicates are presented in **Table 2** for soil samples and **Table 3** for groundwater samples.

5.14 Data Validation and Usability

Amec Foster Wheeler performed a data quality review of samples collected during field activities and submitted to Vista for analysis of PFCs, consisting of: 54 soil samples (plus five field duplicates), 12 groundwater samples (plus one duplicate), and one equipment blank.

The laboratory analytical data generated during the SI were reviewed by a qualified analytical chemist for conformance with the project Data Quality Objectives specified in the QAPP (Amec, 2017). Amec Foster Wheeler performed USEPA Stage 4 validation on 10 percent of the field samples and USEPA Stage 2B validation on the remaining field samples associated with this sampling event. The Stage 4 validation includes review of the QC results in the laboratory's analytical report and reported on QC summary forms as well as recalculation checks and review of the instrument raw data outputs. The Stage 2B validation includes review of the QC results in the laboratory's analytical report and reported on QC summary forms with no review of the associated raw data. Data from equipment and field blanks did not undergo validation because results from these samples are only used to assess data usability for field samples. The validation was performed in general accordance with: Amec Foster Wheeler Final QAPP (Amec, 2017); DoD Quality Systems Manual for Environmental Laboratories (DoD, 2017); and USEPA Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (USEPA, 2009).

Amec Foster Wheeler evaluated 432 data records from field samples during the validation. Amec Foster Wheeler J flagged 119 records (27.5%) as estimated values due to one of the following: low MS/MSD recoveries, imprecision between MS and MSD results, high internal standard recoveries, field duplicate imprecision, and/or analyte concentrations outside the instrument's calibration range. The Data Validation Report, including qualified data, is included as **Appendix D**. Laboratory analytical reports and chains of custody forms are provided in **Appendix E.**

6.0 SITE INVESTIGATIONS

This SI field program was designed to collect data needed to evaluate the presence/absence of PFC at each of the nine PRLs and the base boundary. The scope of the SI was designed using recommendations presented in the PA prepared by BB&E. The following sections describe the investigation approach that was used to fulfill the objectives of the SI. The work was conducted in accordance with the QAPP, SHSP, and FSP presented in the approved Work Plan.

6.1 Field Activities Summary

Completed SI field activities are summarized in **Table 4.**

Individual sampling locations are shown on **Figures 4 through 9.** Soil boring and monitoring well construction and groundwater sampling logs are included in **Appendices A** and **B** respectively.

6.2 General Work Plan Deviations

Deviations from the general work plan included one or more of the following conditions:

- The May 2018 USEPA residential soil Regional Screening Level (RSL) value for PFBS (1,300,000 micrograms per kilogram [µg/kg]) was used as the screening value in place of the May 2016 USEPA residential soil RSL value for PFBS (1,600,000 µg/kg). The updated RSL value was not published at the time the Work Plan was finalized.
- Due to concerns over water availability a decision was made not to develop the wells and instead to immediately collect low-flow or grab samples, depending on water availability.

Work Plan deviations specific to an individual PRL are discussed in the following subsections.

6.3 PRL 1: Building 430 (Current Fire Station)

6.3.1 PRL Deviations

One deviation from the Work Plan occurred at this PRL; dissolved oxygen did not meet stabilization requirements prior to collecting the groundwater sample from TW-01. No other deviations, apart from the general Work Plan deviations (see **Section 6.2**), occurred at this PRL.

6.3.2 Soil Sampling

Three soil borings (01-SB01, 01-SB02, and 01-SB03) were advanced at PRL 1 on 08 November 2017, with shallow (0.5 to 1.0 ft. bgs) and deep (4.0 to 5.0 ft. bgs) soil samples collected from each boring. A total of seven soil samples (including one duplicate) were collected at this PRL.

Soil boring locations are illustrated on **Figure 4**.

6.3.3 Groundwater Sampling

Temporary well TW-01 (co-located with 01-SB01) was drilled to a depth of 10 ft. bgs on 08 November 2017, and a well screen was installed from 5 to 10 ft. bgs. Groundwater was encountered at 8.0 ft. bgs prior to purging and sampling. One groundwater sample was collected from TW-01.

The temporary monitoring well location is illustrated on **Figure 4.**

6.4 PRL 2: Building 430 Nozzle Test Area 1

6.4.1 PRL Deviations

No deviations, apart from the general Work Plan deviations (see **Section 6.2**), occurred at this PRL.

6.4.2 Soil Sampling

Three borings (02-SB01, 02-SB02, and 02-SB03) were advanced at PRL 2 on 08 November 2017, with shallow (0.5 to1.0 ft. bgs) and deep (5.0 to 6.5 ft. bgs) soil samples collected from each boring. A total of seven soil samples (including one duplicate) were collected at this PRL.

Soil boring locations are illustrated on **Figure 4**.

6.4.3 Groundwater Sampling

Temporary well TW-02 (co-located with 02-SB01) was drilled to a depth of 10 ft. bgs on 08 November 2017, and a well screen was installed from 5 to 10 ft. bgs. Groundwater was encountered at 7.17 ft. bgs prior to purging and sampling. One groundwater sample was collected from TW-02.

The temporary monitoring well location is illustrated on **Figure 4.**

6.5 PRL 3: Building 430 Nozzle Test Area 2

6.5.1 PRL Deviations

No deviations, apart from the general Work Plan deviations (see **Section 6.2**), occurred at this PRL.

6.5.2 Soil Sampling

Three soil borings (03-SB01, 03-SB02, and 03-SB03) were advanced at the PRL 3 on 08

November 2017, with shallow (0.5 to 1.0 ft. bgs) and deep (4.0 to 6.5 ft. bgs) soil samples collected from each boring. A total of six soil samples were collected at this PRL.

Soil boring locations are illustrated on **Figure 4**.

6.5.3 Groundwater Sampling

Temporary well TW-03 (co-located with 03-SB01) was drilled to a depth of 10 ft. bgs on 08 November 2017, and a well screen was installed from 5.0 to 10.0 ft. bgs. Groundwater was encountered at 7.1 ft. bgs prior to purging and sampling. One groundwater sample was collected from TW-03.

The temporary monitoring well location is illustrated on **Figure 4.**

6.6 PRL 4: Former Building 403 (Former Fire Station)

6.6.1 PRL Deviations

No deviations, apart from the general Work Plan deviations (see **Section 6.2**), occurred at this PRL.

6.6.2 Soil Sampling

Three soil borings (04-SB01, 04-SB02, and 04-SB03) were advanced on 09 November 2017, with shallow (0.5 to 2.0 ft. bgs) and deep (4.5 to 5.5 ft. bgs) soil samples collected from each boring. A total of six soil samples were collected from this PRL.

Soil boring locations are illustrated on **Figure 5**.

6.6.3 Groundwater Sampling

Temporary well TW-04 (co-located with 04-SB01) was drilled to a depth of 10 ft. bgs on 09 November 2017, and a well screen was installed from 5 to 10 ft. bgs. Groundwater was measured at 6.5 ft. bgs prior to purging and sampling. One groundwater sample was collected from TW-04.

The temporary monitoring well location is illustrated on **Figure 5.**

6.7 PRL 5: Hangar 400

6.7.1 PRL Deviations

No deviations, apart from the general Work Plan deviations (see **Section 6.2**), occurred at this PRL.

6.7.2 Soil Sampling

Three soil borings (05-SB01, 05-SB02, and 05-SB03) were advanced on 09 November 2017, with shallow (0.5 to 1.0 ft. bgs) and deep (6.0 to 7.5 ft. bgs) soil samples collected from each boring. A total of six soil samples were collected from this PRL.

Soil boring locations are illustrated on **Figure 5**.

6.7.3 Groundwater Sampling

Temporary well TW-05 (co-located with 05-SB01) was drilled to a depth of 10 ft. bgs on 09 November 2017, and a well screen was installed from 5.0 to 10.0 ft. bgs. Groundwater was measured at 7.4 ft. bgs prior to purging and sampling. One groundwater sample was collected from TW-05.

The temporary monitoring well location is illustrated on **Figure 5.**

6.8 PRL 6: Hangar 406

6.8.1 PRL Deviations

A deviation from the Work Plan occurred at this PRL. The shallow soil sample from boring 06-SB03 was collected at a depth of 4.5-5.0 ft. bgs due to a thick layer of sub-asphalt fill. No other deviations, apart from the general Work Plan deviations (see **Section 6.2**), occurred at this PRL.

6.8.2 Soil Sampling

Three soil borings (06-SB01, 06-SB02, and 06-SB03) were advanced between 06 and 07 November 2017, with shallow (0.5 to 5.0 ft. bgs) and deep (4.5 to 7.5 ft. bgs) soil samples collected from each boring. A total of seven soil samples (including one duplicate) were collected from this PRL.

Soil boring locations are illustrated on **Figure 6.**

6.8.3 Groundwater Sampling

Temporary well TW-06 (co-located with 06-SB01) was drilled to a depth of 10 ft. bgs on 06. November 2017, and a well screen was installed from 5.0 to 10.0 ft. bgs. Groundwater was encountered at 6.3 ft. bgs prior to purging and sampling. One groundwater sample was collected from TW-06

The temporary monitoring well location is illustrated on **Figure 6.**

6.9 PRL 7: Hangar 414

6.9.1 PRL Deviations

No deviations, apart from the general Work Plan deviations (see **Section 6.2**), occurred at this PRL.

6.9.2 Soil Sampling

Three soil borings (07-SB01, 07-SB02, and 07-SB03) were advanced on 07 November 2017, with shallow (0.5 to 1.0 ft. bgs) and deep (4.5 to 5.5 ft. bgs) soil samples collected from each boring. A total of seven soil samples (including one duplicate) were collected from this PRL.

Soil boring locations are illustrated on **Figure 7.**

6.9.3 Groundwater Sampling

Temporary well TW-07 (co-located with 07-SB01) was drilled to a depth of 10.0 ft. bgs on 07 November 2017, and a well screen was installed from 5.0 to 10.0 ft. bgs. Groundwater was measured at 6.0 ft. bgs prior to purging and sampling. One groundwater sample was collected from TW-07.

The temporary monitoring well location is illustrated on **Figure 7.**

6.10 PRL 8: Fuel Spill Ditch

6.10.1 PRL Deviations

A deviation from the Work Plan occurred at this PRL. The location of PRL 8 was modified based on an updated understanding of its placement via Ms. Susan Gustke. The report figures reflect the modified location of PRL 8 as well as the borings. No other deviations, apart from the general Work Plan deviations (see **Section 6.2**), occurred at this PRL.

6.10.2 Soil Sampling

Three soil borings (08-SB01, 08-SB02, and 08-SB03) were advanced on 07 November 2017, with shallow (0.5 to 1.0 ft. bgs) and deep (4.5 to 5.5 ft. bgs) soil samples collected from each boring. A total of seven soil samples (including one duplicate) were collected from this PRL.

Soil boring locations are illustrated on **Figure 7.**

6.10.3 Groundwater Sampling

Temporary well TW-08 (co-located with 08-SB01) was drilled to a depth of 10 ft. bgs on 07

November 2017, and a well screen was installed from 5.0 to 10.0 ft. bgs. Groundwater was encountered at 6.5 ft. bgs prior to purging and sampling. One groundwater sample was collected from TW-08.

The temporary monitoring well location is illustrated on **Figure 7.**

6.11 PRL 9: Building 503 Parking Lot

6.11.1 PRL Deviations

Two deviations from the Work Plan occurred at this PRL. The shallow soil samples from borings 09-SB02 and 09-SB03 were collected from 2.0-3.0 and 3.5-4.0 ft. bgs respectively due to thick layers of sub-asphalt fill. ORP did not meet stabilization requirements prior to collecting the groundwater sample from TW-09. No other deviations, apart from the general Work Plan deviations (see **Section 6.2**), occurred at this PRL.

6.11.2 Soil Sampling

Three soil borings (09-SB01, 09-SB02, and 09-SB03) were advanced between 07 and 09 November 2017, with shallow (1.0 to 4.0 ft. bgs) and deep (6.5 to 9.5 ft. bgs) soil samples collected from each boring. A total of six soil samples were collected from this PRL.

Soil boring locations are illustrated on **Figure 8.**

6.11.3 Groundwater Sampling

Temporary well TW-09 (co-located with 09-SB01) was drilled to a depth of 15 ft. bgs on 09 November 2017, and a well screen was installed from 10.0-15.0 ft. bgs. Groundwater was encountered at 11.5 ft. bgs prior to purging and sampling. One groundwater sample was collected from TW-09.

The temporary monitoring well locations is illustrated on **Figure 8.**

6.12 Base Boundary Wells: TW-BB01 through TW-BB03

6.12.1 Deviations

Deviations occurred at the two Base Boundary wells. Temporary well TW-BB02 ran dry during purging and therefore a grab sample was collected on 09 November 2017. Temporary well TW-BB03 had a very slow recharge after well completion, so a grab sample was collected on 09 November 2017. Therefore, field parameters were not collected at these locations. No other deviations, apart from the general Work Plan deviations (see **Section 6.2**), occurred at the Base

Boundary wells.

6.12.2 Groundwater Sampling

Between 11/08/2017 and 11/09/2017, four samples (including one duplicate) were collected from Base Boundary wells TW-BB01 through TW-BB03. Two samples (including one duplicate) were collected from TW-BB01, one sample was collected at TW-BB02, and one at TW-BB03. These temporary wells were completed to depths of 10.2, 15.2, and 15.2 ft. for TW-BB01, TW-BB02, and TW-BB03, respectively. Wells TW-BB02 and TW-BB03 were completed with a screened interval of 10.2-15.2 ft., while TW-BB01 was completed with a screened interval of 5.2-10.2 ft. Depth to water was found to be 6.22, 9.40, and 11.10 ft. for TW-BB01 through TW-BB03, respectively. The Base Boundary well locations are illustrated on **Figure 9.**

THIS PAGE INTENTIONALLY LEFT BLANK.

7.0 SOIL AND GROUNDWATER STANDARDS

A soil or groundwater standard is an environmental and/or public health statute or rule used in identifying Base contamination that may pose a risk to human health or the environment. Soil and groundwater standards are federal and state human health and environment-based regulations used to:

- Determine the appropriate levels of Base clean-up
- Define and formulate remedial action alternatives
- Govern implementation and operation of the selected remedial action

Currently no promulgated Standards exist for these compounds.

In accordance with *Interim Air Force Guidance on Sampling and Response Actions for Perfluorinated Compounds at Active and BRAC Installations* (USAF, 2012) and USEPA lifetime drinking water Health Advisories (HAs) for PFOS (USEPA, 2016a) and PFOA (USEPA, 2016b), a release is considered confirmed if the following concentrations are exceeded:

PFOS:

- 0.07 micrograms per liter (µg/L) in groundwater/surface water that is used as or contributes to a drinking water source (combined with PFOA value).
- 1.26 milligrams per kilogram (mg/kg) in soil (calculated in the absence of RSL values[1]).
- 1.26 mg/kg in sediment (calculated in the absence of RSL values).

PFOA:

- 0.07 µg/L in groundwater/surface water that is used as or contributes to a drinking water source (combined with PFOS value).
- 1.26 mg/kg in soil (calculated in the absence of RSL values).
- 1.26 mg/kg in sediment (calculated in the absence of RSL values).

USEPA has also derived RSL values for PFBS, for which there is a Tier 2 toxicity value (USEPA, 2018). The ANG will also consider a release to be confirmed if the following concentrations are exceeded:

[1] Air Force Guidance screening levels calculated using the USEPA Regional Screening Level calculator [https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search]. The toxicity value input for the calculator is the Tier 3 value reference dose of 0.00002 mg/kg/day derived by USEPA in their Drinking Water Health Advisories for both PFOS (USEPA, 2016a) and PFOA (USEPA, 2016b).

PFBS:

- 400 µg/L in groundwater/surface water.
- 1,300 mg/kg in soil/sediment.

The HA, RSLs and ANG Guidance values are collectively referred to as screening criteria in this Report. **Table 5** presents the screening criteria for comparing the analytical results for PFBS, PFOA, and PFOS.

8.0 SITE INVESTIGATION RESULTS

This section presents the soil and groundwater data collected during the SI activities and a comparison of detections. Detections of PFBS, PFOA and PFOS are compared to the screening criteria as defined in the Work Plan and as presented in **Section 7.0**. Locations of detected analytes are shown on **Figures 4 through 9**.

8.1 PRL 1: Building 430 (Current Fire Station)

8.1.1 PRL 1 Soil Analytical Results

Seven soil samples (including one duplicate) were collected and analyzed from three borings as described in **Section 6.3.2**: 01-SB01 from 0.5-1.0 and 4.5 to 5.5 ft. bgs; 01-SB02 from 0.5 to 1.0 and 4.5 to 5.5 ft. bgs; 01-SB03 from 0.5 to 1.0 and 4.0 to 4.5 ft. bgs. Analytical results from soil samples indicate that the six PFCs analyzed for were detected above the laboratory reporting limit, with the shallow sample in 01-SB01 exceeding HA criteria of 1.26 mg/kg for PFOS. PFOS was detected at a concentration of 1.32 J mg/kg and PFOA was detected at a concentration of 0.00241 mg/kg.

Comparison of soil analytical results to applicable screening criteria are presented on **Table 2.** The soil boring locations showing detected compounds are depicted on **Figure 4**.

8.1.2 PRL 1 Groundwater Analytical Results

One groundwater sample was collected from TW-01 and analyzed as described in **Section 6.3.3**. Analytical results from the groundwater sample indicates that six PFCs were detected at concentrations above the laboratory detection limit, with two compounds exceeding USEPA Drinking Water HA of 0.07 µg/L. PFOS was detected at a concentration of 39 µg/L and PFOA was detected at a concentration of 0.841 µg/L. The combined PFOS and PFOA is 40 µg/L.

Comparison of groundwater analytical results to applicable criteria are presented on **Table 3**. The temporary monitoring well location showing detected compounds is illustrated on **Figure 4.**

8.2 PRL 2: Building 430 Nozzle Test Area 1

8.2.1 PRL 2 Soil Analytical Results

Seven soil samples (including one duplicate) were collected and analyzed from three borings as described in **Section 6.4.2**: 02-SB01 from 0.5 to 1.0 and 6.0 to 6.5 ft. bgs; 02-SB02 from 0.5 to

1.0 and 5.0 to 5.5 ft. bgs; 02-SB03 from 0.5 to 1.0 and 6.0 to 6.5 ft. bgs. Analytical results from soil samples indicate that the six PFCs analyzed for were detected above the laboratory reporting limit, with three samples having PFOS concentrations exceeding HA criteria of 1.26 mg/kg. Sample 02-SB02-0.5-1.0 was found to have a PFOS concentration of 3.33 mg/kg and a PFOA concentration of 0.0141 mg/kg. Sample 02SB03-0.5-1.0 was found to have a PFOS concentration of 30.1 J mg/kg and a PFOA concentration of 0.118 mg/kg. The duplicate to sample 02-SB02-0.5-1.0 was found to have a PFOS concentration of 36.8 J mg/kg and a PFOA concentration of 0.151 mg/kg.

Comparison of soil analytical results to applicable screening criteria are presented on **Table 2**. The soil boring locations showing detected compounds are depicted on **Figure 4**.

8.2.2 PRL 2 Groundwater Analytical Results

One groundwater sample was collected from TW-02 and analyzed as described in **Section 6.4.3**. Analytical results from the groundwater sample indicates that six PFCs were detected at concentrations above the laboratory detection limit, with two compounds exceeding USEPA Drinking Water HA of 0.07 µg/L. PFOS was detected at a concentration of 28.4 µg/L and PFOA was detected at a concentration of 0.349 µg/L. The combined PFOS and PFOA is 28.8 µg/L.

Comparison of groundwater analytical results to applicable criteria are presented on **Table 3**. The temporary monitoring well location showing detected compounds is illustrated on **Figure 4.**

8.3 PRL 3: Building 430 Nozzle Test Area 2

8.3.1 PRL 3 Soil Analytical Results

Six soil samples were collected and analyzed from three soil borings as described in **Section 6.5.2**: 03-SB01 from 0.5 to 1.0 and 6.0 to 6.5 ft. bgs; 03-SB02 from 0.5 to 1.0 and 4.0 to 4.5 ft. bgs; and 03-SB03 from 0.5 to 1.0 and 5.0 to 5.5 ft. bgs. Analytical results from soil samples indicate that five of the six PFCs analyzed for were detected above the laboratory reporting limit. There were no exceedances of the screening criteria of 1.26 mg/kg in the soil samples collected from PRL 3.

Comparison of soil analytical results to applicable screening criteria are presented on **Table 2**. The soil boring locations showing detected compounds are depicted on **Figure 4**.

8.3.2 PRL 3 Groundwater Analytical Results

One groundwater sample was collected from TW-03 and analyzed as described in **Section 6.5.3**. Analytical results from the groundwater sample indicates that six PFCs were detected at concentrations above the laboratory detection limit, with two compounds exceeding USEPA Drinking Water HA of 0.07 µg/L. PFOS was detected at a concentration of 13.8 µg/L and PFOA was detected at a concentration of 0.528 µg/L. The combined PFOS and PFOA is 14.3 µg/L.

Comparison of groundwater analytical results to applicable criteria are presented on **Table 3**. The temporary monitoring well location showing detected compounds is illustrated on **Figure 4.**

8.4 PRL 4: Former Building 403 (Former Fire Station)

8.4.1 PRL 4 Soil Analytical Results

Six soil samples were collected and analyzed from 3 soil borings as described in **Section 6.6.2**: 04-SB01 from 0.5 to 1.0 and 4.5 to 5.0 ft. bgs; 04-SB02 from 1.0 to 2.0 and 5.0 to 5.5 ft. bgs; and 04-SB03 from 1.0 to 2.0 and 5.0 to 5.5 ft. bgs. Analytical results from soil samples indicate that the five of the six PFCs analyzed for were detected above the laboratory reporting limit; however, no compounds exceeded the screening criteria of 1.26 mg/kg in any of the soil samples collected from PRL 4.

Comparison of soil analytical results to applicable screening criteria are presented on **Table 2**. The soil boring locations showing detected compounds are depicted on **Figure 5**.

8.4.2 PRL 4 Groundwater Analytical Results

One groundwater sample was collected from TW-04 and analyzed as described in **Section 6.6.3**. Analytical results from the groundwater sample indicates that six PFCs were detected at concentrations above the laboratory detection limit, with two compounds exceeding USEPA Drinking Water HA of 0.07 µg/L. PFOS was detected at a concentration of 0.149 µg/L and PFOA was detected at a concentration of 0.0849 µg/L. The combined PFOS and PFOA is 0.234 µg/L.

Comparison of groundwater analytical results to applicable criteria are presented on **Table 3.** The temporary monitoring well location showing detected compounds is illustrated on **Figure 5.**

8.5 PRL 5: Hangar 400

8.5.1 PRL 5 Soil Analytical Results

Six soil samples were collected and analyzed from three soil borings as described in **Section 6.7.2**: 05-SB01 from 0.5 to 1.0 and 6.0 to 6.5 ft. bgs; 05-SB02 from 0.5 to 1.0 and 7.0 to 7.5 ft. bgs; and 05-SB03 from 0.5 to 1.0 and 6.0 to 6.5 ft. bgs. Analytical results from soil samples indicate that five of the six PFCs analyzed for were detected above the laboratory reporting limit; however, no compounds exceeded the screening criteria of 1.26 mg/kg in any of the soil samples collected from PRL 5.

Comparison of soil analytical results to applicable screening criteria are presented on **Table 2**. The soil boring locations showing detected compounds are depicted on **Figure 5**.

8.5.2 PRL 5 Groundwater Analytical Results

One groundwater sample was collected from TW-05 and analyzed as described in **Section 6.7.3**. Analytical results from the groundwater sample indicates that six PFCs were detected at concentrations above the laboratory detection limit, with one compound exceeding USEPA Drinking Water HA of 0.07 µg/L. PFOS was detected at a concentration of 0.174 µg/L. The combined PFOS and PFOA is 0.239 µg/L.

Comparison of groundwater analytical results to applicable criteria are presented on **Table 3**. The temporary monitoring well location showing detected compounds is illustrated on **Figure 5.**

8.6 PRL 6: Hangar 406

8.6.1 PRL 6 Soil Analytical Results

Seven soil samples (including one duplicate) were collected and analyzed from three soil borings as described in **Section 6.8.2**: 06-SB01 from 0.5 to 1.0 and 6.5 to 7.0 ft. bgs; 06-SB02 from 0.5 to 1.0 and 4.5 to 5.0 ft. bgs; and 06-SB03 from 4.5 to 5.0 and 7.0 to 7.5 ft. bgs. Analytical results from soil samples indicate that five of the six PFCs analyzed for were detected above the laboratory reporting limit; however, no compounds exceeded the screening criteria of 1.26 mg/kg in any of the soil samples collected from PRL 6.

Comparison of analytical results to applicable screening criteria are presented on **Table 2**. The soil boring locations showing detected compounds are depicted on **Figure 6**.

8.6.2 PRL 6 Groundwater Analytical Results

One groundwater sample was collected from TW-06 and analyzed as described in **Section 6.8.3**. Analytical results from the groundwater sample indicates that six PFCs were detected at concentrations above the laboratory detection limit, with one compound exceeding USEPA Drinking Water HA of 0.07 µg/L. PFOS was detected at a concentration of 0.121 J µg/L. The combined PFOS and PFOA is 0.141 µg/L.

Comparison of groundwater analytical results to applicable criteria are presented on **Table 3**. The temporary monitoring well location showing detected compounds is illustrated on **Figure 6.**

8.7 PRL 7: Hangar 414

8.7.1 PRL 7 Soil Analytical Results

Seven soil samples (including one duplicate) were collected and analyzed from three soil borings as described in **Section 6.9.2**: 07-SB01 from 0.5 to 1.0 and 4.5 to 5.0 ft. bgs; 07-SB02 from 0.5 to 1.0 and 4.5 to 5.0 ft. bgs; and 07-SB03 from 0.5 to 1.0 and 5.0 to 5.5 ft. bgs. Analytical results from soil samples indicate that five of the six PFCs analyzed for were detected above the laboratory reporting limit; however, no compounds exceeded the screening criteria of 1.26 mg/kg in any of the soil samples collected from PRL 7.

Comparison of soil analytical results to applicable screening criteria are presented on **Table 2**. The soil boring locations showing detected compounds are depicted on **Figure 7**.

8.7.2 PRL 7 Groundwater Analytical Results

One groundwater sample was collected from TW-07 and analyzed as described in **Section 6.9.3**. Analytical results from the groundwater sample indicates that six PFCs were detected at concentrations above the laboratory detection limit, with two compounds exceeding USEPA Drinking Water HA of 0.07 µg/L. PFOS was detected at a concentration of 3.56 µg/L and PFOA was detected at a concentration of 0.116 µg/L. The combined PFOS and PFOA is 3.68 µg/L.

Comparison of groundwater analytical results to applicable criteria are presented on **Table 3**. The temporary monitoring well location showing detected compounds is illustrated on **Figure 7.**

8.8 PRL 8: Fuel Spill Ditch

8.8.1 PRL 8 Soil Analytical Results

Seven soil samples (including one duplicate) were collected and analyzed from three soil borings

as described in **Section 6.10.2**: 08-SB01 from 0.5 to 1.0 and 5.0 to 5.5 ft. bgs; 08-SB02 from 0.5 to 1.0 and 5.0 to 5.5 ft. bgs; and 08-SB03 from 0.5 to 1.0 and 4.5 to 5.0 ft. bgs. Analytical results from soil samples indicate that the six PFCs analyzed for were detected above the laboratory reporting limit; however, no compounds exceeded the screening criteria of 1.26 mg/kg in any of the soil samples collected from PRL 8.

Comparison of soil analytical results to applicable screening criteria are presented on **Table 2**. The soil boring locations showing detected compounds are depicted on **Figure 7**.

8.8.2 PRL 8 Groundwater Analytical Results

One groundwater sample was collected from TW-08 and analyzed as described in **Section 6.10.3**. Analytical results from the groundwater sample indicates that six PFCs were detected at concentrations above the laboratory detection limit, with two compounds exceeding USEPA Drinking Water HA of 0.07 µg/L. PFOS was detected at a concentration of 7.98 µg/L and PFOA was detected at a concentration of 0.0898 µg/L. The combined PFOS and PFOA is 8.07 µg/L.

Comparison of groundwater analytical results to applicable criteria are presented on **Table 3**. The temporary monitoring well location showing detected compounds is illustrated on **Figure 7.**

8.9 PRL 9: Building 503 Parking Lot

8.9.1 PRL 9 Soil Analytical Results

Six soil samples were collected and analyzed from three soil borings as described in **Section 6.11.2**: 09-SB01 from 1.0 to 2.0 and 9.0 to 9.5 ft. bgs; 09-SB02 from 2.0 to 3.0 and 8.0 to 9.0 ft. bgs; and 09-SB03 from 3.5 to 4.0 and 6.5 to 7.0 ft. bgs. Analytical results from soil samples indicate that two of the six PFCs analyzed for were detected above the laboratory reporting limit; however, no compounds exceeded the screening criteria of 1.26 mg/kg in any of the soil samples collected from PRL 9.

Comparison of soil analytical results to applicable screening criteria are presented on **Table 2**. The soil boring locations showing detected compounds are depicted on **Figure 8**.

8.9.2 PRL 9 Groundwater Analytical Results

One groundwater sample was collected from TW-09 and analyzed as described in **Section 6.11.3**. Analytical results from the groundwater sample indicates that five PFCs were detected at concentrations above the laboratory detection limit, with one compound exceeding USEPA

Drinking Water HA 0.07 µg/L. PFOS was detected at a concentration of 0.3 µg/L. The combined PFOS and PFOA is 0.3 µg/L.

Comparison of groundwater analytical results to applicable criteria are presented on **Table 3**. The temporary monitoring well location showing detected compounds is illustrated on **Figure 8.**

8.10 Base Boundary Wells

8.10.1 Groundwater Analytical Results

Four groundwater samples (including one duplicate) were collected from three Base Boundary wells. Analytical results from these samples indicate that six PFCs were detected at concentrations above the laboratory detection limits in TWBB-01 and TWBB-02, and three PFCs were detected at concentrations above the laboratory detection limit for TWBB-03. PFC concentrations exceeding USEPA Drinking Water HA standards of 0.07 µg/L were found for two compounds in TWBB-01 and TWBB-02; however, no PFC concentrations exceeding HA standards were found in TWBB-03. In TWBB-01 PFOS was detected at a concentration of 0.569 µg/L and PFOA was detected at concentrations of 0.0953 µg/L. In TWBB-02 PFOS was detected at a concentration of 0.509 µg/L and PFOA was detected at concentrations of 0.126 µg/L. Combined PFOS and PFOA were detected at a concentration of 0.664, 0.635, and 0.404 µg/L for TWBB-01, TWBB-02, and TWBB-03 respectively.

Comparisons of analytical results to applicable criteria are presented on **Table 3**. The temporary monitoring well locations showing detected compounds are illustrated on **Figure 9.**

THIS PAGE INTENTIONALLY LEFT BLANK.

9.0 CONCLUSIONS/RECOMMENDATIONS

This section presents the SI conclusions and recommendations at each PRL. Recommendations are based upon data collected by Amec Foster Wheeler during this SI, and an evaluation of results compared to applicable screening criteria. Based on the results of this SI, additional investigation is recommended at each of the nine PRLs. Amec Foster Wheeler recommends that further investigations include analysis of additional compounds, including precursor compounds, to supplement the UCMR3 list. Precursor compounds have potential to result in increased concentrations downgradient and can serve as a lingering source.

9.1 PRL 1: Building 430 (Current Fire Station)

A review of soil analytical data compared to screening criteria indicates there are no USEPA RSL exceedances for PFBS, and no USAF Guidance screening level exceedances for PFOA, at on-Base locations near PRL 1. One USAF Guidance screening level exceedance of for PFOS in the shallow soil sample was observed in boring 01-SB01 at PRL 1.

A review of groundwater data compared to screening criteria indicates exceedances of the USEPA Drinking Water HA exist downgradient from PRL 1. This determination was made based on concentrations observed in TW-01, which was installed to assess groundwater conditions downgradient from both PRL 1. Given that groundwater flows to the east/southeast, groundwater with PFC concentrations above applicable screening criteria is potentially present off-Base to the east/south of PRL 1.

Based on the SI results, the following are recommended for PRL 1:

- Additional investigations to evaluate concentrations of PFC in soil within the footprint of the equipment test area.
- Installation of a permanent monitoring well downgradient of PRL 1 to further evaluate the possible presence of PFCs at concentrations at or exceeding screening criteria levels.

9.2 PRL 2: Building 430 Nozzle Test Area 1

A review of soil analytical data compared to screening criteria indicates no exceedances of USEPA RSL for PFSB and no exceedance of the USAF Guidance screening level for PFOA. PFOS in the shallow soil samples from 02-SB02 and 02-SB03 as well as in the duplicate of 02-SB03 exceeded the USAF Guidance screening level.

A review of groundwater data compared to screening criteria indicates exceedances of the USEPA Drinking Water HA exist downgradient from PRL 2. This determination was made based on concentrations observed in TW-02, which was installed to assess groundwater conditions downgradient from both PRL 2. Given that groundwater flows to the east/southeast, groundwater with PFC concentrations above applicable screening criteria is potentially present off-Base to the east/south of PRL 2.

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

- Additional investigations to evaluate concentrations of PFC in soil within the footprint of the equipment test area.
- Installation of a permanent monitoring well downgradient of PRL 2 to further evaluate the possible presence of PFCs at concentrations at or exceeding screening criteria levels.

9.3 PRL 3: Building 430 Nozzle Test Area 2

A review of soil analytical data compared to soil screening criteria indicates there are no USEPA RSL exceedances for PFBS, and no USAF Guidance screening level exceedances for PFOS or PFOA at on-Base locations near PRL 3. However, PFCs were detected at concentrations above laboratory reporting limits.

A review of groundwater data compared to screening criteria indicates exceedances of the USEPA Drinking Water HA exist downgradient from PRL 3. This determination was made based on concentrations observed in TW-03, which was installed to assess groundwater conditions downgradient from both PRL 3. Given that groundwater flows to the east/southeast, groundwater with PFC concentrations above applicable screening criteria is potentially present off-Base to the east/south of PRL 3.

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

- Additional investigations to further evaluate concentrations of PFC in groundwater. This should include a source evaluation and delineation to determine the nature and extent of the release.

9.4 PRL 4: Former Building 403 (Former Fire Station)

A review of soil analytical data compared to soil screening criteria indicates there are no USEPA RSL exceedances for PFBS, and no USAF Guidance screening level exceedances for PFOS or

PFOA at on-Base locations near PRL 4. However, PFCs were detected at concentrations above laboratory reporting limits.

A review of groundwater data compared to screening criteria indicates exceedances of the USEPA Drinking Water HA exist downgradient from PRL 4. This determination was made based on concentrations observed in TW-04, which was installed to assess groundwater conditions downgradient from both PRL 4. Given that groundwater flows to the east/southeast, groundwater with PFC concentrations above applicable screening criteria is potentially present off-Base to the east/south of PRL 4.

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

- Additional investigations to further evaluate concentrations of PFC in groundwater. This should include a source evaluation and delineation to determine the nature and extent of the release.

9.5 PRL 5: Hangar 400

A review of soil analytical data compared to soil screening criteria indicates there are no USEPA RSL exceedances for PFBS, and no USAF Guidance screening level exceedances for PFOS or PFOA at on-Base locations near PRL 5. However, PFCs were detected at concentrations above laboratory reporting limits.

A review of groundwater data compared to screening criteria indicates an exceedance of the USEPA Drinking Water HA exists downgradient from PRL 5. This determination was made based on concentrations observed in TW-05, which was installed to assess groundwater conditions downgradient from both PRL 5. Given that groundwater flows to the east/southeast, groundwater with PFC concentrations above applicable screening criteria is potentially present off-Base to the east/south of PRL 5.

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

- Additional investigations to further evaluate concentrations of PFC in groundwater. This should include a source evaluation and delineation to determine the nature and extent of the release.

9.6 PRL 6: Hangar 406

A review of soil analytical data compared to soil screening criteria indicates there are no USEPA

RSL exceedances for PFBS, and no USAF Guidance screening level exceedances for PFOS or PFOA at on-Base locations near PRL 6. However, PFCs were detected at concentrations above laboratory reporting limits.

A review of groundwater data compared to screening criteria indicates an exceedance of the USEPA Drinking Water HA exists downgradient from PRL 6. This determination was made based on concentrations observed in TW-06, which was installed to assess groundwater conditions downgradient from both PRL 6. Given that groundwater flows to the east/southeast, groundwater with PFC concentrations above applicable screening criteria is potentially present off-Base to the east/south of PRL 6.

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

- Additional investigations to further evaluate concentrations of PFC in groundwater. This should include a source evaluation and delineation to determine the nature and extent of the release.

9.7 PRL 7: Hangar 414

A review of soil analytical data compared to soil screening criteria indicates there are no USEPA RSL exceedances for PFBS, and no USAF Guidance screening level exceedances for PFOS or PFOA at on-Base locations near PRL 7. However, PFCs were detected at concentrations above laboratory reporting limits.

A review of groundwater data compared to screening criteria indicates exceedances of the USEPA Drinking Water HA exist downgradient from PRL 7. This determination was made based on concentrations observed in TW-07, which was installed to assess groundwater conditions downgradient from both PRL 7. Given that groundwater flows to the east/southeast, groundwater with PFC concentrations above applicable screening criteria is potentially present off-Base to the east/south of PRL 7.

Based on the SI results, the following is recommended for PRL 7:

- Additional investigations to further evaluate concentrations of PFC in groundwater. This should include a source evaluation and delineation to determine the nature and extent of the release.

9.8 PRL 8: Fuel Spill Ditch

A review of soil analytical data compared to soil screening criteria indicates there are no USEPA RSL exceedances for PFBS, and no USAF Guidance screening level exceedances for PFOS or PFOA at on-Base locations near PRL 8. However, PFCs were detected at concentrations above laboratory reporting limits.

A review of groundwater data compared to screening criteria indicates exceedances of the USEPA Drinking Water HA exist downgradient from PRL 8. This determination was made based on concentrations observed in TW-08, which was installed to assess groundwater conditions downgradient from both PRL 8. Given that groundwater flows to the east/southeast, groundwater with PFC concentrations above applicable screening criteria is potentially present off-Base to the east/south of PRL 8.

Based on the SI results, the following is recommended for PRL 8:

- Additional investigations to further evaluate concentrations of PFC in groundwater. This should include a source evaluation and delineation to determine the nature and extent of the release.

9.9 PRL 9: Building 503 Parking Lot

A review of soil analytical data compared to soil screening criteria indicates there are no USEPA RSL exceedances for PFBS, and no USAF Guidance screening level exceedances for PFOS or PFOA at on-Base locations near PRL 9. However, PFCs were detected at concentrations above laboratory reporting limits.

A review of groundwater data compared to screening criteria indicates an exceedance of the USEPA Drinking Water HA exists downgradient from PRL 9. This determination was made based on concentrations observed in TW-09, which was installed to assess groundwater conditions downgradient from both PRL 9. Given that groundwater flows to the east/southeast, groundwater with PFC concentrations above applicable screening criteria is potentially present off-Base to the east/south of PRL 9.

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

- Additional investigations to further evaluate concentrations of PFC in groundwater. This should include a source evaluation and delineation to determine the nature and extent of

the release.

9.10 Base Boundary Wells

A review of groundwater data compared to screening criteria indicates exceedances of the USEPA Drinking Water HA in two of the three Base Boundary wells installed to assess the conditions of groundwater crossing the Base Boundary. This determination was made based on concentrations observed in TW-BB01 and TW-BB02. Given that groundwater flows to the east/southeast and that samples at the Base Boundary have exceedances, groundwater with PFC concentrations above applicable screening criteria is very likely present off-Base to the east/south.

9.11 PRL Sites Summary

In summary, analytical data for soil samples indicate USEPA RSL exceedances for PFOS at two PRLs (1 and 2), whereas the other seven PRLs had detections at concentrations above laboratory reporting limits. Additionally, groundwater samples from the nine PRLs and two Base-boundary locations show exceedances of USEPA Drinking Water HA screening levels. Therefore, Amec Foster Wheeler recommends additional investigations at the nine PRLs to further evaluate PFC concentrations in groundwater and to delineate the contamination to determine the nature and extent of the confirmed releases. Furthermore, Amec Foster Wheeler recommends additional investigations at PRLs 1 and 2 to further evaluate the PFC concentrations in soil and to delineate the contamination to determine the nature and extent of the confirmed releases.

These recommendations are summarized in the **Table 6** below.

Table 6: Screening Criteria Exceedances and Recommendations

PRL	Screening Criteria Exceedance		Recommendations
	Soil	GW	
1	X	X	Soil investigation to determine the extent of PFC contamination. GW investigation to determine the nature and extent of the confirmed PFC release.
2	X	X	Soil investigation to determine the extent of PFC contamination. GW investigation to determine the nature and extent of the confirmed PFC release.
3		X	GW investigation to determine the nature and extent of the confirmed PFC release. Soil investigation, including soils in the saturated zone, to determine if the soil may be a contributing source to GW.
4		X	GW investigation to determine the nature and extent of the confirmed PFC release. Soil investigation, including soils in the saturated zone, to determine if the soil may be a contributing source to GW.
5		X	GW investigation to determine the nature and extent of the confirmed PFC release. Soil investigation, including soils in the saturated zone, to determine if the soil may be a contributing source to GW.
6		X	GW investigation to determine the nature and extent of the confirmed PFC release. Soil investigation, including soils in the saturated zone, to determine if the soil may be a contributing source to GW.
7		X	GW investigation to determine the nature and extent of the confirmed PFC release. Soil investigation, including soils in the saturated zone, to determine if the soil may be a contributing source to GW.
8		X	GW investigation to determine the nature and extent of the confirmed PFC release. Soil investigation, including soils in the saturated zone, to determine if the soil may be a contributing source to GW.
9		X	GW investigation to determine the nature and extent of the confirmed PFC release. Soil investigation, including soils in the saturated zone, to determine if the soil may be a contributing source to GW.
Base Boundary		X	GW investigation both upgradient and downgradient of the Base boundary to determine if PFCs are migrating onto the Base from off-Base sources and to determine the nature and extent of the PFC contamination migrating off-Base.

Notes:
GW = Groundwater
Inc. - Inconclusive based on results of SI
X – Screening criteria exceedance
PFC - Perfluorinated Compound
PRL - Potential Release Location
NFA – No Further Action

THIS PAGE INTENTIONALLY LEFT BLANK.

10.0 REFERENCES

Amec Foster Wheeler, 2017. *Final Quality Assurance Project Plan - FY 16 Phase 1 Regional Site Inspections for Per-fluorinated Compounds, Multiple Air National Guard Installations*. May 2017.

ANG, 2009. *Air National Guard Investigation Guidance*, *Environmental Restoration Program.* September 2009.

BB&E, 2015. Final Perfluorinated Compounds Preliminary Assessment Site Visit Report, Wisconsin Air National Guard Truax Field Dane County Regional Airport, December 2015.

DoD, 2017. *DoD Department of Energy (DOE) Consolidated Quality Systems Manual (QSM) for Environmental Laboratories. Version 5.1,* January 2017

Leidos, 2015. *Final Preliminary Assessment/Site Investigation, Dane County Regional Airport Truax Field, Compliance Restoration Program. February 2015*

National Oceanic and Atmospheric Administration (NOAA), 2013. Local Climatological Data, Madison, Wisconsin. National Climate Data Center, Asheville, North Carolina.

PEER Consultants, P.C. (PEER), 1988. Final Preliminary Assessment, 128th Tactical Fighter Wing, Wisconsin Air National Guard, Truax Field, Madison, Wisconsin. August.

USAF, 2012. *Interim Air Force Guidance on Sampling and Response Actions for Perfluorinated Compounds at Active and BRAC Installations.*

USEPA, 2009. *Method 537. Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry Version 1.1. EPA Document #: EPA/600/R-08/092.* September 2009.

USEPA, 2012. *Federal Register, Volume 77, No. 85, Revisions to the Unregulated Contaminant Monitoring Rule (UCMR 3) for Public Water Systems; Final Rule.* May 2, 2012.

USEPA, 2016a. Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS), EPA 822-R-16-004. United States Environmental Protection Agency, May 2016.

USEPA, 2016b. *Drinking Water Health Advisory for Perfluotooctanoic Acid (PFOA), EPA 822-R-16-005.* Unites States Environmental Protection Agency, May 2016.

USEPA, 2018. *EPA Regional Screening Levels [https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-june-2017],* May 2018.

Wisconsin Department of Natural Resources (WDNR), 2013. Record of Decision, Installation Restoration Program Sites 1 through 8, 115th Fighter Wing, Wisconsin Air National Guard, Truax Field, Madison, Wisconsin. June.

THIS PAGE INTENTIONALLY LEFT BLANK.

TABLES

THIS PAGE INTENTIONALLY LEFT BLANK.

Table 1: Summary of Site Inspection Activities

PRL Name	Analyzed Parameters	Soil Borings	Soil Samples	Temporary Wells	Groundwater Samples
1. Building 430 (Current Fire Station)	Perflourinated Compounds (PFCs)	3	7	1	1
2. Building 430 Nozzle Test Area 1	PFCs	3	7	1	1
3. Building 430 Nozzle Test Area 2	PFCs	3	6	1	1
4. Former Building 403 (Former Fire Station)	PFCs	3	6	1	1
5. Hangar 400	PFCs	3	6	1	1
6. Hangar 406	PFCs	3	7	1	1
7. Hangar 414	PFCs	3	7	1	1
8. Fuel Spill Ditch	PFCs	3	7	1	1
9. Building 503 Parking Lot	PFCs	3	6	1	1
10. Base Boundary Wells	PFCs	3	0	3	4

Table 2
Summary of Soil Analytical Testing Results
FY16 Phase I Regional Site Inspections for Perfluorinated Compounds
Wisconsin Air National Guard, Truax Field, Wisconsin

						Analyte:	Perfluorooctanesulfonic acid (PFOS)	Perfluorooctanoic acid (PFOA)	Perfluorobutanesulfonic acid (PFBS)	Perfluoroheptanoic acid (PFHpA)	Perfluorohexanesulfonic acid (PFHxS)	Perfluorononanoic acid (PFNA)
						Screening Level:	1.26[1]	1.26[1]	1300[2]	NA	NA	NA
PRL	Location	Sample ID	Sample Date	Sample Depth (ft.)	Sample Type		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
1	01-SB01	TRUAX-01-SB01-110817-0.5-1	08-Nov-17	0.5-1.0	N		1.32 J	0.00241	0.00039 J	0.000475 J	0.0287	0.0029
		TRUAX-01-SB01-110817-4.5-5	08-Nov-17	4.5-5.5	N		0.000424 J	0.00101 U	0.00101 U	0.00101 U	0.00101 U	0.00101 U
	01-SB02	TRUAX-01-SB02-110817-0.5-1	08-Nov-17	0.5-1.0	N		0.0293	0.000999 U	0.000999 U	0.000999 U	0.0019 J	0.000999 U
		TRUAX-01-SB02-110817-4.5-5	08-Nov-17	4.5-5.5	N		0.00102 U	0.00102 U	0.00102 U	0.00102 U	0.00102 U	0.00102 U
	01-SB03	TRUAX-01-SB03-110817-0.5-1	08-Nov-17	0.5-1.0	N		0.0683	0.000686 J	0.000304 J	0.000983 U	0.00876	0.00041 J
		TRUAX-DUP4-110817	08-Nov-17	0.5-1.0	FD		0.0519	0.001 J	0.000386 J	0.000371 J	0.00961	0.000516 J
		TRUAX-01-SB03-110817-4-4.5	08-Nov-17	4.0-4.5	N		0.000512 J	0.00266	0.000783 J	0.00029 J	0.041	0.000982 U
2	02-SB01	TRUAX-02-SB01-110817-0.5-1	08-Nov-17	0.5-1.0	N		0.52	0.00103 J	0.000998 U	0.000424 J	0.0177	0.00123 J
		TRUAX-02-SB01-110817-6-6.5	08-Nov-17	6.0-6.5	N		0.0567	0.00103 U	0.00103 U	0.00103 U	0.00161 J	0.00103 U
	02-SB02	TRUAX-02-SB02-0.5-1	08-Nov-17	0.5-1.0	N		3.33	0.0141	0.00651	0.00255	0.41	0.00502
		TRUAX-02-SB02-110817-5-5.5	08-Nov-17	5.0-5.5	N		0.089	0.00108 J	0.0014 J	0.000367 J	0.02	0.00099 U
	02-SB03	TRUAX-02-SB03-110817-0.5-1	08-Nov-17	0.5-1.0	N		30.1 J	0.118	0.0161	0.005	1.37	0.0217
		TRUAX-DUP5-110817	08-Nov-17	0.5-1.0	FD		36.8 J	0.151	0.0171	0.00567	1.73	0.0254
		TRUAX-02-SB03-110817-6-6.5	08-Nov-17	6.0-6.5	N		0.00328	0.00597	0.0132	0.00192 J	0.0994	0.000992 U
3	03-SB01	TRUAX-03-SB01-110817-0.5-1	08-Nov-17	0.5-1.0	N		0.0407	0.000483 J	0.000998 U	0.000998 U	0.00346	0.000387 J
		TRUAX-03-SB01-110817-6-6.5	08-Nov-17	6.0-6.5	N		0.0435	0.000971 U	0.000971 U	0.000971 U	0.000857 J	0.000971 U
	03-SB02	TRUAX-03-SB02-0.5-1	08-Nov-17	0.5-1.0	N		0.054	0.00126 J	0.00104 U	0.000754 J	0.00723	0.000386 J
		TRUAX-03-SB02-4-4.5	08-Nov-17	4.0-4.5	N		0.000966 U	0.000966 U	0.000966 U	0.000966 U	0.000966 U	0.000966 U
	03-SB03	TRUAX-03-SB03-0.5-1	08-Nov-17	0.5-1.0	N		0.169	0.00257	0.00096 U	0.000855 J	0.0076	0.00254
		TRUAX-03-SB03-110817-5-5.5	08-Nov-17	5.0-5.5	N		0.0177	0.000358 J	0.000998 U	0.000998 U	0.00184 J	0.000289 J
4	04-SB01	TRUAX-04-SB01-110917-0.5-1	09-Nov-17	0.5-1.0	N		0.0124	0.00037 J	0.00103 U	0.00103 U	0.0011 J	0.00103 U
		TRUAX-04-SB01-110917-4.5-5	09-Nov-17	4.5-5.5	N		0.0176	0.000979 U	0.000979 U	0.000979 U	0.000354 J	0.000305 J
	04-SB02	TRUAX-04-SB02-110917-1-2	09-Nov-17	1.0-2.0	N		0.368	0.0016 J	0.00104 U	0.000448 J	0.00272	0.00104 U
		TRUAX-04-SB02-110917-5-5.5	09-Nov-17	5.0-5.5	N		0.611 J	0.00431	0.00096 U	0.000895 J	0.016 J	0.0011 J
	04-SB03	TRUAX-04-SB03-110917-1-2	09-Nov-17	1.0-2.0	N		0.00207	0.000972 U	0.000972 U	0.000972 U	0.000972 U	0.000972 U
		TRUAX-04-SB03-110917-5-5.5	09-Nov-17	5.0-5.5	N		0.00345	0.000975 U	0.000975 U	0.000975 U	0.000975 U	0.000975 U
5	05-SB01	TRUAX-05-SB01-110917-0.5-1	09-Nov-17	0.5-1.0	N		0.088	0.00458 J	0.001 U	0.00185 J	0.0388 J	0.00126 J
		TRUAX-05-SB01-110917-6-6.5	09-Nov-17	6.0-6.5	N		0.00104 U	0.00104 U	0.00104 U	0.00104 U	0.002 J	0.00104 U
	05-SB02	TRUAX-05-SB02-110917-0.5-1	09-Nov-17	0.5-1.0	N		0.0222	0.00181 J	0.00102 U	0.00122 J	0.00377	0.00163 J
		TRUAX-05-SB02-110917-7-7.5	09-Nov-17	7.0-7.5	N		0.00103 U	0.00103 U	0.00103 U	0.00103 U	0.00103 U	0.00103 U
	05-SB03	TRUAX-05-SB03-110917-0.5-1	09-Nov-17	0.5-1.0	N		0.333 J	0.00164 J	0.000968 U	0.00062 J	0.00883 J	0.00355
		TRUAX-05-SB03-110917-6-6.5	09-Nov-17	6.0-6.5	N		0.0477	0.00102 U	0.00102 U	0.00102 U	0.000693 J	0.00142 J
6	06-SB01	TRUAX-06-SB01-110617-0.5-1.0	06-Nov-17	0.5-1.0	N		0.00209 J	0.000818 J	0.000988 U	0.000988 U	0.000978 J	0.000988 U
		TRUAX-DUP01-110617	06-Nov-17	0.5-1.0	FD		0.00428 J	0.00101 J	0.000983 U	0.000983 U	0.00128 J	0.000983 U
		TRUAX-06-SB01-110617-6.5-7.0	06-Nov-17	6.5-7.0	N		0.000966 U	0.000966 U	0.000966 U	0.000966 U	0.000966 U	0.000966 U
	06-SB02	TRUAX-06-SB02-0.5-1.0	07-Nov-17	0.5-1.0	N		0.0164	0.000971 U	0.000971 U	0.000971 U	0.00287	0.000378 J
		TRUAX-06-SB02-110717-4.5-5.0	07-Nov-17	4.5-5.0	N		0.000995 J	0.000961 U	0.000961 U	0.000961 U	0.000961 U	0.000961 U
	06-SB03	TRUAX-06-SB03-4.5-5.5	07-Nov-17	4.5-5.0	N		0.00213	0.000927 U	0.000927 U	0.000927 U	0.000326 J	0.000927 U
		TRUAX-06-SB03-7.0-7.5	07-Nov-17	7.0-7.5	N		0.000937 U	0.000937 U	0.000937 U	0.000937 U	0.000287 J	0.000937 U
7	07-SB01	TRUAX-07-SB01-110717-0.5-1.0	07-Nov-17	0.5-1.0	N		0.0194	0.000337 J	0.000999 U	0.000999 U	0.00168 J	0.000999 U
		TRUAX-07-SB01-110717-4.5-5.0	07-Nov-17	4.5-5.0	N		0.022	0.000999 U	0.000999 U	0.000999 U	0.00188 J	0.000999 U
	07-SB02	TRUAX-07-SB02-110717-0.5-1.0	07-Nov-17	0.5-1.0	N		0.0331	0.000965 U	0.000965 U	0.000965 U	0.00293	0.000965 U
		TRUAX-07-SB02-110717-4.5-5.0	07-Nov-17	4.5-5.0	N		0.0175	0.00039 J	0.00092 U	0.00092 U	0.00336	0.000311 J
	07-SB03	TRUAX-07-SB03-110717-0.5-1.0	07-Nov-17	0.5-1.0	N		0.175 J	0.00125 J	0.000984 U	0.000528 J	0.0105 J	0.00133 J
		TRUAX-07-SO-DUP2-110717	07-Nov-17	0.5-1.0	FD		0.103 J	0.00103 J	0.000963 U	0.000375 J	0.00676 J	0.00104 J
		TRUAX-07-SB03-110717-5.0-5.5	07-Nov-17	5.0-5.5	N		0.00823	0.000447 J	0.00094 U	0.00094 U	0.00499	0.00094 U
8	08-SB01	TRUAX-08-SB01-110717-0.5-1.0	07-Nov-17	0.5-1.0	N		0.0366	0.000831 J	0.000947 U	0.000411 J	0.00314	0.000805 J
		TRUAX-08-SB01-110717-5.0-5.5	07-Nov-17	5.0-5.5	N		0.0463	0.000977 U	0.000977 U	0.000977 U	0.00125 J	0.000793 J
	08-SB02	TRUAX-08-SB02-110717-0.5-1.0	07-Nov-17	0.5-1.0	N		0.0199 J	0.000321 J	0.000966 U	0.000966 U	0.00371 J	0.000334 J
		TRUAX-08-SO-DUP3-110717	07-Nov-17	0.5-1.0	FD		0.0381 J	0.000714 J	0.000339 J	0.00043 J	0.00759 J	0.000443 J
		TRUAX-08-SB02-110717-5.0-5.5	07-Nov-17	5.0-5.5	N		0.0274	0.00092 J	0.000322 J	0.000587 J	0.00605	0.000582 J
	08-SB03	TRUAX-08-SB03-110717-0.5-1.0	07-Nov-17	0.5-1.0	N		0.0277	0.00036 J	0.000968 U	0.000968 U	0.00228	0.000355 J
		TRUAX-08-SB03-110717-4.5-5.0	07-Nov-17	4.5-5.0	N		0.00108 J	0.000959 U	0.000959 U	0.000959 U	0.000814 J	0.000959 U
9	09-SB01	TRUAX-09-SB01-110917-1-2	09-Nov-17	1.0-2.0	N		0.000601 J	0.000977 U	0.000977 U	0.000977 U	0.000392 J	0.000977 U
		TRUAX-09-SB01-110917-9.0-9.5	09-Nov-17	9.0-9.5	N		0.00191 J	0.00102 U	0.00102 U	0.00102 U	0.00102 U	0.00102 U
	09-SB02	TRUAX-09-SB02-2-3	08-Nov-17	2.0-3.0	N		0.000961 U	0.000961 U	0.000961 U	0.000961 U	0.000961 U	0.000961 U
		TRUAX-09-SB02-110817-8-9	08-Nov-17	8.0-9.0	N		0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
	09-SB03	TRUAX-09-SB03-110717-3.5-4.0	07-Nov-17	3.5-4.0	N		0.000955 U	0.000955 U	0.000955 U	0.000955 U	0.000955 U	0.000955 U
		TRUAX-09-SB03-110717-6.5-7.0	07-Nov-17	6.5-7.0	N		0.000948 U	0.000948 U	0.000948 U	0.000948 U	0.000948 U	0.000948 U

Notes:
Light blue = Exceeds Screening Level
FD - Field Duplicate Sample
ft - feet
ID - Identification
J - The analyte was positively identified and the associated numerical value it the approximate concentration in the sample.
mg/kg - milligrams per kilogram
N - Normal Field Sample
NA - Not applicable
PRL - Potential Release Location
U - The analyte was analyzed for, but was not detected above the reported limit of detection.
PFAS analysis by Modified USEPA Method 537 using Liquid Chromatography and Tandem Mass Spectrometry
[1] Screening levels calculated using the USEPA Regional Screening Level calculator [https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search]
[2] USEPA Residential Screening Levels (June 2017) [https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-may-2018]

Table 3
Summary of Groundwater Analytical Testing Results
FY16 Phase I Regional Site Inspections for Perfluorinated Compounds
Wisconsin Air National Guard, Truax Field, Wisconsin

						Analyte:	Perfluorooctanesulfonic acid (PFOS)	Perfluorooctanoic acid (PFOA)	PFOS+PFOA	Perfluorobutanesulfonic acid (PFBS)	Perfluoroheptanoic acid (PFHpA)	Perfluorohexanesulfonic acid (PFHxS)	Perfluorononanoic acid (PFNA)
						Health Advisory:	0.07	0.07	0.07	NA	NA	NA	NA
						EPA RSL Tapwater[1]:	NA	NA	NA	40	NA	NA	NA
PRL	**Location**	**Sample ID**	**Sample Date**	**Sample Depth (ft.)**	**Sample Type**		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
1	TW-01	TRUAX-01-TW01-110817	08-Nov-17	5.0-10.0	N		39	0.841	39.841	0.357	0.294	5.49	0.0987
2	TW-02	TRUAX-02-TW02-110817	08-Nov-17	5.0-10.0	N		28.4	0.349	28.749	0.134	0.18	4.26	0.107
3	TW-03	TRUAX-03-TW03-110817	08-Nov-17	5.0-10.0	N		13.8	0.528	14.328	0.133	0.445	8.82	0.089
4	TW-04	TRUAX-04-TW04-110917	09-Nov-17	5.0-10.0	N		0.149	0.0849	0.2339	0.0163	0.035	0.593	0.0028 J
5	TW-05	TRUAX-05-TW05-110917	09-Nov-17	5.0-10.0	N		0.174	0.0649	0.2389	0.013	0.0299	0.285	0.00526 J
6	TW-06	TRUAX-06-TW06-110617	06-Nov-17	5.0-10.0	N		0.121 J	0.0202	0.1412	0.0127	0.0175	0.236 J	0.0024 J
7	TW-07	TRUAX-07-TW07-110817	08-Nov-17	5.0-10.0	N		3.56	0.116	3.676	0.0219	0.055	1.03	0.0288
8	TW-08	TRUAX-08-TW08-110817	08-Nov-17	5.0-10.0	N		7.98	0.0898	8.0698	0.0421	0.0741	0.971	0.125
9	TW-09	TRUAX-09-TW09-110917	09-Nov-17	10.0-15.0	N		0.3	0.0164	0.3164	0.00415 J	0.00924	0.0334	0.00548 U
BBW	TW-BB01	TRUAX-BB-TWBB01-110817	08-Nov-17	5.0-10.0	N		0.569	0.0953	0.6643	0.0687	0.131	1.09	0.0196
		TRUAX-BB-GW-DUP0101-110817	08-Nov-17	5.0-10.0	FD		0.51	0.0994	0.6094	0.0692	0.138	0.966	0.0222
	TW-BB02	TRUAX-BB-TWBB02-110917	09-Nov-17	10.0-15.0	N		0.509	0.126	0.635	1.05	0.137	3.01	0.00699 J
	TW-BB03	TRUAX-BB-TWBB03-110917	09-Nov-17	10.0-15.0	N		0.0404	0.0053 U	NA	0.0099	0.0053 U	0.0796	0.0053 U

Notes:

Light Shaded Blue - Exceeds Health Advisory

FD - Field Duplicate Sample

ft - feet

ID - Identification

J - The analyte was positively identified and the associated numerical value it the approximate concentration in the sample.

N - Normal Field Sample

NA - Not applicable

PRL - Potential Release Location

U - The analyte was analyzed for, but was not detected above the reported limit of detection.

µg/L - micrograms per liter

PFOS+PFOA - Co-occurrence of PFOA and PFOS (PFOA + PFOS) in aqueous samples is reported using the following guidelines:

1. If both PFOA and PFOS are detected at of above the detection limit (DL), then the sum of PFOA + PFOS is reported.
2. If either PFOA or PFOS is detected at or above the DL and the other is below the DL, then PFOA + PFOS is reported as "NA" representing Not Applicable.
3. If neither PFOA nor PFOS is detected at or above the DL, then PFOA + PFOS is reported as "ND" representing Not Detected.

PFAS analysis by Modified USEPA Method 537 using Liquid Chromatography and Tandem Mass Spectrometry

Health Advisory from USEPA Office of Water, 2016a and 2016b, Health Advisories (HAs) for drinking water.

[1] USEPA Residential Screening Levels (June 2017) [https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-may-2018]

Table 4: Preliminary Assessment Recommendations

List of Potential Release Locations (PRLs)		
PRL	**Use**	**Recommendation**
1. Building. 430 (Current Fire Station)	Current Fire Station	Soil and Groundwater Inspection
2. Building. 430	Nozzle Test Area 1	Soil and Groundwater Inspection
3. Building. 430	Nozzle Test Area 2	Soil and Groundwater Inspection
4. Former Building. 403	Former Fire Station	Soil and Groundwater Inspection
5. Hangar 400	Hangar with Aqueous Film Forming Foam (AFFF) Fire Suppression System (FSS)	Soil and Groundwater Inspection
6. Hangar 406	Hangar with AFFF FSS	Soil and Groundwater Inspection
7. Hangar 414	Hangar with AFFF FSS	Soil and Groundwater Inspection
8. Fuel Spill Ditch	Fuel Emergency Response	Soil and Groundwater Inspection
9. Building. 503 Parking Lot	Fuel Emergency Response	Groundwater Inspection
10. Building 510 (Supply)	AFFF Storage Area	No Further Action

Table 5: SI Screening Criteria

Parameter	Chemical Abstract Number	USEPA Regional Screening Level Table (May 2018)[a]		Air Force Guidance for Soils and Sediments[b] (µg/kg)	USEPA Health Advisory Drinking Water (Surface Water or Groundwater) (µg/L)[c]
		Residential Soil (µg/kg)	Tap Water (µg/L)		
Perfluorobutane sulfonate (PFBS)	375-73-5	1,300,000[d]	400	NL	NL
Perfluorooctanoic acid (PFOA)	335-67-1	NL	NL	1,260	0.07 [e]
Perfluorooctane sulfonate (PFOS)	1763-23-1	NL	NL	1,260	

[a] USEPA Regional Screening Levels (USEPA, 2018).

[b] Screening levels calculated using the USEPA Regional Screening Level calculator [https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search]. A toxicity hazard quotient (THQ) of 1.0 was used. The toxicity value input for the calculator is the Tier 3 value reference dose of 0.00002 mg/kg/day derived by USEPA in their Drinking Water Health Advisories for both PFOS (USEPA, 2016a) and PFOA (USEPA, 2016b).

[c] USEPA, 2016b. *Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA)* and USEPA, 2016a. *Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS).*

[d] PFBS RSL for Residential Soil concentration presented in WP was 1,600,000 µg/kg based on the May 2016 RSL values. This table has been updated to include the more recent RSL values published in May 2018.

[e] Note: When PFOA and PFOS are both present, the combined detected concentrations of the compounds are compared with the 0.07 µg/L health advisory value. Only groundwater was sampled during the SI, but analytical results have been compared to the tap water screening levels.

USEPA = United States Environmental Protection Agency

µg/kg = Micrograms per Kilogram

µg/L = Micrograms per Liter

NL = not listed

Table 6: Screening Criteria Exceedances and Recommendations

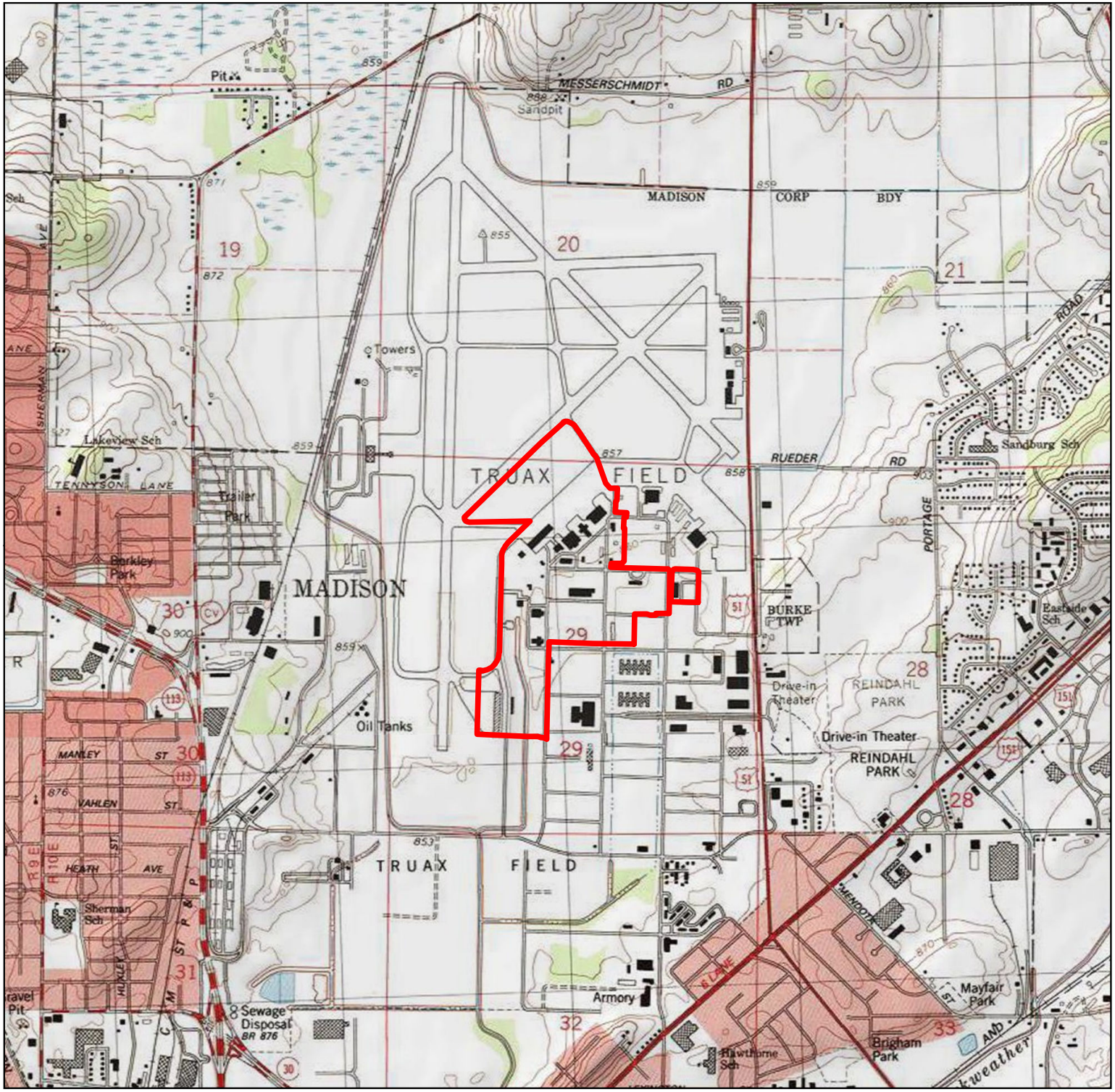
PRL	Screening Criteria Exceedance		Recommendations
	Soil	GW	
1	X	X	Soil investigation to determine the extent of PFC contamination. GW investigation to determine the nature and extent of the confirmed PFC release.
2	X	X	Soil investigation to determine the extent of PFC contamination. GW investigation to determine the nature and extent of the confirmed PFC release.
3		X	GW investigation to determine the nature and extent of the confirmed PFC release. Soil investigation, including soils in the saturated zone, to determine if the soil may be a contributing source to GW.
4		X	GW investigation to determine the nature and extent of the confirmed PFC release. Soil investigation, including soils in the saturated zone, to determine if the soil may be a contributing source to GW.
5		X	GW investigation to determine the nature and extent of the confirmed PFC release. Soil investigation, including soils in the saturated zone, to determine if the soil may be a contributing source to GW.
6		X	GW investigation to determine the nature and extent of the confirmed PFC release. Soil investigation, including soils in the saturated zone, to determine if the soil may be a contributing source to GW.
7		X	GW investigation to determine the nature and extent of the confirmed PFC release. Soil investigation, including soils in the saturated zone, to determine if the soil may be a contributing source to GW.
8		X	GW investigation to determine the nature and extent of the confirmed PFC release. Soil investigation, including soils in the saturated zone, to determine if the soil may be a contributing source to GW.
9		X	GW investigation to determine the nature and extent of the confirmed PFC release. Soil investigation, including soils in the saturated zone, to determine if the soil may be a contributing source to GW.
Base Boundary		X	GW investigation both upgradient and downgradient of the Base boundary to determine if PFCs are migrating onto the Base from off-Base sources and to determine the nature and extent of the PFC contamination migrating off-Base.

Notes:

GW = Groundwater
Inc. - Inconclusive based on results of SI
X – Screening criteria exceedance
PFC - Perfluorinated Compound
PRL - Potential Release Location
NFA – No Further Action

FIGURES

THIS PAGE INTENTIONALLY LEFT BLANK.



BASE LOCATION MAP

Truax Field Air National Guard Base
Madison, Wisconsin

Legend

Installation Area (approximate)

Location of Site

Notes & Sources

Service Layer Credits: Copyright:© 2013 National Geographic Society, i-cubed

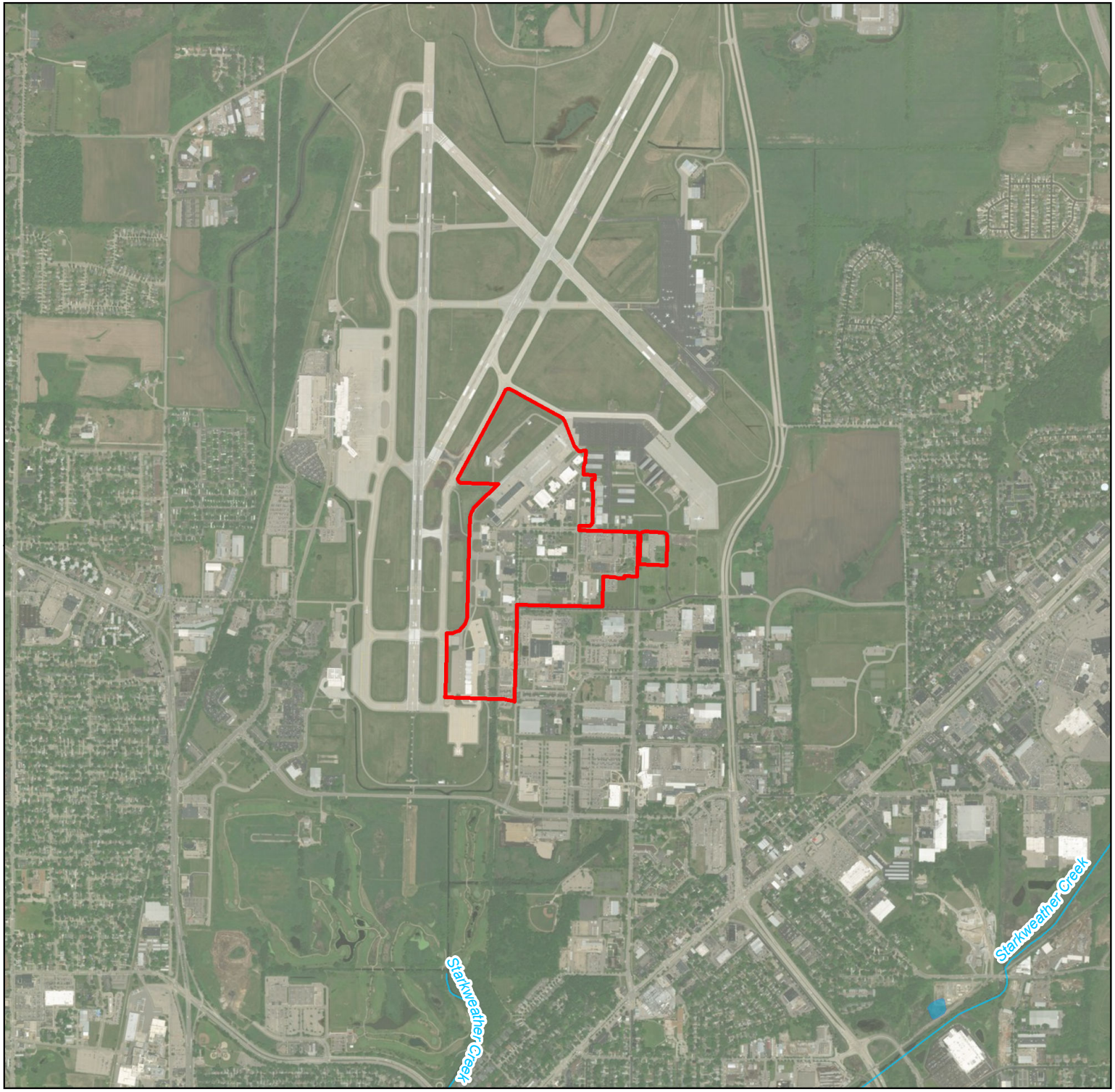
0 2,000 Feet

N

amec foster wheeler
Amec Foster Wheeler
Environment & Infrastructure
46850 Magellan Dr #190
Novi, MI 48377
248 926 4008

FIGURE 1

G:\ANG\a_MXD\TruaxFieldWisconsinANG\NewTemplate\TruaxSiteLocation.mxd May 17, 2018 DWN: kyle.hines CHKD: AKN



BASE AND AREA FEATURES

Truax Field Air National Guard Base
Madison, Wisconsin

Legend

- Rivers and Streams
- Lakes and Ponds
- Installation Area (approximate)

Location of Site

Notes & Sources

Notes: AFFF - aqueous film forming foam. PFC - perfluorinated compounds.
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Hydrogeography data courtesy of Wisconsin Department of Natural Resources.

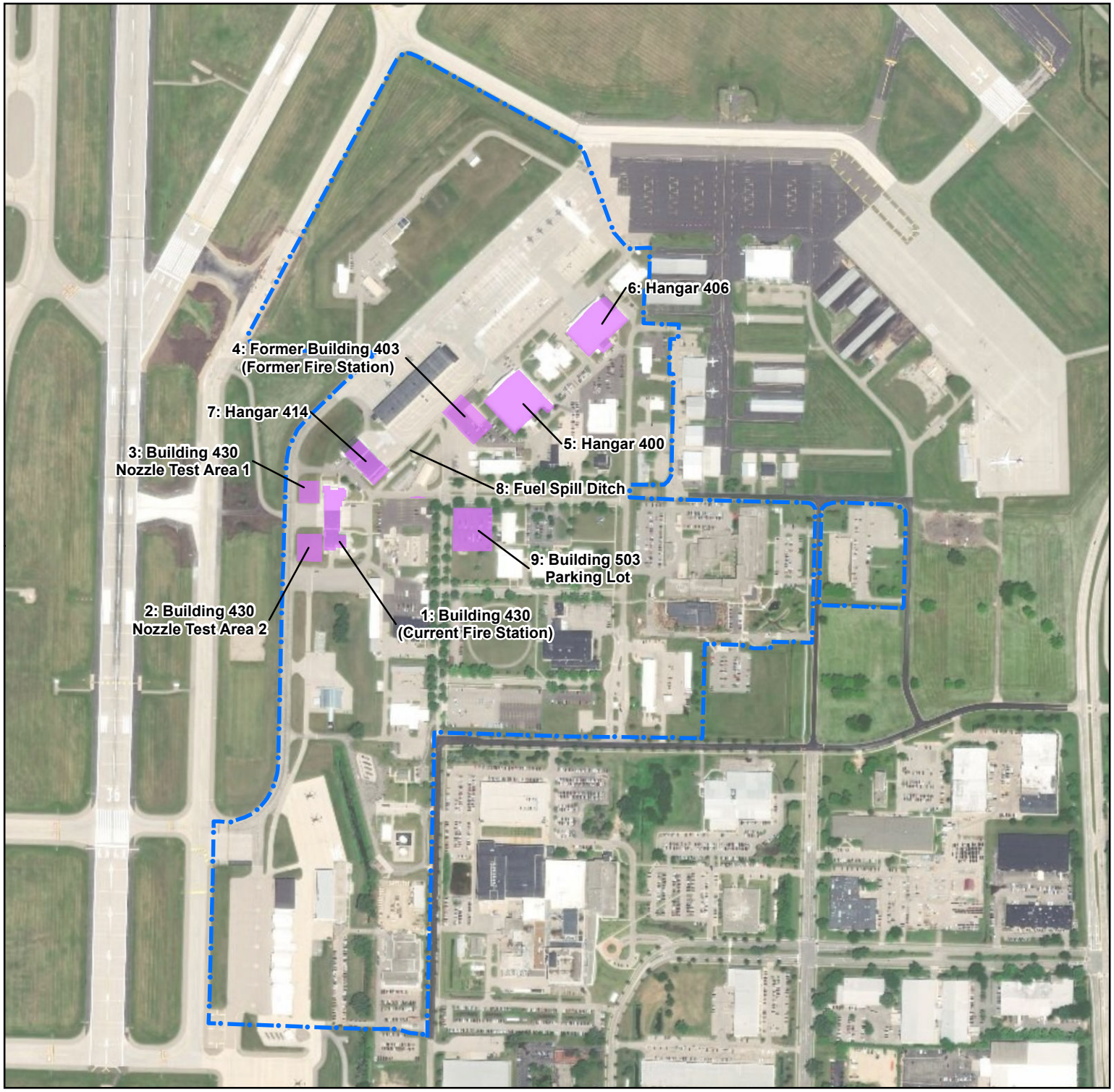
0 2,000 Feet

N

amec foster wheeler
Amec Foster Wheeler
Environment & Infrastructure
46850 Magellan Dr #190
Novi, MI 48377
248 926 4008

FIGURE 2

G:\ANG\a_MXD\TruaxFieldWisconsinANG\NewTemplate\TruaxSiteAndAreaFeatures.mxd May 17, 2018 DWN: kyle.hines CHKD: AKN



PRL LOCATION MAP

Truax Field Air National Guard Base
Madison, Wisconsin

Legend

- Installation Area (approximate)
- Potential AFFF PFOS/PFOA PRL (approximate)

Location of Site

Notes & Sources

Notes: AFFF - aqueous film forming foam. PFC - perfluorinated compounds.
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Hydrogeography data courtesy of Wisconsin Department of Natural Resources.

0 635 Feet

N

amec foster wheeler
Amec Foster Wheeler
Environment & Infrastructure
46850 Magellan Dr #190
Novi, MI 48377
248 926 4008

FIGURE
3

Document: P:\Projects\ANG Phase I-291330006\7.0_Sites\Truax\GIS\Figure3\v104\Fig3_PRLLocationMap.mxd PDF: P:\Projects\ANG Phase I-291330006\7.0_Sites\Truax\GIS\Figures\Figure 3 - PRL Locations.pdf 10/16/2018 3:17 PM brian.peters

PRLs 1, 2, and 3
ANALYTICAL RESULTS

Truax Field Air National Guard Base
Madison, Wisconsin

Legend

- Soil Boring
- Soil Boring and Temporary Well
- Assumed Groundwater Flow
- Potential AFFF PFOS/PFOA PRL (approximate)
- Installation Area (approximate)

Notes & Sources

Notes:
AFFF = aqueous film forming foam
PRL = potential release location
PFC = perflourinated compounds
PFOS = Perfluorooctanesulfonic acid
PFOA = Perfluorooctanoic acid
PFBS = Perfluorobutanesulfonic acid
PFHpA = Perflouroheptanoic acid
PFHxS = Perflourohexanesulfonic acid
PFNA = Perflourononanoic acid

BOLD text indicates a detection

YELLOW highlighted cells indicate 0.07 µg/L Health Advisory Exceedance for PFOA/PFOS in groundwater and 1,260 µg/kg in soil.

* When duplicate was collected, the greater value is shown.

Sources: Potential AFFF PFC PRLs and Installation Area datalayers obtained from Figure 2 of the Final Perfluorinated Compounds Preliminary Assessment Site Visit Report prepared by BB&E and dated February 2016.

0 30 60 Feet

N

FIGURE 4

amec foster wheeler
Amec Foster Wheeler
Environment & Infrastructure, Inc.
46850 Magellan Drive, Suite 190
Novi, MI 48377
(248) 926-4008

SOIL			
Location	Analyte	Depth (ft)	Result (mg/kg)
03SB03	PFOS	0.5-1.0	**0.169**
	PFOA	0.5-1.0	**0.00257**
	PFBS	0.5-1.0	0.00096 U
	PFHpA	0.5-1.0	**0.00855 J**
	PFHxS	0.5-1.0	**0.0076**
	PFNA	0.5-1.0	**0.00254**
	PFOS	5.0-5.5	**0.0177**
	PFOA	5.0-5.5	**0.000358 J**
	PFBS	5.0-5.5	0.000998 U
	PFHpA	5.0-5.5	0.000998 U
	PFHxS	5.0-5.5	**0.00184 J**
	PFNA	5.0-5.5	**0.000289 J**

SOIL			
Location	Analyte	Depth (ft)	Result (mg/kg)
03SB02	PFOS	0.5-1.0	**0.054**
	PFOA	0.5-1.0	**0.00126 J**
	PFBS	0.5-1.0	0.00104 U
	PFHpA	0.5-1.0	**0.000754 J**
	PFHxS	0.5-1.0	**0.00723**
	PFNA	0.5-1.0	**0.000386 J**
	PFOS	4.0-4.5	0.000966 U
	PFOA	4.0-4.5	0.000966 U
	PFBS	4.0-4.5	0.000966 U
	PFHpA	4.0-4.5	0.000966 U
	PFHxS	4.0-4.5	0.000966 U
	PFNA	4.0-4.5	0.000966 U

SOIL			
Location	Analyte	Depth (ft)	Result (mg/kg)
01SB02	PFOS	0.5-1.0	**0.0293**
	PFOA	0.5-1.0	0.000999 U
	PFBS	0.5-1.0	0.000999 U
	PFHpA	0.5-1.0	0.000999 U
	PFHxS	0.5-1.0	**0.0019 J**
	PFNA	0.5-1.0	0.000999 U
	PFOS	4.5-5.5	0.00102 U
	PFOA	4.5-5.5	0.00102 U
	PFBS	4.5-5.5	0.00102 U
	PFHpA	4.5-5.5	0.00102 U
	PFHxS	4.5-5.5	0.00102 U
	PFNA	4.5-5.5	0.00102 U

SOIL			
Location	Analyte	Depth (ft)	Result (mg/kg)
03SB01	PFOS	0.5-1.0	**0.0407**
	PFOA	0.5-1.0	**0.000483 J**
	PFBS	0.5-1.0	0.000998 U
	PFHpA	0.5-1.0	0.000998 U
	PFHxS	0.5-1.0	**0.00346**
	PFNA	0.5-1.0	**0.000387 J**
	PFOS	6.0-6.5	**0.0435**
	PFOA	6.0-6.5	0.000971 U
	PFBS	6.0-6.5	0.000971 U
	PFHpA	6.0-6.5	0.000971 U
	PFHxS	6.0-6.5	**0.000857 J**
	PFNA	6.0-6.5	0.000971 U

GROUNDWATER			
Location	Analyte	Depth (ft)	Result (µg/L)
TW-03	PFOS	5.25-10.25	**13.8**
	PFOA	5.25-10.25	**0.528**
	PFBS	5.25-10.25	**0.133**
	PFHpA	5.25-10.25	**0.445**
	PFHxS	5.25-10.25	**8.82**
	PFNA	5.25-10.25	**0.089**

SOIL			
Location	Analyte	Depth (ft)	Result (mg/kg)
01SB03	PFOS	0.5- 1.0 (DUP)	**0.0519**
	PFOA	0.5- 1.0 (DUP)	**0.001 J**
	PFBS	0.5- 1.0 (DUP)	**0.000386 J**
	PFHpA	0.5- 1.0 (DUP)	**0.000371 J**
	PFHxS	0.5- 1.0 (DUP)	**0.00961**
	PFNA	0.5- 1.0 (DUP)	**0.000516 J**
	PFOS	4.0-4.5	**0.000512 J**
	PFOA	4.0-4.5	**0.00266**
	PFBS	4.0-4.5	**0.000783 J**
	PFHpA	4.0-4.5	**0.00029 J**
	PFHxS	4.0-4.5	**0.041**
	PFNA	4.0-4.5	0.000982 U

SOIL			
Location	Analyte	Depth (ft)	Result (mg/kg)
02SB02	PFOS	0.5-1.0	**3.33**
	PFOA	0.5-1.0	**0.0141**
	PFBS	0.5-1.0	**0.00651**
	PFHpA	0.5-1.0	**0.00255**
	PFHxS	0.5-1.0	**0.41**
	PFNA	0.5-1.0	**0.00502**
	PFOS	5.0-5.5	**0.089**
	PFOA	5.0-5.5	**0.00108 J**
	PFBS	5.0-5.5	**0.0014 J**
	PFHpA	5.0-5.5	**0.000367 J**
	PFHxS	5.0-5.5	**0.02**
	PFNA	5.0-5.5	0.00099 U

SOIL			
Location	Analyte	Depth (ft)	Result (mg/kg)
01SB01	PFOS	0.5-1.0	**1.32 J**
	PFOA	0.5-1.0	**0.00241 J**
	PFBS	0.5-1.0	**0.00039 J**
	PFHpA	0.5-1.0	**0.000475 J**
	PFHxS	0.5-1.0	**0.0287**
	PFNA	0.5-1.0	**0.0029**
	PFOS	4.5-5.5	**0.000424 J**
	PFOA	4.5-5.5	0.00101 U
	PFBS	4.5-5.5	0.00101 U
	PFHpA	4.5-5.5	0.00101 U
	PFHxS	4.5-5.5	0.00101 U
	PFNA	4.5-5.5	0.00101 U

SOIL			
Location	Analyte	Depth (ft)	Result (mg/kg)
02SB03	PFOS	0.5- 1.0 (DUP)	**36.8 J**
	PFOA	0.5- 1.0 (DUP)	**0.151**
	PFBS	0.5- 1.0 (DUP)	**0.0171**
	PFHpA	0.5- 1.0 (DUP)	**0.00567**
	PFHxS	0.5- 1.0 (DUP)	**1.73**
	PFNA	0.5- 1.0 (DUP)	**0.0254**
	PFOS	6.0-6.5	**0.00328**
	PFOA	6.0-6.5	**0.00597**
	PFBS	6.0-6.5	**0.0132**
	PFHpA	6.0-6.5	**0.00192 J**
	PFHxS	6.0-6.5	**0.994**
	PFNA	6.0-6.5	0.000992 U

GROUNDWATER			
Location	Analyte	Depth (ft)	Result (µg/L)
TW-02	PFOS	5.33-10.33	**28.4**
	PFOA	5.33-10.33	**0.349**
	PFBS	5.33-10.33	**0.134**
	PFHpA	5.33-10.33	**0.18**
	PFHxS	5.33-10.33	**4.26**
	PFNA	5.33-10.33	**0.107**

SOIL			
Location	Analyte	Depth (ft)	Result (mg/kg)
02SB01	PFOS	0.5-1.0	**0.52**
	PFOA	0.5-1.0	**0.00103 J**
	PFBS	0.5-1.0	0.000998 U
	PFHpA	0.5-1.0	**0.000424 J**
	PFHxS	0.5-1.0	**0.0177**
	PFNA	0.5-1.0	**0.00123 J**
	PFOS	6.0-6.5	**0.0567**
	PFOA	6.0-6.5	0.00103 U
	PFBS	6.0-6.5	0.00103 U
	PFHpA	6.0-6.5	0.00103 U
	PFHxS	6.0-6.5	**0.00161 J**
	PFNA	6.0-6.5	0.00103 U

GROUNDWATER			
Location	Analyte	Depth (ft)	Result (µg/L)
TW-01	PFOS	5.0-10.0	**39**
	PFOA	5.0-10.0	**0.841**
	PFBS	5.0-10.0	**0.357**
	PFHpA	5.0-10.0	**0.294**
	PFHxS	5.0-10.0	**5.49**
	PFNA	5.0-10.0	**0.0987**

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

G:\ANG\a_MXD\TruaxFieldWisconsinANG\Draft_SI_Report\PRLs_1_2_3_AnalyticalResults.mxd July 17, 2018 DWN: dylan.jones CHKD: CJK

PRLs 4 and 5
ANALYTICAL RESULTS

Truax Field Air National Guard Base
Madison, Wisconsin

Legend

- Soil Boring
- Soil Boring And Temporary
- Assumed Groundwater Flow
- Potential AFFF PFOS/PFOA PRL (approximate)

Notes & Sources

Notes:
AFFF = aqueous film forming foam
PRL = potential release location
PFC = perflourinated compounds
PFOS = Perfluorooctanesulfonic acid
PFOA = Perfluorooctanoic acid
PFBS = Perfluorobutanesulfonic acid
PFHpA = Perflouroheptanoic acid
PFHxS = Perflourohexanesulfonic acid
PFNA = Perflourononanoic acid

BOLD text indicates a detection

YELLOW highlighted cells indicate 0.07 µg/L Health Advisory Exceedance for PFOA/PFOS in groundwater and 1,260 µg/kg in soil.

* When duplicate was collected, the greater value is shown.

Sources: Potential AFFF PFC PRLs and Installation Area datalayers obtained from Figure 2 of the Final Perfluorinated Compounds Preliminary Assessment Site Visit Report prepared by BB&E and dated February 2016.

0 37.5 75 Feet

N

FIGURE 5

amec foster wheeler
Amec Foster Wheeler
Environment & Infrastructure, Inc.
46850 Magellan Drive, Suite 190
Novi, MI 48377
(248) 926-4008

SOIL

Location	Analyte	Depth (ft)	Result (mg/kg)
05SB03	PFOS	0.5-1.0	**0.333 J**
	PFOA	0.5-1.0	**0.00164 J**
	PFBS	0.5-1.0	0.000968 U
	PFHpA	0.5-1.0	**0.00062 J**
	PFHxS	0.5-1.0	**0.00883 J**
	PFNA	0.5-1.0	**0.00355**
	PFOS	6.0-6.5	**0.0477**
	PFOA	6.0-6.5	0.00102 U
	PFBS	6.0-6.5	0.00102 U
	PFHpA	6.0-6.5	0.00102 U
	PFHxS	6.0-6.5	**0.000693 J**
	PFNA	6.0-6.5	**0.00142 J**

SOIL

Location	Analyte	Depth (ft)	Result (mg/kg)
04SB02	PFOS	1.0-2.0	**0.368**
	PFOA	1.0-2.0	**0.0016 J**
	PFBS	1.0-2.0	0.00104 U
	PFHpA	1.0-2.0	**0.000448 J**
	PFHxS	1.0-2.0	**0.00272**
	PFNA	1.0-2.0	0.00104 U
	PFOS	5.0-5.5	**0.611 J**
	PFOA	5.0-5.5	**0.00431**
	PFBS	5.0-5.5	0.00096 U
	PFHpA	5.0-5.5	**0.000895 J**
	PFHxS	5.0-5.5	**0.016 J**
	PFNA	5.0-5.5	**0.0011 J**

SOIL

Location	Analyte	Depth (ft)	Result (mg/kg)
05SB02	PFOS	0.5-1.0	**0.0222**
	PFOA	0.5-1.0	**0.00181 J**
	PFBS	0.5-1.0	0.00102 U
	PFHpA	0.5-1.0	**0.00122 J**
	PFHxS	0.5-1.0	**0.00377**
	PFNA	0.5-1.0	**0.00163 J**
	PFOS	7.0-7.5	0.00103 U
	PFOA	7.0-7.5	0.00103 U
	PFBS	7.0-7.5	0.00103 U
	PFHpA	7.0-7.5	0.00103 U
	PFHxS	7.0-7.5	0.00103 U
	PFNA	7.0-7.5	0.00103 U

GROUNDWATER

Location	Analyte	Depth (ft)	Result (µg/L)
TW-05	PFOS	5.2-10-2	**0.174**
	PFOA	5.2-10-2	**0.0649**
	PFBS	5.2-10-2	**0.013**
	PFHpA	5.2-10-2	**0.0299**
	PFHxS	5.2-10-2	**0.285**
	PFNA	5.2-10-2	**0.00526 J**

SOIL

Location	Analyte	Depth (ft)	Result (mg/kg)
05SB01	PFOS	0.5-1.0	**0.088**
	PFOA	0.5-1.0	**0.00458 J**
	PFBS	0.5-1.0	0.001 U
	PFHpA	0.5-1.0	**0.00185 J**
	PFHxS	0.5-1.0	**0.0388 J**
	PFNA	0.5-1.0	**0.00126 J**
	PFOS	6.0-6.5	0.00104 U
	PFOA	6.0-6.5	0.00104 U
	PFBS	6.0-6.5	0.00104 U
	PFHpA	6.0-6.5	0.00104 U
	PFHxS	6.0-6.5	**0.002 J**
	PFNA	6.0-6.5	0.00104 U

SOIL

Location	Analyte	Depth (ft)	Result (mg/kg)
04SB01	PFOS	0.5-1.0	**0.0124**
	PFOA	0.5-1.0	**0.00037 J**
	PFBS	0.5-1.0	0.00103 U
	PFHpA	0.5-1.0	0.00103 U
	PFHxS	0.5-1.0	**0.0011 J**
	PFNA	0.5-1.0	0.00103 U
	PFOS	4.5-5.5	**0.0176**
	PFOA	4.5-5.5	0.000979 U
	PFBS	4.5-5.5	0.000979 U
	PFHpA	4.5-5.5	0.000979 U
	PFHxS	4.5-5.5	**0.000354 J**
	PFNA	4.5-5.5	**0.000305 J**

GROUNDWATER

Location	Analyte	Depth (ft)	Result (µg/L)
TW-04	PFOS	5.1-10.1	**0.149**
	PFOA	5.1-10.1	**0.0849**
	PFBS	5.1-10.1	**0.0163**
	PFHpA	5.1-10.1	**0.035**
	PFHxS	5.1-10.1	**0.593**
	PFNA	5.1-10.1	**0.0028 J**

SOIL

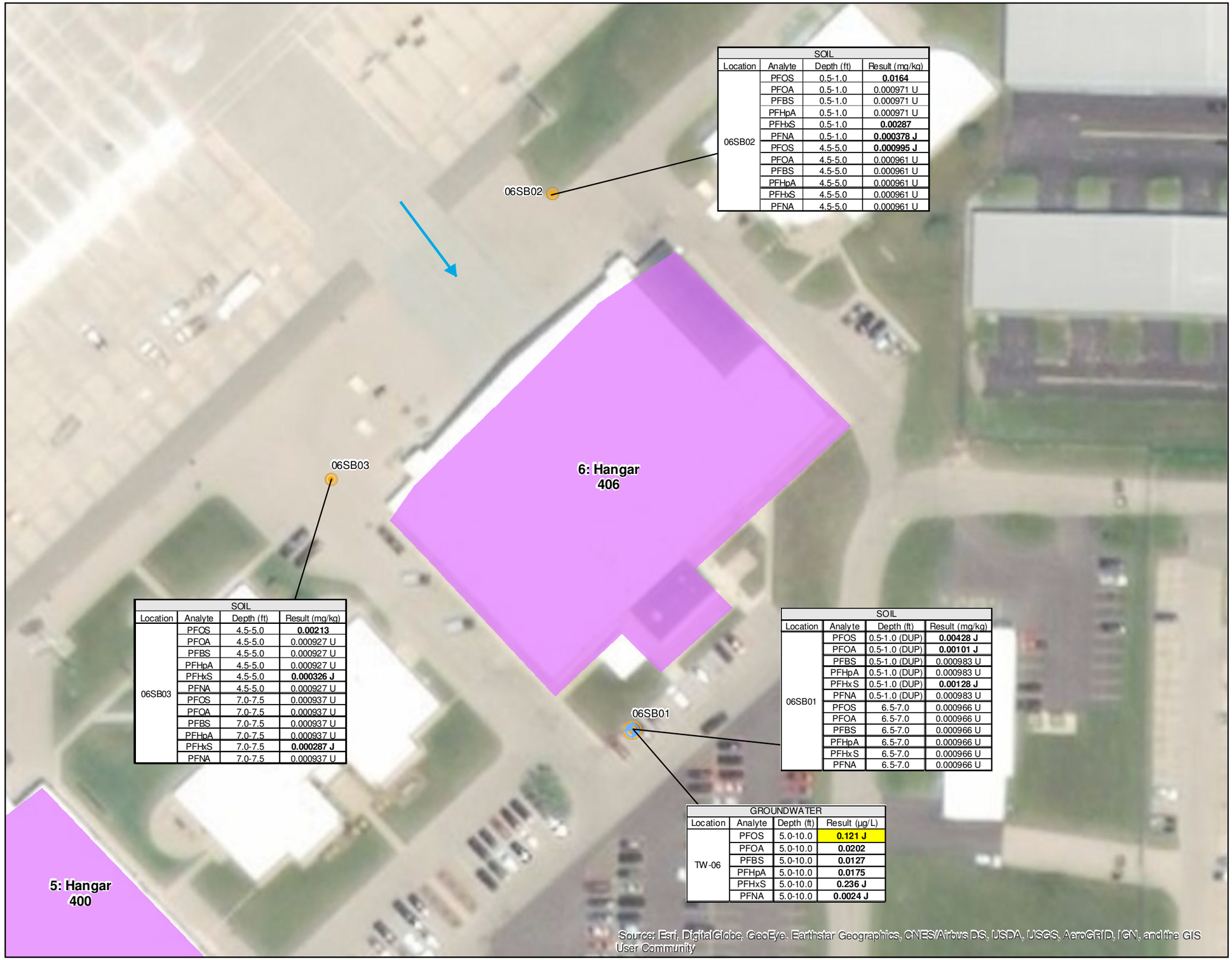
Location	Analyte	Depth (ft)	Result (mg/kg)
04SB03	PFOS	1.0-2.0	**0.00207**
	PFOA	1.0-2.0	0.000972 U
	PFBS	1.0-2.0	0.000972 U
	PFHpA	1.0-2.0	0.000972 U
	PFHxS	1.0-2.0	0.000972 U
	PFNA	1.0-2.0	0.000972 U
	PFOS	5.0-5.5	**0.00345**
	PFOA	5.0-5.5	0.000975 U
	PFBS	5.0-5.5	0.000975 U
	PFHpA	5.0-5.5	0.000975 U
	PFHxS	5.0-5.5	0.000975 U
	PFNA	5.0-5.5	0.000975 U

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

G:\ANG\a_MXD\TruaxFieldWisconsinANG\Draft_SI_Report\PRL_4_and_5_AnalyticalResults.mxd July 17, 2018 DWN: dylan.jones CHKD: CJK

PRL 6
ANALYTICAL RESULTS

Truax Field Air National Guard Base
Madison, Wisconsin



SOIL			
Location	Analyte	Depth (ft)	Result (mg/kg)
06SB02	PFOS	0.5-1.0	**0.0164**
	PFOA	0.5-1.0	0.000971 U
	PFBS	0.5-1.0	0.000971 U
	PFHpA	0.5-1.0	0.000971 U
	PFHxS	0.5-1.0	**0.00287**
	PFNA	0.5-1.0	**0.000378 J**
	PFOS	4.5-5.0	**0.000995 J**
	PFOA	4.5-5.0	0.000961 U
	PFBS	4.5-5.0	0.000961 U
	PFHpA	4.5-5.0	0.000961 U
	PFHxS	4.5-5.0	0.000961 U
	PFNA	4.5-5.0	0.000961 U

SOIL			
Location	Analyte	Depth (ft)	Result (mg/kg)
06SB03	PFOS	4.5-5.0	**0.00213**
	PFOA	4.5-5.0	0.000927 U
	PFBS	4.5-5.0	0.000927 U
	PFHpA	4.5-5.0	0.000927 U
	PFHxS	4.5-5.0	**0.000326 J**
	PFNA	4.5-5.0	0.000927 U
	PFOS	7.0-7.5	0.000937 U
	PFOA	7.0-7.5	0.000937 U
	PFBS	7.0-7.5	0.000937 U
	PFHpA	7.0-7.5	0.000937 U
	PFHxS	7.0-7.5	**0.000287 J**
	PFNA	7.0-7.5	0.000937 U

SOIL			
Location	Analyte	Depth (ft)	Result (mg/kg)
06SB01	PFOS	0.5-1.0 (DUP)	**0.00428 J**
	PFOA	0.5-1.0 (DUP)	**0.00101 J**
	PFBS	0.5-1.0 (DUP)	0.000983 U
	PFHpA	0.5-1.0 (DUP)	0.000983 U
	PFHxS	0.5-1.0 (DUP)	**0.00128 J**
	PFNA	0.5-1.0 (DUP)	0.000983 U
	PFOS	6.5-7.0	0.000966 U
	PFOA	6.5-7.0	0.000966 U
	PFBS	6.5-7.0	0.000966 U
	PFHpA	6.5-7.0	0.000966 U
	PFHxS	6.5-7.0	0.000966 U
	PFNA	6.5-7.0	0.000966 U

GROUNDWATER			
Location	Analyte	Depth (ft)	Result (µg/L)
TW-06	PFOS	5.0-10.0	**0.121 J**
	PFOA	5.0-10.0	**0.0202**
	PFBS	5.0-10.0	**0.0127**
	PFHpA	5.0-10.0	**0.0175**
	PFHxS	5.0-10.0	**0.236 J**
	PFNA	5.0-10.0	**0.0024 J**

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Soil Boring
- Soil Boring and Temporary Well
- Assumed Groundwater Flow
- Potential AFFF PFOS/PFOA PRL (approximate)

Notes & Sources

Notes:
AFFF = aqueous film forming foam
PRL = potential release location
PFC = perflourinated compounds
PFOS = Perfluorooctanesulfonic acid
PFOA = Perfluorooctanoic acid
PFBS = Perfluorobutanesulfonic acid
PFHpA = Perflouroheptanoic acid
PFHxS = Perflourohexanesulfonic acid
PFNA = Perflourononanoic acid

BOLD text indicates a detection

YELLOW highlighted cells indicate 0.07 µg/L Health Advisory Exceedance for PFOA/PFOS in groundwater and 1,260 µg/kg in soil.

* When duplicate was collected, the greater value is shown.

Sources: Potential AFFF PFC PRLs and Installation Area datalayers obtained from Figure 2 of the Final Perfluorinated Compounds Preliminary Assessment Site Visit Report prepared by BB&E and dated February 2016.

0 30 60 Feet

N

amec foster wheeler
Amec Foster Wheeler
Environment & Infrastructure, Inc.
46850 Magellan Drive, Suite 190
Novi, MI 48377
(248) 926-4008

FIGURE 6

G:\ANG\a_MXD\TruaxFieldWisconsinANG\Draft_SI_Report\PRL_6_AnalyticalResults.mxd July 17, 2018 DWN: dylan.jones CHKD: CJK

PRLs 7 and 8
ANALYTICAL RESULTS

Truax Field Air National Guard Base
Madison, Wisconsin

SOIL			
Location	Analyte	Depth (ft)	Result (mg/kg)
07SB02	PFOS	0.5-1.0	**0.0331**
	PFOA	0.5-1.0	0.000965 U
	PFBS	0.5-1.0	0.000965 U
	PFHpA	0.5-1.0	0.000965 U
	PFHxS	0.5-1.0	**0.00293**
	PFNA	0.5-1.0	0.000965 U
	PFOS	4.5-5.0	**0.0175**
	PFOA	4.5-5.0	**0.00039 J**
	PFBS	4.5-5.0	0.00092 U
	PFHpA	4.5-5.0	0.00092 U
	PFHxS	4.5-5.0	**0.00336**
	PFNA	4.5-5.0	**0.000311 J**

SOIL			
Location	Analyte	Depth (ft)	Result (mg/kg)
07SB03	PFOS	0.5-1.0	**0.175 J**
	PFOA	0.5-1.0	**0.00125 J**
	PFBS	0.5-1.0	0.000984 U
	PFHpA	0.5-1.0	**0.000528 J**
	PFHxS	0.5-1.0	**0.0105 J**
	PFNA	0.5-1.0	**0.00133 J**
	PFOS	5.0-5.5	**0.00823**
	PFOA	5.0-5.5	**0.000447 J**
	PFBS	5.0-5.5	0.00094 U
	PFHpA	5.0-5.5	0.00094 U
	PFHxS	5.0-5.5	**0.00499**
	PFNA	5.0-5.5	0.00094 U

SOIL			
Location	Analyte	Depth (ft)	Result (mg/kg)
07SB01	PFOS	0.5-1.0	**0.0194**
	PFOA	0.5-1.0	**0.000337 J**
	PFBS	0.5-1.0	0.000999 U
	PFHpA	0.5-1.0	0.000999 U
	PFHxS	0.5-1.0	**0.00168 J**
	PFNA	0.5-1.0	0.000999 U
	PFOS	4.5-5.0	**0.022**
	PFOA	4.5-5.0	0.000999 U
	PFBS	4.5-5.0	0.000999 U
	PFHpA	4.5-5.0	0.000999 U
	PFHxS	4.5-5.0	**0.00188 J**
	PFNA	4.5-5.0	0.000999 U

SOIL			
Location	Analyte	Depth (ft)	Result (mg/kg)
08SB03	PFOS	0.5-1.0	**0.0277**
	PFOA	0.5-1.0	**0.00036 J**
	PFBS	0.5-1.0	0.000968 U
	PFHpA	0.5-1.0	0.000968 U
	PFHxS	0.5-1.0	**0.00228**
	PFNA	0.5-1.0	**0.000355 J**
	PFOS	4.5-5.0	**0.00108 J**
	PFOA	4.5-5.0	0.000959 U
	PFBS	4.5-5.0	0.000959 U
	PFHpA	4.5-5.0	0.000959 U
	PFHxS	4.5-5.0	**0.000814 J**
	PFNA	4.5-5.0	0.000959 U

SOIL			
Location	Analyte	Depth (ft)	Result (mg/kg)
08SB02	PFOS	0.5-1.0 (DUP)	**0.381 J**
	PFOA	0.5-1.0 (DUP)	**0.000714 J**
	PFBS	0.5-1.0 (DUP)	**0.000339 J**
	PFHpA	0.5-1.0 (DUP)	**0.00043 J**
	PFHxS	0.5-1.0 (DUP)	**0.00759 J**
	PFNA	0.5-1.0 (DUP)	**0.000443 J**
	PFOS	5.0-5.5	**0.0274**
	PFOA	5.0-5.5	**0.00092 J**
	PFBS	5.0-5.5	**0.000322 J**
	PFHpA	5.0-5.5	**0.000587 J**
	PFHxS	5.0-5.5	**0.00605**
	PFNA	5.0-5.5	**0.000582 J**

GROUNDWATER			
Location	Analyte	Depth (ft)	Result (µg/L)
TW-07	PFOS	5.1-10.1	**3.56**
	PFOA	5.1-10.1	**0.116**
	PFBS	5.1-10.1	**0.0219**
	PFHpA	5.1-10.1	**0.055**
	PFHxS	5.1-10.1	**1.03**
	PFNA	5.1-10.1	**0.0288**

SOIL			
Location	Analyte	Depth (ft)	Result (mg/kg)
08SB01	PFOS	0.5-1.0	**0.0366**
	PFOA	0.5-1.0	**0.000831 J**
	PFBS	0.5-1.0	0.000947 U
	PFHpA	0.5-1.0	**0.000411 J**
	PFHxS	0.5-1.0	**0.00314**
	PFNA	0.5-1.0	**0.000805 J**
	PFOS	5.0-5.5	**0.0463**
	PFOA	5.0-5.5	0.000977 U
	PFBS	5.0-5.5	0.000977 U
	PFHpA	5.0-5.5	0.000977 U
	PFHxS	5.0-5.5	**0.00125 J**
	PFNA	5.0-5.5	**0.000793 J**

GROUNDWATER			
Location	Analyte	Depth (ft)	Result (µg/L)
TW-08	PFOS	5.2-10.2	**7.98**
	PFOA	5.2-10.2	**0.0898**
	PFBS	5.2-10.2	**0.0421**
	PFHpA	5.2-10.2	**0.0741**
	PFHxS	5.2-10.2	**0.971**
	PFNA	5.2-10.2	**0.125**

07SB02
07SB03
07SB01
08SB03
08SB02
08SB01

7: Hangar 414

8: Fuel Spill Ditch

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Soil Boring
- Soil Boring and Temporary Well
- Assumed Groundwater Flow
- Potential AFFF PFOS/PFOA PRL (approximate)

Notes & Sources

Notes:
AFFF = aqueous film forming foam
PRL = potential release location
PFC = perflourinated compounds
PFOS = Perfluorooctanesulfonic acid
PFOA = Perfluorooctanoic acid
PFBS = Perfluorobutanesulfonic acid
PFHpA = Perflourohexanesulfonic acid
PFHxS = Perflourohexanesulfonic acid
PFNA = Perfluorononanoic acid

BOLD text indicates a detection

YELLOW highlighted cells indicate 0.07 µg/L Health Advisory Exceedance for PFOA/PFOS in groundwater and 1,260 µg/kg in soil.

* When duplicate was collected, the greater value is shown.

Sources: Potential AFFF PFC PRLs and Installation Area datalayers obtained from Figure 2 of the Final Perfluorinated Compounds Preliminary Assessment Site Visit Report prepared by BB&E and dated February 2016.

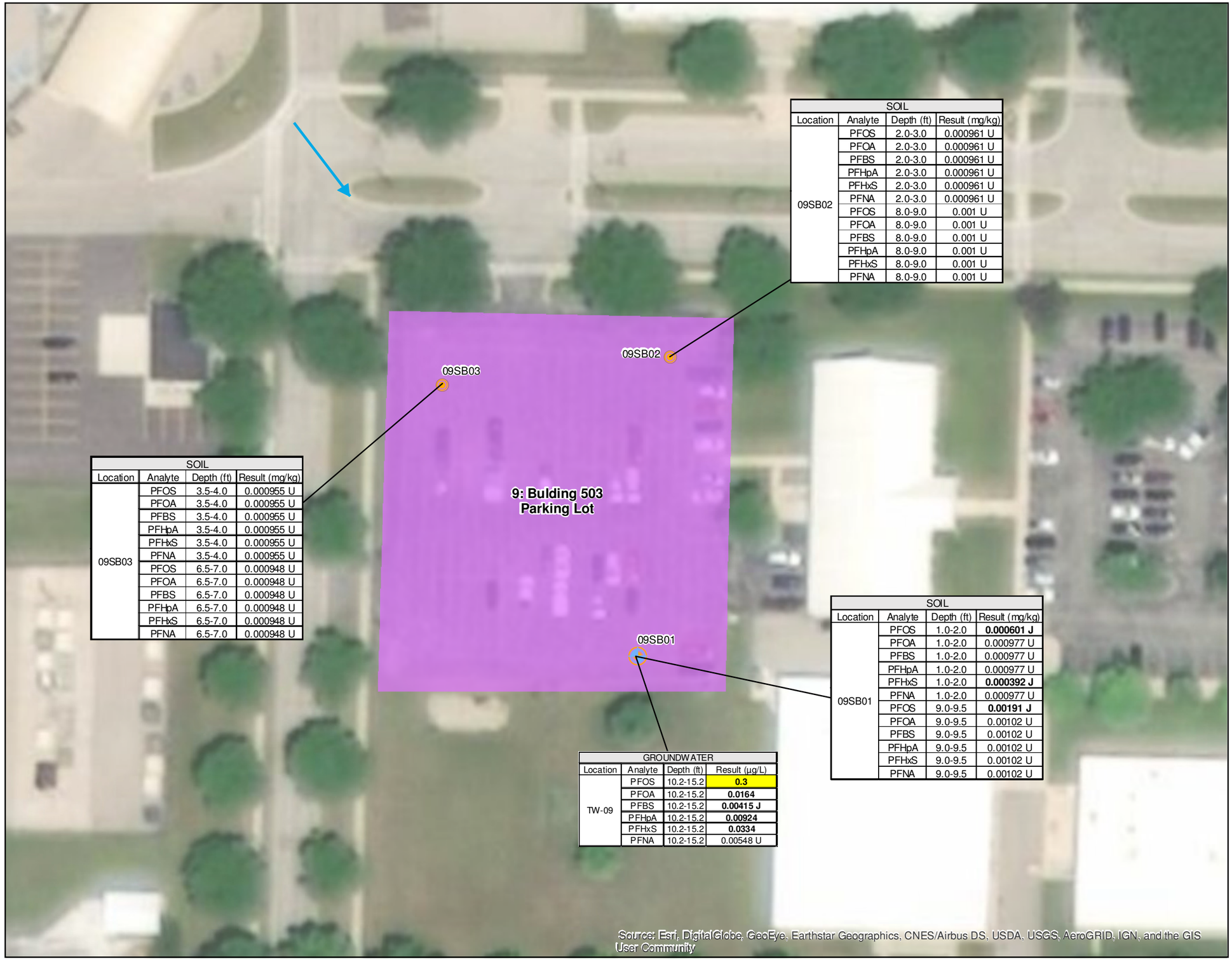
0 22.5 45 Feet

N

amec foster wheeler
Amec Foster Wheeler
Environment & Infrastructure, Inc.
46850 Magellan Drive, Suite 190
Novi, MI 48377
(248) 926-4008

FIGURE 7

G:\ANG\a_MXD\TruaxFieldWisconsinANG\Draft_SI_Report\PRL_7_and_8_AnalyticalResults.mxd July 17, 2018 DWN: dylan.jones CHKD: CJK



SOIL			
Location	Analyte	Depth (ft)	Result (mg/kg)
09SB02	PFOS	2.0-3.0	0.000961 U
	PFOA	2.0-3.0	0.000961 U
	PFBS	2.0-3.0	0.000961 U
	PFHpA	2.0-3.0	0.000961 U
	PFHxS	2.0-3.0	0.000961 U
	PFNA	2.0-3.0	0.000961 U
	PFOS	8.0-9.0	0.001 U
	PFOA	8.0-9.0	0.001 U
	PFBS	8.0-9.0	0.001 U
	PFHpA	8.0-9.0	0.001 U
	PFHxS	8.0-9.0	0.001 U
	PFNA	8.0-9.0	0.001 U

SOIL			
Location	Analyte	Depth (ft)	Result (mg/kg)
09SB03	PFOS	3.5-4.0	0.000955 U
	PFOA	3.5-4.0	0.000955 U
	PFBS	3.5-4.0	0.000955 U
	PFHpA	3.5-4.0	0.000955 U
	PFHxS	3.5-4.0	0.000955 U
	PFNA	3.5-4.0	0.000955 U
	PFOS	6.5-7.0	0.000948 U
	PFOA	6.5-7.0	0.000948 U
	PFBS	6.5-7.0	0.000948 U
	PFHpA	6.5-7.0	0.000948 U
	PFHxS	6.5-7.0	0.000948 U
	PFNA	6.5-7.0	0.000948 U

SOIL			
Location	Analyte	Depth (ft)	Result (mg/kg)
09SB01	PFOS	1.0-2.0	**0.000601 J**
	PFOA	1.0-2.0	0.000977 U
	PFBS	1.0-2.0	0.000977 U
	PFHpA	1.0-2.0	0.000977 U
	PFHxS	1.0-2.0	**0.000392 J**
	PFNA	1.0-2.0	0.000977 U
	PFOS	9.0-9.5	**0.00191 J**
	PFOA	9.0-9.5	0.00102 U
	PFBS	9.0-9.5	0.00102 U
	PFHpA	9.0-9.5	0.00102 U
	PFHxS	9.0-9.5	0.00102 U
	PFNA	9.0-9.5	0.00102 U

GROUNDWATER			
Location	Analyte	Depth (ft)	Result (µg/L)
TW-09	PFOS	10.2-15.2	**0.3**
	PFOA	10.2-15.2	**0.0164**
	PFBS	10.2-15.2	**0.00415 J**
	PFHpA	10.2-15.2	**0.00924**
	PFHxS	10.2-15.2	**0.0334**
	PFNA	10.2-15.2	0.00548 U

PRL 9
ANALYTICAL RESULTS

Truax Field Air National Guard Base
Madison, Wisconsin

Legend

- Soil Boring
- Soil Boring and Temporary Well
- Assumed Groundwater Flow
- Potential AFFF PFOS/PFOA PRL (approximate)

Notes & Sources

Notes:
AFFF = aqueous film forming foam
PRL = potential release location
PFC = perflourinated compounds
PFOS = Perfluorooctanesulfonic acid
PFOA = Perfluorooctanoic acid
PFBS = Perfluorobutanesulfonic acid
PFHpA = Perfluoroheptanoic acid
PFHxS = Perflourohexanesulfonic acid
PFNA = Perfluorononanoic acid

BOLD text indicates a detection

YELLOW highlighted cells indicate 0.07 µg/L Health Advisory Exceedance for PFOA/PFOS in groundwater and 1,260 µg/kg in soil.

* When duplicate was collected, the greater value is shown.

Sources: Potential AFFF PFC PRLs and Installation Area datalayers obtained from Figure 2 of the Final Perfluorinated Compounds Preliminary Assessment Site Visit Report prepared by BB&E and dated February 2016.

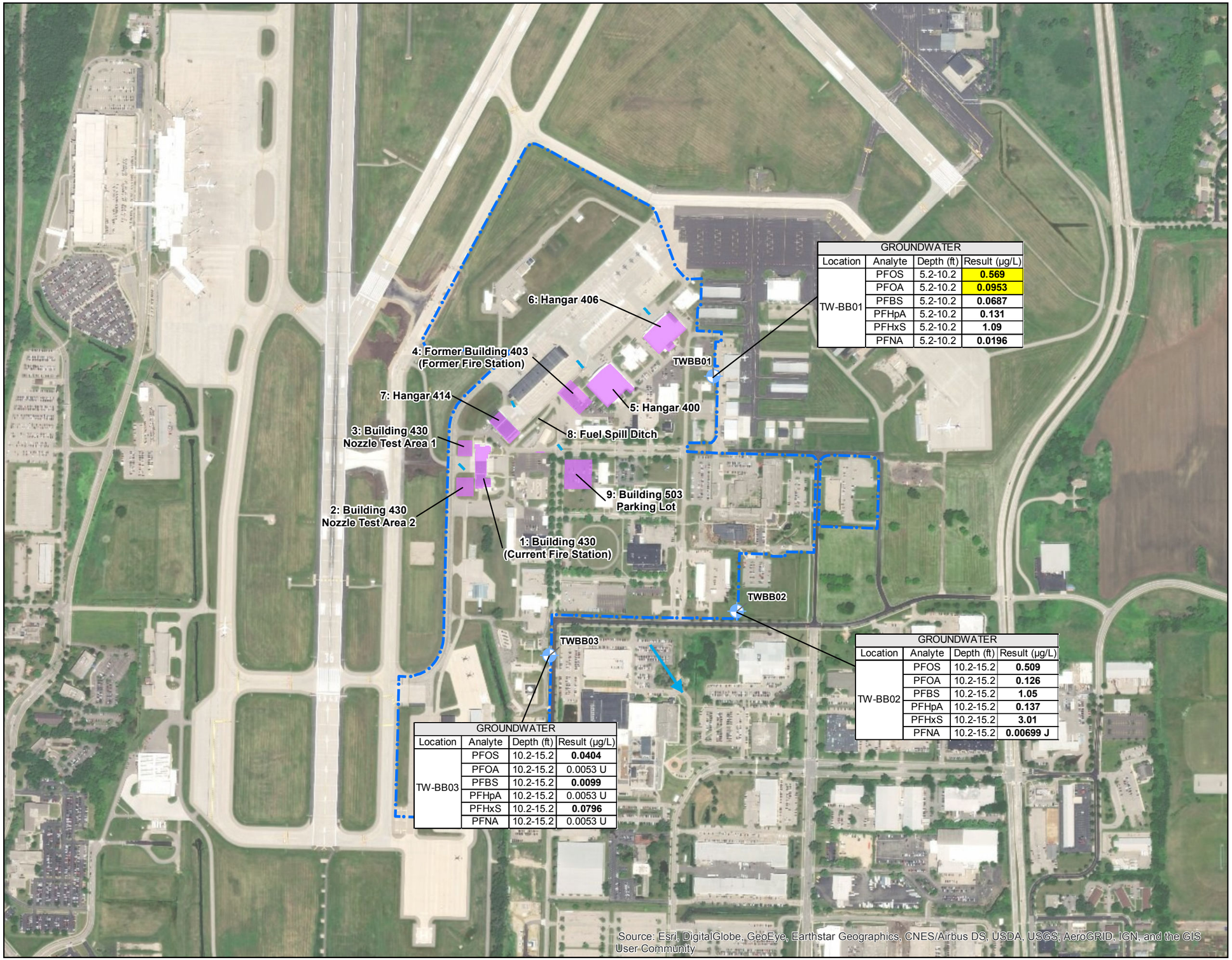
0 25 50 Feet

N

amec foster wheeler
Amec Foster Wheeler
Environment & Infrastructure, Inc.
46850 Magellan Drive, Suite 190
Novi, MI 48377
(248) 926-4008

FIGURE 8

G:\ANG\a_MXD\TruaxFieldWisconsinANG\Draft_SI_Report\PRL_9_AnalyticalResults.mxd July 17, 2018 DWN: dylan.jones CHKD: CJK



GROUNDWATER			
Location	Analyte	Depth (ft)	Result (µg/L)
TW-BB01	PFOS	5.2-10.2	**0.569**
	PFOA	5.2-10.2	**0.0953**
	PFBS	5.2-10.2	**0.0687**
	PFHpA	5.2-10.2	**0.131**
	PFHxS	5.2-10.2	**1.09**
	PFNA	5.2-10.2	**0.0196**

GROUNDWATER			
Location	Analyte	Depth (ft)	Result (µg/L)
TW-BB02	PFOS	10.2-15.2	**0.509**
	PFOA	10.2-15.2	**0.126**
	PFBS	10.2-15.2	**1.05**
	PFHpA	10.2-15.2	**0.137**
	PFHxS	10.2-15.2	**3.01**
	PFNA	10.2-15.2	**0.00699 J**

GROUNDWATER			
Location	Analyte	Depth (ft)	Result (µg/L)
TW-BB03	PFOS	10.2-15.2	**0.0404**
	PFOA	10.2-15.2	0.0053 U
	PFBS	10.2-15.2	**0.0099**
	PFHpA	10.2-15.2	0.0053 U
	PFHxS	10.2-15.2	**0.0796**
	PFNA	10.2-15.2	0.0053 U

BASE BOUNDARY ANALYTICAL RESULTS

Truax Field Air National Guard Base
Madison, Wisconsin

Legend

- Temporary Monitoring Well
- Installation Area (approximate)
- Potential AFFF PFOS/PFOA PRL (approximate)
- Assumed Groundwater Flow

Notes & Sources

Notes:
AFFF = aqueous film forming foam
PRL = potential release location
PFC = perflourinated compounds
PFOS = Perfluorooctanesulfonic acid
PFOA = Perfluorooctanoic acid
PFBS = Perfluorobutanesulfonic acid
PFHpA = Perflourohexanesulfonic acid
PFHxS = Perflourohexanesulfonic acid
PFNA = Perflourononanoic acid

BOLD text indicates a detection

YELLOW highlighted cells indicate 0.07 µg/L Health Advisory Exceedance for PFOA/PFOS in groundwater and 1,260 µg/kg in soil.

* When duplicate was collected, the greater value is shown.

Sources: Potential AFFF PFC PRLs and Installation Area datalayers obtained from Figure 2 of the Final Perfluorinated Compounds Preliminary Assessment Site Visit Report prepared by BB&E and dated February 2016.

0 317.5 635 Feet

N

amec foster wheeler
Amec Foster Wheeler
Environment & Infrastructure, Inc.
46850 Magellan Drive, Suite 190
Novi, MI 48377
(248) 926-4008

FIGURE
9

THIS PAGE INTENTIONALLY LEFT BLANK.

APPENDIX A

SOIL BORING AND MONITORING WELL CONSTRUCTION LOGS

THIS PAGE INTENTIONALLY LEFT BLANK.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLE ID	TYPE	PID (ppm)	RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Topsoil									0
	Silty Sand (SM), with black clay, trace gravel, moist				01SB01-0.5-1.0				Hand augered to 5' bgs	
	Poorly-graded Sand (SP), brown, moist, medium grained									
	Organic Soil (OL/OH), trace sand, black, moist									
	Sandy Lean Clay (CL), green, moist, stiff, slightly plastic									
	Poorly-graded Sand (SP), light brown, moist, fine grained									
5	Poorly-graded Sand (SP), light brown, wet, fine grained				01SB01-4.5-5.0				DTW 4.5 ft bgs during drilling	5
									Temporary well slotted screen 5-10 ft bgs	
10	EOB at 10' bgs									10
15										15
20										20
25										25

START DATE: 11/8/2017
END DATE: 11/8/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: FH

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: 4778008.9609 ft.
EASTING: 309854.5109 ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Well No. 01SB01

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLE ID	TYPE	PID (ppm)	RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Topsoil									0
	FILL, sand-gravel fill, light brown, dry, coarse grained				01SB02-0.5-1.0				Hand augered to 5' bgs	
	Silty Sand (SM), petroleum odor, black, moist									
	Sandy Lean Clay (CL), gray, moist, soft, highly plastic									
	Poorly-graded Sand (SP), petroleum odor, brown, moist, fine grained				01SB02-4.5-5.0					
5	Poorly-graded Sand (SP), gray staining, petroleum odor, wet, fine grained								DTW 5.5 ft bgs during drilling ▼	5
10	EOB at 10' bgs									10
15										15
20										20
25										25

START DATE: 11/8/2017
END DATE: 11/8/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: FH

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: ft.
EASTING: ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Boring No. 01SB02

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLE ID	TYPE	PID (ppm)	RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Topsoil									0
	Silty Sand (SM), trace gravel, dark brown, moist				01SB03-0.5-1.0				Hand augered to 5' bgs	
	Silty Sand (SM), reddish brown, moist									
	Sandy Lean Clay (CL), gray, moist, soft									
	Poorly-graded Sand (SP), light brown to brown, moist, fine grained				01SB03-4-4.5					
5	Poorly-graded Sand (SP), light brown to brown, wet, fine grained								DTW 5 ft bgs during drilling ▼	5
10	EOB at 10' bgs									10
15										15
20										20
25										25

START DATE: 11/8/2017
END DATE: 11/8/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: FH

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: ft.
EASTING: ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Boring No. 01SB03

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLE ID	TYPE	PID (ppm)	RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Topsoil									0
	FILL, sand, some gravel, reddish brown, dry, medium grained				02SB01-0.5-1.0				Hand augered to 5' bgs	
5	Poorly-graded Sand (SP), light brown, moist, fine grained				02SB01-6-6.5				Temporary well slotted screen 5-10 ft bgs DTW 6.5 ft bgs during drilling	5
	Poorly-graded Sand (SP), light brown, wet, fine grained									
10	EOB at 10' bgs									10
15										15
20										20
25										25

START DATE: 11/8/2017
END DATE: 11/8/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: FH

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: 4768738.8106 ft.
EASTING: 309539.9934 ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Well No. 02SB01

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLES: SAMPLE ID	SAMPLES: TYPE	SAMPLES: PID (ppm)	SAMPLES: RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Topsoil									0
	Silty Sand (SM), trace gravel, black, moist				02SB01-0.5-1.0				Hand augered to 5' bgs	
	Lean Clay (CL), black, moist, stiff, slightly plastic									
	Sandy Lean Clay (CL), greenish gray, moist, medium stiff									
	Poorly-graded Sand (SP), light brown, moist, fine grained									
5					02SB01-5-5.5					5
	Poorly-graded Sand (SP), light brown, wet, fine grained								DTW 6 ft bgs during drilling	
10	EOB at 10' bgs									10
15										15
20										20
25										25

START DATE: 11/8/2017
END DATE: 11/8/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: FH

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: 4778032.4709 ft.
EASTING: 309797.2219 ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Boring No. 02SB02

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLE ID	TYPE	PID (ppm)	RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Topsoil									0
	FILL, sand, reddish brown, moist				02SB03-0.5-1.0				Hand augered to 5' bgs	
	Poorly-graded Sand (SP), dark brown, moist, fine grained									
	Sandy Lean Clay (CL), gray, moist, medium stiff, slightly plastic									
5	Poorly-graded Sand (SP), light brown, moist, fine grained									5
	Lean Clay (CL), moist, soft, highly plastic				02SB03-6.0-6.5					
	Poorly-graded Sand (SP), light brown, wet, fine grained								DTW 7 ft bgs during drilling ▼	
10	EOB at 10' bgs									10
15										15
20										20
25										25

START DATE: 11/8/2017
END DATE: 11/8/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: FH

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: 4778033.7796 ft.
EASTING: 309777.9931 ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Boring No. 02SB03

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLE ID	TYPE	PID (ppm)	RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Topsoil								Hand augered to 5' bgs	0
	FILL, gravel				03SB01-0.5-1.0					
	Lean Clay (CL), reddish brown, dry, stiff									
	FILL, gravel									
	Poorly-graded Sand (SP), trace gravel, brown, dry, fine grained									
	Lean Clay (CL), reddish brown, soft, highly plastic									
5	Poorly-graded Sand (SP), light brown, moist, fine grained				03SB01-6-6.5				Temporary well slotted screen 5-10 ft bgs DTW 6.5 ft bgs during drilling	5
	Poorly-graded Sand (SP), light brown, wet, fine grained									
10	EOB at 10' bgs									10
15										15
20										20
25										25

START DATE: 11/8/2017
END DATE: 11/8/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: FH

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: 4778074.6891 ft.
EASTING: 309795.2621 ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Well No. 03SB01

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLE ID	TYPE	PID (ppm)	RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Topsoil									0
	Lean Clay (CL), trace gravel, reddish brown, moist, medium stiff				03SB02-0.5-1.0				Hand augered to 5' bgs	
	Organic Soil (OL/OH), with silt, black, moist									
	Poorly-graded Sand (SP), light brown, moist, fine grained				03SB02-4.0-4.5				▼	
5	Poorly-graded Sand (SP), light brown, wet, fine grained								DTW 4.5 ft bgs during drilling	5
	Lean Clay (CL), gray, wet, very soft, highly plastic									
	Poorly-graded Sand (SP), light brown, wet, fine grained									
10	EOB at 10' bgs									10
15										15
20										20
25										25

START DATE: 11/8/2017
END DATE: 11/8/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: FH

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: 4778103.7127 ft.
EASTING: 309802.0214 ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Boring No. 03SB02

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLE ID	TYPE	PID (ppm)	RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Topsoil									0
	FILL, sand with gravel, brown, moist				03SB03-0.5-1.0				Hand augered to 5' bgs	
5	Poorly-graded Sand (SP), brown, moist, fine grained				03SB03-5.0-5.5					5
	Poorly-graded Sand (SP), brown, wet, fine grained								DTW 6 ft bgs during drilling	
10	EOB at 10' bgs									10
15										15
20										20
25										25

START DATE: 11/8/2017
END DATE: 11/8/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: FH

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: 4778095.1079 ft.
EASTING: 309778.2628 ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Boring No. 03SB03

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLE ID	TYPE	PID (ppm)	RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Topsoil									0
	FILL, sand				04SB01-0.5-1.0				Hand augered to 5' bgs	
	Sandy Lean Clay (CL), gray, moist, stiff, slightly plastic									
	Organic Soil (OL/OH), silty sand, black, moist									
	Poorly-graded Sand (SP), light brown, moist, fine grained									
	Sandy Lean Clay (CL), greenish gray, soft									
	Poorly-graded Sand (SP), light brown, wet, fine grained				04SB01-4.5-5.0				DTW 5.5 ft bgs during drilling	
5										5
	Poorly-graded Sand (SP), trace gravel, brown, wet, medium grained								Temporary well slotted screen 5-10 ft bgs	
10										10
	EOB at 10' bgs									
15										15
20										20
25										25

START DATE: 11/9/2017
END DATE: 11/9/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: FH

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: 4778177.1163 ft.
EASTING: 310053.3339 ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Well No. 04SB01

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLE ID	TYPE	PID (ppm)	RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Asphalt									0
	FILL				04SB02-0.5-1.0				Hand augered to 5' bgs	
	Poorly-graded Sand (SP), trace gravel, light brown, moist, fine grained									
	Lean Clay (CL), moist, soft, slightly plastic									
	Poorly-graded Sand (SP), light brown, moist, fine grained									
5	Sandy Silt (ML), gray, wet				04SB02-5.0-5.5					5
	Poorly-graded Sand (SP), light brown, wet, fine grained								DTW 6 ft bgs during drilling	
	Poorly-graded Sand (SP), trace gravel, light brown, wet, medium grained									
10	EOB at 10' bgs									10
15										15
20										20
25										25

START DATE: 11/9/2017
END DATE: 11/9/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: FH

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: 4778194.6123 ft.
EASTING: 310002.0668 ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Boring No. 04SB02

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLES: SAMPLE ID	SAMPLES: TYPE	SAMPLES: PID (ppm)	SAMPLES: RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Asphalt									0
	FILL, sand, some gravel, moist, fine grained				04SB03-1-2				Hand augered to 5' bgs	
	Sandy Lean Clay (CL), greenish gray, moist, stiff, slightly plastic									
5	Poorly-graded Sand (SP), light brown, moist, fine grained				04SB03-5-5.5					5
	Poorly-graded Sand (SP), some gravel, light brown, wet, medium grained								DTW 6 ft bgs during drilling	
10	EOB at 10' bgs									10
15										15
20										20
25										25

START DATE: 11/9/2017
END DATE: 11/9/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: FH

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: 4778155.2219 ft.
EASTING: 310019.4236 ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Boring No. 04SB03

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLE ID	TYPE	PID (ppm)	RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Topsoil									0
	Lean Clay (CL), dry, stiff				05SB01-0.5-1				Hand augered to 5' bgs	
	Organic Soil (OL/OH), silty sand, black, moist									
	Sandy Lean Clay (CL), greenish gray, moist, stiff									
	Poorly-graded Sand (SP), light brown, moist, fine grained								Temporary well slotted screen 5-10 ft bgs	
5										5
	Poorly-graded Sand (SP), trace gravel, light brown, wet, medium grained				05SB01-6-6.5				DTW 7 ft bgs during drilling	
10	EOB at 10' bgs									10
15										15
20										20
25										25

START DATE: 11/9/2017
END DATE: 11/9/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: FH

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: 4778167.2188 ft.
EASTING: 310109.6858 ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Well No. 05SB01

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLE ID	TYPE	PID (ppm)	RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Topsoil									0
	Organic Soil (OL/OH), silty sand, black, moist				05SB02-0.5-1.0				Hand augered to 5' bgs	
	Sandy Lean Clay (CL), moist, stiff, slightly plastic									
	Poorly-graded Sand (SP), light brown, moist, fine grained									
5										5
	Poorly-graded Sand (SP), light brown, wet, medium grained				05SB02-7-7.5				DTW 8 ft bgs during drilling	
10	EOB at 10' bgs									10
15										15
20										20
25										25

START DATE: 11/9/2017
END DATE: 11/9/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: FH

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: 4778252.1704 ft.
EASTING: 310091.2651 ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Boring No. 05SB02

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLES: SAMPLE ID	SAMPLES: TYPE	SAMPLES: PID (ppm)	SAMPLES: RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Topsoil									0
	Organic Soil (OL/OH), silty sand, black, dry				05SB03-0.5-1				Hand augered to 5' bgs	
	Sandy Lean Clay (CL), light brown, moist, stiff, slightly plastic									
	Poorly-graded Sand (SP), light brown, moist, fine grained									
5	Poorly-graded Sand (SP), trace gravel, light brown, moist, medium grained									5
	Poorly-graded Sand (SP), trace gravel, wet, medium to coarse grained				05SB03-6-6.5				DTW 7 ft bgs during drilling ▼	
10	EOB at 10' bgs									10
15										15
20										20
25										25

START DATE: 11/9/2017
END DATE: 11/9/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: FH

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: 4778212.3765 ft.
EASTING: 310026.209 ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Boring No. 05SB03

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLE ID	TYPE	PID (ppm)	RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Topsoil									0
	Sandy Silt (ML), concrete debris at 2 ft bgs, dark gray, moist, medium stiff, fine grained, non-plastic, low dilatancy, no toughness				06SB01-0.5-1.0				Hand augered to 5' bgs	
5	Poorly-graded Sand (SP), trace silt, light yellowish brown, moist, fine to medium grained				06SB01-6.5-7.0				Temporary well slotted screen 5-10 ft bgs DTW 7 ft bgs during drilling	5
10	EOB at 10' bgs									10
15										15
20										20
25										25

START DATE: 11/6/2017
END DATE: 11/6/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: JM

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: 4778255.9354 ft.
EASTING: 310196.1112 ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Well No. 06SB01

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLE ID	TYPE	PID (ppm)	RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Topsoil									0
	Organic Soil (OL/OH), silt with fine sand, dark gray, moist, soft, non-plastic, no dilatancy, no toughness				06SB02-0.5-1.0				Hand augered to 5' bgs	
	Silty Sand with Gravel (SM), little fine gravel, little silt, yellowish brown, moist, fine to medium grained									
	Lean Clay (CL), little fine sand, reddish brown, moist, soft, highly plastic, no dilatancy, slightly tough				06SB02-4.5-5.0					
5	Poorly-graded Sand (SP), trace silt, dark gray, wet, medium grained								DTW 5 ft bgs during drilling ▼	5
	Poorly-graded Sand (SP), trace silt, gray, wet, medium grained									
10	EOB at 10' bgs									10
15										15
20										20
25										25

START DATE: 11/6/2017
END DATE: 11/6/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: JM

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: 4778667.7334 ft.
EASTING: 310193.1331 ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Boring No. 06SB02

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLE ID	TYPE	PID (ppm)	RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Asphalt								Hand augered to 5' bgs	0
	FILL, silty fine to medium gravel with fine to coarse sand, light yellowish brown, moist									
	Sandy Lean Clay (CL), greenish gray, moist, soft, moderately plastic, no dilatancy, slightly tough				06SB03-0.5-1.0					
5	Poorly-graded Sand (SP), trace silt, light yellowish brown, moist, fine to medium grained				06SB03-7.0-7.5				DTW 7.5 ft bgs during drilling ▼	5
10	EOB at 10' bgs									10
15										15
20										20
25										25

START DATE: 11/7/2017
END DATE: 11/7/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: JM

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: 4778305.6066 ft.
EASTING: 310140.7373 ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Boring No. 06SB03

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLE ID	TYPE	PID (ppm)	RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Topsoil									0
	FILL, lean clay, little fine sand, trace medium gravel, brown, moist, stiff, moderately plastic, no dilatancy, moderately tough				07SB01-0.5-1.0				Hand augered to 5' bgs	
5	Poorly-graded Sand (SP), trace silt, light yellowish brown, wet, fine to medium grained				07SB01-4.5-5.0				DTW 5 ft bgs during drilling	5
	Poorly-graded Sand (SP), trace silt, gray, wet, fine to medium grained								Temporary well slotted screen 5-10 ft bgs	
10	EOB at 10' bgs									10
15										15
20										20
25										25

START DATE: 11/7/2017
END DATE: 11/7/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: JM

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: 4778097.5895 ft.
EASTING: 309888.4441 ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Well No. 07SB01

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLE ID	TYPE	PID (ppm)	RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Topsoil									0
	Lean Clay (CL), little fine sand, olive, moist, medium stiff, moderately plastic, no dilatancy, moderately tough				07SB02-0.5-1.0				Hand augered to 5' bgs	
	Organic Soil (OL/OH), sandy silt, black, moist									
	Lean Clay (CL), little fine sand, olive, moist, medium stiff, moderately plastic, no dilatancy, moderately tough									
5	Poorly-graded Sand (SP), trace silt, light yellowish brown, moist, fine to medium grained				07SB02-4.5-5.0				▼ DTW 5 ft bgs during drilling	5
	Poorly-graded Sand (SP), trace silt, gray, moist, fine to medium grained									
10	EOB at 10' bgs									10
15										15
20										20
25										25

START DATE: 11/7/2017
END DATE: 11/7/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: JM

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: 4778165.5546 ft.
EASTING: 309853.1224 ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Boring No. 07SB02

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLE ID	TYPE	PID (ppm)	RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Topsoil									0
	Organic Soil (OL/OH), silt with fine sand, black, moist				07SB03-0.5-1.0				Hand augered to 5' bgs	
	Sandy Lean Clay (CL), dark brown, moist, stiff, moderately plastic, no dilatancy, highly tough									
5	Lean Clay (CL), little fine sand, olive, moist, medium stiff, moderately plastic, no dilatancy, moderately tough				07SB03-5.0-5.5				DTW 5.5 ft bgs during drilling ▼	5
	Poorly-graded Sand (SP), trace silt, light yellowish brown, wet, fine to medium grained									
	Poorly-graded Sand (SP), trace silt, gray, wet, fine to medium grained									
10	EOB at 10' bgs									10
15										15
20										20
25										25

START DATE: 11/7/2017
END DATE: 11/7/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: JM

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: 4778133.3089 ft.
EASTING: 309824.6475 ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Boring No. 07SB03

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLE ID	TYPE	PID (ppm)	RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Topsoil									0
	Silty Sand with Gravel (SM), brown, moist, fine grained				08SB01-0.5-1.0				Hand augered to 5' bgs	
5	Poorly-graded Sand (SP), trace silt, light yellowish brown, moist, fine grained				08SB01-5.0-5.5				DTW 5.5 ft bgs during drilling Temporary well slotted screen 5-10 ft bgs	5
10	EOB at 10' bgs									10
15										15
20										20
25										25

START DATE: 11/7/2017
END DATE: 11/7/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: JM

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: 4778067.5504 ft.
EASTING: 309949.2815 ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Well No. 08SB01

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLE ID	TYPE	PID (ppm)	RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Topsoil									0
	FILL, fine-grained sandy lean clay, trace fine gravel, brown, moist, stiff, moderately plastic, no dilatancy, moderately tough				08SB02-0.5-1.0				Hand augered to 5' bgs	
	Lean Clay (CL), little fine sand, greenish gray, moist, medium stiff, moderately plastic, no dilatancy, moderately tough									
5					08SB02-5.0-5.5				▼ DTW 5.5 ft bgs during drilling	5
	Poorly-graded Sand (SP), trace silt, strong hydrocarbon odor, gray, wet, medium grained									
10	EOB at 10' bgs									10
15										15
20										20
25										25

START DATE: 11/7/2017
END DATE: 11/7/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: JM

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: 4778084.2811 ft.
EASTING: 309951.5866 ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Boring No. 08SB02

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLE ID	TYPE	PID (ppm)	RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Topsoil									0
	FILL, lean clay with fine gravel, brown, moist, stiff, moderately plastic, no dilatancy, moderately tough				08SB03-0.5-1.0				Hand augered to 5' bgs	
	Lean Clay (CL), little fine sand, greenish gray, moist, medium stiff, moderately plastic, no dilatancy, moderately tough				08SB03-4.5-5.0					
5	Poorly-graded Sand (SP), gray, wet								▼ DTW 5 ft bgs during drilling	5
10	EOB at 10' bgs									10
15										15
20										20
25										25

START DATE: 11/7/2017
END DATE: 11/7/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: JM

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: 4778085.3001 ft.
EASTING: 309897.6907 ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Boring No. 08SB03

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLE ID	TYPE	PID (ppm)	RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Asphalt								Hand augered to 5' bgs	0
	FILL									
	Lean Clay (CL), poor recovery, reddish brown, moist, stiff				09SB01-1.0-2.0					
5	Poorly-graded Sand (SP), reddish brown, moist, fine grained									5
	Poorly-graded Sand (SP), some gravel, light brown, dry, medium grained									
	Poorly-graded Sand (SP), light brown, moist to wet at 10 ft bgs, fine grained				09SB01-9.0-9.5				DTW 10 ft bgs during drilling	
10										10
	Poorly-graded Sand (SP), some gravel, light brown, wet, fine to medium grained								Temporary well slotted screen 10-15 ft bgs	
15	EOB at 15' bgs									15
20										20
25										25

START DATE: 11/9/2017
END DATE: 11/9/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: FH

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: 4778003.532 ft.
EASTING: 310023.44 ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Well No. 09SB01

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLE ID	TYPE	PID (ppm)	RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Asphalt								Hand augered to 5' bgs	0
	FILL, sand with gravel									
	Sandy Lean Clay (CL), brown, moist, stiff, slightly plastic				09SB02-2.0-3.0					
5	Poorly-graded Sand (SP), brown, moist, fine grained									5
	Poorly-graded Sand (SP), light brown, moist, fine grained									
	Poorly-graded Sand (SP), light brown, moist, fine to coarse grained				09SB02-8.0-9.0					
10	Poorly-graded Sand (SP), light brown, wet, fine to coarse grained								DTW 10 ft bgs during drilling ▼	10
15	EOB at 15' bgs									15
20										20
25										25

START DATE: 11/8/2017
END DATE: 11/8/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: FH

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: 4778050.7399 ft.
EASTING: 310030.3121 ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Boring No. 09SB02

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLE ID	TYPE	PID (ppm)	RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Asphalt									0
	Silty Gravel with Sand (GM), light olive, moist								Hand augered to 5' bgs	
	Lean Clay (CL), little fine sand, very dark greenish gray, moist, stiff, moderately plastic, no dilatancy, moderately tough				09SB03-3.5-4.0					
5										5
					09SB03-6.5-7.0				DTW 7 ft bgs during drilling ▼	
	Poorly-graded Sand (SP), trace silt, olive yellow, wet									
10										10
	EOB at 10' bgs									
15										15
20										20
25										25

START DATE: 11/7/2017
END DATE: 11/7/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: JM

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: 4778047.5607 ft.
EASTING: 309994.0831 ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Boring No. 09SB03

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLE ID	TYPE	PID (ppm)	RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Topsoil								Hand augered to 5' bgs	0
	FILL, fine sandy silt, black, moist, soft, non-plastic, slow dilatancy, non-tough									
5	Poorly-graded Sand (SP), trace silt, light yellowish brown								Temporary well slotted screen 5-10 ft bgs DTW 7 ft bgs during drilling	5
10	EOB at 10' bgs									10
15										15
20										20
25										25

START DATE: 11/6/2017
END DATE: 11/6/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: JM

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: 4778215.1402 ft.
EASTING: 310290.1877 ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Well No. TWBB01

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLE ID	TYPE	PID (ppm)	RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Topsoil								Hand augered to 5' bgs	0
	Lean Clay (CL), little fine sand, little medium gravel at 3.5 ft bgs, dark gray, moist, stiff, moderately plastic, no dilatancy, moderately tough									
5	Organic Soil (OL/OH), peat, black, moist									5
	Organic Soil (OL/OH), some aquatic shells, olive, moist									
10	Organic Soil (OL/OH), some plant material and aquatic shells, dark gray, moist								Temporary well slotted screen 10-15 ft bgs DTW 12.5 ft bgs during drilling	10
	Lean Clay (CL), trace fine sand, gray, moist, soft, moderately plastic, no dilatancy, slightly tough									
15	EOB at 15' bgs									15
20										20
25										25

START DATE: 11/6/2017
END DATE: 11/6/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: JM

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: 4777741.0032 ft.
EASTING: 310320.4799 ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Well No. TWBB02

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED BELOW.	LEGEND	ELEV (ft)	SAMPLES: BLOW CT PER 6 IN	SAMPLE ID	TYPE	PID (ppm)	RECOVERY (inch)	MONITORING WELL CONSTRUCTION DETAILS AND REMARKS	DEPTH
0	Topsoil								Hand augered to 5' bgs	0
	Poorly-graded Sand (SP), some gravel, reddish brown, dry									
	Sandy Lean Clay (CL), brown, dry, stiff									
	Sandy Lean Clay (CL), light brown, dry, stiff									
	Sandy Lean Clay (CL), moist, medium stiff, slightly plastic									
5	Lean Clay (CL), greenish gray, moist, very stiff, slightly plastic									5
	Lean Clay (CL), with organics, black, moist, stiff, highly plastic									
10	Lean Clay (CL), gray, moist, soft, highly plastic								Temporary well slotted screen 10-15 ft bgs DTW 12 ft bgs during drilling	10
	Poorly-graded Sand (SP), brown, wet, fine to coarse grained									
	Lean Clay (CL), gray, soft, highly plastic									
15	EOB at 15' bgs									15
20										20
25										25

START DATE: 11/8/2017
END DATE: 11/8/2017
DRILLER: Mateco Drilling
EQUIPMENT: 6620DT
METHOD: Geoprobe Direct Push
HOLE DIA.:
SITE:
LOGGED BY: FH

GROUND ELEVATION: ft.
VERTICAL DATUM: NAVD88
NORTHING: 4777666.0153 ft.
EASTING: 309940.9296 ft.
HORIZONTAL DATUM:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL BORING / MONITORING WELL RECORD

Project: Truax ANG FY16 Site Inspection for PFC
Project No: 291330006.019
Checked By: AD

Well No. TWBB03

amec foster wheeler
511 Congress Street
Suite 200
Portland, Maine 04101

TRUAX TRUAX BORING LOGS.GPJ PFC TEMPLATE.GDT 17/10/18

APPENDIX B

GROUNDWATER SAMPLING LOGS

THIS PAGE INTENTIONALLY LEFT BLANK.

GROUNDWATER SAMPLING RECORD

Site Name:	Truax field	**Project Number:**	291330002.0003.3A
Well ID:	Base Boundary Well -1	**Sample Technician:**	Adam Davis
Initial Depth to Water:	6.22	**Date:**	11/08/2017
Total Depth of Well:	10.2	**Well Diameter (inches):**	1
Method of Purging:	Pumping	**Casing Volumes (gal):**	1 X = 0.2; 3 X = 0.5
Measuring Point (toc, tor, etc.):	Top of Casing	**Pump Intake Depth (feet):**	8.0

Time	Water Level (feet)	Flow Rate (gpm)	Temp. (°C)	pH (units)	Specific Electrical Conductance (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Comments/Observations During Purging (color, sediment, odor, etc.)
Stabilization Criteria			±0.5°C	±0.1	±3%	±10%	±10%	±10% and <10 NTU	
08:55		200ml							Pump Started
08:58		200ml	14.2	7.09	.84	.81	-144.5	122	Slightly cloudy
09:01		200ml	14.4	7.03	.83	.69	-139.4	73.1	Slightly cloudy
09:04		200ml	14.7	6.96	.81	.41	-118.5	47.3	Clear
09:07		200ml	14.6	6.94	.80	.31	-100.7	26.0	Clear
09:10		200ml	14.5	6.91	.80	.31	-83.9	25.4	Clear
09:13		200ml	14.7	6.90	.79	.23	-80.5	19.2	
Final Values:			**14.7**	**6.90**	**.79**	**.23**	**-80.5**	**19.2**	

Stability Reached (Y/N): Yes If No, Provide Explanation

Sample ID:	TRUAX-BB-TWBB01-110817	**Sample Date:**	11/08/2017
Sample Depth:	5.0	**Sample Collection Time:**	09:20
Duplicate Collected:	Yes	**Additional QA/QC:**	No
Duplicate ID:	TRUAX-BB-GW-DUP01-110817	**Blank ID(s):**	
Method of Sampling:	Low Flow	**Total Volume Purged:**	600ml
Analysis/Method(s):	Mod EPA 537	**Depth to Water After Sampling:**	NA

Instruments (Manufacturer, Model, and Serial No.):

Turbidity Meter, Water Quality Meter, Water Level Meter, Peristaltic Pump
LaMotte 2020we Fa01463 YSI Pro plus Fa0777

Calculations:

Saturated well casing volume: V= Π(R^2)H*7.48 gal/ft^3

V=Volume (gal/ft)
Π = 3.14
R = well radius (ft) = (well diameter (in)/12 (in/ft))/2)
H = height of water column (ft)

V= Π(R^2)H*7.48 gal/ft^3
= Π * (1 (in)/12 (in/ft))/2)^2 * 3.98 * 7.48 gal/ft^3
= 0.2

Technician Signature:

Notes:

Technician Name (print)**:** Adam Davis

QA/QC'd by: **QA/QC Date:**

GROUNDWATER SAMPLING RECORD

Site Name:	Truax field	**Project Number:**	291330002.0003.3A
Well ID:	Base Boundary Well 02	**Sample Technician:**	Adam Davis
Initial Depth to Water:	9.4	**Date:**	11/09/2017
Total Depth of Well:	15.2	**Well Diameter (inches):**	1
Method of Purging:	Pumping	**Casing Volumes (gal):**	1 X = 0.2; 3 X = 0.7
Measuring Point (toc, tor, etc.):	Top of Casing	**Pump Intake Depth (feet):**	13.0

Time	Water Level (feet)	Flow Rate (gpm)	Temp. (°C)	pH (units)	Specific Electrical Conductance (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Comments/Observations During Purging (color, sediment, odor, etc.)
Stabilization Criteria			±0.5°C	±0.1	±3%	±10%	±10%	±10% and <10 NTU	
07:40		200ml							Pump Started
		200ml							
		200ml							
		200ml							
		200ml							
		200ml							
Final Values:			#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	

Stability Reached (Y/N): NA - Grab Sample If No, Provide Explanation

Sample ID:	TRUAX-BB-TWBB02-110917	**Sample Date:**	11/09/2017
Sample Depth:	10.2	**Sample Collection Time:**	07:42
Duplicate Collected:	No	**Additional QA/QC:**	No
Duplicate ID:		**Blank ID(s):**	
Method of Sampling:	Low Flow	**Total Volume Purged:**	0
Analysis/Method(s):	Mod EPA 537	**Depth to Water After Sampling:**	NA

Instruments (Manufacturer, Model, and Serial No.):

Turbidity Meter, Water Quality Meter, Water Level Meter, Peristaltic Pump
LaMotte 2020we Fa01463 YSI Pro plus Fa0777

Calculations:

Technician Signature:

Saturated well casing volume: V= Π(R^2)H*7.48 gal/ft^3

V=Volume (gal/ft)
Π = 3.14
R = well radius (ft) = (well diameter (in)/12 (in/ft))/2)
H = height of water column (ft)

V= Π(R^2)H*7.48 gal/ft^3
= Π * (1 (in)/12 (in/ft))/2)^2 * 5.80 * 7.48 gal/ft^3
= 0.2

Notes:

Well went DRY trying to collect data on 11-08-17. Sample was collected 11-09-17 without collecting YSI data.

Technician Name (print)**:**

Adam Davis

QA/QC'd by: **QA/QC Date:**

GROUNDWATER SAMPLING RECORD

Site Name:	Truax field	**Project Number:**	291330002.0003.3A
Well ID:	Base Boundary Well 03	**Sample Technician:**	Adam Davis
Initial Depth to Water:	11.1	**Date:**	11/09/2017
Total Depth of Well:	15.2	**Well Diameter (inches):**	1
Method of Purging:	Pumping	**Casing Volumes (gal):**	1 X = 0.2; 3 X = 0.5
Measuring Point (toc, tor, etc.):	Top of Casing	**Pump Intake Depth (feet):**	14.0

Time	Water Level (feet)	Flow Rate (gpm)	Temp. (°C)	pH (units)	Specific Electrical Conductance (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Comments/Observations During Purging (color, sediment, odor, etc.)
	Stabilization Criteria		±0.5°C	±0.1	±3%	±10%	±10%	±10% and <10 NTU	
08:11		200ml							Pump Started
		200ml							
		200ml							
		200ml							
		200ml							
		200ml							

Stability Reached (Y/N): NA - Grab Sample   If No, Provide Explanation

Final Values:	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

Sample ID:	TRUAX-BB-TWBB03-110917	**Sample Date:**	11/09/2017
Sample Depth:	10.2	**Sample Collection Time:**	08:12
Duplicate Collected:	No	**Additional QA/QC:**	No
Duplicate ID:		**Blank ID(s):**	
Method of Sampling:	Low Flow	**Total Volume Purged:**	0
Analysis/Method(s):	Mod EPA 537	**Depth to Water After Sampling:**	NA

Instruments (Manufacturer, Model, and Serial No.):

Turbidity Meter, Water Quality Meter, Water Level Meter, Peristaltic Pump
LaMotte 2020we Fa01463 YSI Pro plus Fa0777

Calculations:

Saturated well casing volume: V= Π(R^2)H*7.48 gal/ft^3

V=Volume (gal/ft)
Π = 3.14
R = well radius (ft) = (well diameter (in)/12 (in/ft))/2)
H = height of water column (ft)

V= Π(R^2)H*7.48 gal/ft^3
= Π * (1 (in)/12 (in/ft))/2)^2 * 4.10 * 7.48 gal/ft^3
= 0.2

Technician Signature: [signature]

Notes:

Pump had difficulty pumping to surface so when water did flow the sample was collected without data collection.

Technician Name (print): Adam Davis

QA/QC'd by: **QA/QC Date:**

GROUNDWATER SAMPLING RECORD

Site Name:	Truax field	**Project Number:**	291330002.0003.3A
Well ID:	TW01	**Sample Technician:**	Adam Davis
Initial Depth to Water:	8.0	**Date:**	11/08/2017
Total Depth of Well:	10.0	**Well Diameter (inches):**	1
Method of Purging:	Pumping	**Casing Volumes (gal):**	1 X = 0.1; 3 X = 0.2
Measuring Point (toc, tor, etc.):	Top of Casing	**Pump Intake Depth (feet):**	9.0

Time	Water Level (feet)	Flow Rate (gpm)	Temp. (°C)	pH (units)	Specific Electrical Conductance (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Comments/Observations During Purging (color, sediment, odor, etc.)
Stabilization Criteria			±0.5°C	±0.1	±3%	±10%	±10%	±10% and <10 NTU	
11:36		200ml							Pump Started
11:41		200ml	13.8	6.6	1.0	.08	-109.2	122	
11:44		200ml	14.0	6.64	.92	.20	-82.3	60.1	
11:47		200ml	14.2	6.6	.89	.32	-69.0	25.1	
11:50		200ml	14.2	6.58	.88	.15	-64.0	14.7	
11:53		200ml	14.3	6.58	.88	.11	-65.3	11.4	
11:56		200ml	14.2	6.57	.87	.40	-49.7	9.48	
Final Values:			**14.2**	**6.57**	**.87**	**.40**	**-49.7**	**9.48**	

Sample ID:	TRUAX-01-TW01-110817	**Sample Date:**	11/08/2017
Sample Depth:	5.0	**Sample Collection Time:**	11:58
Duplicate Collected:	No	**Additional QA/QC:**	No
Duplicate ID:		**Blank ID(s):**	
Method of Sampling:	Low Flow	**Total Volume Purged:**	600ml
Analysis/Method(s):	Mod EPA 537	**Depth to Water After Sampling:**	NA

Stability Reached (Y/N): No — If No, Provide Explanation: DO not stable

Instruments (Manufacturer, Model, and Serial No.):

Turbidity Meter, Water Quality Meter, Water Level Meter, Peristaltic Pump
LaMotte 2020we Fa01463 YSI Pro plus Fa0777

Calculations:

Saturated well casing volume: V= Π(R^2)H*7.48 gal/ft^3

V=Volume (gal/ft)
Π = 3.14
R = well radius (ft) = (well diameter (in)/12 (in/ft))/2)
H = height of water column (ft)

V= Π(R^2)H*7.48 gal/ft^3
= Π * (1 (in)/12 (in/ft))/2)^2 * 2.00 * 7.48 gal/ft^3
= 0.1

Technician Signature:

Notes:

Technician Name (print)**:** Adam Davis

QA/QC'd by: **QA/QC Date:**

GROUNDWATER SAMPLING RECORD

Site Name:	Truax field	**Project Number:**	291330002.0003.3A
Well ID:	TW02	**Sample Technician:**	Adam Davis
Initial Depth to Water:	7.17	**Date:**	11/08/2017
Total Depth of Well:	10.33	**Well Diameter (inches):**	1
Method of Purging:	Pumping	**Casing Volumes (gal):**	1 X = 0.1; 3 X = 0.4
Measuring Point (toc, tor, etc.):	Top of Casing	**Pump Intake Depth (feet):**	9.0

Time	Water Level (feet)	Flow Rate (gpm)	Temp. (°C)	pH (units)	Specific Electrical Conductance (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Comments/Observations During Purging (color, sediment, odor, etc.)
Stabilization Criteria			±0.5°C	±0.1	±3%	±10%	±10%	±10% and <10 NTU	
14:59		200ml							Pump Started
15:04		200ml	14.2	7.44	.615	.24	-101.5	113	
15:07		200ml	14.3	7.34	.593	.23	-83.7	49.8	
15:10		200ml	14.3	7.28	.580	.25	-63.5	13.1	
15:13		200ml	14.2	7.27	.576	.20	-74.5	6.18	
15:16		200ml	14.2	7.25	.574	.23	-68.9	4.74	
15:19		200ml	14.3	7.23	.570	.20	-66.4	3.43	
Final Values:			**14.3**	**7.23**	**.570**	**.20**	**-66.4**	**3.43**	

Stability Reached (Y/N): Yes — If No, Provide Explanation

Sample ID:	TRUAX-02-TW02-110817	**Sample Date:**	11/08/2017
Sample Depth:	5.33	**Sample Collection Time:**	15:24
Duplicate Collected:	No	**Additional QA/QC:**	No
Duplicate ID:		**Blank ID(s):**	
Method of Sampling:	Low Flow	**Total Volume Purged:**	1000ml
Analysis/Method(s):	Mod EPA 537	**Depth to Water After Sampling:**	NA

Instruments (Manufacturer, Model, and Serial No.):

Turbidity Meter, Water Quality Meter, Water Level Meter, Peristaltic Pump
LaMotte 2020we Fa01463 YSI Pro plus Fa0777

Calculations:

Technician Signature:

Saturated well casing volume: V= Π(R^2)H*7.48 gal/ft^3

V=Volume (gal/ft)
Π = 3.14
R = well radius (ft) = (well diameter (in)/12 (in/ft))/2)
H = height of water column (ft)

V= Π(R^2)H*7.48 gal/ft^3
= Π * (1 (in)/12 (in/ft))/2)^2 * 3.16 * 7.48 gal/ft^3
= 0.1

Notes:

Technician Name (print)**:**

Adam Davis

QA/QC'd by:

QA/QC Date:

GROUNDWATER SAMPLING RECORD

Site Name:	Truax field	**Project Number:**	291330002.0003.3A
Well ID:	TW03	**Sample Technician:**	Adam Davis
Initial Depth to Water:	7.1	**Date:**	11/08/2017
Total Depth of Well:	10.25	**Well Diameter (inches):**	1
Method of Purging:	Pumping	**Casing Volumes (gal):**	1 X = 0.1; 3 X = 0.4
Measuring Point (toc, tor, etc.):	Top of Casing	**Pump Intake Depth (feet):**	9.0

Time	Water Level (feet)	Flow Rate (gpm)	Temp. (°C)	pH (units)	Specific Electrical Conductance (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Comments/Observations During Purging (color, sediment, odor, etc.)
	Stabilization Criteria		±0.5°C	±0.1	±3%	±10%	±10%	±10% and <10 NTU	
13:09		200ml							Pump Started
13:14		200ml	14.7	7.01	.95	.18	-98.9	96.9	
13:17		200ml	14.8	6.98	.94	.19	-105.3	23.3	
13:20		200ml	14.9	6.95	.93	.13	-115.7	8.06	
13:23		200ml	14.9	6.93	.92	.14	-119.4	4.52	
13:26		200ml	14.9	6.91	.91	.15	-120.6	2.58	
Stability Reached (Y/N):		Yes		If No, Provide Explanation					
		Final Values:	**14.9**	**6.91**	**.91**	**.15**	**-120.6**	**2.58**	

Sample ID:	TRUAX-03-TW03-110817	**Sample Date:**	11/08/2017
Sample Depth:	5.0	**Sample Collection Time:**	13:30
Duplicate Collected:	No	**Additional QA/QC:**	No
Duplicate ID:		**Blank ID(s):**	
Method of Sampling:	Low Flow	**Total Volume Purged:**	1000ml
Analysis/Method(s):	Mod EPA 537	**Depth to Water After Sampling:**	NA

Instruments (Manufacturer, Model, and Serial No.):

Turbidity Meter, Water Quality Meter, Water Level Meter, Peristaltic Pump
LaMotte 2020we Fa01463 YSI Pro plus Fa0777

Calculations:

Saturated well casing volume: V= Π(R^2)H*7.48 gal/ft^3

V=Volume (gal/ft)
Π = 3.14
R = well radius (ft) = (well diameter (in)/12 (in/ft))/2)
H = height of water column (ft)

V= Π(R^2)H*7.48 gal/ft^3
= Π * (1 (in)/12 (in/ft))/2)^2 * 3.15 * 7.48 gal/ft^3
= 0.1

Technician Signature:

Notes:

Technician Name (print):

Adam Davis

QA/QC'd by: **QA/QC Date:**

GROUNDWATER SAMPLING RECORD

Site Name:	Truax field	**Project Number:**	291330002.0003.3A
Well ID:	TW04	**Sample Technician:**	Adam Davis
Initial Depth to Water:	6.5	**Date:**	11/09/2017
Total Depth of Well:	10.1	**Well Diameter (inches):**	1
Method of Purging:	Pumping	**Casing Volumes (gal):**	1 X = 0.1; 3 X = 0.4
Measuring Point (toc, tor, etc.):	Top of Casing	**Pump Intake Depth (feet):**	9.0

Time	Water Level (feet)	Flow Rate (gpm)	Temp. (°C)	pH (units)	Specific Electrical Conductance (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Comments/Observations During Purging (color, sediment, odor, etc.)
Stabilization Criteria			±0.5°C	±0.1	±3%	±10%	±10%	±10% and <10 NTU	
12:46		200ml							Pump Started
12:51		200ml	14.5	7.47	.76	.32	-156.2	722	
12:54		200ml	14.3	7.21	.70	.19	-147.5	107	
12:57		200ml	14.5	7.14	.68	.13	-138.4	82.0	
13:00		200ml	14.7	7.16	.67	.15	-131.5	65.7	
13:03		200ml	14.5	7.06	.65	.15	-126.0	36.3	
Final Values:			**14.5**	**7.06**	**.65**	**.15**	**-126.0**	**36.3**	

Sample ID:	TRUAX-04-TW04-110917	**Sample Date:**	11/09/2017
Sample Depth:	5.1	**Sample Collection Time:**	13:07
Duplicate Collected:	No	**Additional QA/QC:**	No
Duplicate ID:		**Blank ID(s):**	
Method of Sampling:	Low Flow	**Total Volume Purged:**	1000ml
Analysis/Method(s):	Mod EPA 537	**Depth to Water After Sampling:**	NA

Stability Reached (Y/N): Yes — If No, Provide Explanation

Instruments (Manufacturer, Model, and Serial No.):

Turbidity Meter, Water Quality Meter, Water Level Meter, Peristaltic Pump
LaMotte 2020we Fa01463 YSI Pro plus Fa0777

Calculations:

Saturated well casing volume: V= Π(R^2)H*7.48 gal/ft^3

V=Volume (gal/ft)
Π = 3.14
R = well radius (ft) = (well diameter (in)/12 (in/ft))/2)
H = height of water column (ft)

V= Π(R^2)H*7.48 gal/ft^3
= Π * (1 (in)/12 (in/ft))/2)^2 * 3.60 * 7.48 gal/ft^3
= 0.1

Technician Signature:

Notes:

Technician Name (print)**:** Adam Davis

QA/QC'd by: **QA/QC Date:**

GROUNDWATER SAMPLING RECORD

Site Name:	Truax field	**Project Number:**	291330002.0003.3A
Well ID:	TW05	**Sample Technician:**	Adam Davis
Initial Depth to Water:	7.4	**Date:**	11/09/2017
Total Depth of Well:	10.2	**Well Diameter (inches):**	1
Method of Purging:	Pumping	**Casing Volumes (gal):**	1 X = 0.1; 3 X = 0.3
Measuring Point (toc, tor, etc.):	Top of Casing	**Pump Intake Depth (feet):**	9.0

Time	Water Level (feet)	Flow Rate (gpm)	Temp. (°C)	pH (units)	Specific Electrical Conductance (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Comments/Observations During Purging (color, sediment, odor, etc.)
Stabilization Criteria			±0.5°C	±0.1	±3%	±10%	±10%	±10% and <10 NTU	
13:38		200ml							Pump Started
13:43		200ml	14.1	7.07	.94	.25	-160.7	1143	
13:46		200ml	14.0	6.98	.88	.17	-146.4	93.4	
13:49		200ml	14.5	6.96	.86	.13	-131.7	18.9	
13:52		200ml	14.2	6.90	.84	.11	-123.8	13.2	
13:55		200ml	14.0	6.86	.83	.12	-120.0	7.16	
Final Values:			**14.0**	**6.86**	**.83**	**.12**	**-120.0**	**7.16**	

Stability Reached (Y/N): Yes — If No, Provide Explanation

Sample ID:	TRUAX-05-TW05-110917	**Sample Date:**	11/09/2017
Sample Depth:	5.2	**Sample Collection Time:**	13:57
Duplicate Collected:	No	**Additional QA/QC:**	No
Duplicate ID:		**Blank ID(s):**	
Method of Sampling:	Low Flow	**Total Volume Purged:**	1000ml
Analysis/Method(s):	Mod EPA 537	**Depth to Water After Sampling:**	NA

Instruments (Manufacturer, Model, and Serial No.):

Turbidity Meter, Water Quality Meter, Water Level Meter, Peristaltic Pump
LaMotte 2020we Fa01463 YSI Pro plus Fa0777

Calculations:

Technician Signature:

Saturated well casing volume: V= Π(R^2)H*7.48 gal/ft^3

V=Volume (gal/ft)
Π = 3.14
R = well radius (ft) = (well diameter (in)/12 (in/ft))/2)
H = height of water column (ft)

V= Π(R^2)H*7.48 gal/ft^3
= Π * (1 (in)/12 (in/ft))/2)^2 * 2.80 * 7.48 gal/ft^3
= 0.1

Notes:

Technician Name (print)**:**

Adam Davis

QA/QC'd by: **QA/QC Date:**

GROUNDWATER SAMPLING RECORD

Site Name:	Truax field	**Project Number:**	
Well ID:	TW06	**Sample Technician:**	Faisal Hussain
Initial Depth to Water:	6.3	**Date:**	11/06/2017
Total Depth of Well:	10.0	**Well Diameter (inches):**	1
Method of Purging:	Pumping	**Casing Volumes (gal):**	1 X = 0.2; 3 X = 0.5
Measuring Point (toc, tor, etc.):	Top of Casing	**Pump Intake Depth (feet):**	9

Time	Water Level (feet)	Flow Rate (gpm)	Temp. (°C)	pH (units)	Specific Electrical Conductance (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Comments/Observations During Purging (color, sediment, odor, etc.)
Stabilization Criteria			±0.5°C	±0.1	±3%	±10%	±10%	±10% and <10 NTU	
15:58		200							Pump Started
16:04		200	14.8	7.49	.86	0.38	-38.7	1258	Cloudy
16:08		200	14.9	7.48	.85	0.28	-36.7	227	
16:11		200	15.0	7.40	0.82	.21	-31.6	117	
16:15		200	15.1	7.37	0.81	0.18	-30.0	49.1	
Final Values:			**15.1**	**7.37**	**0.81**	**0.18**	**-30.0**	**49.1**	

Sample ID:	Truax-06-TW6-110617	**Sample Date:**	11/06/2017
Sample Depth:		**Sample Collection Time:**	16:20
Duplicate Collected:	No	**Additional QA/QC:**	Yes MS/MSD
Duplicate ID:		**Blank ID(s):**	
Method of Sampling:	Low Flow	**Total Volume Purged:**	1.5
Analysis/Method(s):	Mod EPA 537	**Depth to Water After Sampling:**	NA

Stability Reached (Y/N): Yes If No, Provide Explanation

Instruments (Manufacturer, Model, and Serial No.):

Turbidity Meter, Water Quality Meter, Water Level Meter, Peristaltic Pump
LaMotte 2020we Fa01463 YSI Pro plus Fa0777

Calculations:

Saturated well casing volume: V= Π(R^2)H*7.48 gal/ft^3

V=Volume (gal/ft)
Π = 3.14
R = well radius (ft) = (well diameter (in)/12 (in/ft))/2)
H = height of water column (ft)

V= Π(R^2)H*7.48 gal/ft^3
= Π * (1 (in)/12 (in/ft))/2)^2 * 3.70 * 7.48 gal/ft^3
= 0.2

Technician Signature:

Notes:

Technician Name (print)**:**

Faisal Hussain

QA/QC'd by: **QA/QC Date:**

GROUNDWATER SAMPLING RECORD

Site Name:	Truax field	**Project Number:**	291330002.0003.3A
Well ID:	TW07	**Sample Technician:**	Adam Davis
Initial Depth to Water:	6.0	**Date:**	11/08/2017
Total Depth of Well:	10.1	**Well Diameter (inches):**	1
Method of Purging:	Pumping	**Casing Volumes (gal):**	1 X = 0.2; 3 X = 0.5
Measuring Point (toc, tor, etc.):	Top of Casing	**Pump Intake Depth (feet):**	9.0

Time	Water Level (feet)	Flow Rate (gpm)	Temp. (°C)	pH (units)	Specific Electrical Conductance (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Comments/Observations During Purging (color, sediment, odor, etc.)
Stabilization Criteria			±0.5°C	±0.1	±3%	±10%	±10%	±10% and <10 NTU	
13:53		200ml							Pump Started
13:58		200ml	14.9	7.27	.82	.15	-153.1	868	
14:01		200ml	15.1	7.16	.78	.19	-138.9	64	
14:04		200ml	15.1	7.1	.76	.14	-137.4	65.5	
14:07		200ml	15.3	7.08	.75	.16	-113.5	36	
14:10		200ml	15.3	7.05	.74	.16	-105.0	26.3	
14:14		200ml	15.3	7.02	.74	.14	-105.7	24.5	
Final Values:			**15.3**	**7.02**	**.74**	**.14**	**-105.7**	**24.5**	

Stability Reached (Y/N): Yes If No, Provide Explanation

Sample ID:	TRUAX-07-TW07-110817	**Sample Date:**	11/08/2017
Sample Depth:	5.0	**Sample Collection Time:**	14:15
Duplicate Collected:	No	**Additional QA/QC:**	No
Duplicate ID:		**Blank ID(s):**	
Method of Sampling:	Low Flow	**Total Volume Purged:**	1000ml
Analysis/Method(s):	Mod EPA 537	**Depth to Water After Sampling:**	NA

Instruments (Manufacturer, Model, and Serial No.):

Turbidity Meter, Water Quality Meter, Water Level Meter, Peristaltic Pump
LaMotte 2020we Fa01463 YSI Pro plus Fa0777

Calculations:

Saturated well casing volume: V= Π(R^2)H*7.48 gal/ft^3

V=Volume (gal/ft)
Π = 3.14
R = well radius (ft) = (well diameter (in)/12 (in/ft))/2)
H = height of water column (ft)

V= Π(R^2)H*7.48 gal/ft^3
= Π * (1 (in)/12 (in/ft))/2)^2 * 4.10 * 7.48 gal/ft^3
= 0.2

Technician Signature:

Notes:

Technician Name (print)**:** Adam Davis

QA/QC'd by: **QA/QC Date:**

GROUNDWATER SAMPLING RECORD

amec foster wheeler

Site Name:	Truax field	**Project Number:**	291330002.0003.3A
Well ID:	TW08	**Sample Technician:**	Adam Davis
Initial Depth to Water:	6.5	**Date:**	11/08/2017
Total Depth of Well:	10.2	**Well Diameter (inches):**	1
Method of Purging:	Pumping	**Casing Volumes (gal):**	1 X = 0.2; 3 X = 0.5
Measuring Point (toc, tor, etc.):	Top of Casing	**Pump Intake Depth (feet):**	8.0

Time	Water Level (feet)	Flow Rate (gpm)	Temp. (°C)	pH (units)	Specific Electrical Conductance (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Comments/Observations During Purging (color, sediment, odor, etc.)
	Stabilization Criteria		±0.5°C	±0.1	±3%	±10%	±10%	±10% and <10 NTU	
10:15		200ml							Pump Started
10:20		200ml	14.5	7.2	.69	.32	-120.4	132	
10:23		200ml	14.5	7.09	.67	.28	-140.8	62.6	
10:26		200ml	14.7	7.04	.65	.23	-126.2	38.6	
10:29		200ml	14.7	7.01	.64	.16	-103.0	22.5	
10:32		200ml	14.6	6.98	.63	.14	-102.0	17.8	
10:35		200ml	14.6	6.97	.62	.19	-89.2	13.8	

Stability Reached (Y/N): Yes — If No, Provide Explanation

	Temp.	pH	SEC	DO	ORP	Turbidity
Final Values:	14.6	6.97	.62	.19	-89.2	13.8

Sample ID:	TRUAX-08-TW08-110817	**Sample Date:**	11/08/2017
Sample Depth:	5.0	**Sample Collection Time:**	10:39
Duplicate Collected:	No	**Additional QA/QC:**	No
Duplicate ID:		**Blank ID(s):**	
Method of Sampling:	Low Flow	**Total Volume Purged:**	1000ml
Analysis/Method(s):	Mod EPA 537	**Depth to Water After Sampling:**	NA

Instruments (Manufacturer, Model, and Serial No.):

Turbidity Meter, Water Quality Meter, Water Level Meter, Peristaltic Pump
LaMotte 2020we Fa01463 YSI Pro plus Fa0777

Calculations:

Saturated well casing volume: V= Π(R^2)H*7.48 gal/ft^3

V=Volume (gal/ft)
Π = 3.14
R = well radius (ft) = (well diameter (in)/12 (in/ft))/2)
H = height of water column (ft)

V= Π(R^2)H*7.48 gal/ft^3
= Π * (1 (in)/12 (in/ft))/2)^2 * 3.70 * 7.48 gal/ft^3
= 0.2

Technician Signature: [signature]

Notes:

Technician Name (print): Adam Davis

QA/QC'd by: **QA/QC Date:**

GROUNDWATER SAMPLING RECORD

Site Name:	Truax field	**Project Number:**	291330002.0003.3A
Well ID:	TW09	**Sample Technician:**	Adam Davis
Initial Depth to Water:	11.5	**Date:**	11/09/2017
Total Depth of Well:	15.2	**Well Diameter (inches):**	1
Method of Purging:	Pumping	**Casing Volumes (gal):**	1 X = 0.2; 3 X = 0.5
Measuring Point (toc, tor, etc.):	Top of Casing	**Pump Intake Depth (feet):**	14.0

Time	Water Level (feet)	Flow Rate (gpm)	Temp. (°C)	pH (units)	Specific Electrical Conductance (mS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Comments/Observations During Purging (color, sediment, odor, etc.)
Stabilization Criteria			±0.5°C	±0.1	±3%	±10%	±10%	±10% and <10 NTU	
08:53		200ml							Pump Started
08:58		200ml	14.2	7.87	.74	.53	-174.8	45.3	
09:01		200ml	14.0	7.77	.69	.96	-133.3	11.43	
09:04		200ml	14.2	7.65	.67	1.36	-104.7	6.35	
09:07		200ml	14.2	7.55	.66	1.45	-84.6	9.41	
09:10		200ml	14.3	7.49	.65	1.53	-70.3	19.3	
09:13		200ml	14.6	7.44	.64	1.71	-57.8	5.33	
Final Values:			**14.6**	**7.44**	**.64**	**1.71**	**-57.8**	**5.33**	

Stability Reached (Y/N): No — If No, Provide Explanation: ORP not stabilized

Sample ID:	TRUAX-09-TW09-110917	**Sample Date:**	11/09/2017
Sample Depth:	10.2	**Sample Collection Time:**	09:15
Duplicate Collected:	No	**Additional QA/QC:**	No
Duplicate ID:		**Blank ID(s):**	
Method of Sampling:	Low Flow	**Total Volume Purged:**	1000ml
Analysis/Method(s):	Mod EPA 537	**Depth to Water After Sampling:**	NA

Instruments (Manufacturer, Model, and Serial No.):

Turbidity Meter, Water Quality Meter, Water Level Meter, Peristaltic Pump
LaMotte 2020we Fa01463 YSI Pro plus Fa0777

Calculations:

Saturated well casing volume: V= Π(R^2)H*7.48 gal/ft^3

V=Volume (gal/ft)
Π = 3.14
R = well radius (ft) = (well diameter (in)/12 (in/ft))/2)
H = height of water column (ft)

V= Π(R^2)H*7.48 gal/ft^3
= Π * (1 (in)/12 (in/ft))/2)^2 * 3.70 * 7.48 gal/ft^3
= 0.2

Technician Signature:

Notes:

-57.8

Technician Name (print)**:** Adam Davis

QA/QC'd by: **QA/QC Date:**

APPENDIX C

INVESTIGATION DERIVED WASTE MANIFEST

THIS PAGE INTENTIONALLY LEFT BLANK.

0119254

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number: WI3 570 024 247
2. Page 1 of: 1
3. Emergency Response Phone: (800) 838-3975
4. Waste Tracking Number: 0119254

5. Generator's Name and Mailing Address: 3110 MITCHELL ST. MADISON, WI 53704
Generator's Site Address (if different than mailing address): TRUAX FIELD (WI AIR NATIONAL
Generator's Phone: (608) 246-3380

6. Transporter 1 Company Name: EQ INDUSTRIAL SERVICES
U.S. EPA ID Number: MIK 435 642 742

7. Transporter 2 Company Name: Smith Systems
U.S. EPA ID Number: MID986982137

8. Designated Facility Name and Site Address: EQ DETROIT, INC.
1923 FREDERICK STREET
DETROIT, MI 48211
Facility's Phone: (313) 347-1300
U.S. EPA ID Number: MID 980 991 566

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	NON-REGULATED MATERIAL	001	DM	00485	P	
2.	NON-REGULATED MATERIAL	001	DM	00207	P	029L
3.						
4.						

13. Special Handling Instructions and Additional Information
1. D182568DET / IDW Soil 2. D182567DET / IDW Water (T 14 [illegible])

14. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: MATTHEW L. SHAW
Signature:
Month: 06 Day: 01 Year: 18

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: James Scroghan
Signature:
Month: 06 Day: 01 Year: 18

Transporter 2 Printed/Typed Name: Vince Roberts
Signature:
Month: 6 Day: 7 Year: 18

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator)
U.S. EPA ID Number:
Facility's Phone:

17c. Signature of Alternate Facility (or Generator)
Month: Day: Year:

~~NONE~~ H10 ~~LIB~~ H10

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name: Michelle Pringle
Signature:
Month: 6 Day: 7 Year: 18

169-BLC-O 6 10498 (Rev. 9/09)

DESIGNATED FACILITY TO GENERATOR

THIS PAGE INTENTIONALLY LEFT BLANK.

APPENDIX D

DATA VALIDATION REPORTS

THIS PAGE INTENTIONALLY LEFT BLANK.

DATA VALIDATION REPORT

FY16 Phase 1 Regional Site Inspections for Perfluorinated Compounds

Multiple Air National Guard Installations

Samples Collected Between 6 and 9 November 2017

Dane County Regional Airport Truax Field, Dane County, Wisconsin

Prepared for:

National Guard Bureau

Prepared by:

Amec Foster Wheeler Environment & Infrastructure, Inc.
7376 SW Durham Road
Portland, Oregon 97224
(503) 639-3400

February 2018

Project No. 291330006.019.****

TABLE OF CONTENTS

LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

µg/kg	micrograms per kiligram
µg/L	micrograms per liter
%	percent
Amec Foster Wheeler	Amec Foster Wheeler Environment & Infrastructure, Inc.
CCV	Continuing Calibration Verification
COC	Chain of Custody
DL	Detection Limit
DoD	Department of Defense
EPA	United States Environmental Protection Agency
ICAL	Initial Calibration
ICV	Initial Calibration Verification
ID	Identification
LC/MS/MS	Liquid Chromatography/Tandem Mass Spectrometry
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOQ	Limit of Quantification
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PFAS	Per- and Polyfluoroalkyl Substances
PFBS	Perfluorobutanesulfonic Acid
PFHpA	Perfluoroheptanoic Acid
PFHxS	Perfluorohexanesulfonic Acid
PFNA	Perfluorononanoic Acid
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctanesulfonic Acid
QAPP	Quality Assurance Project Plan
QC	Quality Control
QSM	Quality Systems Manual for Environmental Laboratiories

RPD	Relative Percent Difference
Vista	Vista Analytical Laboratory

DATA VALIDATION REPORT
FY16 PHASE 1 REGIONAL SITE INSPECTIONS FOR PERFLUORINATED COMPOUNDS

Multiple Air National Guard Installations
Samples Collected Between 6 and 9 November 2017
Dane County Regional Airport Truax Field, Dane County, Wisconsin

1.0 INTRODUCTION

Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler) collected 59 soil samples (including 5 field duplicates) and 14 water samples (including 1 field duplicate and 1 equipment blank) between 6 and 9 November 2017, from the Dane County Regional Airport Truax Field located in Dane County, Wisconsin. Amec Foster Wheeler submitted the samples to Vista Analytical Laboratory (Vista), located in El Dorado Hills, California, where they were received on 10 November 2017. Vista assigned the samples to sample delivery groups 1701662, 1701663, 1701664, 1701665, and 1701666. Vista analyzed the samples for per- and polyfluoroalkyl substances (PFAS) by modified United States Environmental Protection Agency (EPA) Method 537. A list of these samples by field sample identification (ID), sample collection date, sample matrix, and laboratory sample ID is presented in Table 1.

2.0 DATA VALIDATION METHODOLOGY

Amec Foster Wheeler performed EPA Stage 4 validation on 10 percent (%) of the field samples and EPA Stage 2B validation on the remaining field samples associated with this sampling event, as indicated on Table 1. The Stage 4 validation includes review of the quality control (QC) results in the laboratory's analytical report and reported on QC summary forms as well as recalculation checks and review of the instrument raw data outputs. The Stage 2B validation includes review of the QC results in the laboratory's analytical report and reported on QC summary forms with no review of the associated raw data. Data from equipment and field blanks did not undergo validation because results from these samples are only used to assess data usability for field samples. This data validation has been performed in general accordance with:

- Amec Foster Wheeler, 2017. Final Quality Assurance Project Plan (QAPP), Revision 01. FY16 Phase 1 Regional Site Inspections for Perfluorinated Compounds, Multiple Air National Guard Installations. Contract #: W9133L-14-D-002, Delivery Order 0006, July 2017.
- Department of Defense (DOD), 2017. DoD Quality Systems Manual for Environmental Laboratories (QSM), Version 5.1. January 2017.

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

The data were reviewed following Amec Foster Wheeler's general data validation guidelines and using QAPP-specified QC requirements.

The laboratory's certified analytical report and supporting documentation were reviewed to assess the following:

- Data package and electronic data deliverable completeness;
- Laboratory case narrative review;
- Chain of custody (COC) compliance;
- Holding time compliance;
- QC sample frequency;
- Initial calibration (ICAL), initial calibration verification (ICV), and continuing calibration verification (CCV) compliance with method-specified criteria;
- Presence or absence of laboratory contamination as demonstrated by laboratory blanks;
- Accuracy and bias as demonstrated by recovery of surrogate spikes, laboratory control sample (LCS), and matrix spike (MS) samples;
- Internal standard recoveries;
- Analytical precision as relative percent difference (RPD) of analyte concentration between laboratory duplicates or MS/MS duplicate (MSD);
- Sampling and analytical precision as RPD of analyte concentration between field duplicates;
- Assessment of field contamination as demonstrated by field and trip blanks;
- Insofar as possible, the degree of conformance to method requirements and good laboratory practices.

In general, it is important to recognize that no analytical data are guaranteed to be correct, even if all QC audits are passed. Strict QC serves to increase confidence in data, but any reported value may potentially contain error.

3.0 EXPLANATION OF DATA QUALITY INDICATORS

Summary explanations of the specific data quality indicators reviewed during this data quality review are presented below.

3.1 LABORATORY CONTROL SAMPLE RECOVERIES

LCSs and LCS duplicates (LCSDs) are aliquots of analyte-free matrices that are spiked with the analytes of interest for an analytical method, or a representative subset of those analytes. The spiked matrix is then processed through the same analytical procedures as the samples it accompanies. LCS recovery is an indication of a laboratory's ability to successfully perform an analytical method in an interference-free matrix.

3.2 MATRIX SPIKE RECOVERIES

MSs and MSDs are prepared by adding known amounts of the analytes of interest for an analytical method, or a representative subset of those analytes, to an aliquot of sample. The spiked sample is then processed through the same extraction, concentration, cleanup, and analytical procedures as the unspiked samples in an analytical batch.

MS recovery and precision are an indication of a laboratory's ability to successfully recover an analyte in the matrix of a specific sample or closely related sample matrices. It is important not to apply MS results for any specific sample to other samples without understanding how the sample matrices are related.

3.3 BLANK CONCENTRATIONS

Blank samples are aliquots of analyte free matrix that are used as negative controls to verify that the sample collection, storage, preparation, and analysis system does not produce false positive results.

Equipment blanks are prepared by passing analyte-free water through or over sample collection equipment and collecting the water in sample containers. Equipment blanks are analyzed for the analytical suite required for the project. Equipment blanks are used to monitor for possible sample contamination during the sample collection process and serve as a check on the effectiveness of field decontamination procedures.

Laboratory blanks are processed by the laboratory using exactly the same procedures as the field samples. Target analytes should not be found in laboratory blanks.

Laboratory and equipment blanks are processed by the laboratory using exactly the same procedures as the field samples. Target analytes should not be found in blanks.

When target analytes are detected in blanks, analyte concentrations in the associated samples less than 10 times the concentration detected in the blank will be B qualified.

3.4 LABORATORY AND FIELD DUPLICATES

Laboratory and field duplicate analysis verifies acceptable method precision by the laboratory at the time of preparation and analysis and/or sampling precision at the time of collection.

4.0 DEFINITIONS OF QUALIFIERS THAT MAY BE USED DURING DATA VALIDATION

B The analyte was detected in the sample and an associated blank and the concentration detected in the sample was less than 10 times the concentration detected in the blank.

U The analyte was analyzed for, but was not detected.

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

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Q The analyte was B qualified because of a detection in an associated blank and additionally J qualified because of an additional QC issue.

R The sample result is rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

5.0 QUALIFICATION REASON CODES

Amec Foster Wheeler applied the following reason code to the data during validation:

FDD Imprecision between field duplicate results.

ICE Result was greater than calibration range

ISH Internal standard recovery greater than upper control limit.

ISL Internal standard recovery less than lower control limit.

MSH Matrix spike recovery greater than upper control limit.

MSL Matrix spike recovery less than lower control limit.

TR Detected concentration is less than the limit of quantification (LOQ).

6.0 CHAIN OF CUSTODY AND SAMPLE RECEIPT CONDITION DOCUMENTATION

The samples were received at the laboratories under proper COC, intact, properly preserved, and at temperatures less than the QAPP-specified maximum of 10 degrees Celsius, with the following exceptions:

- The laboratory noted a number of discrepancies between sample names recorded on container labels and the COC. All labeling discrepancies were resolved with Amec Foster Wheeler and correct information is presented in the final laboratory data deliverables.
- Sample TRUAX-EB-110617 was received at the laboratory, but was not listed on the associated COC. Vista analyzed the sample and reported the results.
- The laboratory noted that the IDs recorded on the labels and the caps of samples TRUAX-07-SB03-110717-0.5-1.0 and TRUAX-07-SO-DUP2-110717 did not match. The samples were logged in using the IDs that matched the COC.

7.0 SPECIFIC DATA VALIDATION FINDINGS

Results from these samples may be considered usable with the limitations and exceptions described Sections 7.1 through 7.11.

7.1 PER- AND POLYFLUOROALKYL SUBSTANCES BY MODIFIED EPA METHOD 537

PFAS results generated by Vista are usable with the limitations described in Sections 7.1.1 through 7.1.11.

7.1.1 Holding Times

The aqueous samples were extracted for PFAS within the QAPP-specified maximum holding time of 14 days from sample collection and the extracts were analyzed within the QAPP-specified

maximum hold time of 28 days from extraction. The soil samples were extracted for PFAS within the QAPP-specified maximum holding time of 60 days from sample collection and the extracts were analyzed within the QAPP-specified maximum holding time of 30 days from extraction.

7.1.2 Initial Calibrations

The ICALs associated with the analysis of these samples met the QSM 5.1-specified criteria of relative standard deviations of response factors less than 20%, coefficients of determination greater than or equal to 0.99, and all calibration points calculate to 70 to 130% of their true concentrations.

7.1.3 Initial Calibration Verification

ICV recoveries were within the method-specified 70 to 130% limits.

7.1.4 Continuing Calibration Verification

CCV recoveries were within the method-specified 70 to 130% limits.

7.1.5 Laboratory Blanks

PFAS were not detected in the laboratory blanks associated with these samples.

7.1.6 Equipment Blanks

PFAS were not detected in the equipment blanks associated with these samples.

7.1.7 Laboratory Control Sample Accuracy

LCS recoveries were within the QAPP-specified limits of: 60 to 130% for perfluorobutanesulfonic acid (PFBS); 70 to 130% for perfluoroheptanoic acid (PFHpA), perfluorohexanesulfonic acid (PFHxS), PFOA, and perfluorooctanesulfonic acid (PFOS); and 50 to 130% for perfluorononanoic acid (PFNA).

7.1.8 Matrix Spikes/ Matrix Spike Duplicates

Vista performed MS and MSD analyses on samples TRUAX-06-TW06-110617, TRUAX-06-SB02-0.5-1.0, TRUAX-05-SB01-110917-0.5-1, and TRUAX-01-SB02-110817-0.5-1. Recoveries were within the QAPP-specified limits of: 60 to 130% for PFBS; 70 to 130% for PFHpA, PFHxS, PFOA, and PFOS; and 50 to 130% for PFNA, and precision values were less than the QAPP-specified maximum of 30%, with the exceptions listed below.

- Due to a software flaw, Vista is calculating RPDs based on MS and MSD recoveries instead of concentrations detected in the MS and MSD. Amec Foster Wheeler recalculated RPDs between MS and MSD results to confirm that precision values were within limits.
- PFHxS and PFOS recoveries were low at 62.2% and 62.4%, respectively, in the MS performed on sample TRUAX-06-TW06-110617. Amec Foster Wheeler J qualified the detected PFHxS and PFOS results from this sample due to potential low analytical bias. (J-MSL)
- PFHxS (61.0%, 21.6%), PFOA (61.7% MS), and PFOS (342%, 272%) recoveries were outside of specified limits in the MS and/or MSD performed on sample TRUAX-05-SB01-110917-0.5-1. Data limitations are summarized below.
  - Amec Foster Wheeler J qualified the detected PFHxS and PFOA results from this sample due to potential low analytical bias. (J-MSL)
  - The PFOS concentration in the unspiked native sample was greater than the spike concentration, and data usability cannot be evaluated based on the MS/MSD recovery.
  - PFOS recovery was low at 25.9% in the MS performed on sample TRUAX-01-SB02-110817-0.5-1. The PFOS concentration in the unspiked native sample was greater than the spike concentration, and data usability cannot be evaluated based on the MS/MSD recovery.

7.1.9 Surrogate Recoveries

Vista uses labeled internal standards, which are added before extraction, to quantify their analytical results and does not add surrogates to the samples.

7.1.10 Internal Standard Recoveries

Internal standard areas were within the QAPP-specified limits of 50 to 150% of the average area counts measured during the initial calibration, with the following exceptions:

- $^{13}C_3$-PFBS (36.5%), $^{18}O_2$-PFHxS (47.2%), and $^{13}C_8$-PFOS (46.7%) recoveries were low in the analysis of sample TRUAX-05-SB03-110917-0.5-1. Data limitations are summarized below:
  - Amec Foster Wheeler J qualified the detected PFHxS and PFOS results from this sample due to potential high analytical bias. (J-ISL)
  - PFBS was not detected in this sample and data usability is not adversely affected by the potential high analytical bias.
- $^{13}C_3$-PFBS (12.6%), $^{18}O_2$-PFHxS (22.5%), $^{13}C_8$-PFOS (12.5%), and $^{13}C_5$-PFNA (41.4%) recoveries were low in the analysis of sample TRUAX-04-SB02-110917-5-5.5. Data limitations are summarized below:

- Amec Foster Wheeler J qualified the detected PFHxS, PFOS, and PFNA results from this sample due to potential high analytical bias. (J-ISL)
- PFBS was not detected in this sample and data usability is not adversely affected by the potential high analytical bias.

- $^{13}C_8$-PFOS recovery was high at 153% in the analysis of sample TRUAX-01-SB01-110817-0.5-1. Amec Foster Wheeler J qualified the detected PFOS result from this sample due to potential low analytical bias. (J-ISH)

7.1.11 Data Reporting and Analytical Procedures

Vista J qualified analytes with concentrations between the detection limit (DL) and the LOQ. Amec Foster Wheeler agrees that these results are quantitatively uncertain and has maintained Vista's J qualifiers. (Qualifier and reason code: J-TR)

According to the laboratory, the PFOS results from samples TRUAX-02-SB03-110817-0.5-1 and TRUAX-DUP5-110817 had concentrations greater than the highest concentration in the calibration curve and the extracts could not be diluted further, leading the lab to qualify these results as estimates. Amec Foster Wheeler agrees with the laboratory that the reported concentrations should be considered estimated values, and J qualified the PFOS results in question. (J-ICE)

8.0 FIELD DUPLICATE RESULTS

Amec Foster Wheeler collected field duplicates with samples:

- TRUAX-BB-TWBB01-110817 (TRUAX-BB-GW-DUP0101-110817),
- TRUAX-08-SB02-110717-0.5-1.0 (TRUAX-08-SO-DUP3-110717),
- TRUAX-01-SB03-110817-0.5-1 (TRUAX-DUP4-110817),
- TRUAX-02-SB03-110817-0.5-1 (TRUAX-DUP5-110817),
- TRUAX-06-SB01-110617-0.5-1.0 (TRUAX-DUP01-110617), and
- TRUAX-07-SB03-110717-0.5-1.0 (TRUAX-07-SO-DUP2-110717).

Detected results and RPDs for the field duplicates are summarized in Table 2. Precision values were within the QAPP-specified limits of less than 30% RPD or the difference between analytical results less than the LOQ, with the following exceptions:

- The RPDs between PFHxS and PFOS results from sample TRUAX-07-SB03-110717-0.5-1.0 and its field duplicate TRUAX-07-SO-DUP2-110717 were high at 43% and 52%, respectively.

Amec Foster Wheeler J qualified the PFHxS and PFOS results from these samples due to potential sampling and/or analytical imprecision. (J-FDD)

- The RPDs between PFHxS and PFOS results from sample TRUAX-08-SB02-110717-0.5-1.0 and its field duplicate TRUAX-08-SO-DUP3-110717 were high at 69% and 63%, respectively. Amec Foster Wheeler J qualified the PFHxS and PFOS results from these samples due to potential sampling and/or analytical imprecision. (J-FDD)
- The RPD between PFOS results from sample TRUAX-06-SB01-110617-0.5-1.0 and its field duplicate TRUAX-DUP01-110617 was high at 69%. Amec Foster Wheeler J qualified the PFOS results from these samples due to potential sampling and/or analytical imprecision. (J-FDD)

9.0 SUMMARY AND CONCLUSIONS

Amec Foster Wheeler evaluated a total of 432 data records from field samples during the validation. Amec Foster Wheeler J qualified 118 records (27.3%) as estimated values because of low MS recovery, imprecision between field duplicate results, high or low internal standard recoveries, and/or analyte concentrations outside the instrument's calibration range. Qualified data are summarized in Table 3.

REFERENCES

Amec Foster Wheeler, 2017. Final QAPP, Revision 01. FY16 Phase 1 Regional Site Inspections for Perfluorinated Compounds, Multiple Air National Guard Installations. Contract #: W9133L-14-D-002, Delivery Order 0006, July 2017.

DOD, 2017. DoD Quality Systems Manual for Environmental Laboratories, Version 5.1. January 2017.

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

TABLES

Table 1
Field Samples Submitted to Vista Analytical Laboratory
Truax Field, Wisconsin
FY16 Phase 1 Regional Site Inspection for Per-Fluorinated Compounds

Sample Identification	Collection Date	Sample Matrix	Lab Sample ID	Notes
TRUAX-BB-TWBB01-110817	8-Nov-17	Water	1701662-01	
TRUAX-BB-GW-DUP0101-110817	8-Nov-17	Water	1701662-02	Field duplicate of TRUAX-BB-TWBB01-110817
TRUAX-06-TW06-110617	8-Nov-17	Water	1701662-03	Stage 4 Validation, MS/MSD
TRUAX-01-TW01-110817	8-Nov-17	Water	1701662-04	
TRUAX-03-TW03-110817	8-Nov-17	Water	1701662-05	
TRUAX-07-TW07-110817	8-Nov-17	Water	1701662-06	
TRUAX-02-TW02-110817	8-Nov-17	Water	1701662-07	
TRUAX-08-TW08-110817	8-Nov-17	Water	1701662-08	
TRUAX-BB-TWBB02-110917	9-Nov-17	Water	1701662-09	
TRUAX-BB-TWBB03-110917	9-Nov-17	Water	1701662-10	
TRUAX-09-TW09-110917	9-Nov-17	Water	1701662-11	
TRUAX-04-TW04-110917	9-Nov-17	Water	1701662-12	
TRUAX-05-TW05-110917	9-Nov-17	Water	1701662-13	
TRUAX-EB-110617	6-Nov-17	Water	1701662-14	Equipment Blank
TRUAX-07-SO-DUP2-110717	7-Nov-17	Soil	1701663-01	Field duplicate of TRUAX-07-SB03-110717-0.5-1.0
TRUAX-07-SB01-110717-0.5-1.0	7-Nov-17	Soil	1701663-02	
TRUAX-07-SB01-110717-4.5-5.0	7-Nov-17	Soil	1701663-03	
TRUAX-08-SB03-110717-0.5-1.0	7-Nov-17	Soil	1701663-04	
TRUAX-08-SB03-110717-4.5-5.0	7-Nov-17	Soil	1701663-05	
TRUAX-08-SB02-110717-0.5-1.0	7-Nov-17	Soil	1701663-06	
TRUAX-08-SO-DUP3-110717	7-Nov-17	Soil	1701663-07	Field duplicate of TRUAX-08-SB02-110717-0.5-1.0
TRUAX-08-SB02-110717-5.0-5.5	7-Nov-17	Soil	1701663-08	
TRUAX-08-SB01-110717-0.5-1.5	7-Nov-17	Soil	1701663-09	
TRUAX-08-SB01-110717-5.0-5.5	7-Nov-17	Soil	1701663-10	
TRUAX-06-SB03-4.5-5.5	7-Nov-17	Soil	1701663-11	
TRUAX-06-SB03-7.0-7.5	7-Nov-17	Soil	1701663-12	
TRUAX-06-SB02-0.5-1.0	7-Nov-17	Soil	1701663-13	MS/MSD
TRUAX-06-SB02-110717-4.5-5.0	7-Nov-17	Soil	1701663-14	
TRUAX-09-SB03-110717-3.5-4.0	7-Nov-17	Soil	1701663-15	
TRUAX-09-SB03-110717-6.5-7.0	7-Nov-17	Soil	1701663-16	
TRUAX-07-SB03-110717-0.5-1.0	7-Nov-17	Soil	1701663-17	
TRUAX-07-SB03-110717-5.0-5.5	7-Nov-17	Soil	1701663-18	
TRUAX-07-SB02-110717-0.5-1.0	7-Nov-17	Soil	1701663-19	
TRUAX-07-SB02-110717-4.5-5.0	7-Nov-17	Soil	1701663-20	
TRUAX-09-SB01-110917-1-2	9-Nov-17	Soil	1701664-01	Stage 4 Validation
TRUAX-09-SB01-110917-9.0-9.5	9-Nov-17	Soil	1701664-02	Stage 4 Validation
TRUAX-05-SB02-110917-0.5-1	9-Nov-17	Soil	1701664-03	Stage 4 Validation
TRUAX-05-SB02-110917-7-7.5	9-Nov-17	Soil	1701664-04	Stage 4 Validation
TRUAX-05-SB03-110917-0.5-1	9-Nov-17	Soil	1701664-05	
TRUAX-04-SB02-110917-1-2	9-Nov-17	Soil	1701664-06	
TRUAX-04-SB02-110917-5-5.5	9-Nov-17	Soil	1701664-07	
TRUAX-04-SB03-110917-1-2	9-Nov-17	Soil	1701664-08	Stage 4 Validation
TRUAX-04-SB03-110917-5-5.5	9-Nov-17	Soil	1701664-09	Stage 4 Validation
TRUAX-04-SB01-110917-0.5-1	9-Nov-17	Soil	1701664-10	
TRUAX-04-SB01-110917-4.5-5	9-Nov-17	Soil	1701664-11	
TRUAX-05-SB01-110917-0.5-1	9-Nov-17	Soil	1701664-12	MS/MSD
TRUAX-05-SB01-110917-6-6.5	9-Nov-17	Soil	1701664-13	
TRUAX-05-SB03-110917-6-6.5	9-Nov-17	Soil	1701664-14	
TRUAX-09-SB02-2-3	8-Nov-17	Soil	1701664-15	
TRUAX-09-SB02-110817-8-9	8-Nov-17	Soil	1701664-16	
TRUAX-01-SB01-110817-0.5-1	8-Nov-17	Soil	1701665-01	
TRUAX-DUP4-110817	8-Nov-17	Soil	1701665-02	Field duplicate of TRUAX-01-SB03-110817-0.5-1
TRUAX-01-SB01-110817-4.5-5	8-Nov-17	Soil	1701665-03	
TRUAX-01-SB03-110817-0.5-1	8-Nov-17	Soil	1701665-04	
TRUAX-01-SB03-110817-4-4.5	8-Nov-17	Soil	1701665-05	
TRUAX-01-SB02-110817-0.5-1	8-Nov-17	Soil	1701665-06	MS/MSD
TRUAX-01-SB02-110817-4.5-5	8-Nov-17	Soil	1701665-07	

Table 1
Field Samples Submitted to Vista Analytical Laboratory
Truax Field, Wisconsin
FY16 Phase 1 Regional Site Inspection for Per-Fluorinated Compounds

Sample Identification	Collection Date	Sample Matrix	Lab Sample ID	Notes
TRUAX-03-SB03-0.5-1	8-Nov-17	Soil	1701665-08	
TRUAX-03-SB03-110817-5-5.5	8-Nov-17	Soil	1701665-09	
TRUAX-03-SB01-110817-0.5-1	8-Nov-17	Soil	1701665-10	
TRUAX-03-SB01-110817-6-6.5	8-Nov-17	Soil	1701665-11	
TRUAX-03-SB02-0.5-1	8-Nov-17	Soil	1701665-12	
TRUAX-03-SB02-4-4.5	8-Nov-17	Soil	1701665-13	
TRUAX-02-SB02-0.5-1	8-Nov-17	Soil	1701665-14	
TRUAX-02-SB02-110817-5-5.5	8-Nov-17	Soil	1701665-15	
TRUAX-02-SB03-110817-0.5-1	8-Nov-17	Soil	1701665-16	
TRUAX-DUP5-110817	8-Nov-17	Soil	1701665-17	Field duplicate of TRUAX-02-SB03-110817-0.5-1
TRUAX-02-SB03-110817-6-6.5	8-Nov-17	Soil	1701665-18	
TRUAX-02-SB01-110817-0.5-1	8-Nov-17	Soil	1701665-19	
TRUAX-02-SB02-110817-6-6.5	8-Nov-17	Soil	1701665-20	
TRUAX-06-SB01-110617-0.5-1.0	6-Nov-17	Soil	1701666-01	
TRUAX-06-SB01-110617-6.5-7.0	6-Nov-17	Soil	1701666-02	
TRUAX-DUP01-110617	6-Nov-17	Soil	1701666-03	Field duplicate of TRUAX-06-SB01-110617-0.5-1.0

ID = identification
MS/MSD = matrix spike/matrix spike duplicate analyses performed on this sample

Table 2
Field Duplicate Detections
Truax Field, Wisconsin
FY16 Phase 1 Regional Site Inspection for Per-Fluorinated Compounds

Analyte	LOQ	Primary Sample	Field Duplicate	Units	RPD	Notes
TRUAX-BB-TWBB01-110817 (TRUAX-BB-GW-DUP0101-110817)						
PFBS	0.00846	0.0687	0.0692	µg/L	0.7%	
PFHpA	0.00846	0.131	0.138	µg/L	5.2%	
PFHxS	0.00846	1.09	0.966	µg/L	12%	
PFOA	0.00846	0.0953	0.0994	µg/L	4.2%	
PFOS	0.00846	0.569	0.510	µg/L	11%	
PFNA	0.00846	0.0196	0.0222	µg/L	12%	
TRUAX-07-SB03-110717-0.5-1.0 (TRUAX-07-SO-DUP2-110717)						
PFHpA	1.95	0.528 J	0.375 J	µg/kg	34%	± LOQ
PFHxS	1.95	10.5	6.76	µg/kg	43%	J-FDD
PFOA	1.95	1.25 J	1.03 J	µg/kg	19%	
PFOS	1.95	175	103	µg/kg	52%	J-FDD
PFNA	1.95	1.33 J	1.04 J	µg/kg	24%	
TRUAX-08-SB02-110717-0.5-1.0 (TRUAX-08-SO-DUP3-110717)						
PFBS	1.95	0.966 U	0.339 J	µg/kg	NC	± LOQ
PFHpA	1.95	0.966 U	0.430 J	µg/kg	NC	± LOQ
PFHxS	1.95	3.71	7.59	µg/kg	69%	J-FDD
PFOA	1.95	0.321 J	0.714 J	µg/kg	76%	± LOQ
PFOS	1.95	19.9	38.1	µg/kg	63%	J-FDD
PFNA	1.95	0.334 J	0.443	µg/kg	28%	
TRUAX-01-SB03-110817-0.5-1 (TRUAX-DUP4-110817)						
PFBS	1.98	0.304 J	0.386 J	µg/kg	24%	
PFHpA	1.98	0.983 U	0.371 J	µg/kg	NC	± LOQ
PFHxS	1.98	8.76	9.61	µg/kg	9.3%	
PFOA	1.98	0.686 J	1.00 J	µg/kg	37%	± LOQ
PFOS	1.98	68.3	51.9	µg/kg	27%	
PFNA	1.98	0.410 J	0.516 J	µg/kg	23%	
TRUAX-02-SB03-110817-0.5-1 (TRUAX-DUP5-110817)						
PFBS	1.96	16.1	17.1	µg/kg	6.0%	
PFHpA	1.96	5.00	5.67	µg/kg	13%	
PFHxS	78.2	1,370	1,730	µg/kg	23%	
PFOA	1.96	118	151	µg/kg	25%	
PFOS	78.2	30,100	36,800	µg/kg	20%	
PFNA	1.96	21.7	25.4	µg/kg	16%	
TRUAX-06-SB01-110617-0.5-1.0 (TRUAX-DUP01-110617)						
PFHxS	1.98	0.978 J	1.28 J	µg/L	27%	
PFOA	1.98	0.818 J	1.01 J	µg/L	21%	
PFOS	1.98	2.09	4.28	µg/L	69%	J-FDD

Notes:

µg/kg = micrograms per kilogram
µg/L = micrograms per liter
LOQ = limit of quantification
NC = not calculable
PFBS = perfluorobutanesulfonic acid
PFHpA = perfluoroheptanoic acid
PFHxS = perfluorohexanesulfonic acid
PFNA = perfluorononanioic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid
RPD = relative percent difference

Qualifier Definitions:

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

Reason Codes:

± LOQ = The difference between analyte concentrations is less than the LOQ, indicating acceptable analytical precision.
FDD = Imprecision between field duplicate results

Table 3
Qualifiers Added During Validation
Truax Field, Wisconsin
FY16 Phase 1 Regional Site Inspection for Per-Fluorinated Compounds

Sample Identification	Analyte	Results	Validation Qualifiers and Reason Codes
TRUAX-01-SB01-110817-0.5-1	PFBS	0.390 ug/kg	J TR
TRUAX-01-SB01-110817-0.5-1	PFHpA	0.475 ug/kg	J TR
TRUAX-01-SB01-110817-0.5-1	PFOS	1,320 ug/kg	J ISH
TRUAX-01-SB01-110817-4.5-5	PFOS	0.424 ug/kg	J TR
TRUAX-01-SB02-110817-0.5-1	PFHxS	1.90 ug/kg	J TR
TRUAX-01-SB03-110817-0.5-1	PFBS	0.304 ug/kg	J TR
TRUAX-01-SB03-110817-0.5-1	PFNA	0.410 ug/kg	J TR
TRUAX-01-SB03-110817-0.5-1	PFOA	0.686 ug/kg	J TR
TRUAX-01-SB03-110817-4-4.5	PFBS	0.783 ug/kg	J TR
TRUAX-01-SB03-110817-4-4.5	PFHpA	0.290 ug/kg	J TR
TRUAX-01-SB03-110817-4-4.5	PFOS	0.512 ug/kg	J TR
TRUAX-02-SB01-110817-0.5-1	PFHpA	0.424 ug/kg	J TR
TRUAX-02-SB01-110817-0.5-1	PFNA	1.23 ug/kg	J TR
TRUAX-02-SB01-110817-0.5-1	PFOA	1.03 ug/kg	J TR
TRUAX-02-SB02-110817-5-5.5	PFBS	1.40 ug/kg	J TR
TRUAX-02-SB02-110817-5-5.5	PFHpA	0.367 ug/kg	J TR
TRUAX-02-SB02-110817-5-5.5	PFOA	1.08 ug/kg	J TR
TRUAX-02-SB02-110817-6-6.5	PFHxS	1.61 ug/kg	J TR
TRUAX-02-SB03-110817-0.5-1	PFOS	30,100 ug/kg	J ICE
TRUAX-02-SB03-110817-6-6.5	PFHpA	1.92 ug/kg	J TR
TRUAX-03-SB01-110817-0.5-1	PFNA	0.387 ug/kg	J TR
TRUAX-03-SB01-110817-0.5-1	PFOA	0.483 ug/kg	J TR
TRUAX-03-SB01-110817-6-6.5	PFHxS	0.857 ug/kg	J TR
TRUAX-03-SB02-0.5-1	PFHpA	0.754 ug/kg	J TR
TRUAX-03-SB02-0.5-1	PFNA	0.386 ug/kg	J TR
TRUAX-03-SB02-0.5-1	PFOA	1.26 ug/kg	J TR
TRUAX-03-SB03-0.5-1	PFHpA	0.855 ug/kg	J TR
TRUAX-03-SB03-110817-5-5.5	PFHxS	1.84 ug/kg	J TR
TRUAX-03-SB03-110817-5-5.5	PFNA	0.289 ug/kg	J TR
TRUAX-03-SB03-110817-5-5.5	PFOA	0.358 ug/kg	J TR
TRUAX-04-SB01-110917-0.5-1	PFHxS	1.10 ug/kg	J TR
TRUAX-04-SB01-110917-0.5-1	PFOA	0.370 ug/kg	J TR
TRUAX-04-SB01-110917-4.5-5	PFHxS	0.354 ug/kg	J TR
TRUAX-04-SB01-110917-4.5-5	PFNA	0.305 ug/kg	J TR
TRUAX-04-SB02-110917-1-2	PFHpA	0.448 ug/kg	J TR
TRUAX-04-SB02-110917-1-2	PFOA	1.60 ug/kg	J TR
TRUAX-04-SB02-110917-5-5.5	PFHpA	0.895 ug/kg	J TR
TRUAX-04-SB02-110917-5-5.5	PFHxS	16.0 ug/kg	J ISL
TRUAX-04-SB02-110917-5-5.5	PFNA	1.10 ug/kg	J ISL, TR
TRUAX-04-SB02-110917-5-5.5	PFOS	611 ug/kg	J ISL
TRUAX-04-TW04-110917	PFNA	0.00280 ug/L	J TR
TRUAX-05-SB01-110917-0.5-1	PFHpA	1.85 ug/kg	J TR
TRUAX-05-SB01-110917-0.5-1	PFHxS	38.8 ug/kg	J MSL
TRUAX-05-SB01-110917-0.5-1	PFNA	1.26 ug/kg	J TR
TRUAX-05-SB01-110917-0.5-1	PFOA	4.58 ug/kg	J MSL
TRUAX-05-SB01-110917-6-6.5	PFHxS	2.00 ug/kg	J TR
TRUAX-05-SB02-110917-0.5-1	PFHpA	1.22 ug/kg	J TR
TRUAX-05-SB02-110917-0.5-1	PFNA	1.63 ug/kg	J TR
TRUAX-05-SB02-110917-0.5-1	PFOA	1.81 ug/kg	J TR
TRUAX-05-SB03-110917-0.5-1	PFHpA	0.620 ug/kg	J TR
TRUAX-05-SB03-110917-0.5-1	PFHxS	8.83 ug/kg	J ISL
TRUAX-05-SB03-110917-0.5-1	PFOA	1.64 ug/kg	J TR
TRUAX-05-SB03-110917-0.5-1	PFOS	3.55 ug/kg	J ISL
TRUAX-05-SB03-110917-6-6.5	PFHxS	0.693 ug/kg	J TR
TRUAX-05-SB03-110917-6-6.5	PFNA	1.42 ug/kg	J TR
TRUAX-05-TW05-110917	PFNA	0.00526 ug/L	J TR

Table 3
Qualifiers Added During Validation
Truax Field, Wisconsin
FY16 Phase 1 Regional Site Inspection for Per-Fluorinated Compounds

Sample Identification	Analyte	Results	Validation Qualifiers and Reason Codes
TRUAX-06-SB01-110617-0.5-1.0	PFHxS	0.978 ug/kg	J TR
TRUAX-06-SB01-110617-0.5-1.0	PFOS	2.09 ug/kg	J FDD
TRUAX-06-SB01-110617-0.5-1.0	PFOA	0.818 ug/kg	J TR
TRUAX-06-SB02-0.5-1.0	PFNA	0.378 ug/kg	J TR
TRUAX-06-SB02-110717-4.5-5.0	PFOS	0.995 ug/kg	J TR
TRUAX-06-SB03-4.5-5.5	PFHxS	0.326 ug/kg	J TR
TRUAX-06-SB03-7.0-7.5	PFHxS	0.287 ug/kg	J TR
TRUAX-06-TW06-110617	PFHxS	0.236 ug/L	J MSL
TRUAX-06-TW06-110617	PFNA	0.00240 ug/L	J TR
TRUAX-06-TW06-110617	PFOS	0.121 ug/L	J MSL
TRUAX-07-SB01-110717-0.5-1.0	PFHxS	1.68 ug/kg	J TR
TRUAX-07-SB01-110717-0.5-1.0	PFOA	0.337 ug/kg	J TR
TRUAX-07-SB01-110717-4.5-5.0	PFHxS	1.88 ug/kg	J TR
TRUAX-07-SB02-110717-4.5-5.0	PFNA	0.311 ug/kg	J TR
TRUAX-07-SB02-110717-4.5-5.0	PFOA	0.390 ug/kg	J TR
TRUAX-07-SB03-110717-0.5-1.0	PFHpA	0.528 ug/kg	J TR
TRUAX-07-SB03-110717-0.5-1.0	PFHxS	10.7 ug/kg	J FDD
TRUAX-07-SB03-110717-0.5-1.0	PFNA	1.33 ug/kg	J TR
TRUAX-07-SB03-110717-0.5-1.0	PFOA	1.25 ug/kg	J TR
TRUAX-07-SB03-110717-0.5-1.0	PFOS	175 ug/kg	J FDD
TRUAX-07-SB03-110717-5.0-5.5	PFOA	0.447 ug/kg	J TR
TRUAX-07-SO-DUP2-110717	PFHpA	0.375 ug/kg	J TR
TRUAX-07-SO-DUP2-110717	PFHxS	6.76 ug/kg	J FDD
TRUAX-07-SO-DUP2-110717	PFNA	1.04 ug/kg	J TR
TRUAX-07-SO-DUP2-110717	PFOA	1.03 ug/kg	J TR
TRUAX-07-SO-DUP2-110717	PFOS	103 ug/kg	J FDD
TRUAX-08-SB01-110717-0.5-1.0	PFHpA	0.411 ug/kg	J TR
TRUAX-08-SB01-110717-0.5-1.0	PFNA	0.805 ug/kg	J TR
TRUAX-08-SB01-110717-0.5-1.0	PFOA	0.831 ug/kg	J TR
TRUAX-08-SB01-110717-5.0-5.5	PFHxS	1.25 ug/kg	J TR
TRUAX-08-SB01-110717-5.0-5.5	PFNA	0.793 ug/kg	J TR
TRUAX-08-SB02-110717-0.5-1.0	PFHxS	3.71 ug/kg	J FDD
TRUAX-08-SB02-110717-0.5-1.0	PFNA	0.334 ug/kg	J TR
TRUAX-08-SB02-110717-0.5-1.0	PFOA	0.321 ug/kg	J TR
TRUAX-08-SB02-110717-0.5-1.0	PFOS	19.9 ug/kg	J FDD
TRUAX-08-SB02-110717-5.0-5.5	PFBS	0.322 ug/kg	J TR
TRUAX-08-SB02-110717-5.0-5.5	PFHpA	0.587 ug/kg	J TR
TRUAX-08-SB02-110717-5.0-5.5	PFNA	0.582 ug/kg	J TR
TRUAX-08-SB02-110717-5.0-5.5	PFOA	0.920 ug/kg	J TR
TRUAX-08-SB03-110717-0.5-1.0	PFNA	0.355 ug/kg	J TR
TRUAX-08-SB03-110717-0.5-1.0	PFOA	0.360 ug/kg	J TR
TRUAX-08-SB03-110717-4.5-5.0	PFHxS	0.814 ug/kg	J TR
TRUAX-08-SB03-110717-4.5-5.0	PFOS	1.08 ug/kg	J TR
TRUAX-08-SO-DUP3-110717	PFBS	0.339 ug/kg	J TR
TRUAX-08-SO-DUP3-110717	PFHpA	0.430 ug/kg	J TR
TRUAX-08-SO-DUP3-110717	PFHxS	7.59 ug/kg	J FDD
TRUAX-08-SO-DUP3-110717	PFNA	0.443 ug/kg	J TR
TRUAX-08-SO-DUP3-110717	PFOA	0.714 ug/kg	J TR
TRUAX-08-SO-DUP3-110717	PFOS	38.1 ug/kg	J FDD
TRUAX-09-SB01-110917-1-2	PFHxS	0.392 ug/kg	J TR
TRUAX-09-SB01-110917-1-2	PFOS	0.601 ug/kg	J TR
TRUAX-09-SB01-110917-9.0-9.5	PFOS	1.91 ug/kg	J TR
TRUAX-09-TW09-110917	PFBS	0.00415 ug/L	J TR
TRUAX-BB-TWBB02-110917	PFNA	0.00699 ug/L	J TR
TRUAX-DUP01-110617	PFHxS	1.28 ug/kg	J TR
TRUAX-DUP01-110617	PFOS	4.28 ug/kg	J FDD
TRUAX-DUP01-110617	PFOA	1.01 ug/kg	J TR

Table 3
Qualifiers Added During Validation
Truax Field, Wisconsin
FY16 Phase 1 Regional Site Inspection for Per-Fluorinated Compounds

Sample Identification	Analyte	Results	Validation Qualifiers and Reason Codes
TRUAX-DUP4-110817	PFBS	0.386 ug/kg	J TR
TRUAX-DUP4-110817	PFHpA	0.371 ug/kg	J TR
TRUAX-DUP4-110817	PFNA	0.516 ug/kg	J TR
TRUAX-DUP4-110817	PFOA	1.00 ug/kg	J TR
TRUAX-DUP5-110817	PFOS	36,800 ug/kg	J ICE

Notes:

µg/kg = micrograms per kilogram
µg/L = micrograms per liter
PFBS = perfluorobutanesulfonic acid
PFHpA = perfluoroheptanoic acid
PFHxS = perfluorohexanesulfonic acid
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid

Qualifier Definitions:

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

Reason Code Definitions:

FDD = Imprecision between field duplicate results
ICE = Result was greater than calibration range
ISH = internal standard recovery greater than upper control limit
ISL = internal standard recovery less than lower control limit
MSH = High matrix spike recovery. Result may be biased high.
MSL = Matrix spike recovery less than lower control limit
TR = Detected concentration is less than the limit of quantification.

THIS PAGE INTENTIONALLY LEFT BLANK.

APPENDIX E

LABORATORY ANALYTICAL REPORTS

(Included as a separate file in electronic copy only)

THIS PAGE INTENTIONALLY LEFT BLANK.