NORTON AFB
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JOINT BASE SAN ANTONIO LACKLAND TEXAS

16 Aug 2018

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FROM: AFCEC/CIBE
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SUBJECT: Final Site Inspection (SI) Report for Aqueous Film Forming Foam (AFFF) Areas at Former Norton AFB, CA

Attached for your information and records is the *Final Site Inspection Report for Aqueous Film Forming Foam Areas at Former Norton Air Force Base, CA.* This report presents the results of the site inspection for aqueous film forming foam (AFFF) areas at Norton AFB that were identified in the 2015 *Final Perfluorinated Compound Preliminary Assessment (PA).* For questions or additional information, please contact the undersigned at (210) 395-9452 or Ms. Catherine McMillen, Aerostar SES LLC, at (865) 813-2771.

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Remedial Project Manager

Attachment:
Final Site Inspection Report for Aqueous Film Forming Foam Areas at Former Norton Air Force Base, CA

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FINAL

SITE INSPECTION REPORT
FOR
AQUEOUS FILM FORMING FOAM AREAS
AT
FORMER NORTON AIR FORCE BASE

August 2018

Prepared for:

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Acronyms and Abbreviations

µS/cm	microsiemens per centimeter
µg/kg	micrograms per kilogram
°C	degrees Celsius
AFB	Air Force Base
AFCEC	Air Force Civil Engineer Center
AFFF	aqueous film forming foam
amsl	above mean sea level
ASL	Aerostar SES LLC
AST	aboveground storage tank
BB	base boundary
bgs	below ground surface
BRAC	base realignment and closure
btoc	below top of casing
CBA	central base area
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
C-o-C	chain-of-custody
DO	dissolved oxygen
DoD	United States Department of Defense
DQO	data quality objective
ft	foot/feet
FTA	fire training area
HA	health advisory
ID	identification
IDW	investigation-derived waste
IRP	Installation Restoration Program
LOD	limit of detection
mg/L	milligrams per liter
MS	matrix spike
MSD	matrix spike duplicate
mV	millivolt
ng/L	nanograms per liter
NL	not listed
NR	no reading
NTU	nephelometric turbidity unit
ORP	oxidation-reduction potential
PA	preliminary assessment
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFHpA	perfluoroheptanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
pH	potential of hydrogen
PVC	polyvinyl chloride

QA	quality assurance
QC	quality control
QPP	quality program plan
RSL	regional screening level
RTF	regional treatment facility
SBIAA	San Bernardino International Airport Authority
Sch 80 PVC	Schedule 80 polyvinyl chloride
SI	site inspection
SOP	standard operating procedure
UFP-QAPP	Uniform Federal Policy-Quality Assurance Project Plan
USAF	United States Air Force
USEPA	United States Environmental Protection Agency

EXECUTIVE SUMMARY

This report presents the results of the site inspection (SI) for the aqueous film forming foam (AFFF) areas at the Former Norton Air Force Base (AFB), San Bernardino, California. Field activities were conducted between April and July 2017. Selection of the AFFF areas for evaluation was based on findings of the *Final Perfluorinated Compound Preliminary Assessment (PA), Former Norton Air Force Base, California* (AMEC, 2015) and documented in the *Installation-Specific Uniform Federal Policy-Quality Assurance Project Plan Addendum, Former Norton Air Force Base* (ASL, 2017).

The SI was a limited field investigation whose primary objectives were to

- determine the presence/absence of perfluorooctanoic acid (PFOA), perfluorooctanesulfonic acid (PFOS), and perfluorobutanesulfonic acid (PFBS) in groundwater and soil;
- determine if concentrations of PFOA, PFOS, or sum of both in groundwater exceed the United States Environmental Protection Agency (USEPA) health advisory (HA) of 70 nanograms per liter (ng/L);
- determine if PFBS concentrations in groundwater and soil exceed the USEPA regional screening levels (RSLs) of 400,000 ng/L and 1,300,000 micrograms per kilogram (µg/kg), respectively;
- determine if PFOS and/or PFOA are present in soil at concentrations above the US Air Force (USAF)-calculated screening level of 1,260 µg/kg; and
- identify potential human health drinking water pathways and receptors, and if necessary, mitigate impacts to drinking water greater than the HA that are attributable to the USAF.

The objectives were met through sampling of new and existing monitoring wells and surface and subsurface soils and conducting a potable well survey. Eight areas were identified in the PA as areas where AFFF was used or stored and potentially entered the environment (AMEC, 2015). Three AFFF areas were categorized as no further action prior to the start of fieldwork (ASL, 2017). The five remaining AFFF areas were carried forward under the SI. Groundwater data were compared to the USEPA HAs for PFOS and PFOA and the USEPA RSL for PFBS. Soil data were compared to the USAF-developed screening criteria for PFOS and PFOA and the USEPA RSLs for PFBS. There are no established screening criteria for surface water. Therefore, surface water was evaluated based solely on presence or absence.

Groundwater

Groundwater samples were collected from each AFFF Area and along the downgradient installation boundary through a total of six newly installed monitoring wells and four existing monitoring wells. The analytical results indicate that PFOS, PFOA, and PFBS are present at concentrations above the laboratory limit of detection. However, groundwater samples collected did not contain concentrations of PFOS, PFOA, or PFBS above their respective screening values. Although domestic and public supply wells were identified within 4 miles of the AFFF areas, as groundwater concentrations of PFOS and PFOA do not exceed project screening values, the drinking water exposure pathway is incomplete.

Soil

Soil samples were collected at four AFFF areas during the SI field effort. The analytical results indicate that concentrations of PFOS in surface soil samples collected from AFFF Areas 7 and 8 exceed the USAF-calculated screening level. No other soil samples had concentrations of PFOS, PFOA, or PFBS exceeding

their respective screening values. The soil exposure pathway is considered complete for AFFF Areas 7 and 8 since human receptors are present in each area, and concentrations of PFOS exceed the USAF-calculated screening level. While surface soils are impacted with PFOS at two AFFF Areas, analytical samples from the associated groundwater and downgradient of these areas demonstrate very low to non-detect levels of PFOS, suggesting that PFOS has not significantly leached from soil.

A summary of the sample results is provided in Table ES-1.

Table ES-1. AFFF Area Summary

AFFF Area	Media	Analyte	Screening Level	# Samples	# Detections	# Samples Exceeding Screening Levels	Highest Concentration
1: Former IRP Site 2 Landfill	Ground-water	PFOS	70[a] ng/L	2	2	--	4.37 J ng/L
		PFOA	70[a] ng/L	2	2	--	5.37 J ng/L
		PFOS + PFOA	70[a] ng/L	2	2	--	9.74 J ng/L
		PFBS	400,000[b] ng/L	2	2	--	12.8 ng/L
2: Building 763	*Not investigated - no potential AFFF releases*						
3: Building 695	*Not investigated - no potential AFFF releases*						
4: Buildings 674 and 667	Ground-water	PFOS	70 ng/L	2	--	--	--
		PFOA	70 ng/L	2	--	--	--
		PFOS + PFOA	70 ng/L	2	--	--	--
		PFBS	400,000 ng/L	2	1	--	8.50 ng/L
	Soil	PFOS	1,260[c] µg/kg	4	--	--	--
		PFOA	1,260[c] µg/kg	4	--	--	--
		PFBS	1,300,000[b] µg/kg	4	--	--	--
5: Building 680 and Fire Tech Service	Ground-water	PFOS	70 ng/L	2	--	--	--
		PFOA	70 ng/L	2	--	--	--
		PFOS + PFOA	70 ng/L	2	--	--	--
		PFBS	400,000 ng/L	2	2	--	32.4 ng/L
	Soil	PFOS	1,260 µg/kg	6	3	--	423 µg/kg
		PFOA	1,260 µg/kg	6	3	--	2.80 µg/kg
		PFBS	1,300,000 µg/kg	6	--	--	--
6: Building 24	*Not investigated - no potential AFFF releases*						
7: Building 694	Ground-water	PFOS	70 ng/L	1	--	--	--
		PFOA	70 ng/L	1	1	--	21.9 ng/L
		PFOS + PFOA	70 ng/L	1	1	--	21.9 ng/L
		PFBS	400,000 ng/L	1	1	--	24.3 ng/L
	Soil	PFOS	1,260 µg/kg	13	12	1	5,990 J µg/kg
		PFOA	1,260 µg/kg	13	12	--	167 µg/kg
		PFBS	1,300,000 µg/kg	13	7	--	84.9 µg/kg
8: Facility 2333	Ground-water	PFOS	70 ng/L	1	1	--	18.8 ng/L
		PFOA	70 ng/L	1	--	--	--
		PFOS + PFOA	70 ng/L	1	1	--	18.8 ng/L
		PFBS	400,000 ng/L	1	--	--	--

AFFF Area	Media	Analyte	Screening Level	# Samples	# Detections	# Samples Exceeding Screening Levels	Highest Concentration
8: Facility 2333 (continued)	Soil	PFOS	1,260 µg/kg	13[d]	13	4	4,490 µg/kg
		PFOA	1,260 µg/kg	13[d]	12	--	569 µg/kg
		PFBS	1,300,000 µg/kg	13[d]	12	--	489 µg/kg
Downgradient Boundary Wells	Ground-water	PFOS	70 ng/L	3	--	--	--
		PFOA	70 ng/L	3	3	--	6.22 J ng/L
		PFOS + PFOA	70 ng/L	3	3	--	6.22 J ng/L
		PFBS	400,000 ng/L	3	2	--	63.1 ng/L

Notes:
Shaded concentrations are those detected above the screening levels.
[a] USEPA, 2016a. Drinking Water Health Advisory for PFOA and USEPA, 2016b. Drinking Water Health Advisory for PFOS.
[b] USEPA Regional Screening Levels (USEPA, 2017)
[c] USAF Calculated Screening Levels
[d] Includes field duplicates.
-- = analyte not detected above the laboratory limit of detection or the category is not applicable
HA = health advisory
J = The analyte was positively identified; the numerical value is the estimated concentration of the analyte in the sample.
ng/L = nanograms per liter
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic Acid
PFOS = perfluorooctanesulfonic acid
RSL = regional screening level
µg/kg = micrograms per kilogram
USAF = United States Air Force
USEPA = United States Environmental Protection Agency

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1.0 INTRODUCTION

Aerostar SES LLC (ASL), under Air Force Civil Engineer Center (AFCEC) Contract No. FA8903-08-D-8785, Task Order No. 0017, has conducted site inspections (SIs) within the former Norton Air Force Base (AFB), San Bernardino County, California. The SI was completed to determine the presence or absence of perfluorooctanesulfonic acid (PFOS), perfluorooctanoic acid (PFOA), and perfluorobutanesulfonic acid (PFBS) in the environment at areas related to historical United States Air Force (USAF) use of aqueous film forming foam (AFFF). These compounds are a class of synthetic fluorinated chemicals used in industrial and consumer products, including defense-related applications.

The data presented in this report was collected and evaluated in accordance with the *Final Quality Program Plan (QPP) for Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple Base Realignment and Closure (BRAC) Installations* (ASL, 2016) and the *Installation-Specific Uniform Federal Policy-Quality Assurance Project Plan (UFP-QAPP) Addendum Former Norton Air Force Base* (ASL, 2017). The SI was conducted and this report developed following the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 (as amended by the Superfund Amendments and Reauthorization Act of 1986, and using the *Federal Facilities Remedial Site Inspection Summary Guide* (United States Environmental Protection Agency [USEPA], 2005) and the *Guidance for Performing Site Inspections under CERCLA* **Invalid source specified.**.

1.1 PROJECT PURPOSE

The USEPA identified PFOS and PFOA as emerging contaminants of concern and issued lifetime drinking water health advisories (HAs) for these constituents. In response, and per Air Force Instruction 32-7020, Chapter 18, “Emerging Contaminants” (USAF, 2014), the *Interim Air Force Guidance on Sampling and Response Actions for Perfluorinated Compounds at Active and BRAC Installations* (USAF, 2012), and the *SAF/IEE Policy on Perfluorinated Compounds of Concern* (USAF, 2016), the USAF will

- identify locations where there is a reasonable expectation that there may have been a release of PFOA/PFOS associated with USAF actions,
- determine if there is unacceptable risk to human health and the environment, and
- address releases that pose an unacceptable risk, including offsite migration.

Therefore, the USAF is conducting the current SI as a proactive, voluntary action to determine if PFOS, PFOA, and PFBS are present in groundwater, soil, surface water, and sediment resulting from past USAF activities.

1.1.1 Per- and Polyfluoroalkyl Substances Overview

PFOS, PFOA, and PFBS are per- and polyfluoroalkyl substances (PFAS), a class of synthetic compounds formed from carbon chains with fluorine attached. Their chemical structure gives them unique properties (thermal stability and the ability to repel both water and oil) that make them useful components in a wide variety of consumer and industrial products, including non-stick cookware, food packaging, waterproof clothing, fabric stain protectors, lubricants, paints, and firefighting foams such as AFFF. AFFF contains fluorocarbon surfactants to meet the United States Department of Defense (DoD) required performance standards (DoD, 1994). The surfactants provide AFFF with the low surface tension needed to enable film

formation on top of fuel to help suffocate a fire. Several federal government documents confirm the initial use of AFFF by the USAF beginning in 1970:

- Military Specification for AFFF (MIL-F-24385), formally issued in 1969 (DoD, 1969);
- General Accounting Office determination on sole source award protest to provide AFFF to the Navy in December 1969; and
- *A History of USAF Fire Protection Training at Chanute Air Force Base, 1964–1976* (Coates, 1977).

From the early 1970s until 2002, the DoD purchased and used AFFF containing PFOA, PFOS, and PFBS for firefighting and firefighting training exercises (USAF, 2012). Releases of AFFF to the environment may have occurred during routine fire training, equipment maintenance, storage, and use.

1.2 PROJECT OBJECTIVES

The objectives of this study were to

- determine the presence/absence of PFOA, PFOS, and PFBS in groundwater and soil;
- determine if concentrations of PFOA, PFOS, or sum of both in groundwater exceed the USEPA HA of 70 nanograms per liter (ng/L);
- determine if PFBS concentrations in groundwater and soil exceed the USEPA regional screening levels (RSLs) of 400,000 ng/L and 1,300,000 micrograms per kilogram (µg/kg), respectively;
- determine if PFOS and/or PFOA are present in soil at concentrations above the USAF-calculated screening level of 1,260 µg/kg; and
- identify potential human health drinking water pathways and receptors.

The screening levels for the project are summarized on the following page (Table 1-1). While PFBS screening values were not included in the UFP-QAPP (ASL 2016), later USAF guidance recommends evaluating PFBS against established RSLs (USEPA, 2017). The USAF developed soil screening levels for PFOS and PFOA using the USEPA RSL calculator (USEPA, 2018). The toxicity value input for the calculator is the Tier 3 value reference dose of 0.00002 milligrams per kilogram per day derived by USEPA in their HAs for both PFOS and PFOA (USEPA, 2016a; USEPA, 2016b). The reference dose assumes that exposure will occur through ingestion.

1.3 PROJECT SCOPE

A preliminary assessment (PA) identified eight areas where AFFF was used, handled, or potentially entered the environment (AMEC, 2015). Further review of the historical records did not find any evidence to support the use, handling, or release of AFFF at Areas 2, 3, and 6. Therefore, AFFF Areas 2, 3, and 6 were not evaluated during the SI. AFFF area descriptions, backgrounds, and the rationale for selection or exclusion from further investigation are presented in Section 2.0.

Table 1-1. Health-Based Project Screening Values

Parameter	Chemical Abstract Service Number	USEPA Regional Screening Levels[a]		U.S. Air Force Guidance for Soils[b] (µg/kg)	USEPA Health Advisory Drinking Water (Groundwater)[c] (ng/L)
		Residential Soil (µg/kg)	Tap Water (ng/L)		
PFBS	375-73-5	1,300,000	400,000	NL	NL
PFOA	335-67-1	NL	NL	1,260	70
PFOS	1763-23-1	NL	NL	1,260	70
PFOA + PFOS	--	--	--	--	70

Notes:

[a] USEPA, November 2017

[b] Screening levels established using the USEPA Regional Screening Level calculator. The toxicity value input for the calculator is the Tier 3 value ingestion reference dose of 0.00002 milligrams per kilogram per day derived in the USEPA Drinking Water Health Advisories for both PFOS and PFOA.

[c] USEPA Drinking Water Health Advisory for PFOA (2016a) and USEPA Drinking Water Health Advisory for PFOS (2016b).

-- = not applicable
NL = not listed
PFOA = Perfluorooctanesulfonic acid
µg/kg = micrograms per kilogram
ng/L = nanograms per liter
PFBS = Perfluorobutanesulfonic acid
PFOS = Perfluorooctanesulfonic acid
USEPA = United States Environmental Protection Agency

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2.0 BACKGROUND

2.1 INSTALLATION LOCATION AND SETTING

The former Norton AFB is located in San Bernardino County, California, at 1601 East 3rd Street, San Bernardino, California 92408 (latitude 34.103423, longitude -117.250793) (Figure 2-1). The former base occupied approximately 2,105 acres and was in operation from 1942 to 1994.

2.2 INSTALLATION OWNERSHIP AND HISTORY

The Norton AFB was established as the San Bernardino Air Depot in March 1942 with the primary purpose of storage and shipment of war supplies and aircraft and engine maintenance. The base also maintained a gas turbine engine overhaul facility. The base originally consisted of approximately 500 acres that included primarily agricultural land prior to construction (USAF, 1993a).

By 1943, the base was improved with a 7,000-foot runway, supply warehouses, maintenance shops, hospital, mess halls and shops, officer quarters, barracks, and military family housing. The installation was permanently named after Captain Leland F. Norton in 1950 (USAF, 1993a).

The base was transferred to the USAF in 1948. When World War II ended, the base was downsized and scheduled for closure by 1949. However, when the USAF was established as an independent agency, Norton AFB continued operations for aircraft maintenance, repair and supply, and jet engine overhaul. The base became one of three major maintenance facilities for jet engines. The runway was increased to 10,000 feet in length to support the base's activity in 1954 (USAF, 1993a).

Norton AFB began supporting the Falcon Missile Program in 1955, which involved repairing, storing, and maintaining an inventory database for the missiles. The industrial wastewater treatment plant and the golf course were constructed at the base in the 1950s (USAF, 1993a).

The Ballistic Systems Division, also known as the Ballistic Missile Office, transferred to Norton AFB in 1966, followed by a phasing out of the aircraft maintenance and engine overhaul program. The Military Airlift Command took over as host of the base in 1967 with the purpose of maintaining immediate airlift readiness. The 63rd Military Airlift Wing was transferred to Norton AFB at this time and C-141s were the primary aircraft operated and maintained at the base (USAF, 1993a).

In 1994, the former base discontinued military operations on the site with the exception of the Defense Finance and Accounting Service, which operated in the former Ballistic Missile Office complex (USAF, 1993a). Norton AFB was selected for closure under BRAC in 1988 and permanently closed in March 1994.

The Air Force Real Property Agency completed transfer of the entire base in June 2007. The non-aviation portion of the base was transferred to the Inland Valley Development Agency and the aviation portion was transferred to the San Bernardino International Airport Authority (SBIAA).

2.3 AFFF OPERATIONS AND SOURCE CHARACTERISTICS

The USAF began purchasing and using AFFF containing PFAS for extinguishing petroleum fires and firefighting training activities in 1970 (USAF, 2012). Although AFFF was primarily used at USAF installations in and around fire training areas, AFFF was also stored, released, and disposed of at multiple locations throughout the installations. Specific to the former Norton AFB, historical documentation

indicates that AFFF containing PFOS, PFOA, and/or PFBS was mainly stored in buildings and on fire trucks within buildings to extinguish petroleum fires and firefighting training activities (AMEC, 2015).

2.4 HISTORICAL WASTE MANAGEMENT PRACTICES

The AFFF areas identified in the PA were classified as either storage areas, handling areas, or usage/release areas (AMEC, 2015). Storage areas consist of buildings where virgin AFFF for use or spent AFFF/water mixtures were kept. Handling areas are those areas where AFFF was transferred from or to storage manually. Usage/release areas consist of areas where AFFF was discharged intentionally (e.g., fire training exercises, equipment testing, and unintentional releases such as discharge from fire suppression systems and spills/releases from drums or tank storage areas without secondary containment). No airplane crashes or fires resulting in the use, or suspected use, of AFFF were reported at the former Norton AFB.

2.5 REGULATORY COMPLIANCE

Currently, there are no legally enforceable federal criteria in the United States for PFAS. The USEPA Office of Water issued lifetime drinking water HAs of 70 ng/L for both PFOS and PFOA in May 2016. The USEPA also recommended that when PFOA and PFOS occur in the same location in a drinking water source, the sum of the concentrations (PFOA + PFOS) also be compared to the 70 ng/L HA. These HA values serve as informal technical guidance to assist federal, state, and local officials and managers of public or community water systems in protecting public health when emergency spills or other contamination situations occur. The HA values are not to be construed as legally enforceable federal standards and are subject to change as new information becomes available (USEPA, 2016a) (USEPA, 2016b).

The USEPA has derived RSLs for PFBS (USEPA, 2017). However, similar to the HAs, RSLs are screening values only and not to be considered as legally enforceable federal standards. It should be noted that the State of California does not have promulgated action levels for PFAS.

2.6 PREVIOUS PFAS INVESTIGATIONS

Previous investigations at the former Norton AFB include a PA of potential AFFF areas base-wide and a site investigation at Fire Training Area (FTA) Site AT005.

2.6.1 Preliminary Assessment

A PA was conducted at the former Norton AFB in 2015 as part of the USAF enterprise-wide response to possible releases of AFFF containing PFAS. The PA consisted of conducting personnel interviews of current and former installation employees; AFCEC personnel involved in the restoration of the base; performing online research of the Administrative Record and other general search engines; and performing archival research at the Air Force Historical Research Agency and the Air Force Safety Center. Research was conducted to find information on the use, handling, or release of AFFF on the installation. The research targeted the years 1970 through the installation closure date of 1994. Based on the results of the PA, eight potential AFFF areas associated with the former Norton AFB were recommended for further investigation (AMEC, 2015) (Figure 2-2).

2.6.2 AT005 Site Investigation

Norton operated FTA AT005 during the period of time that AFFF was used for firefighting training. In 2015, a site investigation was conducted at AT005 to assess the presence or absence the following six PFAS

in soil, groundwater, surface water, and sediment:

- PFOS,
- PFOA,
- PFBS,
- Perfluorohexanesulfonic acid (PFHxS),
- Perfluoroheptanoic acid (PFHpA), and
- Perfluorononanoic acid (PFNA).

Results of the investigation identified the presence of PFOS and PFOA in surface and subsurface soils from the ground surface to a maximum depth of approximately 30.5 feet below ground surface (bgs). PFBS, PFHxS, and PFHpA were also detected in surface and subsurface soils. PFOS was detected in sediment collected downgradient of the airfield drainage culvert outfall. However, none of the detections exceeded the screening criteria for soil or sediment. In addition, none of the six PFAS listed above were detected in groundwater (AMEC, 2016).

2.7 SUMMARY OF AFFF RELEASE AREAS

While eight AFFF areas were originally identified as potential AFFF release areas at the former Norton AFB, further review of the PA and historical records indicated there is no evidence to support AFFF use, handling, and/or releases at AFFF Areas 2, 3, and 6. Therefore, these areas were not evaluated as part of the SI.

2.7.1 AFFF Area 1: Former Installation Restoration Program (IRP) Site 2 Landfill

AFFF Area 1 (Figure 2-2) is the IRP Site 2 Landfill, which was used as the main base landfill from 1958 to 1980. The landfill accepted general refuse, demolition debris, and industrial waste that may have included spent solvent, acid refrigerant, paint stripper, paint thinner, waste oil, and sludge (USAF, 1993b). FTA AT005, located south of the runway, was an area used to conduct fire control and abatement training exercises presumably using AFFF. In 1998, approximately 20,000 tons of soil from AT005 was excavated and transported to the IRP Site 2 Landfill (AFFF Area 1), where it was stabilized with cement and used as foundation material (Earth Tech, 1999). The landfill was closed in 1999 with an alternative vegetative cap and methane gas vent system in accordance with California Code of Regulations, Title 27 requirements (Bechtel Environmental, Inc., 1999). The top surface of the landfill was subsequently covered with an asphaltic monolithic cap (Geo-Logic Associates, 2009). In 2013, trucks began using the cap as a parking lot for trailer storage and staging (CH2M Hill, 2014). Post closure operation, monitoring, and maintenance of the landfill and cap is ongoing. Groundwater at AFFF Area 1 was evaluated since the landfill received soil potentially containing PFOS, PFOA, and/or PFBS from AFFF use at the former FTA (AT005).

2.7.2 AFFF Area 2: Building 763 (Aircraft Maintenance Hangar and Electroplating Shop)

Building 763 (Figure 2-2) is an aircraft maintenance hangar and electroplating shop constructed in 1943. The floor within the hangar was earthen until the 1980s. This hangar was included as a potential AFFF release area in the PA, since AFFF fire suppression systems are located in the hangar. As part of the SI planning process, a site-scoping visit was conducted by ASL on 20 October 2015. A foam fire suppression system including foam generators were observed in each of the four bays (ASL, 2017). However, this AFFF system was installed after the base was closed in 1994 and no releases of AFFF were documented at this hangar. Therefore, this area was not evaluated as a part of this SI.

2.7.3 AFFF Area 3: Building 695 (Aircraft Maintenance Hangar)

Building 695 (Figure 2-2) is an aircraft fuels maintenance hangar that was used by the Air Force from 1942 to 1994. The building currently maintains an AFFF fire suppression system and associated AFFF storage tanks; however, this system was installed after the transfer of the installation (AMEC, 2015). Since the building did not contain an AFFF system used by the USAF and no releases of AFFF were documented at this hangar, this area was not evaluated as a part of this SI.

2.7.4 AFFF Area 4: Buildings 674 (Aircraft Maintenance Hangar) and 667 (Pump House)

Building 674, an aircraft corrosion control hangar, and Building 667, an auxiliary pump house, were both constructed in 1988 (Figure 2-2). Building 667 maintains two 500-gallon AFFF aboveground storage tanks (ASTs) that serviced the AFFF fire suppression system in Building 674 (USAF, 1993a). This system is still in use today by the SBIAA; however, the SBIAA upgraded the system and replaced the contents with a new generation of AFFF not containing PFOS or PFOA (Gibbs, 2015). No releases of AFFF from the fire suppression system and/or the associated pump house have been reported from either building. However, the presence of AFFF ASTs and fire suppression system during USAF occupation of the buildings implies that a release could have occurred through system calibration or during AFFF handling. Therefore, these areas were evaluated during this SI. AFFF releases not attributable to USAF operations are beyond the scope of this evaluation.

2.7.5 AFFF Area 5: Building 20 (Base Engineering Pavements and Grounds)

AFFF Area 5 (Figure 2-2) is an active fire station (constructed in 1986) that contained the Fire Tech Service (USAF 1993c). The facility reportedly stored approximately 88 pounds of AFFF through 1989 (USAF, 1993c). Emergency vehicles were also washed inside Building 680 and testing/calibration of the vehicle AFFF system was conducted in front of Building 680 (AMEC, 2015). AFFF Area 5 was included for evaluation since the use of AFFF at this area suggests that PFOS, PFOA, and/or PFBS could have been released into the environment.

2.7.6 AFFF Area 6: Building 24 (Childcare Center)

AFFF Area 6, Building 24 (Figure 2-2), was constructed in 1973 and used as a childcare center until it was razed in 2004. In 2007, the site was redeveloped with an office/warehouse building and associated paved parking areas. It is currently occupied by Stater Brothers corporate office and bakery distribution warehouse.

The building was identified in the PA as an AFFF area since AFCEC Real Property records indicate the facility had a “foam fire system” (AMEC, 2015). The use of the building as a childcare facility does not correlate with the need for a fire-fighting foam used for fuel/petroleum fires. None of the other documents reviewed indicated the release, use, or handling of AFFF at this facility. It is highly unlikely that an AFFF system would be located within a childcare facility and this area was not evaluated during the SI.

2.7.7 AFFF Area 7: Building 694 (Crash Truck Station)

Building 694 (Figure 2-2) was a crash truck station located adjacent to Building 695 (AFFF Area 2, Aircraft Fuels Maintenance Hangar). The crash truck station was a garage-type building used to house emergency vehicles and equipment. Building 694 was in operation until the early 1980s and demolished prior to 1994 (USAF, 1993a). Although there were no documented releases of AFFF at this building, typical USAF

practice suggests that AFFF could have been used or released due to the nature of the building and its proximity to the flight line. Therefore, this area was evaluated during the SI.

2.7.8 AFFF Area 8: Facility 2333 (Fire Training Facility)

AFFF Area 8, Facility 2333, is currently a storage area located on the northeastern portion of the former installation (Figure 2-2). The area was used as a fire training facility from 1982 to the mid-2000s. One 10,000-gallon underground storage tank containing JP-4 and a 1,200-gallon oil/water separator draining to the sanitary sewer were located within the fenced training area. Fire training using JP-4 was conducted in the center of the fenced area (USAF, 1993a). The use of AFFF at this training facility is not documented; however, AFFF was used by the USAF during the operation of the facility and typical USAF practice suggests that AFFF could have been used or released here during fire training exercises. Therefore, this area was evaluated during the SI.

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3.0 FIELD ACTIVITIES AND ANALYTICAL PROTOCOL

SI field activities were conducted at the former Norton AFB between April 11 and July 26, 2017. The field activities included

- field mobilization and demobilization;
- advancement of soil borings;
- installation and development of monitoring wells;
- collection of groundwater and soil samples;
- collection of quality assurance (QA)/quality control (QC) samples; and
- investigation-derived waste (IDW) sampling, staging, management, and transfer.

Field activities were conducted in accordance with ASL standard operating procedures (SOPs), including those project-specific SOPs modified for sample collection of PFAS and found in the general QPP (ASL, 2016).

Field data were recorded chronologically in logbooks and on appropriate field forms. Daily health and safety briefings and activity sheets were also completed. Changes and the circumstances/cause for any deviation from the QPP or UFP-QAPP addendum were noted in logbooks and field forms. Field documentation is provided in Appendix A.

Prior to mobilization, the following activities were conducted:

- ASL field personnel reviewed the project SOPs, work plan, and general and site-specific health and safety requirements, as well as subcontractor health and safety plans and training records.
- Site access was coordinated with the USAF and SBIAA prior to all fieldwork.
- Well permits were obtained from the San Bernardino County Department of Health for each monitoring well (six total) installed as a part of this SI. A copy of these permits is included in Appendix A.
- Dig Alert and a private utility locate service (Ground Penetrating Radar Systems) marked underground utilities. The first four feet at each drilling location were advanced using a hand auger.

3.1 DEVIATIONS

Deviations from the original plan proposed in the UFP-QAPP addendum (ASL, 2017) occurred during the fieldwork. The work plan originally specified that drilling would be conducted with a Roto-sonic drill rig. However, upon further evaluation of the site geology (i.e., the presence of large cobbles within the subsurface), it was determined that sonic drilling may not be effective at all AFFF areas. In coordination with the California Department of Toxic Substances, Santa Ana Regional Water Quality Control Board, and the USEPA, the decision to use mud rotary and/or hollow-stem-auger drilling methods was made with the stipulation that drilling materials, regardless of drilling method, would be PFAS-free.

When developing newly installed monitoring well NORPMW003, the end cap was punctured with the surge block. Heaving sands entered the well, restricting access to the bottom 13 feet of the well screen. A polyvinyl chloride (PVC) plug was inserted into the bottom of the well to seal off the sand intrusion from the remainder of the intact well screen. The final accessible well screen was approximately 7 feet in length

rather than 20 feet, as originally proposed. This well was successfully developed, purged, and sampled and this deviation did not affect the project data quality objectives (DQOs).

NORPMW001 was proposed to be installed at AFFF Area 1 (Former IRP Site 2 Landfill). Prior to well installation, the water level in nearby well MW-043 was checked and it was determined that there was enough water in this well to collect a sample. MW-043 had been dry previously. Therefore, NORPMW001 was no longer necessary and a groundwater sample was collected from MW-043 on the downgradient side of the landfill.

During the installation of NORPMW007, the screen was placed at approximately 200–220 feet bgs. This placement was consistent with other wells in the area and the soil at this depth appeared to be saturated. After installation of the well, it was determined that it would not sufficiently produce groundwater. Therefore, NORPMW007R was installed in the same area with a screened interval of 229–249 feet bgs. This well successfully produced water and was able to be properly developed, purged, and sampled. Monitoring well NORPMW007R was installed using a sonic drill rig. Well NORPMW007 was left in place.

3.2 SOIL BORING ADVANCEMENT AND SAMPLING

Soil borings were advanced using a combination of air rotary, mud rotary, and hollow stem auger methodologies. The first four feet of each borehole was cleared using a hand auger to ensure no underground utilities were present. An 11.75-inch diameter temporary conductor casing was installed to a depth of 19 feet or less via air rotary at each proposed monitoring well location prior to drilling with mud rotary. Each monitoring well location was drilled to depth using 10.6-inch-diameter mud rotary tooling. Borings not completed as monitoring wells were advanced using 8-inch hollow stem augers. Soil cores were collected at varying intervals in each boring using decontaminated 1.5-foot split spoon samplers. A drilling log documenting the soil lithology was compiled by a California Professional Geologist for each soil boring in accordance with the Unified Soil Classification System. Copies of the drilling logs are provided in Appendix A.

A total of 36 soil samples (including four field duplicate samples) were collected from AFFF Areas 4, 5, 7, and 8. Soil samples were collected in accordance with ASL SOP-013_R1 (ASL, 2016) from three approximate intervals: 0–1, 13–15, and 28–30 feet bgs. These intervals were chosen based on the FTA AT005 Site Investigation, which found no detections of PFOS, PFOA or PFBS at depths greater than 21 feet bgs (AMEC, 2016). In a few instances, samples were collected slightly outside of these intervals. At NORPMW005, the lowest sample was collected from 60–60.5 feet bgs as there was an insufficient sample for lab analysis (too much rock in sample) at the 30–31 foot bgs interval. Soil samples were collected directly from the samplers and placed in polyethylene sample containers for transport to the analytical laboratory. A summary of soil samples collected during the SI is provided in Table 3-1. Soil sample collection logs were completed for each location and are provided in Appendix A. Disposable gloves were changed in between sample intervals to prevent cross-contamination. Borings, which were not completed as monitoring wells, were abandoned by backfilling with bentonite/cement grout.

Table 3-1. Summary of Soil Borings and Soil Samples Collected

AFFF Area	Station ID	Boring Depth (feet bgs)	Drilling Method	Soil Sample ID	Soil Sample Depth (feet bgs)
4	NORPMW005	223	Hand auger	NORP04006	1.5–2.5
			Mud rotary	NORP04007, NORP04008 (field duplicate)	16–16.5
			Mud rotary	NORP04009	60–60.5
	NORPMW006*	223	Mud rotary	none	--
5	NORPMW002	223	Hand auger	NORP05013	0.5–1.5
			Mud rotary	NORP05014	16–16.25
			Mud rotary	NORP05015	37–37.25
	NORPMW003	236	Hand auger	NORP05017	0–1
			Mud rotary	NORP05019	15–16
			Mud rotary	NORP050200	30–30.75
7	NORPMW004	224	Hand auger	NORP07022	0.5–1
			Mud rotary	NORP07023	16–17.5
			Mud rotary	NORP07024	34–34.5
	NORPSB001	30	Hand auger	NORP07026, NORP07026 (field duplicate)	0–1
			Hollow stem auger	NORP07027	15–16
			Hollow stem auger	NORP07028	28.5–30
	NORPSB002	29.5	Hand auger	NORP07029	0–1
			Hollow stem auger	NORP07030	15–15.5
			Hollow stem auger	NORP07031	28–29.5
	NORPSB003	30	Hand auger	NORP07032	0–1
			Hollow stem auger	NORP07033	15–16.3
			Hollow stem auger	NORP07034	28.5–30
8	NORPMW007	233	Hand auger	NORP08037	0–1
			Mud rotary	NORP08038	15–15.5
	NORPMW007R*	250	Sonic	none	--
	NORPSB004	30	Hand auger	NORP08041, NORP08042 (field duplicate)	0.75–2
			Hollow stem auger	NORP08043	15–16.5
			Hollow stem auger	NORP08044	28.5–30
	NORPSB005	30	Hand auger	NORP08045	0.5–2
			Hollow stem auger	NORP08046	15.5–16.5
			Hollow stem auger	NORP08048	28.5–30
	NORPSB006	31.5	Hand auger	NORP08049	1–2
			Hollow stem auger	NORP08050	15.5–16.5
			Hollow stem auger	NORP08052, NOPR08053 (field duplicate)	30–31.5

Notes: * Borings were advanced for well construction purposes. No soil samples were collected from these borings.
-- = analyte not detected above the laboratory limit of detection or the category is not applicable
AFFF = aqueous film forming foam bgs = below ground surface
ID = identification

3.3 MONITORING WELL INSTALLATION AND DEVELOPMENT

Six groundwater monitoring wells were installed at the former Norton AFB during the SI field effort. Monitoring wells were constructed by a California-licensed drilling contractor in accordance with standard industry construction practices and guidance set forth in the California Department of Water Resources California Well Standards Bulletin 74-90. The borings were advanced as described in Section 3.2. Monitoring wells were constructed using 4-inch-diameter, schedule 80 PVC flush thread riser coupled with a 20-foot, .020 machine slot screen and stainless steel end cap. The first two monitoring wells (NORPMW003 and NORPMW004) were installed with Schedule 80 PVC end caps due to availability of materials. The depths of the screened intervals were determined based on lithologic interpretations in the field and placed where water was encountered at each location. In some cases, the screens were placed 5 to 10 feet deeper to avoid the installation of a dry well. Table 3-2 summarizes the well construction details of the six new groundwater monitoring wells.

Table 3-2. Well Construction Details

Station ID	AFFF Area	Total Depth (ft bgs)	Depth to Water[a] (ft btoc)	Well Material	Well Screen Interval (ft bgs)	Location	
						Northing	Easting
NORPMW002	5	219.36	200.14	4” Sch 80 PVC	198.96–218.96	1859281.16	6789763.22
NORPMW003	5	220.52	196.91	4” Sch 80 PVC	213.12–220.12	1859231.18	6789451.94
NORPMW004	7	220.03	202.18	4” Sch 80 PVC	199.63–219.63	1860094.82	6790888.54
NORPMW005	4	220.47	194.65	4” Sch 80 PVC	200.07–220.07	1860690.39	6789778.52
NORPMW006	4	222.25	195.28	4” Sch 80 PVC	201.85–221.85	1860622.97	6789621.43
NORPMW007R	8	249.88	238.26	4” Sch 80 PVC	229.48–249.48	1860849.80	6797523.78

Notes: AFFF = aqueous film forming foam
bgs = below ground surface
btoc = below top of casing
ft = foot/feet
ID = identification
Sch 80 PVC = Schedule 80 polyvinyl chloride

A minimum of 24 hours following monitoring well installation and surface completion activities, each monitoring well was developed to remove fines from the filter pack material and promote groundwater flow through the screen. Monitoring well development was conducted in accordance with SOP-019_R1, *Monitoring Well Installation/Abandonment* (ASL, 2016). Wells were developed by mechanical surging (i.e., surge block and bailing) and over-pumping until the water was free of visible sediment. Following completion of well development, the wells were allowed to equilibrate for a minimum of 24 hours prior to purging and sampling. After well development and recharge in wells NORPMW003, -005 and -006, the water table was higher than expected and the tops of the well screens were below the water table. As PFOS, PFOA and PFBS do not float in water, this did not affect the results.

When developing newly installed monitoring well NORPMW003, the end cap was punctured with the surge block. Heaving sands entered the well, restricting access to the bottom 13 feet of well screen. A PVC plug was inserted into the bottom of the well to seal off the sand intrusion from the remainder of the intact well screen. The final accessible well screen was approximately 7 feet in length rather than 20 feet, as originally proposed. The monitoring well was redeveloped following placement of the PVC plug. Well development forms and completion reports are provided in Appendix A.

After the wells were completed, the horizontal and vertical (top of well casing) locations were measured by a California-licensed Professional Land Surveyor. A copy of the survey reports is included in Appendix B.

3.4 GROUNDWATER SAMPLING METHODOLOGY

Monitoring wells were purged and sampled using low-flow purging and sampling techniques in accordance with ASL SOP-002_R2, *Groundwater Sampling at PFC Sites* (ASL, 2016). Low-flow purging and sampling were conducted using a bladder pump with the exception of NORPMW007R, which was sampled with a Grundfos pump. Prior to initiating purging and sampling activities, depths to groundwater and total well depths were measured per ASL-SOP-005_R1, "*Water Level and Well Depth Measurements*." Water level measurements were recorded to the nearest 0.01 feet from the top of casing in monitoring wells using an electronic water level indicator.

During the purging process, water quality parameters (temperature, specific conductance, potential of hydrogen [pH], dissolved oxygen [DO], oxidation-reduction potential [ORP], and turbidity) were measured using a water quality meter and flow-through cell. Well purging was considered complete when stabilization of water quality parameters was achieved in accordance with ASL SOP-002P_R2. Water quality parameters, flow rates, and volumes purged were recorded on well purging and sampling forms (provided in Appendix A).

After achieving stabilization, the flow-through cell was removed and groundwater samples were collected in laboratory-provided, high-density polyethylene containers using direct fill sampling techniques. Sample containers were sealed, labeled, packed on ice in an insulated cooler, and delivered to Vista Analytical Laboratory in El Dorado Hills, California, under chain-of-custody (C-o-C) protocol. Groundwater sampling information was recorded on well sampling forms provided in Appendix A. A summary of groundwater sample locations is provided in Table 3-3.

Table 3-3. Summary of Groundwater Samples Collected

AFFF Area	Station ID	Sample ID	Sample Interval/Depth (feet btoc)
1	MW-403	NORP01403, NORP01404 (field duplicate)	152–192
4	NORPMW005	NORP04005	200.07–220.07
	NORPMW006	NORP04010	201.85–221.85
5	NORPMW002	NORP05011	198.96–218.96
	NORPMW003	NORP05016	213.12–220.12
7	NORPMW004	NORP07021	199.63–219.63
8	NORPMW007R	NORP08104	229–249
Boundary Wells	MW-274	NORPXX056	201–221
	MW-289	NORPXX057	210–235
	MW-401	NORPXX058	175–190

AFFF = aqueous film forming foam btoc = below top of casing ID = identification

3.5 GROUNDWATER ELEVATION

Groundwater level measurements were collected from newly installed monitoring wells and existing monitoring wells on May 19, 2017 (Table 3-4). Water levels were measured to the nearest 0.01 foot, relative to top-of-casing. The potentiometric contours generated from water levels collected on May 19, 2017, are provided on Figure 3-1. Groundwater elevations ranged from approximately 883 to 982 feet above mean sea level (amsl). In the 2015 and 2016 operations, maintenance, and monitoring annual reports, groundwater

elevations were documented between approximately 878 to 982 feet amsl across the base, consistent with the water elevations obtained during the SI (CH2M Hill, 2016 and 2017). Groundwater flow in the eastern portion of the base is primarily west and groundwater flow in the western portion of the base is primarily southwest.

Table 3-4. Groundwater Elevations

Station ID	AFFF Area	Top of Casing Elevation (feet amsl)	Depth to Water (feet btoc)	Groundwater Elevation (feet amsl)
MW-274	None	1101.90	200.19	901.71
MW-289	None	1057.11	176.93	880.18
MW-401	None	1071.56	187.19	884.37
MW-403	1	1169.30	186.93	982.37
NORPMW002	5	1093.72	200.27	893.45
NORMMW003	5	1089.85	196.98	892.87
NORPMW004	7	1100.05	202.27	897.78
NORPMW005	4	1094.48	194.67	899.81
NORPMW006	4	1094.26	195.24	899.02

AFFF = aqueous film forming foam
amsl = above mean sea level
btoc = below top of casing
ID = identification

3.6 Analytical Methods Used

The analytical methods used for groundwater and soil are based on USEPA Method 537 Version 1.1, *Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry* (Shoemaker, Grimmett, & Boutin, 2009). However, the method was modified to allow for the analysis of additional matrices, to meet DoD Quality Systems Manual criteria, and/or to allow for improved analyte quantification. Groundwater samples were analyzed for the 14 analytes listed in Table 3-5.

Table 3-5. Analyte List

Analyte	Acronym	Chemical Abstract Service Number
Perfluorooctanesulfonic acid	PFOS	1763-23-1
Perfluorooctanoic acid	PFOA	335-67-1
Perfluorobutanesulfonic acid	PFBS	375-73-5
Perfluorononanoic acid	PFNA	375-95-1
Perfluoroheptanoic acid	PFHpA	375-85-9
Perfluorohexanesulfonic acid	PFHxS	355-46-4
Perfluorodecanoic acid	PFDA	335-76-2
Perfluorododecanoic acid	PFDoA	307-55-1
Perfluorohexanoic acid	PFHxA	307-24-4
Perfluorotetradecanoic acid	PFTA (or PFTeDA)	376-06-7
Perfluorotridecanoic acid	PFTrDA	72629-94-8
Perfluoroundecanoic acid	PFUnA	2058-94-8
N-ethyl perfluorooctanesulfonamidoacetic acid	N-EtFOSAA	2991-50-6
N-methyl perfluorooctanesulfonamidoacetic	N-MeFOSAA	2355-31-9

3.7 DATA QUALITY

QA/QC data are necessary to determine precision and accuracy and to demonstrate the absence of interferences and/or contamination of sampling equipment, glassware, and reagents. Specific QC requirements for laboratory analyses are incorporated into the *Final Quality Program Plan for Site Inspection of PFC Release Areas at Multiple BRAC Installations* (ASL, 2016) and the *Installation- Specific Work Plan Addendum for the former Norton Air Force Base* (ASL, 2017). Analyses were performed by TestAmerica in Sacramento, California. Compliance with C-o-C, interim sample storage, and shipping procedures were all met. C-o-Cs are included as part of the laboratory data packages in Appendix C.

QA/QC samples were collected for this project. QC samples included a blind field duplicate and matrix spike ((MS)/matrix spike duplicate (MSD) samples. Blind field duplicate samples were collected at a frequency of one in ten samples per matrix, and MS/MSD samples were collected at a frequency of one in every twenty samples per matrix. These QC samples were analyzed for the 14 PFAS. Equipment rinsate blanks were collected at a frequency of one in every twenty samples per matrix. Data validation determined that the data quality satisfied required QC objectives.

Data validation was conducted on 100% of the analytical data for the PFAS compounds. The laboratory and field data were reviewed to ensure that DQOs for the project were met. Precision, accuracy, representativeness, completeness, and comparability parameters were evaluated and data quality was acceptable and 100% of the data was usable. The laboratory and the field data met the DQOs for the project. The data validation report is included in Appendix D.

3.8 AFFF AREA 1: FORMER IRP SITE 2 LANDFILL

3.8.1 Sample Locations

Groundwater was evaluated at AFFF Area 1. One primary and one field duplicate groundwater sample were collected from existing well MW-043, which has a screened interval from 152 to 192 feet bgs (Figure 3-2). This well is located along the western side of the landfill to capture contaminants migrating downgradient.

3.8.2 Analytical Results

Analytical results for PFOS, PFOA, and PFBS at AFFF Area 1 are summarized in Table 3-6 and illustrated on Figure 3-2. Laboratory data reports are included in Appendix C and complete analytical results are provided in Exhibit 1.

Table 3-6. AFFF Area 1 PFOS, PFOA, and PFBS Summary

Media	Analyte	Screening Level	# Samples	# Detections	# Samples Exceeding Screening Levels	Highest Concentration
Ground-water[a]	PFOS	70 ng/L[b]	2	2	0	4.37 J[d] ng/L
	PFOA	70 ng/L[b]	2	2	0	5.37 J ng/L
	PFOS + PFOA	70 ng/L[b]	2	2	0	9.74 J ng/L
	PFBS	400,000 ng/L[c]	2	2	0	12.8 ng/L

ng/L = nanograms per liter
PFOA = perfluorooctanoic acid
PFBS = perfluorobutanesulfonic acid
PFOS = perfluorooctanesulfonic acid
Notes:
[a] Includes one primary sample and one field duplicate from MW-403.
[b] USEPA, 2016a. Drinking Water Health Advisory for PFOA and USEPA, 2016b. Drinking Water Health Advisory for PFOS.
[c] USEPA Regional Screening Level (USEPA, 2017)
[d] J = The analyte was positively identified; the numerical value is the estimated concentration of the analyte in the sample.

PFOS, PFOA, and PFBS were each detected at concentrations above the laboratory limit of detection (LOD) in both the primary and duplicate groundwater samples from MW-043. None of the concentrations exceeded the USEPA HA or RSL values.

3.8.3 Conclusions

Analytical data suggests that PFOS, PFOA, and PFBS are present in groundwater near former IRP Site 2 Landfill (AFFF Area 1). However, reported concentrations of PFOS, PFOA, and PFBS were detected at concentrations below the USEPA HAs and USEPA RSL respectively.

3.9 AFFF Area 4 – Building 674

3.9.1 Sample Locations

Both groundwater and soil were evaluated at AFFF Area 4. Samples were collected from the southeast (sidegradient) and southwest (downgradient) site boundaries (Figure 3-3).

3.9.1.1 Groundwater Samples

Two monitoring wells, NORPMW005 and NORPMW006, were installed at AFFF Area 4. The wells were installed near Building 674 and were screened from approximately 200–220 and 202–222 feet bgs, respectively. One groundwater sample was collected from each well.

3.9.1.2 Soil Samples

Four soil samples were collected from soil boring NORPMW005 (Figure 3-3), three primary samples and one duplicate sample. Soil samples were collected at the following intervals: 1.5–2.5, 16.0–16.5, and 60.0–60.5 feet bgs.

3.9.2 Analytical Results

The analytical results for PFOS, PFOA, and PFBS are summarized in Table 3-7. Complete analytical results are provided by media in Exhibits 1 and 2 and illustrated on Figure 3-3. Laboratory data reports are provided in Appendix C.

Table 3-7. AFFF Area 4 PFOS, PFOA, and PFBS Summary

Media	Analyte	Screening Criteria	# Samples	# Detections	# Samples Exceeding Screening Criteria	Highest Concentration
Ground-water	PFOS	70 ng/L[b]	2	--	--	--
	PFOA	70 ng/L[b]	2	--	--	--
	PFOS + PFOA	70 ng/L[b]	2	--	--	--
	PFBS	400,000 ng/L[c]	2	1	--	8.50 ng/L
Soil[a]	PFOS	1,260 µg/kg[d]	4	--	--	--
	PFOA	1,260 µg/kg[d]	4	--	--	--
	PFBS	1,300,000 µg/kg[c]	4	--	--	--

-- = analyte not detected above the laboratory limit of detection or the category is not applicable
ng/L = nanograms per liter PFBS = perfluorobutanesulfonic acid PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid µg/kg = micrograms per kilogram
Notes:
[a] Includes three primary samples and one field duplicate.
[b] USEPA, 2016a Drinking Water Health Advisory for PFOA and USEPA, 2016b Drinking Water Health Advisory for PFOS.
[c] USEPA Regional Screening Levels (USEPA, 2017)
[d] USAF Calculated Screening Levels

3.9.2.1 Groundwater Sample Results

Neither PFOS nor PFOA were detected at concentrations above the LOD in AFFF Area 4 groundwater.

PFBS was detected at a concentration above the LOD in one groundwater sample from NORPMW005; however, the concentration did not exceed the USEPA RSL.

3.9.2.2 Soil Sample Results

PFOS, PFOA, and PFBS were not detected at concentrations above the LOD in AFFF Area 4 soil.

3.9.3 Conclusions

PFOS and PFOA were not present in groundwater or soil at AFFF Area 4. PFBS is not present in soil but was present in groundwater, although concentration did not exceed the USEPA RSL.

3.10 AFFF AREA 5 – BUILDING 674

3.10.1 Sample Locations

Both groundwater and soil were evaluated at AFFF Area 5. Sample locations are shown on Figure 3-4.

3.10.1.1 Groundwater Samples

Two downgradient monitoring wells (NORPMW002 and NORPMW003) were installed at AFFF Area 5. The wells were installed on the south side and downgradient of Building 680, and screened between approximately 198 and 220 feet bgs.

3.10.1.2 Soil Samples

Three soil samples each were collected from soil boring NORPMW002 (at 0.5–1.5, 16.0–16.25, and 37.0–37.25 feet bgs) and NORPMW003 (at 0–1, 15–16, and 30.0–30.75 feet bgs).

3.10.2 Analytical Results

The analytical results for PFOS, PFOA, and PFBS are summarized in Table 3-8. Complete analytical results are provided by media in Exhibits 1 and 2 and illustrated on Figures 3-4. Laboratory data reports are provided in Appendix C.

Table 3-8. AFFF Area 5 PFOS, PFOA and PFBS Summary

Media	Analyte	Screening Criteria	# Samples	# Detections	# Samples Exceeding Screening Criteria	Highest Concentration
Ground-water	PFOS	70 ng/L[a]	2	--	--	--
	PFOA	70 ng/L[a]	2	--	--	--
	PFOS + PFOA	70 ng/L[a]	2	--	--	--
	PFBS	400,000 ng/L[b]	2	2	--	32.4 ng/L
Soil	PFOS	1,260 µg/kg[c]	6	3	--	423 µg/kg
	PFOA	1,260 µg/kg[c]	6	3	--	2.80 µg/kg
	PFBS	1,300,000 µg/kg[b]	6	--	--	--

-- = analyte not detected above the laboratory limit of detection or the category is not applicable
ng/L = nanograms per liter PFBS = perfluorobutanesulfonic acid PFOA = perfluorooctanoic Acid
PFOS = perfluorooctanesulfonic acid µg/kg = micrograms per kilogram
Notes:
[a] USEPA, 2016a. Drinking Water Health Advisory for PFOA and USEPA, 2016b. Drinking Water Health Advisory for PFOS.
[b] USEPA Regional Screening Levels (USEPA, 2017)
[c] USAF Calculated Screening Levels

3.10.2.1 Groundwater Sample Results

Neither PFOS nor PFOA were detected at concentrations above the LOD in AFFF Area 5 groundwater.

PFBS was detected at concentrations above the LOD in both AFFF Area 5 groundwater samples; however, concentrations did not exceed the USEPA RSL.

3.10.2.2 Soil Sample Results

PFOS was detected at concentrations above the LOD in three of the six soil samples collected at NORPMW002 and NORPME003. However, reported concentrations did not exceed the USAF calculated screening levels.

PFOA was detected at concentrations above the LOD; however, reported concentrations were below the USAF calculated screening levels.

PFBS was not detected at concentrations above the LOD in AFFF Area 5 soil.

3.10.3 Conclusions

PFOS and PFOA are not present in AFFF Area 5 groundwater. PFBS was found at detectable concentrations in groundwater, but each was below the USEPA RSL.

PFOS and PFOA were both present in AFFF Area 5 soil; however, concentrations were below the USAF calculated screening value. PFBS was not present in AFFF Area 5 soil.

3.11 AFFF AREA 7 – BUILDING 694

3.11.1 Sample Locations

Groundwater and soil were evaluated at AFFF Area 7. Sample locations are shown on Figure 3-5.

3.11.1.1 Groundwater Samples

One groundwater sample was collected from monitoring well NORPMW004, with a screened interval of approximately 200 to 220 feet bgs. This location is along the northeast corner of the fire station where runoff from fire truck washing or calibration may have occurred.

3.11.1.2 Soil Samples

Three soil samples were collected to an approximate depth of 35 feet from each of the following four locations: NORPMW004, NORPSB001, NORPSB002, and NORPSB003. One field duplicate was collected from NORPSB001. Soil boring locations were positioned along the grassy area along the apron where calibration testing may have taken place.

3.11.2 Analytical Results

The analytical results for PFOS, PFOA, and PFBS are summarized in Table 3-9. Complete analytical results are provided by media in Exhibits 1 and 2 and illustrated on Figure 3-5. Laboratory data reports are provided in Appendix C.

Table 3-9. AFFF Area 7 PFOS, PFOA, and PFBS Summary

Media	Analyte	Screening Criteria	# Samples	# Detections	# Samples Exceeding Screening Criteria	Highest Concentration
Ground-water	PFOS	70 ng/L[a]	1	--	--	--
	PFOA	70 ng/L[a]	1	1	--	21.9 ng/L
	PFOS + PFOA	70 ng/L[a]	1	1	--	21.9 ng/L
	PFBS	400,000 ng/L[b]	1	1	--	24.3 ng/L
Soil	PFOS	1,260 µg/kg[c]	13[d]	12	1	**5,990 J[e] µg/kg**
	PFOA	1,260 µg/kg[c]	13[d]	12	--	167 µg/kg
	PFBS	1,300,000 µg/kg[b]	13[d]	7	--	84.9 µg/kg

-- = analyte not detected above the laboratory limit of detection or the category is not applicable
ng/L = nanograms per liter PFBS = perfluorobutanesulfonic acid PFOA = perfluorooctanoic Acid
PFOS = perfluorooctanesulfonic acid µg/kg = micrograms per kilogram
Notes:
Shaded concentrations are those detected above the screening levels.
[a] USEPA, 2016a. Drinking Water Health Advisory for PFOA and USEPA, 2016b. Drinking Water Health Advisory for PFOS.
[b] USEPA Regional Screening Levels (USEPA, 2017)
[c] USAF Calculated Screening Levels
[d] Includes twelve primary samples and one field duplicate.
[e] J = The analyte was positively identified; the numerical value is the estimated concentration of the analyte in the sample.

3.11.2.1 Groundwater Sample Results

PFOS was not detected at concentrations above the LOD in AFFF Area 7 groundwater.

PFOA and PFBS were each detected at concentrations above the LOD but below the USEPA HA and RSL, respectively.

3.11.2.2 Soil Sample Results

PFOS was detected at concentrations above the LOD in 12 of 13 soil samples collected. Reported concentrations (5,990 µg/kg) in the 0–1 foot bgs (surface soil) sample collected from soil boring NORPSB002 exceeded the USAF-calculated screening level. The remaining reported concentrations did not exceed USAF-calculated screening levels.

PFOA was detected at concentrations above the LOD in 12 soil samples; however, reported concentrations were below the USAF calculated screening levels.

PFBS was detected at concentrations above the LOD in seven soil samples; however, reported concentrations were below the USAF calculated screening levels.

3.11.3 Conclusions

PFOS was not present in AFFF Area 7 groundwater. PFOA and PFBS were each present in groundwater, however, at concentrations below the USEPA HA and RSL, respectively.

PFOS, PFOA, and PFBS were present in AFFF Area 7 soil. PFOS exceeded the USAF-calculated screening level in one surface soil sample collected from 0–1 foot bgs. No other soil samples reported concentrations of PFOS, PFOA, or PFBS exceeding the applicable USAF-calculated screening levels or USEPA RSLs.

3.12 AFFF AREA 8 – FACILITY 2333

3.12.1 Sample Locations

Groundwater and soil were evaluated at AFFF Area 8. Sample locations are shown on Figure 3-6.

3.12.1.1 Groundwater Samples

One downgradient groundwater sample was collected from monitoring well NORPMW007R at AFFF Area 8.

3.12.1.2 Soil Samples

Soil samples were collected from four locations at AFFF Area 8: NORPMW007, NORPSB004, NORPSB005, and NORPSB006. Sample locations were distributed across the FTA to capture potential soil impacts. Eleven primary samples were collected along with two field duplicate samples.

3.12.2 Analytical Results

The analytical results for PFOS, PFOA, and PFBS are summarized in Table 3-10. Complete analytical results are provided by media in Exhibits 1 and 2 and illustrated on Figure 3-6. Laboratory data reports are provided in Appendix C.

Table 3-10. AFFF Area 8 PFOS, PFOA, and PFBS Summary

Media	Analyte	Screening Criteria	# Samples	# Detections	# Samples Exceeding Screening Criteria	Highest Concentration
Ground-water	PFOS	70 ng/L[a]	1	1	--	18.8 ng/L
	PFOA	70 ng/L[a]	1	--	--	--
	PFOS + PFOA	70 ng/L[a]	1	1	--	18.8 ng/L
	PFBS	400,000 ng/L[b]	1	--	--	--
Soil	PFOS	1,260 µg/kg[c]	13[d]	13	4	**4,490 µg/kg**
	PFOA	1,260 µg/kg[c]	13[d]	12	--	569 µg/kg
	PFBS	1,300,000	13[d]	12	--	489 J[e] µg/kg

-- = analyte not detected above the laboratory limit of detection or the category is not applicable
ng/L = nanograms per liter PFBS = perfluorobutanesulfonic acid PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid µg/kg = micrograms per kilogram
Notes:
Shaded concentrations are those detected above the screening levels.
[a] USEPA, 2016a. Drinking Water Health Advisory for PFOA and USEPA, 2016b. Drinking Water Health Advisory for PFOS.
[b] USEPA Regional Screening Levels (USEPA, 2017)
[c] USAF Calculated Screening Levels
[d] Includes eleven primary samples and two field duplicates.
[e] J = The analyte was positively identified; the numerical value is the estimated concentration of the analyte in the sample.

3.12.2.1 Groundwater Sample Results

PFOS was detected at concentrations above the LOD; however, reported concentrations were below the USEPA HA.

Neither PFOA nor PFBS were detected at concentrations above the LOD in AFFF Area 8 groundwater.

3.12.2.2 Soil Sample Results

PFOS was detected in each AFFF Area 8 soil sample. Four surface soil (0–2 feet bgs) samples collected from NORPSB004, NORPSB005, and NORPSB006 had reported concentrations of PFOS above the USAF-calculated screening level. Deeper soil sample results did not exceed the USAF-calculated screening level.

PFOA and PFBS were each detected at concentrations above the LOD in 12 soil samples; however, reported concentrations were below the USAF calculated screening levels and RSL, respectively.

3.12.3 Conclusions

Analytical data suggests that PFOS is present in groundwater and that PFOS, PFOA, and PFBS are present in soil at AFFF Area 8. PFOS was found in surficial soil (upper most 2 feet) at concentrations exceeding the USAF-calculated screening level. No other samples exceeded the applicable USEPA HA, USEPA RSL, or USAF-calculated screening levels.

3.13 DOWNGRADIENT BOUNDARY WELLS

3.13.1 Sample Locations

Three groundwater samples were collected from existing downgradient wells MW-274, MW-289, and MW-401 to determine if PFOS, PFOA, and/or PFBS were present at the installation boundary and potentially migrating offsite. The locations of these wells are shown on Figure 3-7.

3.13.2 Analytical Results

Analytical results for PFOS, PFOA, and PFBS at the installation boundary wells are summarized in Table 3-11 and illustrated on Figure 3-7. Laboratory data reports are included in Appendix C and complete analytical results are provided in Exhibit 1.

Table 3-11. Boundary Well PFOS, PFOA, and PFBS Summary

Media	Analyte	Screening Level	# Samples	# Detections	# Samples Exceeding Screening Levels	Highest Concentration
Ground-water	PFOS	70 ng/L[a]	3	--	--	--
	PFOA	70 ng/L[a]	3	3	--	6.22 J[c] ng/L
	PFOS + PFOA	70 ng/L[a]	3	3	--	6.22 J ng/L
	PFBS	400,000 ng/L[b]	3	2	--	63.1 ng/L

-- = analyte not detected above the laboratory limit of detection or the category is not applicable
ng/L = nanograms per liter PFBS = perfluorobutanesulfonic acid PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid
Notes:
[a] USEPA, 2016a. Drinking Water Health Advisory for PFOA and USEPA, 2016b. Drinking Water Health Advisory for PFOS.
[b] USEPA Regional Screening Levels (USEPA, 2017)
[c] J = The analyte was positively identified; the numerical value is the estimated concentration of the analyte in the sample.

3.13.2.1 Downgradient Boundary Groundwater Sample Results

PFOS was not detected in boundary well groundwater.

PFOA was detected at concentrations above the LOD; however, reported concentrations were below the USEPA HA.

PFBS was detected at concentrations above the LOD in two of the three groundwater samples; however, reported concentrations were below the USEPA RSL.

3.13.3 Conclusions

Analytical data suggests that PFOA and PFBS are present in groundwater in downgradient boundary wells. PFOA was detected at concentrations below the USEPA HA level and PFBS was detected at levels below the USEPA RSL. Wells MW-289 and MW-401 are hydraulically downgradient of AFFF Area 7 and 8, both of which were found to have PFOS impacts in surficial soils. Since PFOS was not detected in wells MW-289 and MW-401, this suggests that the PFOS in soil is not leaching into groundwater and is not migrating downgradient at the former Norton AFB.

3.14 INVESTIGATION-DERIVED WASTE

The SI field effort at the former Norton AFB generated approximately 83 cubic yards of soil and 13,524 gallons of wastewater. The soil and water were both characterized as nonhazardous. The waste was then transported to and disposed of via incineration at Clean Harbors Aragonite landfill in Utah. This facility is permitted to receive CERCLA waste under EPA Permit #UTD981552177. The final waste manifests, certificates of disposal, and additional information on the Clean Harbors Aragonite facility are included in Appendix E.

4.0 MIGRATION/EXPOSURE PATHWAYS AND TARGETS

The following subsections describe migration exposure pathways and targets (receptors) associated with PFOS, PFOA, and PFBS in groundwater and soil at the former Norton AFB. The information contained in this section has also been included in the updated conceptual site models. These dynamic models serve to conceptualize the relationship between the contaminant sources and receptors through consideration of potential or actual migration pathways (Appendix F).

4.1 LOCAL GEOLOGY AND HYDROGEOLOGY

4.1.1 Geology

The former Norton AFB is located within the Bunker Hill Basin, underlain by more than 1,000 feet of Pleistocene and recent age alluvium composed of granitic and gneissic detritus. Generally, surface soils over the area of the former base are classified as Tujunga, gravelly, loamy sand, typically highly permeable with a slow to very slow surface runoff rating. The geologic setting of the former Norton AFB is that of a fault-controlled alluvial basin environment and the sediments consist of unconsolidated, relatively undisturbed gravels, sands, silts, and clays in varying proportions.

4.1.2 Hydrogeology

The former Norton AFB hydrogeology is consistent with the regional hydrogeology. The major hydrologic units evaluated within the former Norton AFB include the Upper Confining Member and the Upper Aquifer. The uppermost hydrologic unit at the former Norton AFB is the confining member that overlies the Upper Aquifer and correlates regionally with what is known as the Upper Confining Member. The Upper Confining Member is present in the southwest portion of the base, the former Industrial Waste Treatment Plant and the former Palm Meadows golf course area, but appears to be absent across much of the eastern half of the base. In general, confining members consist of fine-grained clays, silty sands, and sands; contains more clay in the west portion of the base; and becomes siltier towards the east (AECOM, 2015).

The extent of confined water beneath the confining member is variable. The confining member may locally support perched water zones that occur from depths between approximately 30 and 60 feet, but the clay layers that support perched water are not laterally continuous. Perched water zones can only be maintained if recharge water is available, and artificial recharge of the perched zone along the southern part of the base from the former golf course has ceased. Many of the perched zone wells that were installed as part of earlier investigations have gone dry and been abandoned (CH2M Hill, 2014).

Below the Upper Confining Member, the Upper Aquifer extends from historic depths of approximately 75 feet to depths in excess of 250 feet and is approximately 200 to 250 feet thick in the vicinity of the former Norton AFB (AECOM, 2015). The results of groundwater investigations suggest that the Upper Aquifer should be considered as one hydrologic unit. Fine-grained lenses exist within the Upper Aquifer, but they are not laterally extensive and cannot be used to designate separate units. During the SI fieldwork, depths to groundwater across the installation varied from approximately 176 feet to 202 feet bgs. Groundwater flow was found to be generally to the west across the eastern portion of the installation and to the southwest in the western portion of the installation.

Previously, groundwater in parts of the base were influenced by pump and treat remediation systems used to control base to remove and hydraulically control trichloroethylene (TCE) in groundwater. The Central

Base Area (CBA) system was located on the northwest portion of the base, near well BP-3 (Figure 2-2). This system commenced 24-hour operation in June 1992 and ceased in May 2002. The CBA system included liquid-phase granular activated carbon (GAC) treatment, which not only was effective in reducing TCE concentrations, would also have been effective in removing any PFOS or PFOA from the groundwater. The Base Boundary (BB) system was located in the southwest corner of the installation, near the intersection of Tippecanoe Avenue and Mill Street. This system commenced 24-hour operations in February 1995 and ceased in November 2001. Liquid-phase GAC treatment was not included in this system. Currently, no pump and treat system operate at the former installation.

4.2 HYDROLOGY

The former Norton AFB is situated in the upstream end of the Santa Ana River basin. The southern edge of the former base is bounded by the main channel of the Santa Ana River and the majority of the northern edge is bounded by City Creek, a major tributary to the Santa Ana River whose confluence with the river is west and south of the former installation. The general slope of the ground surface and the direction of flow of the channels is to the southwest. Both channels have only intermittent flows, usually in the wet season, when rainfall is heavy and sustained enough to produce runoff. The drainage area of City Creek is north of the former base and the Santa Ana River drainage area is east and north of the base. Both watersheds originate in the San Bernardino Mountains. There are no identified wetlands within the boundaries of the former Norton AFB (AECOM, 2015).

4.3 WELL SURVEY

A desktop inventory of potable water wells was conducted as part of the SI for locations of municipal/public drinking water wells and domestic/private drinking water wells located within four miles downgradient (southwest) of the former installation. The California State Water Resources Control Board database was queried to identify these wells. The database was manipulated to remove wells that were reported as plugged or abandoned, monitoring wells, geothermal wells, and irrigation wells. The resultant database identified 192 wells within four miles downgradient of the former base, all within San Bernardino County, California. The results of the survey are presented in Appendix G and Figure 4-1. Table 4-1 provides a summary of the wells identified.

Table 4-1. Summary of Well Survey Results

Well Type	Number of Wells
Domestic	123
Public	41
Unknown	28
Total	**192**

Four on-base wells identified as Wells BP2, BP3, BP5, and BP11 completed at depths ranging from 733–990 feet bgs were identified (Figure 2-2). These wells are owned and operated by the City of San Bernardino as part of their water supply system. According to Third Unregulated Contaminant Monitoring Rule data obtained from the City of San Bernardino, neither PFOS nor PFOA were detected in their system between the years of 2013 and 2015 (City of San Bernardino, 2013, 2014, and 2015).

Local residences and businesses surrounding the former installation obtain potable water from the middle and lower aquifers of the Bunker Hill groundwater basin. The major municipal drinking water supply wells are comprised of the Gage Canal water wells, Raub wells, Warren-Thorne wells, and the Meeks and Daley well, all located within 2 miles southwest of the base (AECOM, 2015). These supply wells are operated by the City of Riverside. Just as with the City of San Bernardino, the City of Riverside also sampled for PFOS and PFOA in 2013, 2014, and 2015, as mandated by the Third Unregulated Contaminant Monitoring Rule. Data obtained from the City of Riverside indicated that neither PFOS nor PFOA were detected in their system between the years of 2013 and 2015 (Riverside Public Utilities, 2013, 2014, and 2015).

4.4 HUMAN EXPOSURE PATHWAYS

This SI evaluated five AFFF areas for impacts from PFOS, PFOA, and PFBS to groundwater and soil. Groundwater and soil are considered impacted when concentrations of PFOS, PFOA, or PFBS exceed project screening levels (i.e., USEPA HAs, USAF calculated levels, or USEPA RSLs [see Table 1-1]). Exposure pathway analysis was not required for AFFF areas in which no impacts were identified.

AFFF areas identified with groundwater and/or soil impacts are evaluated below to determine if a human exposure pathway is characterized as complete or incomplete. A complete exposure pathway must have the following five elements (ATSDR, 2005):

- A source of contamination (area with analytical result above the HA for PFOS/PFOA in water contributing to drinking water),
- A mechanism for transport to drinking water (groundwater migration),
- A point of exposure (a drinking water well),
- A route of exposure to a human receptor (ingestion of drinking water), and
- A human receptor (a person drinking the water).

If any one or more of the elements above is missing, the exposure pathway is considered incomplete.

The drinking water pathway discussion includes AFFF areas where PFOS and PFOA impacts to groundwater were identified and assessment of associated drinking water pathways. The non-drinking water pathway discussion includes AFFF areas where impacts from PFOS and/or PFOA were identified to soil and from PFBS to soil and/or groundwater.

4.4.1 Drinking Water Pathways

Complete drinking water pathways are defined as actionable when concentrations of PFOS, PFOA, or PFOS+PFOA above the HA have been confirmed in drinking water that is attributable to the USAF. A drinking water pathway is incomplete when concentrations of PFOS, PFOA, or PFOS+PFOA exceed the HA but there are no drinking water receptors. The groundwater migration pathway for PFOS, PFOA, and/or PFBS impacts is discussed below, including whether the exposure pathway is actionable, complete, or incomplete. Based on the collection and review of analytical data from the former Norton AFB, no impacts from PFOS or PFOA to groundwater were identified.

Municipal drinking water wells downgradient of Norton AFB have been impacted by various contaminants in the past. TCE contamination was found in Raub Well #5 (Figure 4-1), resulting in the installation of a

wellhead treatment system including liquid phase GAC treatment. Lockheed-Martin has installed liquid-phase granular-activated carbon at three City of Riverside Regional Treatment Facilities (RTFs). Tippecanoe RTF treats Gage 29-2, Gage 29-3, Gage 92-1, and Tippecanoe; Sunnyside RTF treats Gage 26-1, Gage 27-1, and Gage 51-1; Raub RTF treats Raub #4, Raub #5, and Raub #7 (Tetra Tech, 2008). While groundwater was not observed to be impacted by PFOS or PFOA during this SI, these treatment systems have historically provided further protection to drinking water from PFOS and PFOA.

4.4.1.1 Actionable Complete Pathways

Since no impacts from PFOS or PFOA to groundwater were identified in the AFFF areas at the former Norton AFB, there are no actionable pathways.

4.4.1.2 Complete Pathways

Since no impacts from PFOS or PFOA to groundwater were identified in the AFFF areas at the former Norton AFB, there are no complete pathways.

4.4.1.3 Incomplete Pathways

All drinking water pathways at Norton AFB are considered incomplete. Since there were no concentrations of PFOS or PFOA above the HA within potential source areas, there is no source of contamination. Further, analytical data from the City of San Bernardino and the City of Riverside, both of which have drinking water production wells downgradient of the potential source areas, did not detect PFOS or PFOA in their drinking water systems. Therefore, the drinking water pathway is considered incomplete.

4.4.2 Non Drinking Water Pathway

Non-drinking water pathways are evaluated for areas with concentrations of PFOS and/or PFOA in soil above the USAF-calculated screening level and/or concentrations of PFBS in soil or groundwater above the respective RSLs. PFOA was not detected above the USAF-calculated screening level in soil at any AFFF area. The only confirmed non-drinking water impacts were identified at AFFF Areas 7 and 8 where PFOS was found within surficial soils (0–2 feet bgs) above the USAF-calculated screening level. Human receptors to soils at the AFFF Areas 7 and 8 are potentially present; however, these areas are restricted to the public. Based on the analytical data and the receptor evaluation, the soil exposure pathways at AFFF Areas 7 and 8 are considered complete.

5.0 SUMMARY AND CONCLUSIONS

The primary objectives of the former Norton AFB SI were to

- determine the presence/absence of PFOS, PFOA, and PFBS in groundwater and soil;
- determine if concentrations of PFOA, PFOS, or sum of both in groundwater exceed the USEPA HA levels;
- determine if PFBS concentrations in groundwater and soil exceed the USEPA RSLs;
- determine if PFOS and/or PFOA are present in soil at concentrations above the USAF-calculated screening levels; and
- identify potential human health drinking water pathways and receptors.

The objectives were met by sampling groundwater and soil at potential source areas and conducting a drinking water well survey.

Groundwater

Groundwater samples were collected from six newly installed monitoring wells and four existing monitoring wells from five AFFF areas and near the downgradient site boundary. None of the groundwater samples collected contained concentrations of PFOS, PFOA, or PFBS above their respective health-based screening values defined in Table 1-1. Therefore, no impacts from PFOS, PFOA, or PFBS were identified in groundwater. Domestic and public supply wells were identified within 4 miles of the AFFF areas; however, since groundwater is not impacted with PFOS or PFOA, the drinking water exposure pathway is incomplete.

Soil

Soil samples were collected at four AFFF areas during the SI field effort. The analytical results indicate that concentrations of PFOS surface soil samples at AFFF Areas 7 and 8 exceeded the USAF-calculated screening level. No other soil samples had concentrations of PFOS, PFOA, or PFBS exceeding their respective screening values. This non-drinking water pathway is considered complete for AFFF Areas 7 and 8 since human receptors are routinely present in each area, and concentrations of PFOS may pose a risk to human health. However, in the absence of legally enforceable federal or state standards, further action is not recommended until these standards are developed and promulgated. While surficial soils were impacted with PFOS in two AFFF Areas, analytical samples from groundwater in and downgradient of these areas show very low to no levels of PFOS, suggesting that PFOS has not significantly leached from soil. Table 5-1 is a comprehensive summary of PFOS, PFOA, and PFBS results from this SI and the previous investigations conducted in 2015.

Table 5-1. AFFF Area Summary

AFFF Area	Media	Actionable Drinking Water Exposure Pathway (# of Public/Private Drinking Water Wells > HA[a])	Complete Drinking Water Exposure Pathway (# of Public/Private Drinking Water Wells < HA[a])	Groundwater > PFOS + PFOA USEPA HA[a]	Groundwater > Tapwater USEPA RSL for PFBS[b]	Soil/Sediment > USEPA RSL for PFBS[b]	Soil/Sediment > USAF calculated screening level for PFOS/ PFOA[c]	Further Response Actions[d]
1: Former IRP Site 2 Landfill	Groundwater	No	No	No	No	--	--	No
2: Building 763 (Aircraft Maintenance Hangar and Electroplating Shop)	*Not investigated since no suspected releases of AFFF were identified. No further action.*							No
3: Building 695 (Aircraft Maintenance Hangar)	*Not investigated since no suspected releases of AFFF were identified. No further action.*							No
4: Buildings 674 (Aircraft Maintenance Hangar) and 667 (Pump House)	Groundwater	No	No	No	No	--	--	No
	Soil	--	--	--	--	No	No	No
5: Building 680 (Fire Station) and Fire Tech Service	Groundwater	No	No	No	No	--	--	No
	Soil	--	--	--	--	No	No	No
6: Building 24 (Childcare Center)	*Not investigated since no suspected releases of AFFF were identified. No further action.*							No
7: Building 694 (Crash Truck Station)	Groundwater	No	No	No	No	--	--	No
	Soil	--	--	--	--	No	Yes (5,990 µg/kg)	Yes
8: Facility 2333 (Fire Training Facility)	Groundwater	No	No	No	No	--	--	No
	Soil	--	--	--	--	No	Yes (4,490 µg/kg)	Yes

AFFF Area	Media	Actionable Drinking Water Exposure Pathway (# of Public/Private Drinking Water Wells > HA[a])	Complete Drinking Water Exposure Pathway (# of Public/Private Drinking Water Wells < HA[a])	Groundwater > PFOS + PFOA USEPA HA[a]	Groundwater > Tapwater USEPA RSL for PFBS[b]	Soil/Sediment > USEPA RSL for PFBS[b]	Soil/Sediment > USAF calculated screening level for PFOS/ PFOA[c]	Further Response Actions[d]
FTA Site AT005	Groundwater	No	No	No	No	--	--	No
	Soil	--	--	--	--	No	No	No
	Sediment	--	--	--	--	No	No	No

Notes:
* Includes information obtained during the 2015 Site Investigation of AT005
a. USEPA, 2016a. Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA) and USEPA, 2016b. Drinking Water Health Advisory for Perfluorooctanesulfonic acid (PFOS).
b. USEPA Regional Screening Levels (USEPA, 2017) [https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-november-2017]
c. 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 milligrams per kilogram per day derived by USEPA in their Drinking Water Health Advisories for both PFOS and PFOA (USEPA, 2017).
d. Pending promulgated reulgations

> = greater than
< = less than
-- = analyte not detected above the laboratory limit of detection or the category is not applicable
AFFF = aqueous film forming foam
FTA = fire training area
HA = health advisory
IRP = Installation Restoration Program
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid
RSL = Regional Screening Level
µg/kg = micrograms per kilogram
USAF = United States Air Force
USEPA = United States Environmental Protection Agency

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FIGURES

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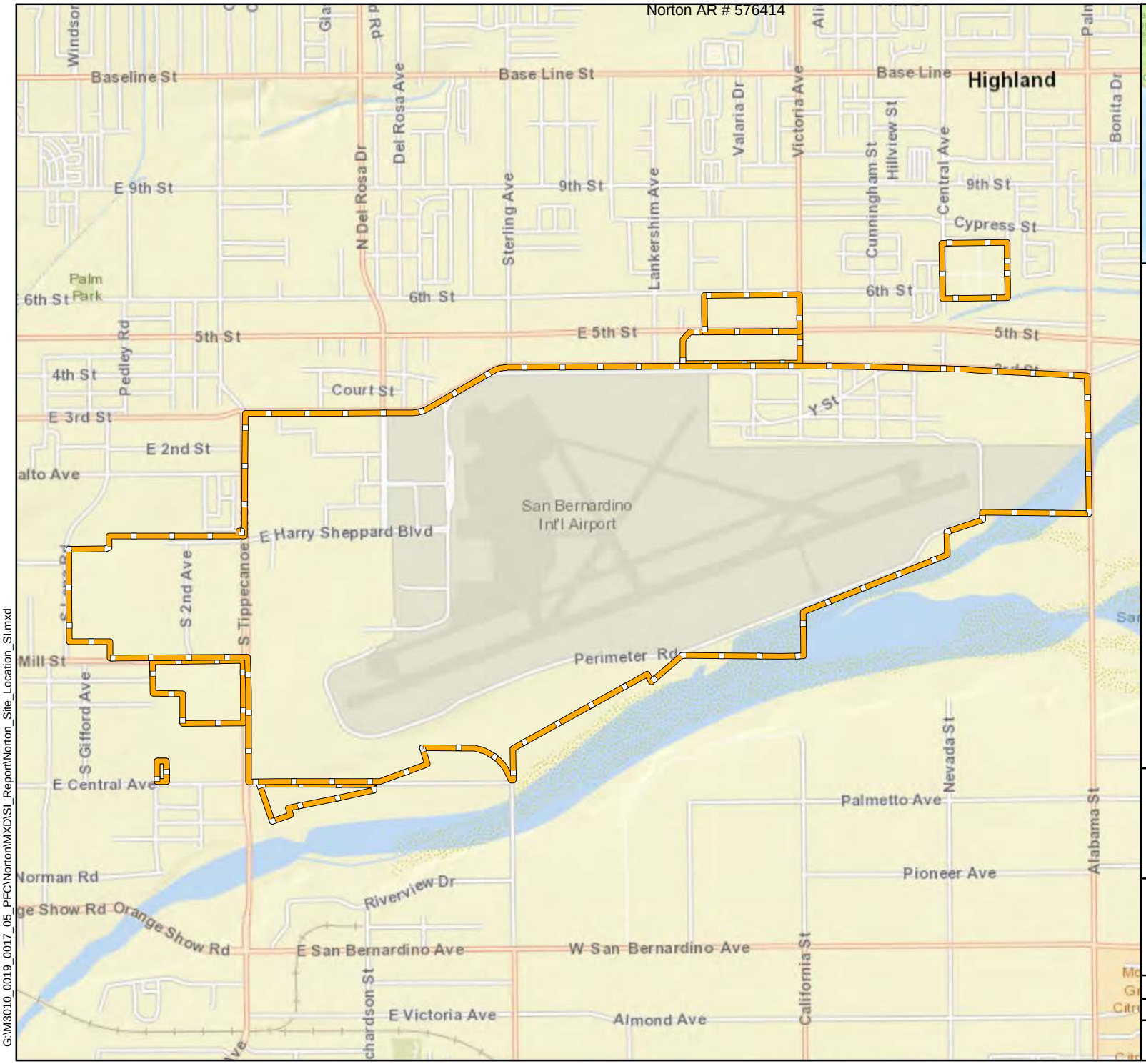

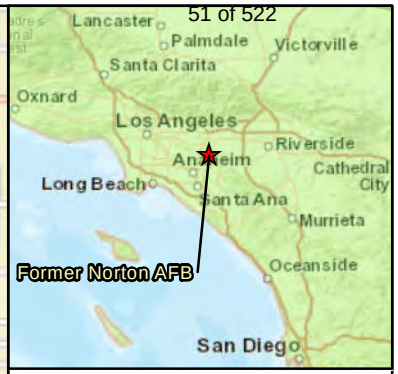

Legend

Installation Boundary

N

0 2,500

Feet

Figure 2-1
Site Location Map
Former Norton Air Force Base

Air Force Civil Engineer Center
2261 Hughes Avenue
Building 171, Ste 155
JBSA Lackland, Texas 78236

Norton_Site_Location_SI.mxd

Drawn: LNatzke | Date: 10/18/2017

Service Layer Credits: Esri ArcGIS Online Aerial Photography

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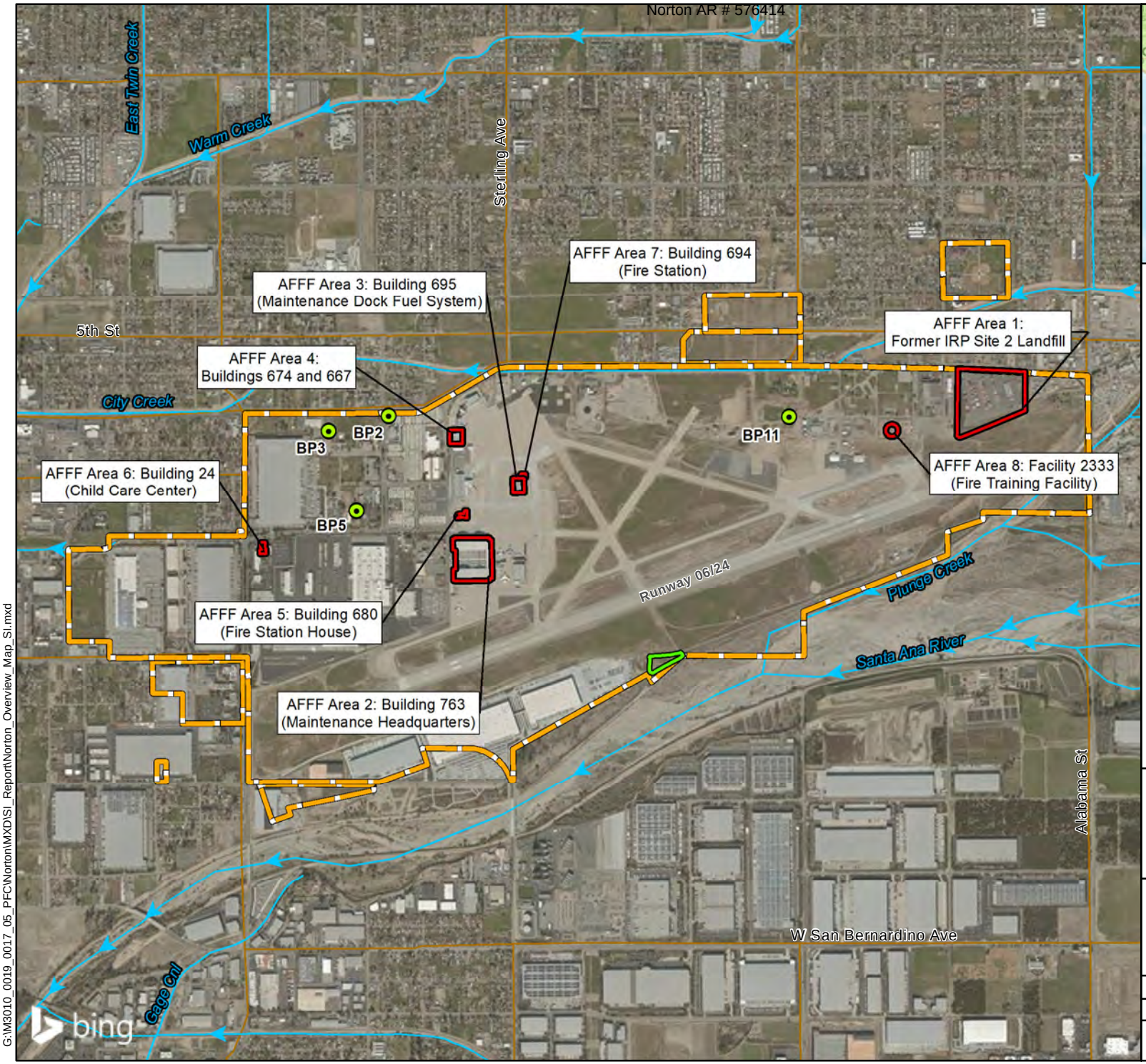

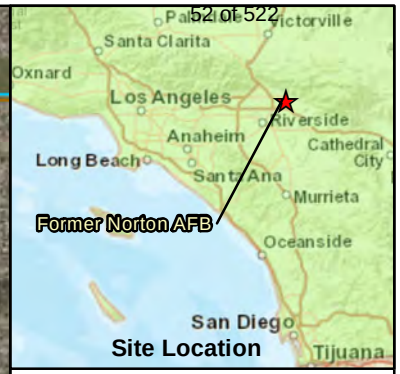

Legend

- Production/Water Supply Well
- AFFF Area Boundary
- Fire Training Boundary
- Installation Boundary
- Streams

N

0 2,500
Feet

Figure 2-2
Installation Overview Map
Former Norton Air Force Base

Air Force Civil Engineer Center
2261 Hughes Avenue
Building 171, Ste 155
JBSA Lackland, Texas 78236

Norton_Overview_Map_SI.mxd

Drawn: jowens | Date: 6/19/2018

Service Layer Credits: Esri ArcGIS Online Aerial Photography

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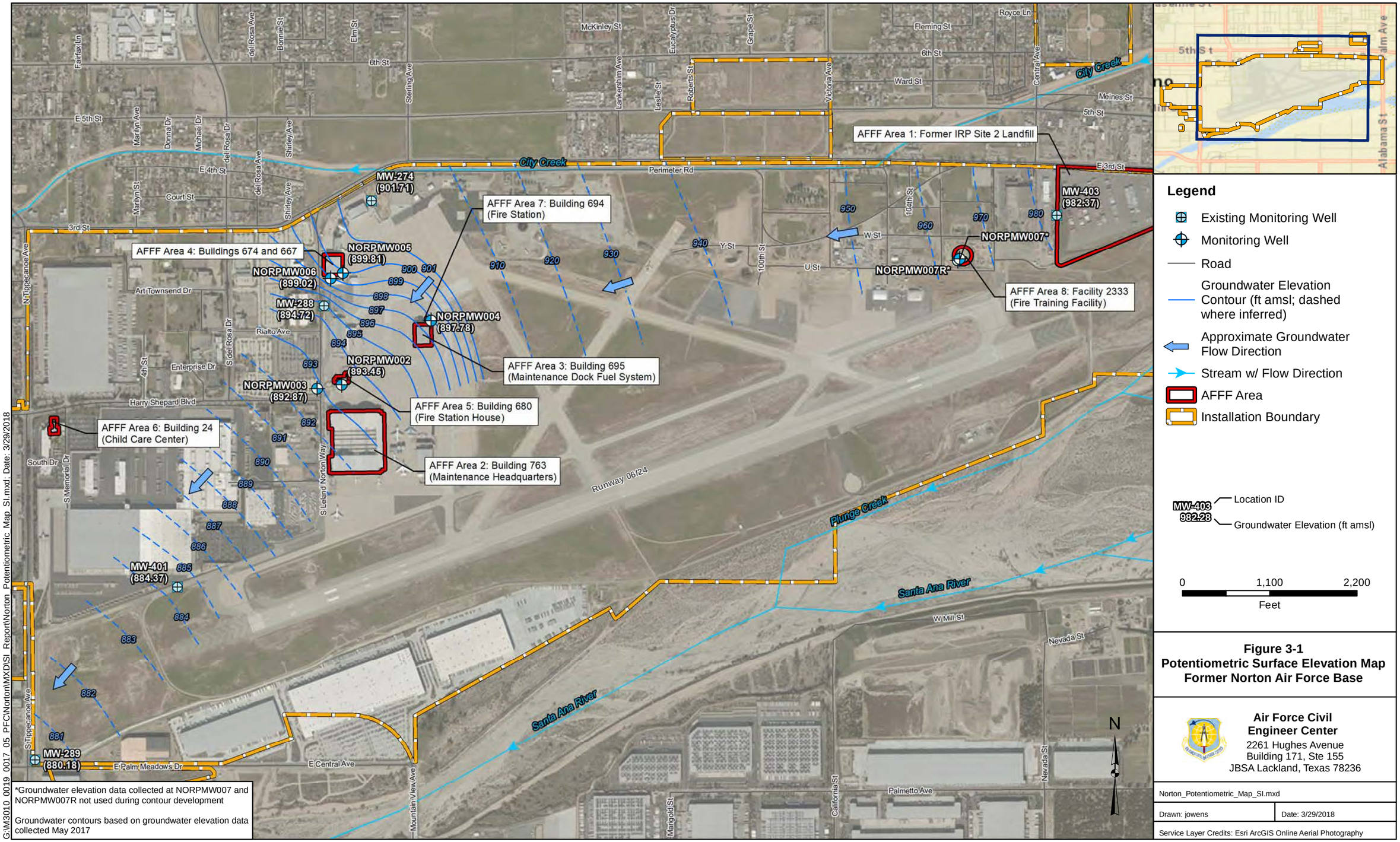

*Groundwater elevation data collected at NORPMW007 and NORPMW007R not used during contour development

Groundwater contours based on groundwater elevation data collected May 2017

Figure 3-1
Potentiometric Surface Elevation Map
Former Norton Air Force Base

Air Force Civil Engineer Center
2261 Hughes Avenue
Building 171, Ste 155
JBSA Lackland, Texas 78236

Norton_Potentiometric_Map_SI.mxd

Drawn: jowens | Date: 3/29/2018

Service Layer Credits: Esri ArcGIS Online Aerial Photography

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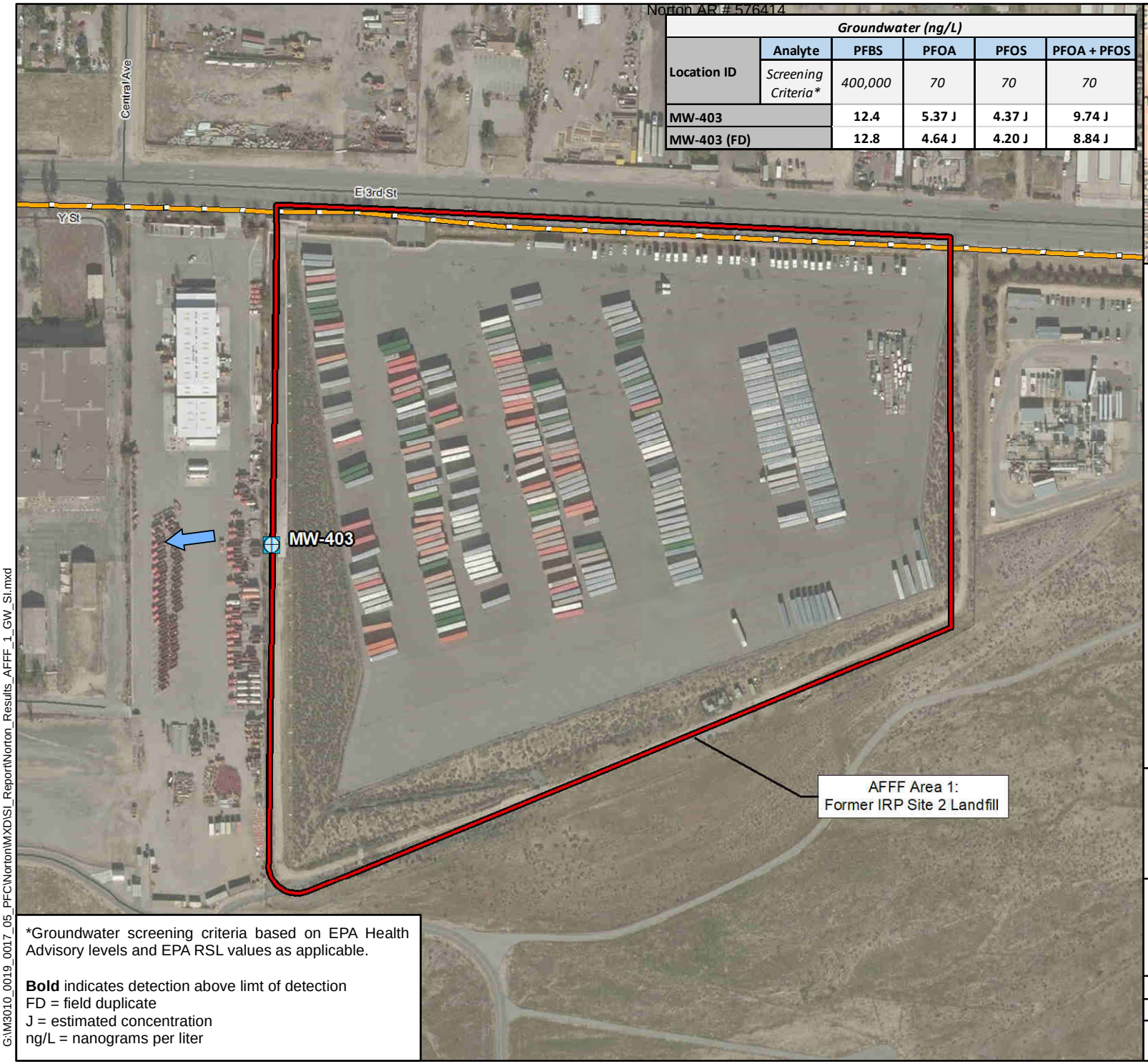
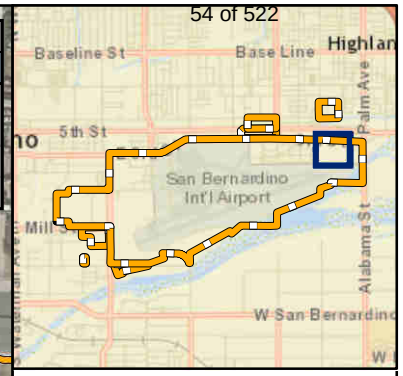
Groundwater (ng/L)					
Location ID	Analyte	PFBS	PFOA	PFOS	PFOA + PFOS
	*Screening Criteria**	*400,000*	*70*	*70*	*70*
MW-403		**12.4**	**5.37 J**	**4.37 J**	**9.74 J**
MW-403 (FD)		**12.8**	**4.64 J**	**4.20 J**	**8.84 J**





Legend

- Existing Monitoring Well (sampled)
- Road
- AFFF Area Boundary
- Installation Boundary
- Approximate Groundwater Flow Direction

N

0 250
Feet

*Groundwater screening criteria based on EPA Health Advisory levels and EPA RSL values as applicable.

Bold indicates detection above limt of detection
FD = field duplicate
J = estimated concentration
ng/L = nanograms per liter

Figure 3-2
AFFF Area 1
Groundwater Sampling Results
Former Norton Air Force Base

Air Force Civil Engineer Center
2261 Hughes Avenue
Building 171, Ste 155
JBSA Lackland, Texas 78236

Norton_Results_AFFF_1_GW_SI.mxd
Drawn: LNatzke
Date: 11/16/2017

Service Layer Credits: Esri ArcGIS Online Aerial Photography

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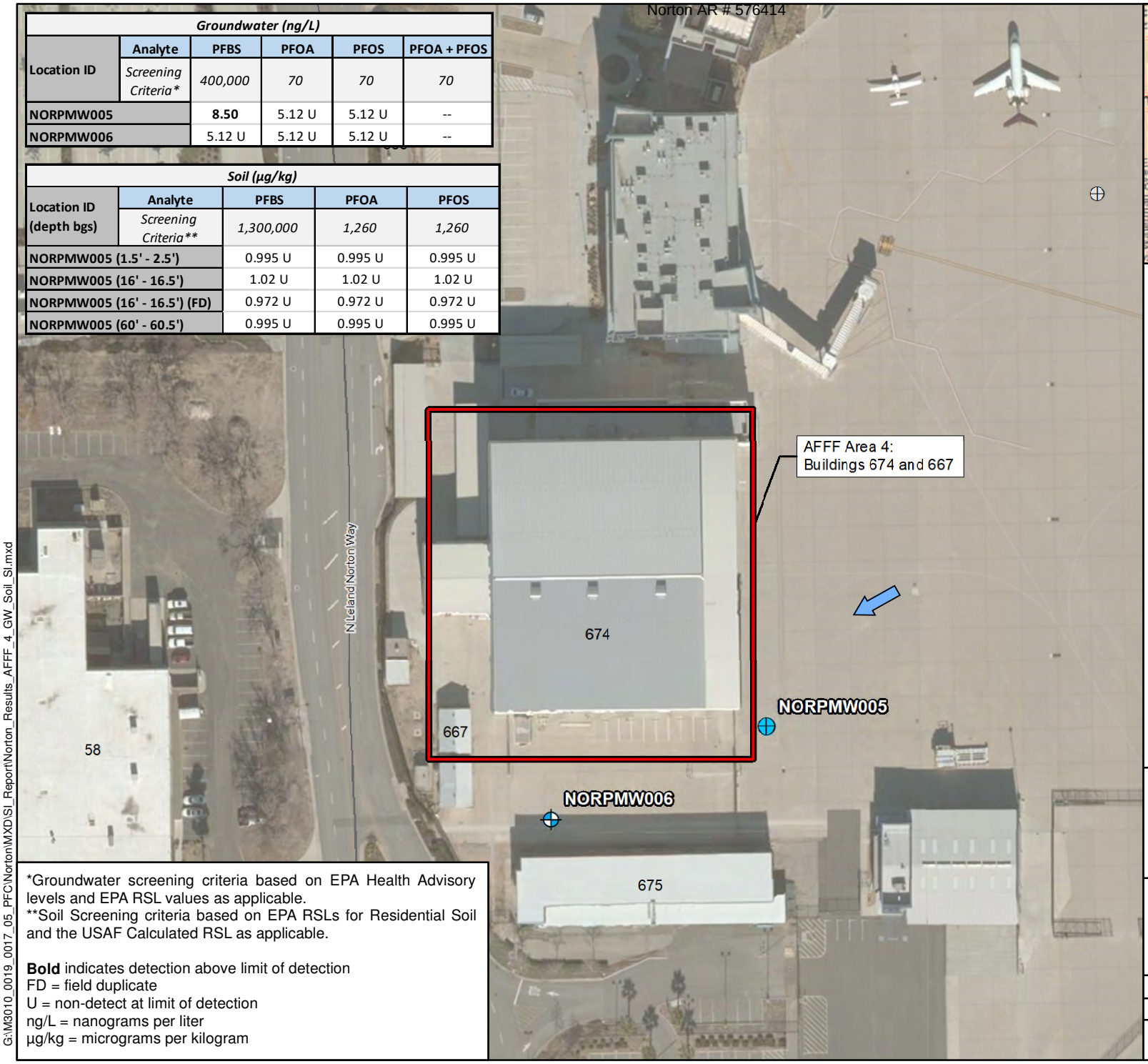
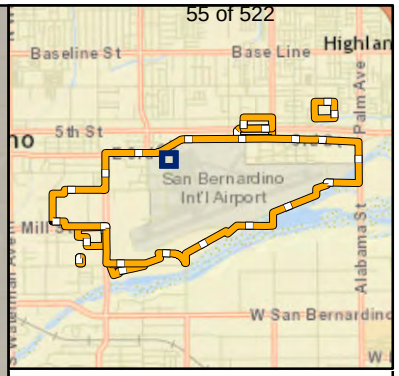
Groundwater (ng/L)					
Location ID	Analyte	PFBS	PFOA	PFOS	PFOA + PFOS
	*Screening Criteria**	*400,000*	*70*	*70*	*70*
NORPMW005		**8.50**	5.12 U	5.12 U	--
NORPMW006		5.12 U	5.12 U	5.12 U	--

Soil (µg/kg)				
Location ID (depth bgs)	Analyte	PFBS	PFOA	PFOS
	*Screening Criteria***	*1,300,000*	*1,260*	*1,260*
NORPMW005 (1.5' - 2.5')		0.995 U	0.995 U	0.995 U
NORPMW005 (16' - 16.5')		1.02 U	1.02 U	1.02 U
NORPMW005 (16' - 16.5') (FD)		0.972 U	0.972 U	0.972 U
NORPMW005 (60' - 60.5')		0.995 U	0.995 U	0.995 U





Legend

- Monitoring Well
- Monitoring Well/Soil Boring
- Existing Monitoring Well
- Road
- AFFF Area Boundary
- Installation Boundary
- Approximate Groundwater Flow Direction

N

0 100
Feet

*Groundwater screening criteria based on EPA Health Advisory levels and EPA RSL values as applicable.
**Soil Screening criteria based on EPA RSLs for Residential Soil and the USAF Calculated RSL as applicable.

Bold indicates detection above limit of detection
FD = field duplicate
U = non-detect at limit of detection
ng/L = nanograms per liter
µg/kg = micrograms per kilogram

Figure 3-3
AFFF Area 4
Groundwater and Soil Sampling Results
Former Norton Air Force Base

Air Force Civil Engineer Center
2261 Hughes Avenue
Building 171, Ste 155
JBSA Lackland, Texas 78236

Norton_Results_AFFF_4_GW_Soil_SI.mxd
Drawn: jowens
Date: 10/25/2017

Service Layer Credits: Esri ArcGIS Online Aerial Photography

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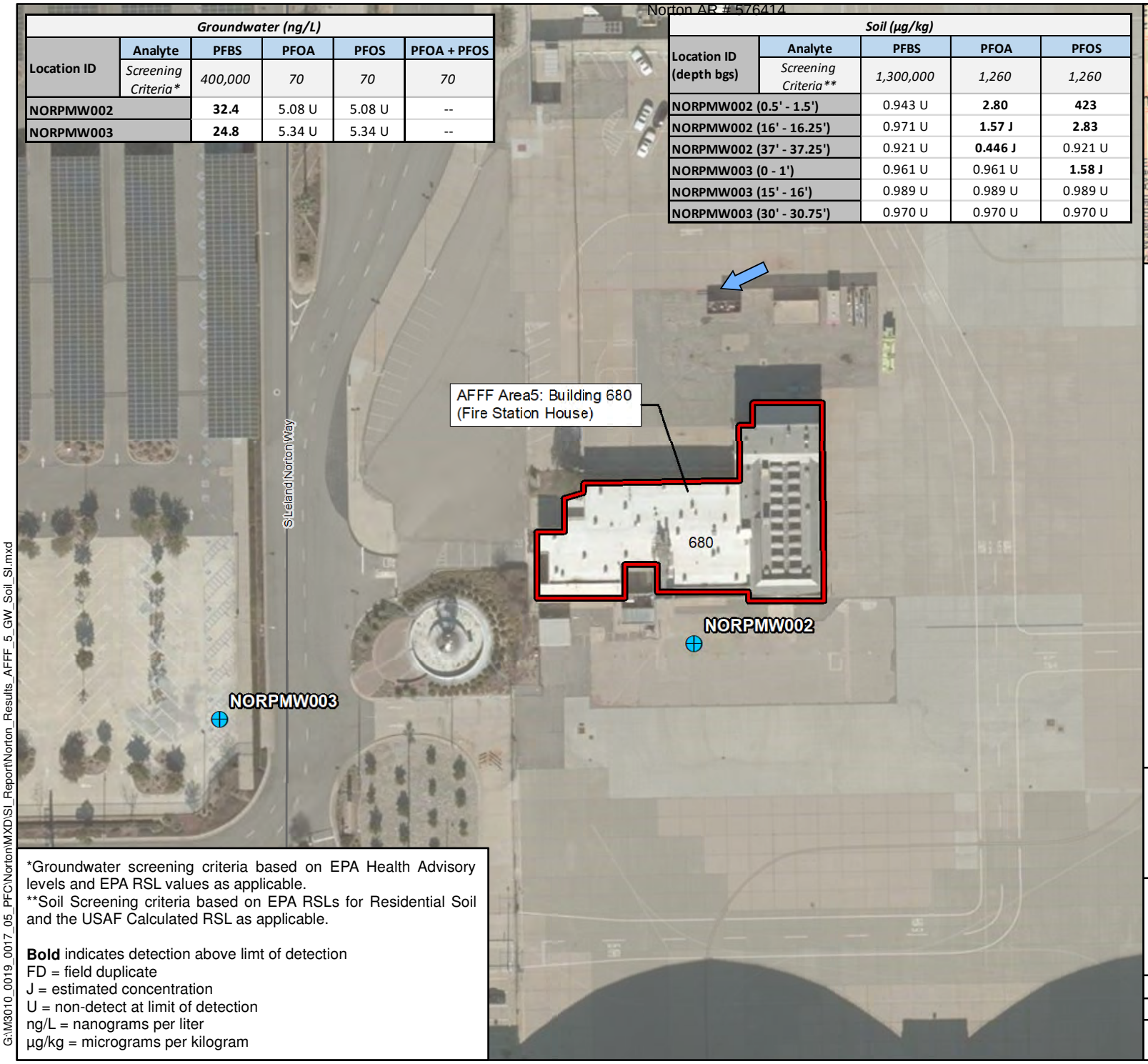
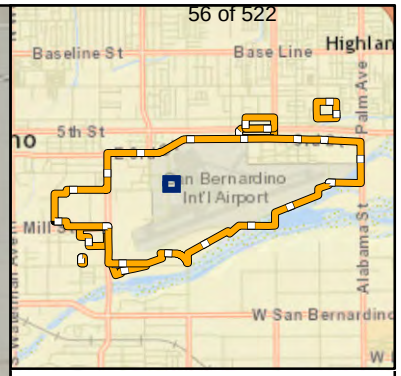
Groundwater (ng/L)					
Location ID	Analyte	PFBS	PFOA	PFOS	PFOA + PFOS
	*Screening Criteria**	*400,000*	*70*	*70*	*70*
NORPMW002		**32.4**	5.08 U	5.08 U	--
NORPMW003		**24.8**	5.34 U	5.34 U	--

Soil (µg/kg)				
Location ID (depth bgs)	Analyte	PFBS	PFOA	PFOS
	*Screening Criteria***	*1,300,000*	*1,260*	*1,260*
NORPMW002 (0.5' - 1.5')		0.943 U	**2.80**	**423**
NORPMW002 (16' - 16.25')		0.971 U	**1.57 J**	**2.83**
NORPMW002 (37' - 37.25')		0.921 U	**0.446 J**	0.921 U
NORPMW003 (0 - 1')		0.961 U	0.961 U	**1.58 J**
NORPMW003 (15' - 16')		0.989 U	0.989 U	0.989 U
NORPMW003 (30' - 30.75')		0.970 U	0.970 U	0.970 U





Legend

- Monitoring Well/Soil Boring
- Road
- AFFF Area Boundary
- Installation Boundary
- Approximate Groundwater Flow Direction

N

0 90
Feet

*Groundwater screening criteria based on EPA Health Advisory levels and EPA RSL values as applicable.
**Soil Screening criteria based on EPA RSLs for Residential Soil and the USAF Calculated RSL as applicable.

Bold indicates detection above limt of detection
FD = field duplicate
J = estimated concentration
U = non-detect at limit of detection
ng/L = nanograms per liter
µg/kg = micrograms per kilogram

Figure 3-4
AFFF Area 5
Groundwater and Soil Sampling Results
Former Norton Air Force Base

Air Force Civil Engineer Center
2261 Hughes Avenue
Building 171, Ste 155
JBSA Lackland, Texas 78236

Norton_Results_AFFF_5_GW_Soil_SI.mxd
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Date: 10/25/2017

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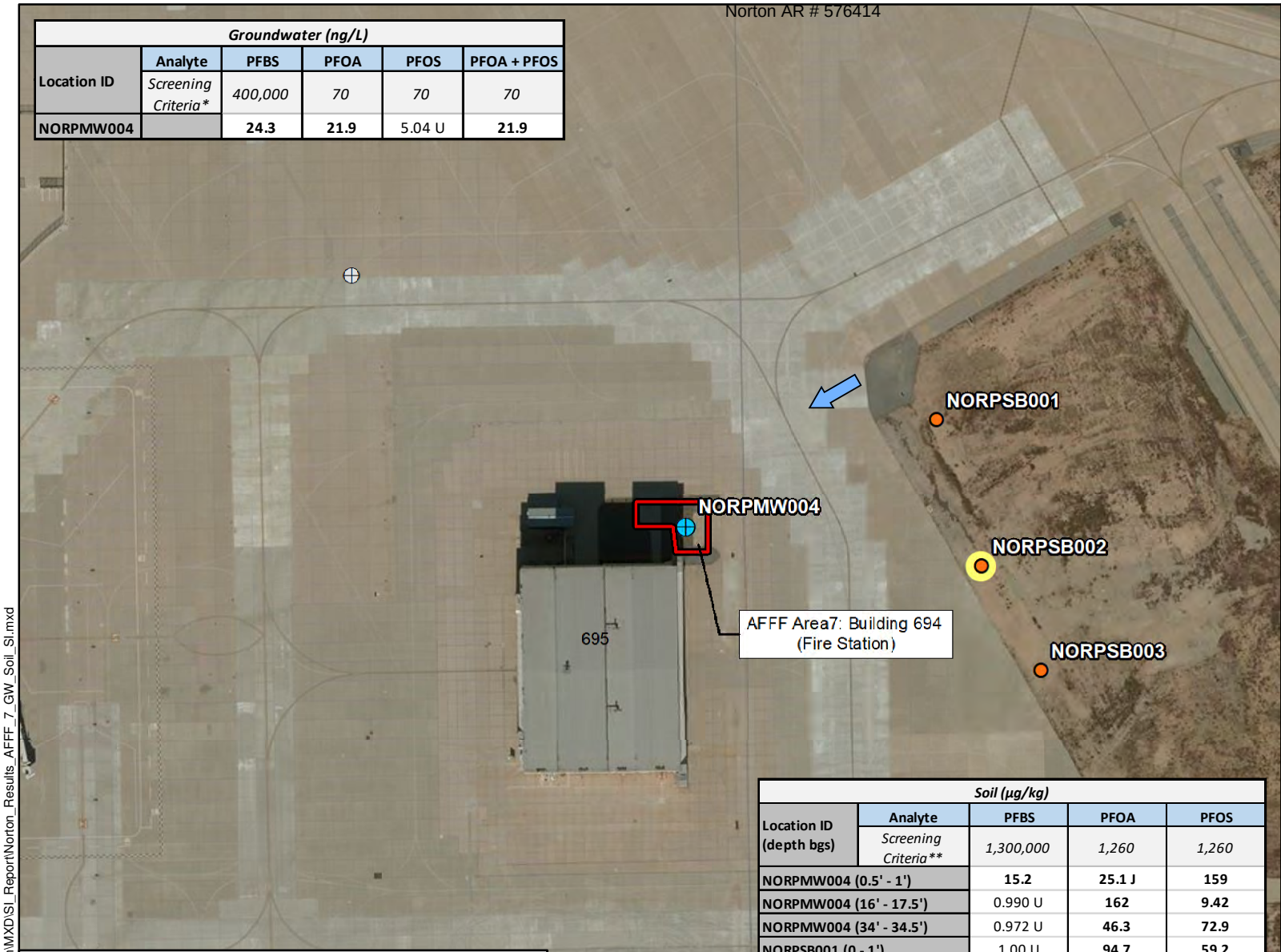
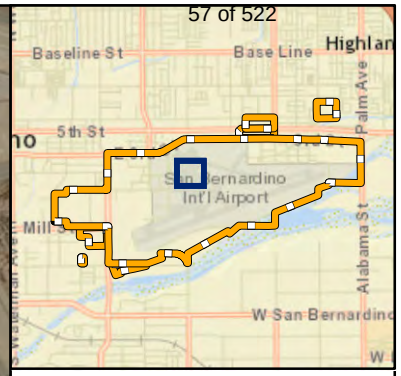
Groundwater (ng/L)					
Location ID	Analyte	PFBS	PFOA	PFOS	PFOA + PFOS
	*Screening Criteria**	*400,000*	*70*	*70*	*70*
NORPMW004		**24.3**	**21.9**	5.04 U	**21.9**





Legend

- Soil Boring
- Monitoring Well/Soil Boring
- Existing Monitoring Well
- Indicates sample result(s) exceeds screening criteria*
- AFFF Area Boundary
- Approximate Groundwater Flow Direction
- Installation Boundary

N

0 200
Feet

Soil (µg/kg)				
Location ID (depth bgs)	Analyte	PFBS	PFOA	PFOS
	*Screening Criteria***	*1,300,000*	*1,260*	*1,260*
NORPMW004 (0.5' - 1')		**15.2**	**25.1 J**	**159**
NORPMW004 (16' - 17.5')		0.990 U	**162**	**9.42**
NORPMW004 (34' - 34.5')		0.972 U	**46.3**	**72.9**
NORPSB001 (0 - 1')		1.00 U	**94.7**	**59.2**
NORPSB001 (0 - 1') (FD)		1.00 U	**69.6**	**45.9**
NORPSB001 (15' - 16')		0.998 U	**10.2**	**0.796 J**
NORPSB001 (28.5' - 30')		0.995 U	**4.22**	**0.373 J**
NORPSB002 (0 - 1')		**84.9**	**138**	**5,990 J**
NORPSB002 (15' - 15.5')		**0.458 J**	**34.9**	**57.2**
NORPSB002 (28' - 29.5')		**7.22**	**88.4**	**237**
NORPSB003 (0 - 1')		**3.21**	**167**	**690**
NORPSB003 (15' - 16.3')		**1.28 J**	**2.14**	**1.90 J**
NORPSB003 (28.5' - 30')		**0.624 J**	1.00 U	1.00 U

*Groundwater screening criteria based on EPA Health Advisory levels and EPA RSL values as applicable.
**Soil Screening criteria based on EPA RSLs for Residential Soil and the USAF Calculated RSL as applicable.

Bold indicates detection above limt of detection
FD = field duplicate
J = estimated concentration
U = non-detect at limit of detection
ng/L = nanograms per liter
µg/kg = micrograms per kilogram

Figure 3-5
AFFF Area 7
Groundwater and Soil Sampling Results
Former Norton Air Force Base

Air Force Civil Engineer Center
2261 Hughes Avenue
Building 171, Ste 155
JBSA Lackland, Texas 78236

Norton_Results_AFFF_7_GW_Soil_SI.mxd

Drawn: jowens | Date: 10/25/2017

Service Layer Credits: Esri ArcGIS Online Aerial Photography

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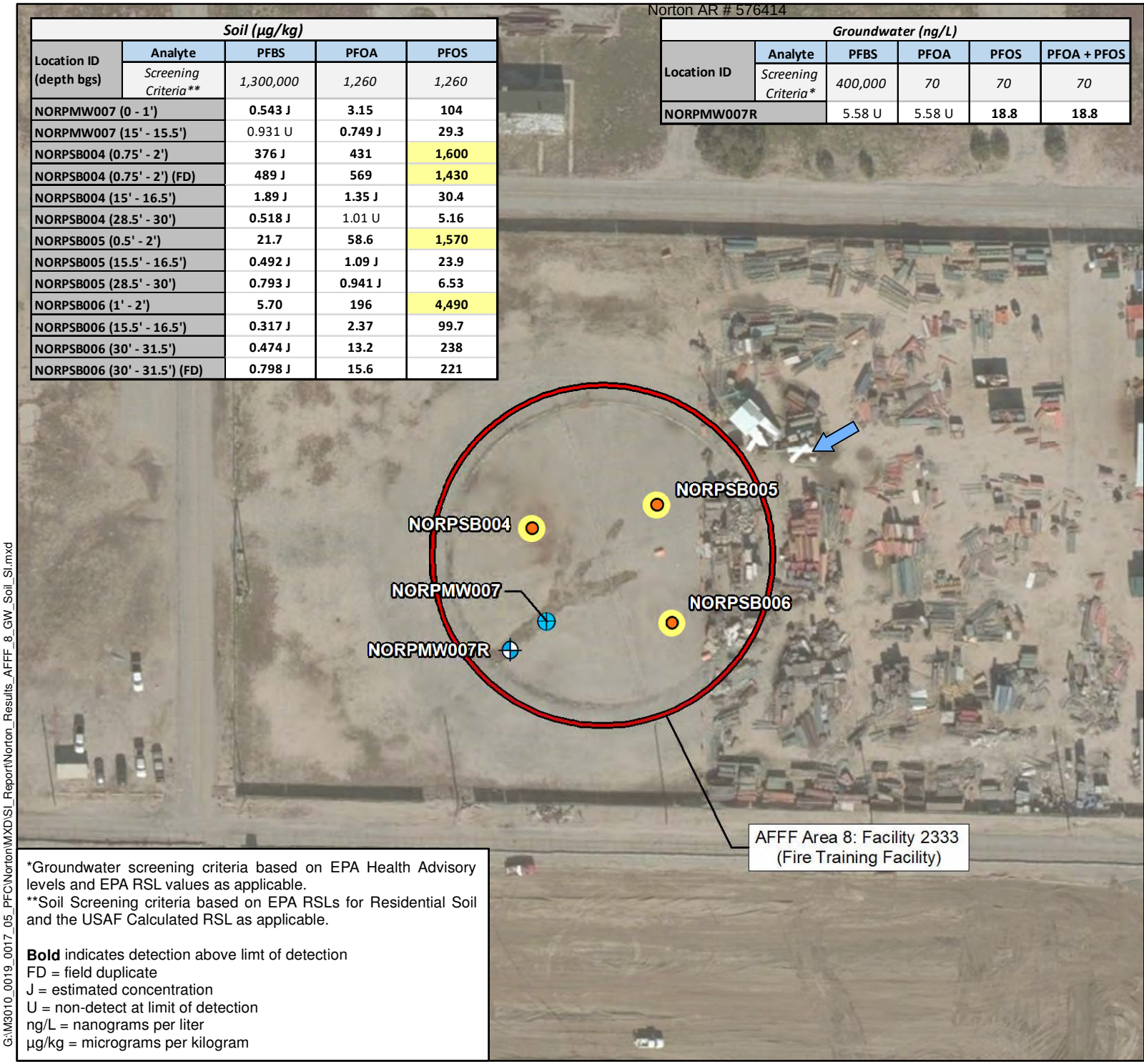
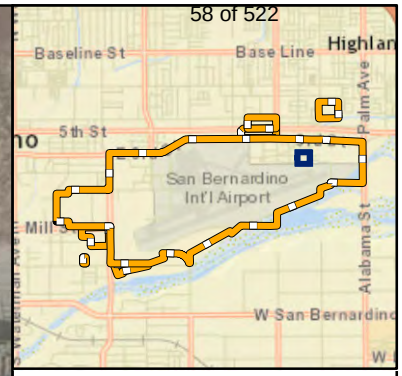
Soil (µg/kg)				
Location ID (depth bgs)	Analyte	PFBS	PFOA	PFOS
	Screening Criteria**	1,300,000	1,260	1,260
NORPMW007 (0 - 1')		**0.543 J**	**3.15**	**104**
NORPMW007 (15' - 15.5')		0.931 U	**0.749 J**	**29.3**
NORPSB004 (0.75' - 2')		**376 J**	**431**	**1,600**
NORPSB004 (0.75' - 2') (FD)		**489 J**	**569**	**1,430**
NORPSB004 (15' - 16.5')		**1.89 J**	**1.35 J**	**30.4**
NORPSB004 (28.5' - 30')		**0.518 J**	1.01 U	**5.16**
NORPSB005 (0.5' - 2')		**21.7**	**58.6**	**1,570**
NORPSB005 (15.5' - 16.5')		**0.492 J**	**1.09 J**	**23.9**
NORPSB005 (28.5' - 30')		**0.793 J**	**0.941 J**	**6.53**
NORPSB006 (1' - 2')		**5.70**	**196**	**4,490**
NORPSB006 (15.5' - 16.5')		**0.317 J**	**2.37**	**99.7**
NORPSB006 (30' - 31.5')		**0.474 J**	**13.2**	**238**
NORPSB006 (30' - 31.5') (FD)		**0.798 J**	**15.6**	**221**

Groundwater (ng/L)					
Location ID	Analyte	PFBS	PFOA	PFOS	PFOA + PFOS
	Screening Criteria*	400,000	70	70	70
NORPMW007R		5.58 U	5.58 U	**18.8**	**18.8**





Legend

- Approximate Groundwater Flow Direction
- Soil Boring
- Monitoring Well/Soil Boring
- Monitoring Well
- Indicates sample result(s) exceeds screening criteria*
- AFFF Area Boundary
- Installation Boundary

N

0 90
Feet

*Groundwater screening criteria based on EPA Health Advisory levels and EPA RSL values as applicable.
**Soil Screening criteria based on EPA RSLs for Residential Soil and the USAF Calculated RSL as applicable.

Bold indicates detection above limt of detection
FD = field duplicate
J = estimated concentration
U = non-detect at limit of detection
ng/L = nanograms per liter
µg/kg = micrograms per kilogram

Figure 3-6
AFFF Area 8
Groundwater and Soil Sampling Results
Former Norton Air Force Base

Air Force Civil Engineer Center
2261 Hughes Avenue
Building 171, Ste 155
JBSA Lackland, Texas 78236

Norton_Results_AFFF_8_GW_Soil_SI.mxd
Drawn: jowens
Date: 10/25/2017

Service Layer Credits: Esri ArcGIS Online Aerial Photography

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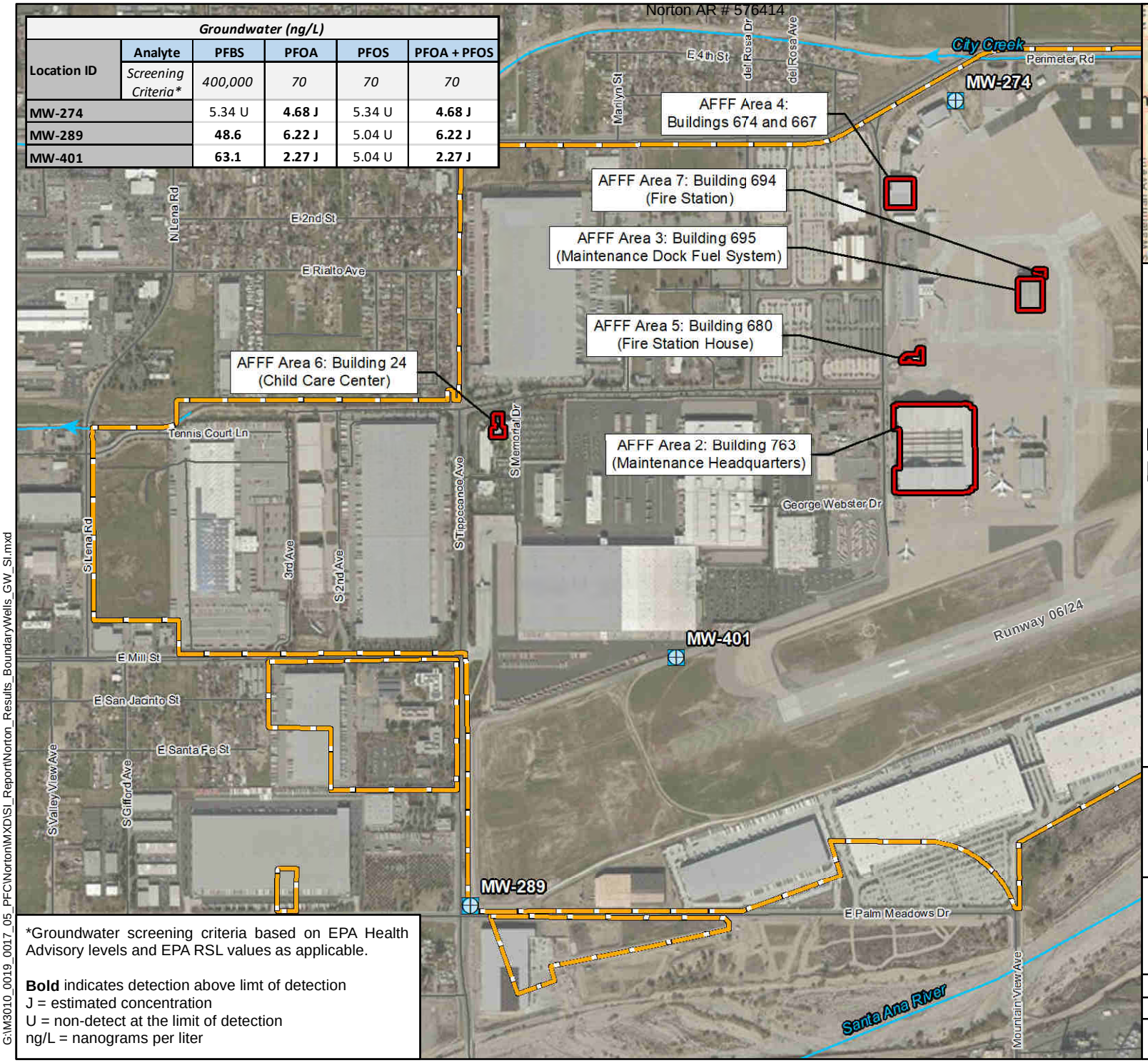
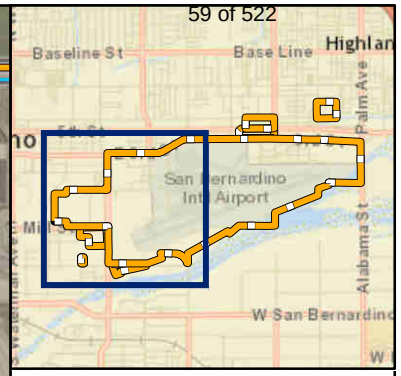
Groundwater (ng/L)					
Location ID	Analyte	PFBS	PFOA	PFOS	PFOA + PFOS
	*Screening Criteria**	*400,000*	*70*	*70*	*70*
MW-274		5.34 U	**4.68 J**	5.34 U	**4.68 J**
MW-289		**48.6**	**6.22 J**	5.04 U	**6.22 J**
MW-401		**63.1**	**2.27 J**	5.04 U	**2.27 J**





Legend

- Existing Monitoring Well (sampled)
- Road
- Streams
- AFFF Area Boundary
- Installation Boundary

N

0 1,200

Feet

*Groundwater screening criteria based on EPA Health Advisory levels and EPA RSL values as applicable.

Bold indicates detection above limt of detection
J = estimated concentration
U = non-detect at the limit of detection
ng/L = nanograms per liter

Figure 3-7
Downgradient Boundary Well Groundwater Sampling Results
Former Norton Air Force Base

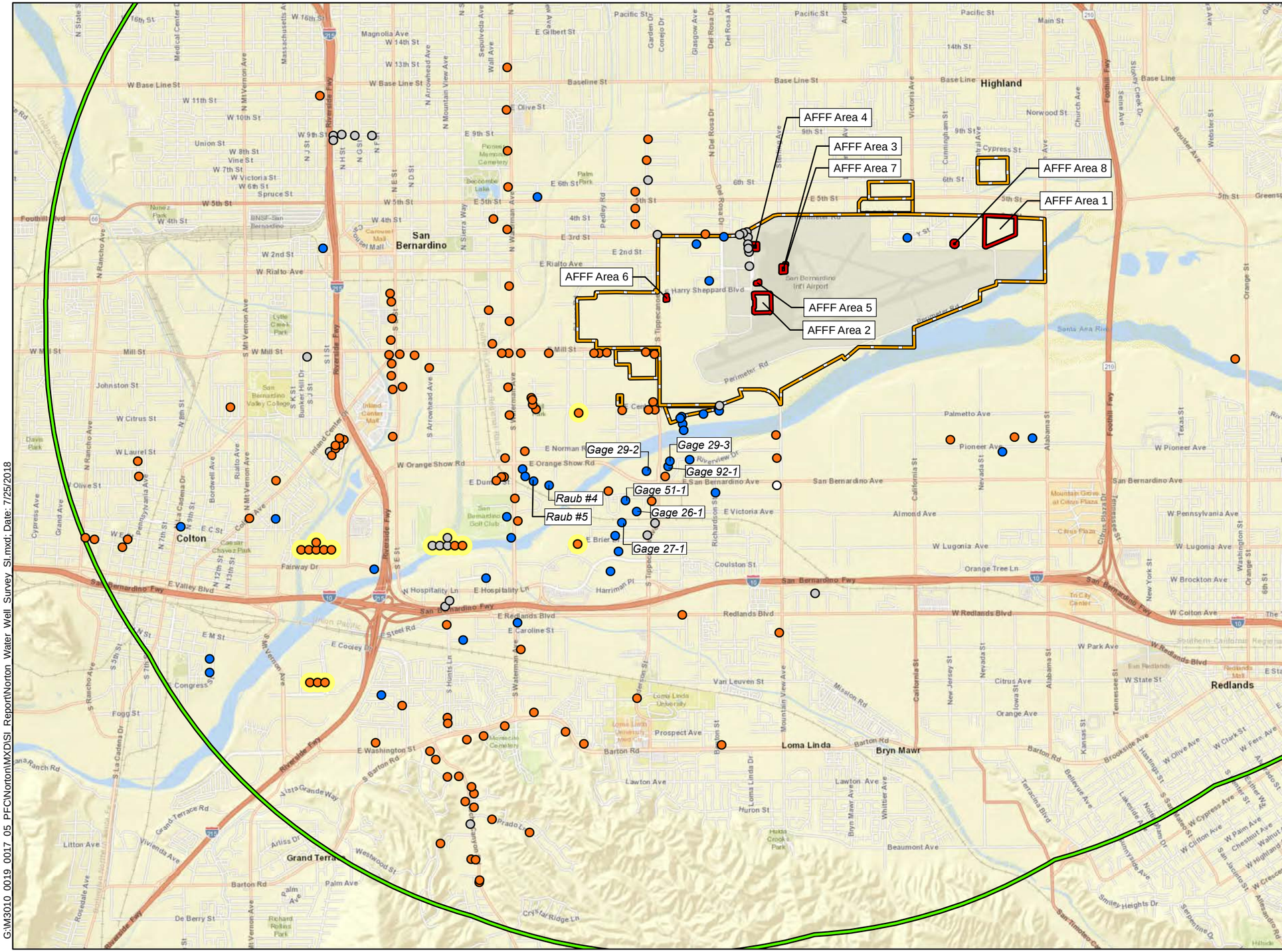
Air Force Civil Engineer Center
2261 Hughes Avenue
Building 171, Ste 155
JBSA Lackland, Texas 78236

Norton_Results_BoundaryWells_GW_SI.mxd

Drawn: LNatzke | Date: 11/16/2017

Service Layer Credits: Esri ArcGIS Online Aerial Photography

G:\M3010_0019_0017_05_PFC\Norton\MXD\SI_Report\Norton_Results_BoundaryWells_GW_SI.mxd



Legend

- Water Supply Domestic - 123
- Water Supply Public - 41
- Other Not Specified - 28
- Other Unknown - 1
- Indicates exact well location is not available. Well placed at the approx. center of its respective PLSS section.
- AFFF Area Boundary
- Installation Boundary
- 4 Mile Radius

N

0 4,000 8,000

Feet

Figure 4-1
Water Well Survey
Former Norton Air Force Base

Air Force Civil Engineer Center
2261 Hughes Avenue
Building 171, Ste 155
JBSA Lackland, Texas 78236

Norton_Water_Well_Survey_SI.mxd

Drawn: jowens | Date: 7/25/2018

Service Layer Credits: Esri ArcGIS Online Aerial Photography

G:\M3010_0019_0017_05_PEC\Norton\MXD\SI_Report\Norton_Water_Well_Survey_SI.mxd; Date: 7/25/2018

EXHIBITS

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Exhibit 1. Groundwater Analytical Results

Norton AR # 576414

Exhibit 1: Groundwater Analytical Results

	Area	1		4		5	
	Station	MW-403	MW-403	NORPMW005	NORPMW006	NORPMW002	NORPMW003
	Date Collected	05/12/17	05/12/17	05/17/17	05/17/17	05/18/17	05/14/17
	Sample Type	N	FD	N	N	N	N
	Sample ID	NORP01403	NORP01404	NORP04005	NORP04010	NORP05011	NORP05016
	Depth (ft)	152 - 192	152 - 192	200.07 - 220.07	201.85 - 221.85	198.96 - 218.96	200.12 - 220.12
Analyte	**Screening Level (ng/L)**	**Result (ng/L)**	**Result (ng/L)**	**Result (ng/L)**	**Result (ng/L)**	**Result (ng/L)**	**Result (ng/L)**
Perfluorobutane Sulfonate (PFBS)	400,000[a]	**12.4**	**12.8**	**8.50**	5.12 U	**32.4**	**24.8**
Perfluorohexanoic acid (PFHxA)	--	**66.6**	**63.1**	**17.0**	5.12 U	**45.4**	**31.1**
Perfluoroheptanoic acid (PFHpA)	--	**5.13 J**	**4.59 J**	5.12 U	5.12 U	**4.53 J**	5.34 U
Perfluorohexane Sulfonate (PFHxS)	--	**47.9**	**55.0**	**21.6**	5.12 U	**55.2**	**22.2**
Perfluorooctanoic Acid (PFOA)	70[b]	**5.37 J**	**4.64 J**	5.12 U	5.12 U	5.08 U	5.34 U
Perfluorooctane sulfonate (PFOS)	70[b]	**4.37 J**	**4.20 J**	5.12 U	5.12 U	5.08 U	5.34 U
Perfluorononanoic acid (PFNA)	--	4.96 U	5.04 U	5.12 U	5.12 U	5.08 U	5.34 U
Perfluorodecanoic acid (PFDA)	--	4.96 U	5.04 U	5.12 U	5.12 U	5.08 U	5.34 U
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	--	4.96 U	5.04 U	5.12 U	5.12 U	5.08 U	5.34 U
Perfluoroundecanoic acid (PFUnA)	--	4.96 U	5.04 U	5.12 U	5.12 U	5.08 U	5.34 U
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	--	4.96 U	5.04 U	5.12 U	5.12 U	5.08 U	5.34 U
Perfluorododecanoic acid (PFDoA)	--	4.96 U	5.04 U	5.12 U	5.12 U	5.08 U	5.34 U
Perfluorotridecanoic acid (PFTrIA)	--	4.96 U	5.04 U	5.12 U	5.12 U	5.08 U	5.34 U
Perfluorotetradecanoic acid (PFTEA)	--	4.96 U	5.04 U	5.12 U	5.12 U	5.08 U	5.34 U
PFOS + PFOA	70[b]	**9.74 J**	**8.84 J**	ND	ND	ND	ND

Bold values indicate analyte detected at concentration indicated.

[a] EPA Regional Screening Levels for Tapwater (Nov 2017)

[b] EPA Health Advistory Levels for PFOS and PFOA (May 2016)

EPA = United States Environmental Protection Agency

FD = Field duplicate

J =The reported concentration is an estimated value

N = Normal environmental sample

ng/L = nanograms per liter

Norton AR # 576414

Exhibit 1: Groundwater Analytical Results

	Area	7	8	Border Wells		
	Station	NORPMW004	NORPMW007R	MW-274	MW-289	MW-401
	Date Collected	05/17/17	07/25/17	05/18/17	05/18/17	05/16/17
	Sample Type	N	N	N	N	N
	Sample ID	NORP07021	NORP08104	NORPXX056	NORPXX057	NORPXX058
	Depth (ft)	199.63 - 219.63	229.48 - 249.48	201 - 221	216 - 236	175 - 190
Analyte	**Screening Level (ng/L)**	**Result (ng/L)**	**Result (ng/L)**	**Result (ng/L)**	**Result (ng/L)**	**Result (ng/L)**
Perfluorobutane Sulfonate (PFBS)	400,000[a]	**24.3**	5.58 U	5.34 U	**48.6**	**63.1**
Perfluorohexanoic acid (PFHxA)	--	**38.3**	5.58 U	**3.49 J**	**120**	**139**
Perfluoroheptanoic acid (PFHpA)	--	**4.60 J**	5.58 U	**2.55 J**	**7.25 J**	**7.45 J**
Perfluorohexane Sulfonate (PFHxS)	--	**107**	**2.65 J**	5.34 U	**41.1**	**30.8**
Perfluorooctanoic Acid (PFOA)	70[b]	**21.9**	5.58 U	**4.68 J**	**6.22 J**	**2.27 J**
Perfluorooctane sulfonate (PFOS)	70[b]	5.04 U	**18.8**	5.34 U	5.04 U	5.04 U
Perfluorononanoic acid (PFNA)	--	5.04 U	5.58 U	5.34 U	5.04 U	5.04 U
Perfluorodecanoic acid (PFDA)	--	5.04 U	5.58 U	5.34 U	5.04 U	5.04 U
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	--	5.04 U	5.58 U	5.34 U	5.04 U	5.04 U
Perfluoroundecanoic acid (PFUnA)	--	5.04 U	5.58 U	5.34 U	5.04 U	5.04 U
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	--	5.04 U	5.58 U	5.34 U	5.04 U	5.04 U
Perfluorododecanoic acid (PFDoA)	--	5.04 U	5.58 U	5.34 U	5.04 U	5.04 U
Perfluorotridecanoic acid (PFTrIA)	--	5.04 U	5.58 U	5.34 U	5.04 U	5.04 U
Perfluorotetradecanoic acid (PFTEA)	--	5.04 U	5.58 U	5.34 U	5.04 U	5.04 U
PFOS + PFOA	70[b]	**4.60 J**	**18.8**	**4.68 J**	**6.22 J**	**2.27 J**

Bold values indicate analyte detected at concentration indicated.

[a] EPA Regional Screening Levels for Tapwater (Nov 2017)

[b] EPA Health Advistory Levels for PFOS and PFOA (May 2016)

EPA = United States Environmental Protection Agency

FD = Field duplicate

J =The reported concentration is an estimated value

N = Normal environmental sample

ng/L = nanograms per liter

Exhibit 2. Soil Analytical Results

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Exhibit 2: Soil Analytical Results

	Area	4				5		
	Station	NORPMW005	NORPMW005	NORPMW005	NORPMW005	NORPMW002	NORPMW002	NORPMW002
	Date Collected	04/18/17	04/18/17	04/18/17	04/18/17	05/09/17	05/09/17	05/09/17
	Sample Type	N	N	FD	N	N	N	N
	Sample ID	NORP04006	NORP04007	NORP04008	NORP04009	NORP05013	NORP05014	NORP05015
	Depth (ft)	1.5 - 2.5	16 - 16.5	16 - 16.5	60 - 60.5	0.5 - 1.5	16 - 16.25	37 - 37.25
Analyte	**Screening Level (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**
Perfluorobutane Sulfonate (PFBS)	1,300,000[a]	0.995 U	1.02 U	0.972 U	0.995 U	0.943 U	0.971 U	0.921 U
Perfluorohexanoic acid (PFHxA)	NL	0.995 U	1.02 U	0.972 U	0.995 U	**1.18 J**	**1.22 J**	0.921 U
Perfluoroheptanoic acid (PFHpA)	NL	0.995 U	1.02 U	0.972 U	0.995 U	**0.769 J**	**0.486 J**	0.921 U
Perfluorohexane Sulfonate (PFHxS)	NL	0.995 U	**0.303 J**	0.972 U	0.995 U	**2.73**	**4.43**	**1.90**
Perfluorooctanoic Acid (PFOA)	1,260[b]	0.995 U	1.02 U	0.972 U	0.995 U	**2.80**	**1.57 J**	**0.446 J**
Perfluorooctane sulfonate (PFOS)	1,260[b]	0.995 U	1.02 U	0.972 U	0.995 U	**423**	**2.83**	0.921 U
Perfluorononanoic acid (PFNA)	NL	0.995 U	1.02 U	0.972 U	0.995 U	**0.953 J**	0.971 U	0.921 U
Perfluorodecanoic acid (PFDA)	NL	0.995 U	1.02 U	0.972 U	0.995 U	**1.29 J**	0.971 U	0.921 U
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	NL	0.995 U	1.02 U	0.972 U	0.995 U	0.943 U	0.971 U	0.921 U
Perfluoroundecanoic acid (PFUnA)	NL	0.995 U	1.02 U	0.972 U	0.995 U	0.943 U	0.971 U	0.921 U
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	NL	0.995 U	1.02 U	0.972 U	0.995 U	0.943 U	0.971 U	0.921 U
Perfluorododecanoic acid (PFDoA)	NL	0.995 U	1.02 U	0.972 U	0.995 U	**0.554 J**	0.971 U	0.921 U
Perfluorotridecanoic acid (PFTrIA)	NL	0.995 U	1.02 U	0.972 U	0.995 U	0.943 U	0.971 U	0.921 U
Perfluorotetradecanoic acid (PFTEA)	NL	0.995 U	1.02 U	0.972 U	0.995 U	0.943 U	0.971 U	0.921 U

Bold values indicate analyte detected at concentration indicated.
Shaded cells indicate analyte detected above screening level.
[a] EPA Regional Screening Levels for Residential Soil (Nov 2017)
[b] Screening levels calculated using the EPA Regional Screening Level calculator
EPA = United States Environmental Protection Agency
FD = Field duplicate
J =The reported concentration is an estimated value
N = Normal environmental sample
µg/kg = micrograms per kilogram
U = The analyte was not detected above the reported value

Exhibit 2: Soil Analytical Results

Norton AR # 570414

	Area	5			7			
	Station	NORPMW003	NORPMW003	NORPMW003	NORPMW004	NORPMW004	NORPMW004	NORPSB001
	Date Collected	04/11/17	04/12/17	04/12/17	04/15/17	04/15/17	04/15/17	05/17/17
	Sample Type	N	N	N	N	N	N	N
	Sample ID	NORP05017	NORP05019	NORP05020	NORP07022	NORP07023	NORP07024	NORP07025
	Depth (ft)	0 - 1	15 - 16	30 - 30.75	0.5 - 1	16 - 17.5	34 - 34.5	0 - 1
Analyte	**Screening Level (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**
Perfluorobutane Sulfonate (PFBS)	1,300,000[a]	0.961 U	0.989 U	0.970 U	**15.2**	0.990 U	0.972 U	1.00 U
Perfluorohexanoic acid (PFHxA)	NL	0.961 U	0.989 U	0.970 U	**56.6**	**8.13**	**9.88**	**1.74 J**
Perfluoroheptanoic acid (PFHpA)	NL	0.961 U	0.989 U	0.970 U	**2.87**	**2.85**	**1.74 J**	**0.458 J**
Perfluorohexane Sulfonate (PFHxS)	NL	**0.510 J**	0.989 U	0.970 U	**27.5**	**199**	**73.7**	**23.1**
Perfluorooctanoic Acid (PFOA)	1,260[b]	0.961 U	0.989 U	0.970 U	**25.1 J**	**162**	**46.3**	**94.7**
Perfluorooctane sulfonate (PFOS)	1,260[b]	**1.58 J**	0.989 U	0.970 U	**159**	**9.42**	**72.9**	**59.2**
Perfluorononanoic acid (PFNA)	NL	0.961 U	0.989 U	0.970 U	**1.72 J**	0.990 U	**1.35 J**	**0.433 J**
Perfluorodecanoic acid (PFDA)	NL	0.961 U	0.989 U	0.970 U	0.998 U	0.990 U	0.972 U	1.00 U
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	NL	0.961 U	0.989 U	0.970 U	0.998 U	0.990 U	0.972 U	1.00 U
Perfluoroundecanoic acid (PFUnA)	NL	0.961 U	0.989 U	0.970 U	0.998 U	0.990 U	0.972 U	1.00 U
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	NL	0.961 U	0.989 U	0.970 U	0.998 U	0.990 U	0.972 U	1.00 U
Perfluorododecanoic acid (PFDoA)	NL	0.961 U	0.989 U	0.970 U	0.998 U	0.990 U	0.972 U	1.00 U
Perfluorotridecanoic acid (PFTrIA)	NL	0.961 U	0.989 U	0.970 U	0.998 U	0.990 U	0.972 U	1.00 U
Perfluorotetradecanoic acid (PFTEA)	NL	0.961 U	0.989 U	0.970 U	0.998 U	0.990 U	0.972 U	1.00 U

Bold values indicate analyte detected at concentration indicated.
Shaded cells indicate analyte detected above screening level.
[a] EPA Regional Screening Levels for Residential Soil (Nov 2017)
[b] Screening levels calculated using the EPA Regional Screening Level calculator
EPA = United States Environmental Protection Agency
FD = Field duplicate
J =The reported concentration is an estimated value
N = Normal environmental sample
µg/kg = micrograms per kilogram
U = The analyte was not detected above the reported value

Exhibit 2: Soil Analytical Results

Norton AR # 570414

	Area	7							
	Station	NORPSB001	NORPSB001	NORPSB001	NORPSB002	NORPSB002	NORPSB002	NORPSB003	NORPSB003
	Date Collected	05/17/17	05/17/17	05/17/17	05/17/17	05/17/17	05/17/17	05/17/17	05/17/17
	Sample Type	FD	N	N	N	N	N	N	N
	Sample ID	NORP07026	NORP07027	NORP07028	NORP07029	NORP07030	NORP07031	NORP07032	NORP07033
	Depth (ft)	0 - 1	15 - 16	28.5 - 30	0 - 1	15 - 15.5	28 - 29.5	0 - 1	15 - 16.3
Analyte	**Screening Level (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**
Perfluorobutane Sulfonate (PFBS)	1,300,000[a]	1.00 U	0.998 U	0.995 U	**84.9**	**0.458 J**	**7.22**	**3.21**	**1.28 J**
Perfluorohexanoic acid (PFHxA)	NL	**1.22 J**	**1.23 J**	**0.322 J**	**305**	**3.23**	**35.0 J**	**225**	**7.46**
Perfluoroheptanoic acid (PFHpA)	NL	**0.349 J**	0.998 U	0.995 U	**14.8**	**0.781 J**	**6.67**	**61.2**	**1.05 J**
Perfluorohexane Sulfonate (PFHxS)	NL	**19.4**	**7.52**	**4.24**	**206**	**26.5**	**82.7**	**272**	**9.65**
Perfluorooctanoic Acid (PFOA)	1,260[b]	**69.6**	**10.2**	**4.22**	**138**	**34.9**	**88.4**	**167**	**2.14**
Perfluorooctane sulfonate (PFOS)	1,260[b]	**45.9**	**0.796 J**	**0.373 J**	**5,990 J**	**57.2**	**237**	**690**	**1.90 J**
Perfluorononanoic acid (PFNA)	NL	**0.327 J**	0.998 U	0.995 U	**22.8**	0.999 U	**1.12 J**	**2.67**	1.00 U
Perfluorodecanoic acid (PFDA)	NL	1.00 U	0.998 U	0.995 U	**1.08 J**	0.999 U	0.999 U	**2.80**	1.00 U
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	NL	1.00 U	0.998 U	0.995 U	1.00 U	0.999 U	0.999 U	0.998 U	1.00 U
Perfluoroundecanoic acid (PFUnA)	NL	1.00 U	0.998 U	0.995 U	1.00 U	0.999 U	0.999 U	**0.715 J**	1.00 U
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	NL	1.00 U	0.998 U	0.995 U	1.00 U	0.999 U	0.999 U	0.998 U	1.00 U
Perfluorododecanoic acid (PFDoA)	NL	1.00 U	0.998 U	0.995 U	1.00 U	0.999 U	0.999 U	0.998 U	1.00 U
Perfluorotridecanoic acid (PFTrIA)	NL	1.00 U	0.998 U	0.995 U	1.00 U	0.999 U	0.999 U	0.998 U	1.00 U
Perfluorotetradecanoic acid (PFTEA)	NL	1.00 U	0.998 U	0.995 U	1.00 U	0.999 U	0.999 U	0.998 U	1.00 U

Bold values indicate analyte detected at concentration indicated.
Shaded cells indicate analyte detected above screening level.
[a] EPA Regional Screening Levels for Residential Soil (Nov 2017)
[b] Screening levels calculated using the EPA Regional Screening Level calculator
EPA = United States Environmental Protection Agency
FD = Field duplicate
J =The reported concentration is an estimated value
N = Normal environmental sample
µg/kg = micrograms per kilogram
U = The analyte was not detected above the reported value

Exhibit 2: Soil Analytical Results

Norton AR # 570414

	Area	7	8						
	Station	NORPSB003	NORPMW007	NORPMW007	NORPSB004	NORPSB004	NORPSB004	NORPSB004	NORPSB005
	Date Collected	05/17/17	05/12/17	05/12/17	05/16/17	05/16/17	05/16/17	05/16/17	05/16/17
	Sample Type	N	N	N	N	FD	N	N	N
	Sample ID	NORP07034	NORP08037	NORP08038	NORP08041	NORP08042	NORP08043	NORP08044	NORP08045
	Depth (ft)	28.5 - 30	0 - 1	15 - 15.5	0.75 - 2	0.75 - 2	15 - 16.5	28.5 - 30	0.5 - 2
Analyte	**Screening Level (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**	
Perfluorobutane Sulfonate (PFBS)	1,300,000[a]	**0.624 J**	**0.543 J**	0.931 U	**376 J**	**489 J**	**1.89 J**	**0.518 J**	**21.7**
Perfluorohexanoic acid (PFHxA)	NL	**2.13**	**4.28**	0.931 U	**1,160**	**1,870**	**5.50**	**1.32 J**	**145**
Perfluoroheptanoic acid (PFHpA)	NL	1.00 U	**2.11**	0.931 U	**331**	**412**	**1.17 J**	1.01 U	**21.7**
Perfluorohexane Sulfonate (PFHxS)	NL	1.00 U	**15.9**	**0.504 J**	**4,860 J**	**15,300 J**	**17.6**	**4.23**	**454**
Perfluorooctanoic Acid (PFOA)	1,260[b]	1.00 U	**3.15**	**0.749 J**	**431**	**569**	**1.35 J**	1.01 U	**58.6**
Perfluorooctane sulfonate (PFOS)	1,260[b]	1.00 U	**104**	**29.3**	**1,600**	**1,430**	**30.4**	**5.16**	**1,570**
Perfluorononanoic acid (PFNA)	NL	1.00 U	**0.681 J**	0.931 U	**8.75**	**8.10**	0.991 U	1.01 U	**4.42**
Perfluorodecanoic acid (PFDA)	NL	1.00 U	**2.33**	0.931 U	**1.41 J**	**1.17 J**	0.991 U	1.01 U	0.969 U
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	NL	1.00 U	0.984 U	0.931 U	1.00 U	1.00 U	0.991 U	1.01 U	0.969 U
Perfluoroundecanoic acid (PFUnA)	NL	1.00 U	**7.93**	0.931 U	**0.326 J**	1.00 U	0.991 U	1.01 U	0.969 U
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	NL	1.00 U	0.984 U	0.931 U	1.00 U	1.00 U	0.991 U	1.01 U	0.969 U
Perfluorododecanoic acid (PFDoA)	NL	1.00 U	**2.32**	0.931 U	1.00 U	1.00 U	0.991 U	1.01 U	0.969 U
Perfluorotridecanoic acid (PFTrIA)	NL	1.00 U	**0.380 J**	0.931 U	1.00 U	1.00 U	0.991 U	1.01 U	0.969 U
Perfluorotetradecanoic acid (PFTEA)	NL	1.00 U	0.984 U	0.931 U	1.00 U	1.00 U	0.991 U	1.01 U	0.969 U

Bold values indicate analyte detected at concentration indicated.

Shaded cells indicate analyte detected above screening level.

[a] EPA Regional Screening Levels for Residential Soil (Nov 2017)

[b] Screening levels calculated using the EPA Regional Screening Level calculator

EPA = United States Environmental Protection Agency

FD = Field duplicate

J =The reported concentration is an estimated value

N = Normal environmental sample

µg/kg = micrograms per kilogram

U = The analyte was not detected above the reported value

Exhibit 2: Soil Analytical Results

Norton AR # 576414

	Area	8					
	Station	NORPSB005	NORPSB005	NORPSB006	NORPSB006	NORPSB006	NORPSB006
	Date Collected	05/16/17	05/16/17	05/16/17	05/16/17	05/16/17	05/16/17
	Sample Type	N	N	N	N	N	FD
	Sample ID	NORP08046	NORP08048	NORP08049	NORP08050	NORP08052	NORP08053
	Depth (ft)	15.5 - 16.5	28.5 - 30	1 - 2	15.5 - 16.5	30 - 31.5	30 - 31.5
Analyte	**Screening Level (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**	**Results (µg/kg)**
Perfluorobutane Sulfonate (PFBS)	1,300,000[a]	**0.492 J**	**0.793 J**	**5.70**	**0.317 J**	**0.474 J**	**0.798 J**
Perfluorohexanoic acid (PFHxA)	NL	**2.03**	**2.05**	**63.1**	**1.96 J**	**3.62**	**4.59**
Perfluoroheptanoic acid (PFHpA)	NL	**0.342 J**	0.995 U	**26.6**	**0.316 J**	**1.67 J**	**2.13**
Perfluorohexane Sulfonate (PFHxS)	NL	**5.94**	**5.41**	**545**	**5.35**	**43.1**	**53.4**
Perfluorooctanoic Acid (PFOA)	1,260[b]	**1.09 J**	**0.941 J**	**196**	**2.37**	**13.2**	**15.6**
Perfluorooctane sulfonate (PFOS)	1,260[b]	**23.9**	**6.53**	**4,490**	**99.7**	**238**	**221**
Perfluorononanoic acid (PFNA)	NL	0.998 U	0.995 U	**12.6**	1.00 U	**0.308 J**	**0.318 J**
Perfluorodecanoic acid (PFDA)	NL	0.998 U	0.995 U	**1.26 J**	1.00 U	0.987 U	0.983 U
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	NL	0.998 U	0.995 U	1.02 U	1.00 U	0.987 U	0.983 U
Perfluoroundecanoic acid (PFUnA)	NL	0.998 U	0.995 U	1.02 U	1.00 U	0.987 U	0.983 U
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	NL	0.998 U	0.995 U	1.02 U	1.00 U	0.987 U	0.983 U
Perfluorododecanoic acid (PFDoA)	NL	0.998 U	0.995 U	**0.481 J**	1.00 U	0.987 U	0.983 U
Perfluorotridecanoic acid (PFTrIA)	NL	0.998 U	0.995 U	1.02 U	1.00 U	0.987 U	0.983 U
Perfluorotetradecanoic acid (PFTEA)	NL	0.998 U	0.995 U	1.02 U	1.00 U	0.987 U	0.983 U

Bold values indicate analyte detected at concentration indicated.
Shaded cells indicate analyte detected above screening level.
[a] EPA Regional Screening Levels for Residential Soil (Nov 2017)
[b] Screening levels calculated using the EPA Regional Screening Level calculator
EPA = United States Environmental Protection Agency
FD = Field duplicate
J =The reported concentration is an estimated value
N = Normal environmental sample
µg/kg = micrograms per kilogram
U = The analyte was not detected above the reported value

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APPENDICES

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Appendix A

Field Documentation

Well Permits

Well Completion Reports

Soil Boring Logs

Monitoring Well Boring and Construction Logs

Soil Sampling Logs

Well Development Logs

Groundwater Sampling Logs

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Table A-1. Water Quality Parameters

AFFF Area	Well ID	Screened Interval	Depth to Water	Total Well Depth	pH	Specific Conductance	Turbidity	DO	ORP	Temp
		(ft btoc)	(ft btoc)	(ft)		(µS/cm)	(NTU)	(mg/L)	(mV)	(°C)
1	MW-403	152-192	187.01	192	7.29	620	4.23	5.59	184.6	26.1
4	NORPMW005	199.4-218.70	194.65	219.20	7.11	730	0.54	3.37	221.7	21.8
	NORPMW006	201.8-221.10	195.28	221.60	7.23	680	0.53	3.71	193.1	22.4
5	NORPMW002	198.9-218.20	200.14	218.70	7.16	590	1.95	3.95	210.0	23.5
	NORPMW003	213.2-219.75	196.91	219.75	7.14	540	1.93	3.06	203.4	23.2
7	NORPMW004	199.40-218.75	202.18	219.2	7.31	580	0.49	4.34	221.9	19.7
8	NORPMW007R	230-250	238.26	249.5	6.57	860	9.62	187.1	52.4	25.63
Boundary Wells	MW-274	201-221	200.15	221	7.12	770	0.51	4.31	210.1	21.4
	MW-289	216-236	176.82	236	7.02	610	0.58	3.29	200.1	21.1
	MW-401	175-190	187.22	190	7.07	660	2.01	7.34	238.1	20.8

Notes:
µS/cm = microsiemens per centimeter
btoc = below top of casing
°C = degrees Celsius
ft = feet
mg/L = milligrams per liter
mV = millivolt
NR = no reading
NTU = nephelometric turbidity unit
ORP = oxidation-reduction potential
*Westbay well

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Rec # 029367

N0b17MWW01

APPLICATION FOR WELL PERMIT

2017004827

THIS SECTION TO BE COMPLETED BY APPLICANT UNLESS THE PROPERTY OWNER IS NOT THE APPLICANT

1 – PROPERTY INFORMATION

Property Owner: San Bernardino International Airport Authority			Phone Number: 909-677-2007
Site Address: 3291 East 3rd Street	City: San Bernardino	State: CA	Zip: 92408
Assessor's Parcel Number: 0136-381-20-0000	nburrows@sbdairport.com		
Township: 1 South	MB Tier	RW Range: 3 West	Section: NE 1/4 of Section 8
Well Head: Latitude (decimal) 34.104780		Longitude (decimal) -117.216605	
Property Owner's Mailing Address: 105 N. Leland Norton Way #7	City: San Bernardino	State: CA	Zip: 92408

2 – CONSULTANT INFORMATION

Name of Consultant: Aerostar SES, LLC	Email: cmorrillen@aerostar.net		Phone Number: 865-813-2771
Address: 1006 Floyd Culler Court	City: Oak Ridge	State: TN	Zip: 37830

3 – REGISTERED WELL DRILLER INFORMATION

Name of Driller: Yellow Jacket Drilling PR 0075461			Phone Number: 909-989-8583
Email:	dc.ea@yjdrilling.com	C-57 License Number: 643081	
Return well permit to: ☐ Well Driller ☒ Consultant ☐ Property Owner		Return by: ☐ Mail ☒ Email	

4 – TYPE OF WORK

☒ New ☐ Reconstruction ☐ Destruction

Date of Work	Start Date: 4/11/2017	Completion Date: 5/20/2017	Estimated groundwater depth: 185 feet

5 – WELL TYPE

☐ Agriculture	☐ Geothermal	☐ Industrial
☐ Cathodic	☐ Horizontal	☒ Monitoring/Observation
☐ Community/PWS/City – Specify Use Below	☐ Residential – cannot be used as a community well	☐ Test
Use:		☐ Other

6 – ANNULAR SEAL

Seal Depth (ft.) 193

☐ Driven Conductor Diameter (in.) ☐ Wall (gauge) (in.) ☐ Drilling method

☒ Sealing Material C-B Grout ☐ Thickness (in.)

Sealing material shall be placed in one continuous pour. Annular seal thickness must be at least 2 inches for public water supply wells.

THIS SECTION TO BE COMPLETED BY DRILLER OR CONTRACTOR OF WELL WORK

7 – DRILLING

Proposed Depth of Well (ft.) 218	Existing Depth of Well (ft.)	Diameter of Bore (in.) 8

8 – CASING INSTALLED

☒ Casing Material ☐ ATSM/AWWA/APPI PVC

From (ft.)	To (ft.)	Diameter (in.)	Wall (Gauge)
above ground surface	195	4	Schedule 80

Gravel Pack ☒ Yes ☐ No		From (ft.) 193.5	To (ft.) 218
Specify Other Backfill Material: Bentonite Seal		From (ft.) 193	To (ft.) 193.5

9 – PERFORATIONS (list all if applicable)

From (ft.) 195	To (ft.) 215	Well Screen Size 0.020 inch	Pumping Rate (gpm) unknown

10 – SEALED ZONES (list all if applicable)

From (ft.) 0-193 and 193-193.5	To (ft.)

11 – PLOT PLAN

a) In perspective to the well site, sketch and label the following items on a separate paper: well lot property lines, other wells (include abandoned wells), sewage disposal systems (sewers, septic tanks, leaching fields, seepage pits, cesspools), lakes and ponds, watercourses and animals or fowl kept.

b) Indicate the distance, in feet, of any of the above which are within 500 ft. of the well site. The plot plan needs to be drawn to scale (½ inch = 100 feet). Show the approximate drainage pattern of the property and show access roads to the well site within 500 feet.

c) ☐ None of the above is within 500 feet.

d) Solid or Liquid Disposal Site within Two Miles ☒ Yes ☐ No Location Site 2 Landfill

12 – METHOD OF CONSTRUCTION OR DESTRUCTION

Provide the method of construction/destruction in the space below or as an attachment if more space is needed. The method shall be in accordance with the standards recommended in the California Department of Water Resources Bulletin No. 74-81 and 74-90. Title 22 standards shall also be followed for public water supply wells.

I will submit water well drillers report to Environmental Health Services within 30 days of completion, and will construct or destroy well/borings in accordance with the permit application and Water Well Standards Bulletin 74-81 & 74-90.

13 – AGREEMENT AND SIGNATURE

I have read this application and agree to comply with all laws regulating the type of work being performed.

Property Owner's Signature: X	Date: 3-29-17
Print Property Owner's Name: Mike Burrows, Executive Director	
C-57 Contractor's Signature: X	Date: 3/28/17
Print Contractor's Name: Richard LeBlanc	

[illegible]

☐ Sent to Water Agency
☐ Water Agency conditions or recommendations attached
☐ Denied
☒ Approved subject to the following:

Permit Number:	2017004827
Expiration Date:	10/10/2017
WP Number:	WP0032835

A. ☒ Notify the Division's Safe Drinking Water Program at (800) 442-2283 at least seventy two (72) hours in advance to make an inspection of the following operations: (Inspections are conducted Monday – Friday between 8:00 AM to 5:00 PM). Failure to cancel or reschedule appointments may result in an additional hourly fee.

- ☐ Prior to sealing of the annular space or filling of the conductor casing.
- ☒ After installation of the surface protective slab and pumping equipment.
- ☒ After installation of the surface features.
- ☐ During destruction of wells, prior to pouring the sealing material.

B. ☐ Submit to the Division, within thirty (30) days after completion of work, a copy of:

☐ Water Well Driller's Report ☐ Bacterial Analysis ☐ Inorganic Chemical Analysis ☐ General Physical
☐ Radiological Analysis ☐ Nitrate as Nitrogen ☐ Organic Chemical Analysis ☐ General Mineral

Comments:

[illegible] – FOR OFFICE USE ONLY

Fee: 371.00	FA Number:	Record ID: 77402	PE Number: 4555
Late Fee: ☐ Y ☒ N	Designated Employee: JY	Received By: JH	Date: 3/28/17
Check One: ☒ New ☐ Transfer ☐ Reactivate		Changes (please specify):	

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NORPM W002

APPLICATION FOR WELL PERMIT

2017 008828

THIS SECTION TO BE COMPLETED BY APPLICANT - FAILURE TO PROVIDE ALL REQUIRED INFORMATION WILL DELAY PERMIT PROCESSING

1 – PROPERTY INFORMATION

Property Owner: San Bernardino International Airport Authority			Phone Number: 909-877-2007
Site Address: 1099 N HANGAR WAY	City: San Bernardino	State: CA	Zip: 92408
Assessor's Parcel Number: 0136-371-33-0000	Email: mburrows@sbdairport.com		
Township: N/S Tier: 1 South		EW/Range: 3 West	Section: Section 8
Well Head: Latitude (decimal): ~~34.184789~~ 34.009097		Longitude (decimal): ~~-117.216663~~ -117.216491	
Property Owner's Mailing Address: 105 N. Leland Norton Way #7	City: San Bernardino	State: CA	Zip: 92408

2 – CONSULTANT INFORMATION

Name of Consultant: Aerostar SES, LLC	Email: cmcmillen@aerostar.net		Phone Number: 865-813-2771
Address: 1006 Floyd Culler Court	City: Oak Ridge	State: TN	Zip: 37830

3 – REGISTERED WELL DRILLER INFORMATION

Name of Driller: Yellow Jacket Drilling	PR 0035461		Phone Number: 909-989-8563
Email:	dawn@yjdrilling.com	C-57 License Number: 643081	

Return well permit to: ☐ Well Driller ☒ Consultant ☐ Property Owner

Return by: ☐ Mail ☒ Email

4 – TYPE OF WORK

☒ New ☐ Reconstruction ☐ Destruction

Date of Work	Start Date: 4/11/2017	Completion Date: 5/20/2017	Estimated ground water depth: 160 feet

5 – WELL TYPE

☐ Agriculture	☐ Geothermal	☐ Industrial
☐ Cathodic	☐ Horizontal	☒ Monitoring/Observation
☐ Community/PWS/City – Specify Use Below	☐ Residential – cannot be used as a community well	☐ Test
Use:		☐ Other

6 – ANNULAR SEAL

Seal Depth (ft.) 178

☐ Driven Conductor Diameter (in.) ☐ Well (gauge) (in.) ☐ Drilling method

☒ Sealing Material C-B Grout ☐ Thickness (in.)

Sealing material shall be placed in one continuous pour. Annular seal thickness must be at least 2 inches for public water supply wells.

TO BE COMPLETED BY DRILLER AFTER WELL CONSTRUCTION

7 – DIMENSIONS

Proposed Depth of Well (ft.): 203	Existing Depth of Well (ft.):	Diameter of Bore (in.): 8

8 – CASING INSTALLED

☒ Casing Material ☐ ATSM/AWWA/API PVC

From (ft.)	To (ft.)	Diameter (in.)	Wall (Gauge)
above ground surface	180	4	Schedule 80

Gravel Pack: ☒ Yes ☐ No		From (ft.) 178.5	To (ft.) 203
Specify Other Backfill Material: Bentonite Seal		From (ft.) 178	To (ft.) 178.5

9 – PERFORATIONS (list all if applicable)

From (ft.) 180	To (ft.) 200	Well Screen Size 0.020 inch	Pumping Rate (gpm) unknown

10 – SEALED ZONES (list all if applicable)

From (ft.) 0-178 and 178-178.5	To (ft.)

11 – PLOT PLAN

a) In perspective to the well site, sketch and label the following items on a separate paper: well lot property lines, other wells (include abandoned wells), sewage disposal systems (sewers, septic tanks, leaching fields, seepage pits, cesspools), lakes and ponds, watercourses and animals or fowl kept.

b) Indicate the distance, in feet, of any of the above which are within 500 ft. of the well site. The plot plan needs to be drawn to scale (½ inch = 100 feet). Show the approximate drainage pattern of the property and show access roads to the well site within 500 feet.

c) ☐ None of the above is within 500 feet.

d) Solid or Liquid Disposal Site within Two Miles ■ Yes ☐ No Location Site 2 Landfill

12 – METHOD OF CONSTRUCTION OR DESTRUCTION

Provide the method of construction/destruction in the space below or as an attachment if more space is needed. The method shall be in accordance with the standards recommended in the California Department of Water Resources Bulletin No. 74-81 and 74-90. Title 22 standards shall also be followed for public water supply wells.

I will submit water well drillers report to Environmental Health Services within 30 days of completion, and will construct or destroy wellborings in accordance with the permit application and Water Well Standards Bulletin 74-81 & 74-90.

13 – AGREEMENT AND SIGNATURE

I have read this application and agree to comply with all laws regulating the type of work being performed.

Property Owner's Signature X [signature]	Date 3-28-17
Print Property Owner's Name Mike Burrows, Executive Director	
C-57 Contractor's Signature X [signature]	Date 3/28/17
Print Contractor's Name Richard Le Blanc	

☐ Sent to Water Agency
☐ Water Agency conditions or recommendations attached
☐ Denied
☒ Approved subject to the following:

Permit Number:	2017008628
Expiration Date:	10/10/2017
WP Number:	WP0632836

A. ☒ Notify the Division's Safe Drinking Water Program at (800) 442-2283 at least seventy two (72) hours in advance to make an inspection of the following operations: (Inspections are conducted Monday – Friday between 8:00 AM to 5:00 PM). Failure to cancel or reschedule appointments may result in an additional hourly fee.

☐ Prior to sealing of the annular space or filling of the conductor casing.
☒ After installation of the surface protective slab and pumping equipment.
☒ After installation of the surface features.
☐ During destruction of wells, prior to pouring the sealing material.

B. ☐ Submit to the Division, within thirty (30) days after completion of work, a copy of:

☐ Water Well Driller's Report ☐ Bacterial Analysis ☐ Inorganic Chemical Analysis ☐ General Physical
☐ Radiological Analysis ☐ Nitrate as Nitrogen ☐ Organic Chemical Analysis ☐ General Mineral

Comments

Fee: 371.00	FA Number:	Record ID: 77403	PE Number: 455
Late Fee: ☐ Y ☒ N	Designated Employee: JV	Received By: JH	Date: 3/28/17
Check One: ☒ New ☐ Transfer ☐ Reactivate		Changes (please specify):	

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NORPM W003

APPLICATION FOR WELL PERMIT

2017004829

THIS SECTION TO BE COMPLETED BY STAFF ONLY - NOT TRANSFERABLE

1 – PROPERTY INFORMATION

Property Owner: San Bernardino International Airport Authority			Phone Number: 909-877-2007
Site Address: ~~8291 East 3rd Street~~ 199 N HANGAR WAY	City: San Bernardino	State: CA	Zip: 92408
Assessor's Parcel Number: 0136 371330000	mburrows@sbdairport.com		
Township: 1 South	N/S Tier	E/W Range: 3 West	Section: NE 1/4 of Section 8
Well Head: Latitude (decimal): 34.089000		Longitude (decimal): -117.246925	
Property Owner's Mailing Address: 105 N. Leland Norton Way #7	City: San Bernardino	State: CA	Zip: 92408

2 – CONSULTANT INFORMATION

Name of Consultant: Aerostar SES, LLC	Email: omcmillen@aerostar.net		Phone Number: 865-813-2771
Address: 1006 Floyd Culler Court	City: Oak Ridge	State: TN	Zip: 37830

3 – REGISTERED WELL DRILLER INFORMATION

Name of Driller: Yellow Jacket Drilling PR0075461			Phone Number: 909-889-8563
Email:	dean@yjdrilling.com	C-57 License Number: 643081	
Return well permit to: ☐ Well Driller ■ Consultant ☐ Property Owner		Return by: ☐ Mail ■ Email	

4 – TYPE OF WORK

■ New ☐ Reconstruction ☐ Destruction

Date of Work	Start Date: 4/11/2017	Completion Date: 5/20/2017	Estimated groundwater depth: 195 feet

5 – WELL TYPE

☐ Agriculture	☐ Geothermal	☐ Industrial
☐ Cathodic	☐ Horizontal	■ Monitoring/Observation
☐ Community/PWS/City – Specify Use Below	☐ Residential – cannot be used as a community well	☐ Test
Use:		☐ Other

6 – ANNULAR SEAL

Seal Depth (ft.) 193

☐ Driven Conductor Diameter (in.)	☐ Wall (gauge) (in.)	☐ Drilling method
■ Sealing Material C-B Grout	☐ Thickness (in.)	

Sealing material shall be placed in one continuous pour. Annular seal thickness must be at least 2 inches for public water supply wells.

THIS SECTION TO BE COMPLETED BY THE WELL OWNER OR DRILLER

7 – DIMENSIONS

Proposed Depth of Well (ft.) 218	Existing Depth of Well (ft.)	Diameter of Bore (in.) 8

8 – CASING INSTALLED

■ Casing Material ☐ ATSM/AWWA/APPI PVC

From (ft.)	To (ft.)	Diameter (in.)	Wall (Gauge)
above ground surface	195	6	Schedule 80

Gravel Pack ■ Yes ☐ No		From (ft.) 193.5	To (ft.) 218
Specify Other Backfill Material: Bentonite Seal		From (ft.) 193	To (ft.) 193.5

9 – PERFORATIONS (list all if applicable)

From (ft.) 195	To (ft.) 215	Well Screen Size 0.020 inch	Pumping Rate (gpm) unknown

10 – SEALED ZONES (list all if applicable)

From (ft.) 0-192 and 193-193.5	To (ft.)

11 – PLOT PLAN

a) In perspective to the well site, sketch and label the following items on a separate paper: well lot property lines, other wells (include abandoned wells), sewage disposal systems (sewers, septic tanks, leaching fields, seepage pits, cesspools), lakes and ponds, watercourses and animals or fowl kept.

b) Indicate the distance, in feet, of any of the above which are within 500 ft. of the well site. The plot plan needs to be drawn to scale (½ inch = 100 feet). Show the approximate drainage pattern of the property and show access roads to the well site within 500 feet.

c) ☐ None of the above is within 500 feet.

d) Solid or Liquid Disposal Site within Two Miles ■ Yes ☐ No Location Site 2 Landfill

12 – METHOD OF CONSTRUCTION OR DESTRUCTION

Provide the method of construction/destruction in the space below or as an attachment if more space is needed. The method shall be in accordance with the standards recommended in the California Department of Water Resources Bulletin No. 74-81 and 74-90. Title 22 standards shall also be followed for public water supply wells.

I will submit water well drillers report to Environmental Health Services within 30 days of completion, and will construct or destroy well/borings in accordance with the permit application and Water Well Standards Bulletin 74-81 & 74-90.

13 – AGREEMENT AND SIGNATURE

I have read this application and agree to comply with all laws regulating the type of work being performed.

Property Owner's Signature X	Date 3-24-17
Print Property Owner's Name Mike Burrows, Executive Director	
C-57 Contractor's Signature X R. LeBlanc	Date 3/28/17
Print Contractor's Name Richard LeBlanc	

For Office Use Only

☐ Sent to Water Agency
☐ Water Agency conditions or recommendations attached
☐ Denied
☐ Approved subject to the following:

Permit Number:	2017 0004829
Expiration Date:	10/10/2017
WP Number:	WP0039828

A. ☐ Notify the Division's Safe Drinking Water Program at (800) 442-2283 at least seventy two (72) hours in advance to make an inspection of the following operations: (inspections are conducted Monday – Friday between 8:00 AM to 5:00 PM). Failure to cancel or reschedule appointments may result in an additional hourly fee.

☐ Prior to sealing of the annular space or filling of the conductor casing.
☐ Prior installation of the surface protective slab and pumping equipment.
☐ After installation of the surface features.
☐ During destruction of wells, prior to pouring the sealing material.

B. ☐ Submit to the Division, within thirty (30) days after completion of work, a copy of:

☐ Water Well Driller's Report ☐ Bacterial Analysis ☐ Inorganic Chemical Analysis ☐ General Physical
☐ Radiological Analysis ☐ Nitrate as Nitrogen ☐ Organic Chemical Analysis ☐ General Mineral

Comments

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Fee: 371	FA Number:	Receipt ID: SR77400	PE Number: 4555
Late Fee: ☐ Y ☑ N	Delegated Employee: Shay Young	Received By:	Date: 3/28/17
Check One: ☑ New ☐ Transfer ☐ Reactivate		Changes (please specify):	

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NORPMW004

APPLICATION FOR WELL PERMIT

2017 004830

THIS WORK MUST BE COMPLETED BY A LICENSED WELL DRILLER IF APPLICABLE

1 – PROPERTY INFORMATION

Property Owner: San Bernardino International Airport Authority			Phone Number: 909-677-2007
Site Address: ~~3281 East 3rd Street~~ 199 N HANGAR	City: San Bernardino	State: CA	Zip: 92408
Assessor's Parcel Number: 0136371330000	mburrows@sbdairport.com		
Township: 1 South	N/S Tier	E/W Range: 3 West	Section: NE 1/4 of Section 8
Well Head	Latitude (decimal): 34.101155	Longitude (decimal): -117.242804	
Property Owner's Mailing Address: 105 N. Leland Norton Way #7	City: San Bernardino	State: CA	Zip: 92408

2 – CONSULTANT INFORMATION

Name of Consultant: Aerostar SES, LLC	Email: cmcmillen@aerostar.net		Phone Number: 865-813-2771
Address: 1006 Floyd Culler Court	City: Oak Ridge	State: TN	Zip: 37830

3 – REGISTERED WELL DRILLER INFORMATION

Name of Driller: Yellow Jacket Drilling		Phone Number: 909-989-5553
Email:	jason@yjdrilling.com	C-57 License Number: 643081

Return well permit to: ☐ Well Driller ☒ Consultant ☐ Property Owner

Return by: ☐ Mail ☒ Email

4 – TYPE OF WORK

☒ New ☐ Reconstruction ☐ Destruction

Date of Work	Start Date: 4/11/2017	Completion Date: 6/20/2017	Estimated groundwater depth: 195 feet

5 – WELL TYPE

☐ Agriculture ☐ Geothermal ☐ Industrial
☐ Cathodic ☐ Horizontal ☒ Monitoring/Observation
☐ Community/PWS/City – Specify Use Below ☐ Residential – cannot be used as a community well ☐ Test
Use: ☐ Other

6 – ANNULAR SEAL

Seal Depth (ft.) 188

☐ Driven Conductor Diameter (in.) ☐ Wall (gauge) (in.) ☐ Drilling method
☒ Sealing Material C-B Grout ☐ Thickness (in.)

Sealing material shall be placed in one continuous pour. Annular seal thickness must be at least 2 inches for public water supply wells.

ITEMS 7-8 ARE REQUIRED IF ESTIMATED GROUNDWATER DEPTH IS LESS THAN 100 FEET

7 – DIMENSIONS

Proposed Depth of Well (ft.): 213	Existing Depth of Well (ft.):	Diameter of Bore (in.): 8

8 – CASING INSTALLED

☒ Casing Material ☐ ATSM/AWWA/API PVC

From (ft.)	To (ft.)	Diameter (in.)	Wall (Gauge)
above ground surface	190	<4	Schedule 80

Gravel Pack ☒ Yes ☐ No		From (ft.) 188.5	To (ft.) 213
Specify Other Backfill Material: Bentonite Seal		From (ft.) 188	To (ft.) 188.5

9 – PERFORATIONS (list all if applicable)

From (ft.) 190	To (ft.) 210	Well Screen Size 0.020 inch	Pumping Rate (gpm) unknown

10 – SEALED ZONES (list all if applicable)

From (ft.) 0-188 and 188-189.5	To (ft.)

11 – PLOT PLAN

a) In perspective to the well site, sketch and label the following items on a separate paper: well lot property lines, other wells (include abandoned wells), sewage disposal systems (sewers, septic tanks, leaching fields, seepage pits, cesspools), lakes and ponds, watercourses and animals or fowl kept.

b) Indicate the distance, in feet, of any of the above which are within 500 ft. of the well site. The plot plan needs to be drawn to scale (¼ inch = 100 feet). Show the approximate drainage pattern of the property and show access roads to the well site within 500 feet.

c) ☐ None of the above is within 500 feet.

d) Solid or Liquid Disposal Site within Two Miles ☒ Yes ☐ No Location Site 2 Landfill

12 – METHOD OF CONSTRUCTION OR DESTRUCTION

Provide the method of construction/destruction in the space below or as an attachment if more space is needed. The method shall be in accordance with the standards recommended in the California Department of Water Resources Bulletin No. 74-81 and 74-90. Title 22 standards shall also be followed for public water supply wells.

I will submit water well drillers report to Environmental Health Services within 30 days of completion, and will construct or destroy well/borings in accordance with the permit application and Water Well Standards Bulletin 74-81 & 74-90.

13 – AGREEMENT AND SIGNATURE

I have read this application and agree to comply with all laws regulating the type of work being performed.

Property Owner's Signature: X [signature]	Date: 3-29-17
Print Property Owner's Name: Mike Burrows, Executive Director	
C-57 Contractor's Signature: X [signature]	Date: 3/29/17
Print Contractor's Name: Richard LeBlanc	

[illegible]

☐ Sent to Water Agency
☐ Water Agency conditions or recommendations attached
☐ Denied
☒ Approved subject to the following:

Permit Number:	2017004820
Expiration Date:	10/10/2017
WP Number:	WP0032838

A. ☒ Notify the Division's Safe Drinking Water Program at (800) 442-2283 at least seventy two (72) hours in advance to make an inspection of the following operations: (Inspections are conducted Monday – Friday between 8:00 AM to 5:00 PM). Failure to cancel or reschedule appointments may result in an additional hourly fee.

- ☐ Prior to sealing of the annular space or filling of the conductor casing.
- ☒ After installation of the surface protective slab and pumping equipment.
- ☒ After installation of the surface features.
- ☐ During destruction of wells, prior to pouring the sealing material.

B. ☐ Submit to the Division, within thirty (30) days after completion of work, a copy of:

☐ Water Well Driller's Report ☐ Bacterial Analysis ☐ Inorganic Chemical Analysis ☐ General Physical
☐ Radiological Analysis ☐ Nitrate as Nitrogen ☐ Organic Chemical Analysis ☐ General Mineral

Comments:

[illegible]

Fee: 371.00	PA Number:	Receipt No: 71349	PE Number: 4555
Late Fee: ☐ Y ☒ N	Designated Employee: J.V	Received By: [signature]	Date: 3/28/17
Check One: ☒ New ☐ Transfer ☐ Reactivate		Changes (please specify):	

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Public Health
Environmental Health Services

www.sbcounty.gov/dph/ehs
Phone: (800) 442-2283

Fax

Rec#029367

NORPMW005

APPLICATION FOR WELL PERMIT

2017004831

1 – PROPERTY INFORMATION

Property Owner: San Bernardino International Airport Authority			Phone Number: 909-577-2007
Site Address: ~~3291 East 3rd Street~~ 109 N HANGAR	City: San Bernardino	State: CA	Zip: 92408
Assessor's Parcel Number: 0136-371-33-0000	Email: mburrows@sbdairport.com		
Township: N/S Tier: 1 South	E/W Range: 3 West	Section: Section 8	
Well Head: Latitude (decimal): 34.102923	Longitude (decimal): -117.246543		
Property Owner's Mailing Address: 105 N. Leland Norton Way #7	City: San Bernardino	State: CA	Zip: 92408

2 – CONSULTANT INFORMATION

Name of Consultant: Aerostar SES, LLC	Email: cmcmillan@aerostar.net		Phone Number: 865-813-2771
Address: 1006 Floyd Culler Court	City: Oak Ridge	State: TN	Zip: 37830

3 – REGISTERED WELL DRILLER INFORMATION

Name of Driller: Yellow Jacket Drilling	912007526 61		Phone Number: 909-889-8583
Email:	dean@yjdrilling.com	C-57 License Number: 643081	
Return well permit to: ☐ Well Driller ■ Consultant ☐ Property Owner		Return by: ☐ Mail ■ Email	

4 – TYPE OF WORK

■ New ☐ Reconstruction ☐ Destruction

Date of Work	Start Date: 4/11/2017	Completion Date: 5/20/2017	Estimated groundwater depth: 195 feet

5 – WELL TYPE

☐ Agriculture	☐ Geothermal	☐ Industrial
☐ Cathodic	☐ Horizontal	■ Monitoring/Observation
☐ Community/PWS/City – Specify Use Below	☐ Residential – cannot be used as a community well	☐ Test
Use:		☐ Other

6 – ANNULAR SEAL

Seal Depth (ft.) 188

☐ Driven Conductor Diameter (in.)	☐ Wall (gauge) (in.)	☐ Drilling method
■ Sealing Material C-8 Grout	☐ Thickness (in.)	

Sealing material shall be placed in one continuous pour. Annular seal thickness must be at least 2 inches for public water supply wells.

7 – DIMENSIONS

Proposed Depth of Well (ft.): 213	Existing Depth of Well (ft.):	Diameter of Bore (in.): 8

8 – CASING INSTALLED

■ Casing Material ☐ ATSM/AWWA/API PVC

From (ft.)	To (ft.)	Diameter (in.)	Wall (Gauge)
above ground surface	190	4	Schedule 80

Gravel Pack ■ Yes ☐ No		From (ft.) 188.5	To (ft.) 213
Specify Other Backfill Material: Bentonite Seal		From (ft.) 188	To (ft.) 188.5

9 – PERFORATIONS (list all if applicable)

From (ft.) 190	To (ft.) 210	Well Screen Size 0.020 inch	Pumping Rate (gpm) unknown

10 – SEALED ZONES (list all if applicable)

From (ft.) 0-188 and 188-188.5	To (ft.)

11 – PLOT PLAN

a) In perspective to the well site, sketch and label the following items on a separate paper: well lot property lines, other wells (include abandoned wells), sewage disposal systems (sewers, septic tanks, leaching fields, seepage pits, cesspools), lakes and ponds, watercourses and animals or fowl kept.

b) Indicate the distance, in feet, of any of the above which are within 500 ft. of the well site. The plot plan needs to be drawn to scale (½ inch = 100 feet). Show the approximate drainage pattern of the property and show access roads to the well site within 500 feet.

c) ☐ None of the above is within 500 feet.

d) Solid or Liquid Disposal Site within Two Miles ■ Yes ☐ No Location Site 2 Landfill

12 – METHOD OF CONSTRUCTION OR DESTRUCTION

Provide the method of construction/destruction in the space below or as an attachment if more space is needed. The method shall be in accordance with the standards recommended in the California Department of Water Resources Bulletin No. 74-81 and 74-90. Title 22 standards shall also be followed for public water supply wells.

I will submit water well drillers report to Environmental Health Services within 30 days of completion, and will construct or destroy well/borings in accordance with the permit application and Water Well Standards Bulletin 74-81 & 74-90.

13 – AGREEMENT AND SIGNATURE

I have read this application and agree to comply with all laws regulating the type of work being performed.

Property Owner's Signature X [signature] Date 3-27-17

Print Property Owner's Name Mike Burrows, Executive Director

C-57 Contractor's Signature X [signature] Date 3/28/17

Print Contractor's Name Richard LeBlanc

FOR ENVIRONMENTAL HEALTH USE ONLY

☐ Sent to Water Agency
☐ Water Agency conditions or recommendations attached
☐ Denied
☒ Approved subject to the following:

Permit Number: 20170038731
Expiration Date: 10/10/17
WP Number: WP0032899

A. ☒ Notify the Division's Safe Drinking Water Program at (800) 442-2283 at least seventy two (72) hours in advance to make an inspection of the following operations: (inspections are conducted Monday – Friday between 8:00 AM to 5:00 PM). Failure to cancel or reschedule appointments may result in an additional hourly fee.

- ☐ Prior to sealing of the annular space or filling of the conductor casing.
- ☒ After installation of the surface protective slab and pumping equipment.
- ☒ After installation of the surface features.
- ☐ During destruction of wells, prior to pouring the sealing material.

B. ☐ Submit to the Division, within thirty (30) days after completion of work, a copy of:

☐ Water Well Driller's Report ☐ Bacterial Analysis ☐ Inorganic Chemical Analysis ☐ General Physical
☐ Radiological Analysis ☐ Nitrate as Nitrogen ☐ Organic Chemical Analysis ☐ General Mineral

Comments

FOR ENVIRONMENTAL HEALTH USE ONLY

Fee: 371.00	FA Number:	Receipt #: SR774101	FS Inspector: 4555
Late Fee: ☐ Y ☒ N	Designated Employee: J.Y	Received By: [signature]	Date: 3/28/17
Check One: ☒ New ☐ Transfer ☐ Reactivate		Changes: (please specify):	

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Environmental Health Services

Rec# 029367

www.sbcounty.gov/dph/ehs
Phone: (800) 442-2283

NORPMW006

APPLICATION FOR WELL PERMIT

20170048 32

THIS SECTION MUST BE COMPLETED BY APPLICANT BEFORE PERMIT CAN BE ISSUED

1 – PROPERTY INFORMATION

Property Owner: San Bernardino International Airport Authority			Phone Number: 909-677-2007
Site Address: ~~3281 East 3rd Street~~ 199 N HANGAR	City: n Bernardino	State: CA	Zip: 92408
Assessor's Parcel Number: 0136371330000		mburrows@sbdairport.com	
Township: N/S Tier: 1 South		R/W Range: 3 West	Section: NE 1/4 of Section 8
Well Head: Latitude (decimal): 34.102869		Longitude (decimal): -117.247371	
Property Owner's Mailing Address: 105 N. Leland Norton Way #7	City: San Bernardino	State: CA	Zip: 92408

2 – CONSULTANT INFORMATION

Name of Consultant: Aerostar SES, LLC	Email: omcmillen@aerostar.net		Phone Number: 865-813-2771
Address: 1006 Floyd Culler Court	City: Oak Ridge	State: TN	Zip: 37830

3 – REGISTERED WELL DRILLER INFORMATION

Name of Driller: Yellow Jacket Drilling		Phone Number: 909-989-5563
Email:	jason@yjdrilling.com	C-57 License Number: 643081

Return well permit to: ☐ Well Driller ☒ Consultant ☐ Property Owner

Return by: ☐ Mail ☒ Email

4 – TYPE OF WORK

☒ New ☐ Reconstruction ☐ Destruction

Date of Work	Start Date: 4/11/2017	Completion Date: 5/20/2017	Estimated groundwater depth: 195 feet

5 – WELL TYPE

☐ Agriculture
☐ Cathodic
☐ Community/PWS/City – Specify Use Below
Use:
☐ Geothermal
☐ Horizontal
☐ Residential – cannot be used as a community well
☐ Industrial
☒ Monitoring/Observation
☐ Test
☐ Other

6 – ANNULAR SEAL

Seal Depth (ft.) 188

☐ Driven Conductor Diameter (in.)
☒ Sealing Material C-B Grout
☐ Well (gauge) (in.)
☐ Thickness (in.)
☐ Drilling method

Sealing material shall be placed in one continuous pour. Annular seal thickness must be at least 2 inches for public water supply wells.

PLEASE INCLUDE ESTIMATED FINISHED WELL SCHEMATIC WITH THIS APPLICATION

7 – DIMENSIONS

Proposed Depth of Well (ft.): 213	Existing Depth of Well (ft.):	Diameter of Bore (in.): 8

8 – CASING INSTALLED

☒ Casing Material ☐ ATSM/AWWA/APPI PVC

From (ft.)	To (ft.)	Diameter (in.)	Wall (Gauge)
above ground surface	190	4	Schedule 80

Gravel Pack: ☒ Yes ☐ No		From (ft.) 188.5	To (ft.) 213
Specify Other Backfill Material: Bentonite Seal		From (ft.) 188	To (ft.) 188.5

9 – PERFORATIONS (list all if applicable)

From (ft.) 190	To (ft.) 210	Well Screen Size 0.020 inch	Pumping Rate (gpm) unknown

10 – SEALED ZONES (list all if applicable)

From (ft.) 0-188 and 189-185.5	To (ft.)

11 – PLOT PLAN

a) In perspective to the well site, sketch and label the following items on a separate paper: well lot property lines, other wells (include abandoned wells), sewage disposal systems (sewers, septic tanks, leaching fields, seepage pits, cesspools), lakes and ponds, watercourses and animals or fowl kept.

b) Indicate the distance, in feet, of any of the above which are within 500 ft. of the well site. The plot plan needs to be drawn to scale (½ inch = 100 feet). Show the approximate drainage pattern of the property and show access roads to the well site within 500 feet.

c) ☐ None of the above is within 500 feet.

d) Solid or Liquid Disposal Site within Two Miles ☒ Yes ☐ No Location Site 2 Landfill

12 – METHOD OF CONSTRUCTION OR DESTRUCTION

Provide the method of construction/destruction in the space below or as an attachment if more space is needed. The method shall be in accordance with the standards recommended in the California Department of Water Resources Bulletin No. 74-81 and 74-90. Title 22 standards shall also be followed for public water supply wells.

I will submit water well drillers report to Environmental Health Services within 30 days of completion, and will construct or destroy well/borings in accordance with the permit application and Water Well Standards Bulletin 74-81 & 74-90.

13 – AGREEMENT AND SIGNATURE

I have read this application and agree to comply with all laws regulating the type of work being performed.

Property Owner's Signature: X [signature]	Date: 3-29-17
Print Property Owner's Name: Mike Burrows, Executive Director	
C-57 Contractor's Signature: X [signature]	Date: 3/28/17
Print Contractor's Name: Richard LeBlanc	

FOR THE COUNTY USE ONLY – PERMIT INFORMATION

☐ Sent to Water Agency
☐ Water Agency conditions or recommendations attached
☐ Denied
☒ Approved subject to the following:

Permit Number:	2017 0049832
Expiration Date:	10/10/2017
WP Number:	WP0037846

A. ☒ Notify the Division's Safe Drinking Water Program at (800) 442-2283 at least seventy two (72) hours in advance to make an inspection of the following operations: (Inspections are conducted Monday – Friday between 8:00 AM to 5:00 PM). Failure to cancel or reschedule appointments may result in an additional hourly fee.

- ☐ Prior to sealing of the annular space or filling of the conductor casing.
- ☒ After installation of the surface protective slab and pumping equipment.
- ☒ After installation of the surface features.
- ☐ During destruction of wells, prior to pouring the sealing material.

B. ☐ Submit to the Division, within thirty (30) days after completion of work, a copy of:

☐ Water Well Driller's Report ☐ Bacterial Analysis ☐ Inorganic Chemical Analysis ☐ General Physical
☐ Radiological Analysis ☐ Nitrate as Nitrogen ☐ Organic Chemical Analysis ☐ General Mineral

Comments:

FOR DEHS USE ONLY – FOR CLERK TO COMPLETE – DO NOT WRITE IN THIS BOX

Fee: 371	FA Number:	Record ID: 77405	PE Number: 4555
Late Fee: ☐ Y ☑ N	Designated Employee: J. Yuhrge	Received By: [signature]	Date: 3/28/17
Check One: ☑ New ☐ Transfer ☐ Reactivate		Changes (please specify):	

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SAN BERNARDINO COUNTY

Public Health
Environmental Health Services

Rec# 029367

www.sbcounty.gov/dph/dehs
Phone: (800) 442-2283

NORPMW007

APPLICATION FOR WELL PERMIT

2017004833

1 – PROPERTY INFORMATION

Property Owner: San Bernardino International Airport Authority			Phone Number: 909-577-2097
Site Address: ~~3281 East 3rd Street~~ 199 N HANGAR	City: San Bernardino	State: CA	Zip: 92408
Assessor's Parcel Number: 0136-371-33-0000	Email: mburrows@sbdairport.com		
Township: N/S Tier: 1 South		E/W Range: 3 West	Section: Section 7
Well Head: Latitude (decimal): 34.103256	Longitude (decimal): -117.220822		
Property Owner's Mailing Address: 105 N. Leland Norton Way #7	City: San Bernardino	State: CA	Zip: 92408

2 – CONSULTANT INFORMATION

Name of Consultant: Aerostar SES, LLC	Email: cmcmillen@aerostar.net		Phone Number: 865-813-2771
Address: 1006 Floyd Culler Court	City: Oak Ridge	State: TN	Zip: 37830

3 – REGISTERED WELL DRILLER INFORMATION

Name of Driller: Yellow Jacket Drilling	R2039461		Phone Number: 909-989-8583
Email:	dean@yjdrilling.com	C-57 License Number: 643081	

Return well permit to: ☐ Well Driller ☒ Consultant ☐ Property Owner

Return by: ☐ Mail ☒ Email

4 – TYPE OF WORK

☒ New ☐ Reconstruction ☐ Destruction

Date of Work	Start Date: 4/11/2017	Completion Date: 5/20/2017	Estimated groundwater depth: 195 feet

5 – WELL TYPE

☐ Agriculture ☐ Geothermal ☐ Industrial
☐ Cathodic ☐ Horizontal ☒ Monitoring/Observation
☐ Community/PWS/City – Specify Use Below ☐ Residential – cannot be used as a community well ☐ Test
Use: ☐ Other

6 – ANNULAR SEAL

Seal Depth (ft.) 203

☐ Driven Conductor Diameter (in.) ☐ Wall (gauge) (in.) ☐ Drilling method
☒ Sealing Material C-E Grout ☐ Thickness (in.)

Sealing material shall be placed in one continuous pour. Annular seal thickness must be at least 2 inches for public water supply wells.

7 – [illegible]

Proposed Depth of Well (ft.): 228	Existing Depth of Well (ft.):	Diameter of Bore (in.): 8

8 – CASING INSTALLED

☒ Casing Material ☐ ATSM/AWWA/APPI PVC

From (ft.)	To (ft.)	Diameter (in.)	Wall (Gauge)
above ground surface	205	4	Schedule 80

Gravel Pack ☒ Yes ☐ No		From (ft.) 203.5	To (ft.) 228
Specify Other Backfill Material: Bentonite Seal		From (ft.) 200	To (ft.) 203.5

9 – PERFORATIONS (list all if applicable)

From (ft.) 205	To (ft.) 225	Well Screen Size 0.020 inch	Pumping Rate (gpm) unknown

10 – SEALED ZONES (list all if applicable)

From (ft.) 0-203 and 203-203.5	To (ft.)

11 – PLOT PLAN

a) In perspective to the well site, sketch and label the following items on a separate paper: well lot property lines, other wells (include abandoned wells), sewage disposal systems (sewers, septic tanks, leaching fields, seepage pits, cesspools), lakes and ponds, watercourses and animals or fowl kept.

b) Indicate the distance, in feet, of any of the above which are within 500 ft. of the well site. The plot plan needs to be drawn to scale (½ inch = 100 feet). Show the approximate drainage pattern of the property and show access roads to the well site within 500 feet.

c) ☐ None of the above is within 500 feet.

d) Solid or Liquid Disposal Site within Two Miles ■ Yes ☐ No Location Site 2 Landfill

12 – METHOD OF CONSTRUCTION OR DESTRUCTION

Provide the method of construction/destruction in the space below or as an attachment if more space is needed. The method shall be in accordance with the standards recommended in the California Department of Water Resources Bulletin No. 74-81 and 74-90. Title 22 standards shall also be followed for public water supply wells.

I will submit water well drillers report to Environmental Health Services within 30 days of completion, and will construct or destroy wellborings in accordance with the permit application and Water Well Standards Bulletin 74-81 & 74-90.

13 – AGREEMENT AND SIGNATURE

I have read this application and agree to comply with all laws regulating the type of work being performed.

Property Owner's Signature: X [signature]	Date: 3-29-17
Print Property Owner's Name: Mike Burrows, Executive Director	
C-57 Contractor's Signature: X [signature]	Date: 3/28/17
Print Contractor's Name: Richard LeBlanc	

[illegible]

☐ Sent to Water Agency

☐ Water Agency conditions or recommendations attached

☐ Denied

☒ Approved subject to the following:

Permit Number:	201700[illegible]8273
Expiration Date:	10/10/2017
WP Number:	WP0037[illegible]

A. ☒ Notify the Division's Safe Drinking Water Program at (800) 442-2283 at least seventy two (72) hours in advance to make an inspection of the following operations: (Inspections are conducted Monday – Friday between 8:00 AM to 5:00 PM). Failure to cancel or reschedule appointments may result in an additional hourly fee.

- ☐ Prior to sealing of the annular space or filling of the conductor casing.
- ☒ After installation of the surface protective slab and pumping equipment.
- ☐ After installation of the surface features.
- ☐ During destruction of wells, prior to pouring the sealing material.

B. ☐ Submit to the Division, within thirty (30) days after completion of work, a copy of:

☐ Water Well Driller's Report ☐ Bacterial Analysis ☐ Inorganic Chemical Analysis ☐ General Physical

☐ Radiological Analysis ☐ Nitrate as Nitrogen ☐ Organic Chemical Analysis ☐ General Mineral

Comments

[illegible]

Fee: 371.00	FA Number:	Receipt ID: 74404	PE Number:
Late Fee: ☐ Y ☒ N	Designated Employee: O.Y.	Received By: SL	Date: 3/28/17
Check One: ☒ New ☐ Transfer ☐ Reactivate		Changes (please specify):	

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0356327

Page 1 of 11

Owner's Well Number NORPMW002

Date Work Began 05/09/2017 Date Work Ended 7/24/2017

Local Permit Agency SAN BERNARDINO COUNTY PUBLIC HEALTH

Permit Number 2017003828 Permit Date 3/28/17

DWR Use Only – Do Not Fill In

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

Geologic Log

Orientation ○ Vertical ◉ Horizontal ○ Angle Specify

Drilling Method MUD ROTARY Drilling Fluid

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
		SEE ATTACHED

Total Depth of Boring 222 Feet

Total Depth of Completed Well 220 Feet

Well Owner

Name SAN BERNARDINO INTERNATIONAL AIRPORT AUTHOR

Mailing Address 105 N LELAND WAY#7

City SAN BERNARDINO State CA Zip 92408

Well Location

Address 199 N. HANGAR WAY

City SAN BERNARDINO County San Bernardino

Latitude Deg. Min. Sec N Longitude Deg. Min. Sec W

Datum Dec. Lat. 34.099097 Dec. Long. -117.246431

APN Book Page Parcel 013637133-0000

Township 15 Range 3W Section 8

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

See Attached

West East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

◉ New Well

○ Modification/Repair

○ Deepen

○ Other

○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply

☐ Domestic ☐ Public

☐ Irrigation ☐ Industrial

○ Cathodic Protection

○ Dewatering

○ Heat Exchange

○ Injection

◉ Monitoring

○ Remediation

○ Sparging

○ Test Well

○ Vapor Extraction

○ Other

Water Level and Yield of Completed Well

Depth to first water 200 (Feet below surface)

Depth to Static Water Level 200 (Feet) Date Measured 05/15/2017

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size If Any (Inches)
0	200	10	BLANK	PVC	SCH 80	4	N/A	
200	220	10	BLANK	PVC	SCH 80	4	SLOTTED	0.020

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	184	Annular seal	Cement/Bentonite
184	190	Well Seal	Bentonite Pellets
190	202	Filter Pack	#2/12 sand

Attachments

☑ Geologic Log

☐ Well Construction Diagram

☐ Geophysical Log(s)

☐ Soil/Water Chemical Analyses

☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Yellow Jacket Drilling (Person, Firm or Corporation)

9460 Lucas Ranch Road (Address) Rancho Cucamonga (City) CA (State) 91730 (Zip)

Signed [signature] (C-57 Licensed Water Well Contractor) 11/2/17 (Date Signed) 643081 (C-57 License Number)

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0356326

Page 1 of 10

Owner's Well Number NORPMW003

Date Work Began 05/09/2017 Date Work Ended 7/24/2017

Local Permit Agency SAN BERNARDINO COUNTY PUBLIC HEALTH

Permit Number 2017003829 Permit Date 3/28/17

DWR Use Only – Do Not Fill In

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

Geologic Log

Orientation ○ Vertical ◉ Horizontal ○ Angle Specify

Drilling Method MUD ROTARY Drilling Fluid

Depth from Surface Feet	to Feet	Description Describe material, grain size, color, etc
		SEE ATTACHED

Total Depth of Boring Feet

Total Depth of Completed Well Feet

Well Owner

Name SAN BERNARDINO INTERNATIONAL AIRPORT AUTHOR

Mailing Address 105 N LELAND WAY#7

City SAN BERNARDINO State CA Zip 92408

Well Location

Address 199 N. HANGAR WAY

City SAN BERNARDINO County San Bernardino

Latitude Deg. Min. Sec. N Longitude Deg. Min. Sec. W

Datum Dec. Lat. 34.099000 Dec. Long. -117.246925

APN Book Page Parcel 013637133-0000

Township 1s Range 3w Section 8

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

See Attached

West East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

◉ New Well
○ Modification/Repair
○ Deepen
○ Other
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply
☐ Domestic ☐ Public
☐ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
◉ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other

Water Level and Yield of Completed Well

Depth to first water 196 (Feet below surface)

Depth to Static Water Level 196 (Feet) Date Measured 05/15/2017

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size If Any (Inches)
0	213	10	BLANK	PVC	SCH 80	4	N/A	
213	233	10	BLANK	PVC	SCH 80	4	SLOTTED	0.020

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	203	Annular seal	Cement/Bentonite
203	208	Well Seal	Bentonite Pellets
208	234	Filter Pack	#2/12 sand

Attachments

☑ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Yellow Jacket Drilling
Person, Firm or Corporation

9460 Lucas Ranch Road Rancho Cucamonga CA 91730
Address City State Zip

Signed 11/2/17 643081
C-57 Licensed Water Well Contractor Date Signed C-57 License Number

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0356329

Page 1 of 10

Owner's Well Number NORPMW004

Date Work Began 05/09/2017 Date Work Ended 7/24/2017

Local Permit Agency SAN BERNARDINO COUNTY PUBLIC HEALTH

Permit Number 2017003830 Permit Date 3/28/17

DWR Use Only – Do Not Fill In

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

Geologic Log

Orientation ○ Vertical ◉ Horizontal ○ Angle Specify

Drilling Method MUD ROTARY Drilling Fluid

Depth from Surface Feet	to Feet	Description Describe material, grain size, color, etc
		SEE ATTACHED

Total Depth of Boring Feet

Total Depth of Completed Well Feet

Well Owner

Name SAN BERNARDINO INTERNATIONAL AIRPORT AUTHO

Mailing Address 105 N LELAND WAY#7

City SAN BERNARDINO State CA Zip 92408

Well Location

Address 199 N. HANGAR WAY

City SAN BERNARDINO County San Bernardino

Latitude Deg. Min. Sec. N Longitude Deg. Min. Sec. W

Datum Dec. Lat. 34.101155 Dec. Long. -117.242804

APN Book Page Parcel 013637133-0000

Township 1s Range 3w Section 8

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

See Attached

West East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

◉ New Well

○ Modification/Repair

○ Deepen

○ Other

○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply

☐ Domestic ☐ Public

☐ Irrigation ☐ Industrial

○ Cathodic Protection

○ Dewatering

○ Heat Exchange

○ Injection

◉ Monitoring

○ Remediation

○ Sparging

○ Test Well

○ Vapor Extraction

○ Other

Water Level and Yield of Completed Well

Depth to first water 202 (Feet below surface)

Depth to Static Water Level 202 (Feet) Date Measured 05/15/2017

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size If Any (Inches)
0	200	10	BLANK	PVC	SCH 80	4	N/A	
200	220	10	BLANK	PVC	SCH 80	4	SLOTTED	0.020

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	190	Annular seal	Cement/Bentonite
190	195	Well Seal	Bentonite Pellets
195	223	Filter Pack	#2/12 sand

Attachments

☑ Geologic Log

☐ Well Construction Diagram

☐ Geophysical Log(s)

☐ Soil/Water Chemical Analyses

☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Yellow Jacket Drilling (Person, Firm or Corporation)

9460 Lucas Ranch Road (Address) Rancho Cucamonga (City) CA (State) 91730 (Zip)

Signed (C-57 Licensed Water Well Contractor) 11/6/17 (Date Signed) 643081 (C-57 License Number)

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0356330

Page 1 of 11

Owner's Well Number NORPMW005

Date Work Began 05/09/2017 Date Work Ended 7/24/2017

Local Permit Agency SAN BERNARDINO COUNTY PUBLIC HEALTH

Permit Number 2017003831 Permit Date 3/28/17

DWR Use Only – Do Not Fill In

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

Geologic Log

Orientation ○ Vertical ◉ Horizontal ○ Angle Specify

Drilling Method MUD ROTARY Drilling Fluid

Depth from Surface Feet	to Feet	Description Describe material, grain size, color, etc
		SEE ATTACHED

Total Depth of Boring Feet

Total Depth of Completed Well Feet

Well Owner

Name SAN BERNARDINO INTERNATIONAL AIRPORT AUTHOR

Mailing Address 105 N LELAND WAY#7

City SAN BERNARDINO State CA Zip 92408

Well Location

Address 199 N. HANGAR WAY

City SAN BERNARDINO County San Bernardino

Latitude Deg. Min. Sec. N Longitude Deg. Min. Sec. W

Datum Dec. Lat. 34.102923 Dec. Long. -117.246543

APN Book Page Parcel 013637133-0009

Township 1s Range 3w Section 8

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

see Attached

West East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

◉ New Well

○ Modification/Repair

○ Deepen

○ Other

○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply

☐ Domestic ☐ Public

☐ Irrigation ☐ Industrial

○ Cathodic Protection

○ Dewatering

○ Heat Exchange

○ Injection

◉ Monitoring

○ Remediation

○ Sparging

○ Test Well

○ Vapor Extraction

○ Other

Water Level and Yield of Completed Well

Depth to first water 195 (Feet below surface)

Depth to Static Water Level 195 (Feet) Date Measured 05/15/2017

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size If Any (Inches)
0	200	10	BLANK	PVC	SCH 80	4	N/A	
200	220	10	BLANK	PVC	SCH 80	4	SLOTTED	0.020

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	190	Annular seal	Cement/Bentonite
190	195	Well Seal	Bentonite Pellets
195	223	Filter Pack	#2/12 sand

Attachments

☑ Geologic Log

☐ Well Construction Diagram

☐ Geophysical Log(s)

☐ Soil/Water Chemical Analyses

☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Yellow Jacket Drilling
Person, Firm or Corporation

9460 Lucas Ranch Road Rancho Cucamonga CA 91730
Address City State Zip

Signed 11/2/17 643081
C-57 Licensed Water Well Contractor Date Signed C-57 License Number

*The free Adobe Reader may be used to view and complete this form. However, [illegible] used to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0356334

Page 1 of 11

Owner's Well Number NORPMW006

Date Work Began 05/09/2017 Date Work Ended 7/24/2017

Local Permit Agency SAN BERNARDINO COUNTY PUBLIC HEALTH

Permit Number 2017003832 Permit Date 3/28/17

DWR Use Only – Do Not Fill In

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

Geologic Log

Orientation ○ Vertical ◉ Horizontal ○ Angle Specify

Drilling Method MUD ROTARY Drilling Fluid

Depth from Surface Feet	to Feet	Description Describe material, grain size, color, etc
		SEE ATTACHED

Total Depth of Boring _____ Feet

Total Depth of Completed Well _____ Feet

Well Owner

Name SAN BERNARDINO INTERNATIONAL AIRPORT AUTHOR

Mailing Address 105 N LELAND WAY#7

City SAN BERNARDINO State CA Zip 92408

Well Location

Address 199 N. HANGAR WAY

City SAN BERNARDINO County San Bernardino

Latitude ___ Deg. ___ Min. ___ Sec. N Longitude ___ Deg. ___ Min. ___ Sec. W

Datum _____ Dec. Lat. 34.102923 Dec. Long. -117.246543

APN Book _____ Page _____ Parcel 013637133-0000

Township 1s Range 3w Section 8

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

See Attached

West East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

◉ New Well
○ Modification/Repair
○ Deepen
○ Other
○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply
☐ Domestic ☐ Public
☐ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
◉ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other

Water Level and Yield of Completed Well

Depth to first water 195 (Feet below surface)

Depth to Static Water Level 195 (Feet) Date Measured 05/15/2017

Estimated Yield * _____ (GPM) Test Type _____

Test Length _____ (Hours) Total Drawdown _____ (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Well Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size If Any (Inches)
0	202	10	BLANK	PVC	SCH 80	4	N/A	
202	222	10	BLANK	PVC	SCH 80	4	SLOTTED	0.020

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	191	Annular seal	Cement/Bentonite
19	196	Well Seal	Bentonite Pellets
196	223	Filter Pack	#2/12 sand

Attachments

☑ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Yellow Jacket Drilling
Person, Firm or Corporation

9460 Lucas Ranch Road Rancho Cucamonga CA 91730
Address City State Zip

Signed [signature] 11/2/17 643081
C-57 Licensed Water Well Contractor Date Signed C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0356343

Page 1 of 11

Owner's Well Number NORPMW007R

Date Work Began 05/09/2017 Date Work Ended 7/24/2017

Local Permit Agency SAN BERNARDINO COUNTY PUBLIC HEALTH

Permit Number 2017003833 Permit Date 3/28/17

DWR Use Only – Do Not Fill In

State Well Number/Site Number

N Latitude W Longitude

APN/TRS/Other

Geologic Log

Orientation ○ Vertical ◉ Horizontal ○ Angle Specify

Drilling Method MUD ROTARY Drilling Fluid

Depth from Surface Feet	to Feet	Description Describe material, grain size, color, etc
		SEE ATTACHED

Total Depth of Boring Feet

Total Depth of Completed Well Feet

Well Owner

Name SAN BERNARDINO INTERNATIONAL AIRPORT AUTHO

Mailing Address 105 N LELAND WAY#7

City SAN BERNARDINO State CA Zip 92408

Well Location

Address 199 N. HANGAR WAY

City SAN BERNARDINO County San Bernardino

Latitude Deg. Min. Sec. N Longitude Deg. Min. Sec. W

Datum Dec. Lat. 34.103256 Dec. Long. -117.220822

APN Book Page Parcel 013637133-0000

Township 1s Range 3w Section 8

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

See Attached

West East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

- ○ New Well
- ◉ Modification/Repair
  - ○ Deepen
  - ○ Other
- ○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

- ○ Water Supply
  - ☐ Domestic ☐ Public
  - ☐ Irrigation ☐ Industrial
- ○ Cathodic Protection
- ○ Dewatering
- ○ Heat Exchange
- ○ Injection
- ◉ Monitoring
- ○ Remediation
- ○ Sparging
- ○ Test Well
- ○ Vapor Extraction
- ○ Other

Water Level and Yield of Completed Well

Depth to first water 238 (Feet below surface)

Depth to Static Water Level 238 (Feet) Date Measured 05/15/2017

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size If Any (Inches)
0	230	10	BLANK	PVC	SCH 80	4	N/A	
230	250	10	BLANK	PVC	SCH 80	4	SLOTTED	0.020

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	220	Annular seal	Cement/Bentonite
220	225	Well Seal	Bentonite Pellets
225	250	Filter Pack	#2/12 sand

Attachments

- ☑ Geologic Log
- ☐ Well Construction Diagram
- ☐ Geophysical Log(s)
- ☐ Soil/Water Chemical Analyses
- ☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Yellow Jacket Drilling (Person, Firm or Corporation)

9460 Lucas Ranch Road (Address) Rancho Cucamonga (City) CA (State) 91730 (Zip)

Signed (C-57 Licensed Water Well Contractor) 11/6/17 (Date Signed) 643081 (C-57 License Number)

Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPSB001

(Page 1 of 2)

Start Date/Time	: 05/17/2017 - 0745
End Date/Time	: 05/17/2017 - 1015
Northing/Easting	: N/A
Elevation (ft) (BGS)	: N/A
Borehole Dia. (in)	: 8
Borehole Depth (ft)	: 30

Installation	: Former Norton AFB
AFFF Area	: 7
Station ID	: NORPSB001
Drilling Company	: Yellow Jacket
Drilling Method	: CME 95 HSA
Sampling Method	: Split Spoon
Borehole Completion	: Backfilled with Bentonite/ : Cement grout
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach

Depth in Ft BGS	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID	REMARKS
0–3	7/10/13	SAND, 10YR 6/3, pale brown, with little gravel, well graded, fine to coarse grained sand, fine subangular to subrounded gravel, pink coarse feldspar sand, dry		SW		SO	NORP07025 NORP07026	Hand Cleared Borehole to 5' bgs using hand auger
3–5		SAND, 10YR 6/4, light yellowish brown, with some silt and trace gravel, poorly graded, fine grained sand, fine subrounded gravel, pervasive orange oxide staining		SP SM				
5–7	13/14/15	(2.5" lense of SANDY SILT, 10YR 4/3, Brown, with few clay at 6 ft BGS)						
7–15		SAND, 10YR 5/6, yellowish brown, with few gravel, fine to coarse grained sand and subgranular to subrounded fine gravel, thin beds of sorted sands, pervasive orange oxide staining, finding upwards sequences, damp		SW				
15–16	13/17/23	SAND, 2.5Y 6/3, light yellowish brown, medium to course grained sand, some fine grained sand subrounded to subangular fine gravel, well graded, damp		SW		SO	NORP07027	
16–18		Driller reports coarse gravel and cobbles from 17' bgs based on drilling conditions and soil cuttings, gravely sand		GW				
18–20		GRAVELLY SAND, 2.5Y 6/4, light yellowish brown, fine to coarse sand, fine to coarse gravel, damp		SW				Due to problem with hammer sliding no blow counts.

Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPSB001

(Page 2 of 2)

Start Date/Time	: 05/17/2017 - 0745
End Date/Time	: 05/17/2017 - 1015
Northing/Easting	: N/A
Elevation (ft) (BGS)	: N/A
Borehole Dia. (in)	: 8
Borehole Depth (ft)	: 30

Installation	: Former Norton AFB
AFFF Area	: 7
Station ID	: NORPSB001
Drilling Company	: Yellow Jacket
Drilling Method	: CME 95 HSA
Sampling Method	: Split Spoon
Borehole Completion	: Backfilled with Bentonite/ : Cement grout
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach

Depth in Ft BGS	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID	REMARKS
20								
21				SW				
22	28/33 /38	SAND w/ gravel, 2.5Y 7/3 light yellow, fine to medium grained sand, some coarse sand, trace fine gravel, trace coarse gravel, damp						
23								
24								
25				SW				
26								
27	14/40 /44							
28		SAND w/ gravel, 10YR 6/4 light yellowish brown, medium to coarse grained sand, fine to coarse gravel, subangular, some fine sand, well graded						
29				SW		SO	NORP07028	
30		End of boring at 30 ft BGS						
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								

Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPSB002

(Page 1 of 2)

Start Date/Time	: 05/17/2017 - 1100
End Date/Time	: 05/17/2017 - 1250
Northing/Easting	: N/A
Elevation (ft) (BGS)	: N/A
Borehole Dia. (in)	: 8
Borehole Depth (ft)	: 29.5

Installation	: Former Norton AFB
AFFF Area	: 7
Station ID	: NORPSB002
Drilling Company	: Yellow Jacket
Drilling Method	: CME 95 HSA
Sampling Method	: Split Spoon
Borehole Completion	: Backfilled with Bentonite/ : Cement Grout
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach

Depth in Ft BGS	Blow Count	DESCRIPTION	PID (ppm) 0 1020	USCS	GRAPHIC	SAMPLE TYPE	Sample ID	REMARKS
0		SILTY SAND, 10YR 4/3, brown, fine grained sand, some medium and coarse grained,trace fine gravel, dry to damp		SM		SO	NORP07029	Hand cleared borehole to 5' bgs using hand auger
1		SAND, 10YR 6/6, brownish yellow, with gravel, medium grained sand, some fine and coarse sand, subrounded fine to coarse gravel, well graded, damp		SW				
2	7/11 /15							
3		Becomes Gravely Sand from 3 ft, cobble, 6" x 5.5" x 3"		SW				
4								
5		SAND, 10YR 7/3, pale brown, fine to medium grained sand, trace gravel, poorly graded, dry to damp		SP				
6								
7	5/8 /11							
8								
9		SILTY SAND, 10YR 4/3, pale brown, fine to medium grained sand, some coarse sand, trace fine gravel, damp		SM				
10								
11		SAND, 10YR 6/4, yellowish brown, fine grained sand, some mediukm to coarse grained, trace fine subangular gravel, damp		SP				
12	50+							
13								
14								
15		GRAVELLY SAND, 2.5Y 6/7, light yellowish brown, fine to medium sand, driller reports coarse gravel to cobbles, also rock fragments present in sample		SW		SO	NORP07030	
16								
17	9/17 /24							
18								
19								
20								

Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPSB002

(Page 2 of 2)

Start Date/Time	: 05/17/2017 - 1100
End Date/Time	: 05/17/2017 - 1250
Northing/Easting	: N/A
Elevation (ft) (BGS)	: N/A
Borehole Dia. (in)	: 8
Borehole Depth (ft)	: 29.5

Installation	: Former Norton AFB
AFFF Area	: 7
Station ID	: NORPSB002
Drilling Company	: Yellow Jacket
Drilling Method	: CME 95 HSA
Sampling Method	: Split Spoon
Borehole Completion	: Backfilled with Bentonite/ : Cement Grout
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach

Depth in Ft BGS	Blow Count	DESCRIPTION	PID (ppm) 0 1020	USCS	GRAPHIC	SAMPLE TYPE	Sample ID	REMARKS
20	9/17/24	SAND, 2.5Y 7/3, yellow, fine graveled sand, some medium sand, trace fine gravel, poorly graded, damp		SP				
21								
22	18/30 32							
23		GRAVELLY SAND, 2.5Y 7/3, pale yellow, medium to coarse sand, fine to coarse gravel, well graded, damp		SW				
24								
25								
26								
27	3/5/7							
28		SILTY SAND, 10YR 4/3, Brown, fine to medium grained sand, damp		SM		SO	NORP07031	
				SW				
29		GRAVELLY SAND, 2.5Y 7/3, Pale Yellow, medium to coarse sand, with sand, fine to coarse gravel, well graded, damp		CL				
30		CLAY, 2.5Y 5/4, Light Olive Brown, fine grained sand, low plasticity, damp						
31		End of boring 29.5 ft BGS						
32								
33								
34								
35								
36								
37								
38								
39								
40								

Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPSB003

(Page 1 of 2)

Start Date/Time	: 05/17/2017 - 1300
End Date/Time	: 05/17/2017 - 1600
Northing/Easting	: N/A
Elevation (ft) (BGS)	: N/A
Borehole Dia. (in)	: 8
Borehole Depth (ft)	: 30

Installation	: Former Norton AFB
AFFF Area	: 7
Station ID	: NORPSB003
Drilling Company	: Yellow Jacket
Drilling Method	: CME 95 HSA
Sampling Method	: Split Spoon
Borehole Completion	: Backfilled with Bentonite/ : Cement grout
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach

Depth in Ft BGS	% RECOVERY	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID	REMARKS
0		SILTY SAND, 10YR 5/4, yellowish brown, damp		SM		SO	NORP07032	Hand cleared borehole to 5' bgs using hand auger
1		SAND w/ gravel, 10YR 6/4, light yellowish brown, fine to coarse sand, fine subrounded gravel, well graded		SW				
2	2/3/6							
3								
4		GRAVELLY SAND, 10YR 5/4 yellowish brown, fine to coarse grained sand, fine to coarse subrounded gravel. pervasive orange oxide staining, damp		SW				
5								
6		SANDY SILT to SILTY SAND, 10YR 4/3 brown, fine grained sand, some medium grained sand, trace subrounded fine gravel, patchy orange oxide staining		ML SM				
7		SAND, 10YR 7/3 very pale brown, fine to medium sand, some coarse sand, damp color becomes very pale brown, 10YR 8/2, medium to coarse sand, trace gravel		SW				
8								
9								
10	5/11 19							
11								
12								
13		Driller reports cobbles and gravel from 13 ft approximately 1.5' to 2' thick		GW				
14								
15		SAND, 2.5Y 7/3, pale yellow, interspersed with several 1/4" lamena of sandy clay, light olive brown, 2.5y 5/4, fine to coarse grained sand, trace fine to coarse gravel, well graded, damp		SW		SO	NORP07033	
16								
17	3/4/6							
18		Driller reports gravel and cobbles from 18' to 19'		GW				
19		SAND, 2.5Y 6/3, light yellowish brown, fine to medium sand, trace coarse sand, trace fine gravel, damp		SP				
20								

Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPSB003

(Page 2 of 2)

Start Date/Time	: 05/17/2017 - 1300
End Date/Time	: 05/17/2017 - 1600
Northing/Easting	: N/A
Elevation (ft) (BGS)	: N/A
Borehole Dia. (in)	: 8
Borehole Depth (ft)	: 30

Installation	: Former Norton AFB
AFFF Area	: 7
Station ID	: NORPSB003
Drilling Company	: Yellow Jacket
Drilling Method	: CME 95 HSA
Sampling Method	: Split Spoon
Borehole Completion	: Backfilled with Bentonite/ : Cement grout
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach

Depth in Ft BGS	% RECOVERY	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID	REMARKS
20	3/4/6			SP				
21		SAND, 2.5Y 5/4, light olive brown, fine to coarse sand		SW				
22	7/21 34	SILTY SAND to SANDY SILT, 2.5Y 5/4, light olive brown, fine grained sand, damp		SM ML				
23								
24		SILTY SAND w/ gravel, 2.5Y 5/3, light olive brown, fine grained sand, some medium to coarse sand, fine subrounded gravel, well graded, damp		SM				
25								
26		SAND with gravel, 2.5Y 8/2 to 2.5Y 7/3, pale yellow, fine to coarse sand, coarse pale feldspar sand, fine to coarse subrounded gravel up to 2", damp		SW				
27	11/25 33							
28								
29						SO	NORP07034	
30		End of borehole 30 ft BGS.						
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								

Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPSB004

(Page 1 of 2)

Start Date/Time	: 05/17/2017
End Date/Time	: 05/17/2017
Northing/Easting	: N/A
Elevation (ft) (BGS)	: N/A
Borehole Dia. (in)	: 8
Borehole Depth (ft)	: 30

Installation	: Former Norton AFB
AFFF Area	: 8
Station ID	: NORPSB004
Drilling Company	: Yellow Jacket
Drilling Method	: HSA CME 95
Sampling Method	: Split Spoon
Borehole Completion	: Backfilled with Bentonite/
	: Cement grout
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach

Depth in Ft BGS	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID	REMARKS
0		Concrete, 9" thick, slightly decomposed broke out with jackhammer						Hand cleared borehole to 5' bgs using hand auger
1–2	8/10 15	SAND w/ silt, 10YR 6/2 light grayish brown, to 10YR 4/3 brown, fine to medium grained sand, trace coarse sand, fine subangular gravel, concrete fragments (0,15,75,10) [FILL], dry to damp		SM		SO	NORP08041 NORP08042	
3–5		SAND, 10YR 6/3 pale brown, medium to coarse sand, trace fine gravel, poorly graded (0,0,98,2), dry to damp		SP				
6–10	7/9 /11	SAND, 10YR 4/3 brown, fine to medium grained sand, trace fine subrounded gravel, medium dense, poorly graded (0,5,93,2), damp		SP				
10–15	11/24 /40	SAND w/ gravel, 10YR 7/3 very pale brown, medium to coarse grained sand, some fine sand, well graded (0,0,80,20), dry to damp		SW				
15–20	16/20 /23	SAND w/ gravel, 10YR 6/3 light yellowish brown, fine to medium grained sand, some coarse sand, fine subangular to subrounded gravel, well graded (0,0,90,10), dry to damp		SW		SO	NORP08043	

Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPSB004

(Page 2 of 2)

Start Date/Time	: 05/17/2017
End Date/Time	: 05/17/2017
Northing/Easting	: N/A
Elevation (ft) (BGS)	: N/A
Borehole Dia. (in)	: 8
Borehole Depth (ft)	: 30

Installation	: Former Norton AFB
AFFF Area	: 8
Station ID	: NORPSB004
Drilling Company	: Yellow Jacket
Drilling Method	: HSA CME 95
Sampling Method	: Split Spoon
Borehole Completion	: Backfilled with Bentonite/ : Cement grout
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach

Depth in Ft BGS	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID	REMARKS
20	16/20/23	SAND, 2.5Y 7/3 pale yellow, fine to medium sand, streaks of orange iron oxide staining, poorly graded (0,0,100,0), damp		SP				
21		SANDY SILT w/ clay, 2.5Y 5/3 light olive brown, fine grained sand, patches of iron oxide staining, damp (15,65,20,0)		ML				
22	11/16/20	SAND, 2.5Y 6/3 light yellowish brown, fine grained sand, some medium sand, trace fine subrounded gravel, poorly graded (0,0,98,2), damp		SP				
23								
24								
25								
26								
27	11/16/28							
28		SAND w/ gravel, fine to coarse grained sand, fine to coarse gravel, some pink feldspar, coarse sand, well graded (0,0,85,15), damp						
29						SO	NORP08044	
30		End of Boring at 30'						
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								

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Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPSB005

(Page 1 of 2)

Start Date/Time	: 05/17/2017
End Date/Time	: 05/17/2017
Northing/Easting	: N/A
Elevation (ft) (BGS)	: N/A
Borehole Dia. (in)	: 8
Borehole Depth (ft)	: 30

Installation	: Former Norton AFB
AFFF Area	: 7
Station ID	: NORPSB005
Drilling Company	: Yellow Jacket
Drilling Method	: HSA CME 95
Sampling Method	: Split Spoon
Borehole Completion	: Backfilled with Bentonite/
	: Cement grout
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach

Depth in Ft BGS	Blow count	DESCRIPTION	PID (ppm) 0 1020	USCS	GRAPHIC	SAMPLE TYPE	Sample ID	REMARKS
0		CONCRETE with silt						Hand cleared borehole to 5' bgs using hand auger
1		SAND, 10YR 6/3, pale brown, fine to coarse sand, trace fine subangular gravel, dry		SM		SO	NORP08045	
2	7,8,9	SAND, 10YR 6/4, light yellowish brown, fine to coarse sand, trace gravel, trace cobbles up to 4 3/4" x 3 1/2" x 3" of various granitic origin color very pale brown, 10YR 7/3, dry		SP				
3								
4								
5								
6		SAND with gravel, 10YR 6/4, light yellowish brown, fine to coarse sand, fine to coarse subgranular to subrounded gravel, damp		SW				
7	8,13,55							
8								
9								
10								
11								
12								
13								
14								
15	14,50,6	SAND with silt, 2.5Y 7/2, light gray, fine to medium grained sand, trace gravel, trace cobbles, well graded, dry to damp		SW		SO	NORP08046	
16								
17								
18								
19								
20								

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Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPSB005

(Page 2 of 2)

Start Date/Time	: 05/17/2017
End Date/Time	: 05/17/2017
Northing/Easting	: N/A
Elevation (ft) (BGS)	: N/A
Borehole Dia. (in)	: 8
Borehole Depth (ft)	: 30

Installation	: Former Norton AFB
AFFF Area	: 7
Station ID	: NORPSB005
Drilling Company	: Yellow Jacket
Drilling Method	: HSA CME 95
Sampling Method	: Split Spoon
Borehole Completion	: Backfilled with Bentonite/ : Cement grout
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach

Depth in Ft BGS	Blow count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID	REMARKS
20	14,50,6	SAND with gravel, 2.5Y 6/4, light yellowish brown, fine to medium sand, trace coarse sand, well graded fine gravel, trace coarse graind of various granitic origin, damp		SW				
21								
22	14,50,6							
23								
24								
25								
26								
27	14,27,50	GRAVEL content increase3s to 20%, 2.5Y 4/3, color becomes olive brown from 28.5' to 9', pale yellow, 2.5Y 7/3, to 30'		SW		SO	NORP08048	
28								
29								
30		End of borehole 30 ft BGS.						
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								

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Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPSB006

(Page 1 of 2)

Start Date/Time	: 05/16/2017 - 0900
End Date/Time	: 05/16/2017 - 1040
Northing/Easting	: N/A
Elevation (ft) (BGS)	: N/A
Borehole Dia. (in)	: 8
Borehole Depth (ft)	: 31.5

Installation	: Former Norton AFB
AFFF Area	: 8
Station ID	: NORPSB006
Drilling Company	: Yellow Jacket
Drilling Method	: HSA CME 95
Sampling Method	: Split Spoon
Borehole Completion	: Backfilled with Bentonite/ : Cement grout
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach

Depth in Ft BGS	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID	REMARKS
0		Concrete, slightly decomposed broke out with jackhammer						Hand cleared borehole to 5' bgs using hand auger
1		SILTY SAND, 10YR 4/3 brown, fine grained sand, trace fine gravel, damp (0,37,60,3)		SM		SO	NORP08049	
2								
3		SAND, 10YR 7/3 very pale brown, fine to medium sand (0,0,100,0)		SP				
4								
5	70/6							
6		SAND w/ gravel, 10YR 6/4 light yellowish brown, fine to medium sand, some coarse sand, subangular to subrounded fine to coarse gravel, trace subrounded cobbles, well graded (0,0,75,25)		SP				
7								
8								
9								
10		color change to 2.5Y 6/4 light yellowish brown						
11								
12	50+							
13		increase in cobbles						
14								
15		SANDY GRAVEL to GRAVELLY SAND, 2.5Y 6/4 light yellowish brown, fine to coarse sand, fine to coarse gravel, cobbles, subangular to subrounded		SW /GW		SO	NORP08050	
16								
17		SAND w/ gravel		SW				
18								
19								
20								

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Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPSB006

(Page 2 of 2)

Start Date/Time	: 05/16/2017 - 0900
End Date/Time	: 05/16/2017 - 1040
Northing/Easting	: N/A
Elevation (ft) (BGS)	: N/A
Borehole Dia. (in)	: 8
Borehole Depth (ft)	: 31.5

Installation	: Former Norton AFB
AFFF Area	: 8
Station ID	: NORPSB006
Drilling Company	: Yellow Jacket
Drilling Method	: HSA CME 95
Sampling Method	: Split Spoon
Borehole Completion	: Backfilled with Bentonite/ : Cement grout
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach

Depth in Ft BGS	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID	REMARKS
20	50+	SAND w/ gravel, 2.5Y 6/3 light yellowish brown, fine to coarse grained sand, fine gravel, thin beds of medium sand, well graded (0,0,80,20)		SW				
21								
22								
23	18/21 /23							
24								
25		SAND, 2.5Y 6/4 light yellowish brown to CLAYEY SILT, 2.5Y 5/3 light olive brown, alternating beds of sand and sandy silt, fine to medium grained sand, trace fine subrounded gravel, (0,0,98,2) to (15,50,35,0)		SP /ML				
26								
27								
28	20/28 /40	SAND, 2.5Y 8/2 pale yellow and 2.5Y 4/1 dark gray, speckled fine to medium grained sand, alternating with beds of light yellowish brown 2.5Y 6/4 sand		SP				
29								
30						SO	NORP08052	
31								
32		End of Boring at 31.5'						
33								
34								
35								
36								
37								
38								
39								
40								

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Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW002

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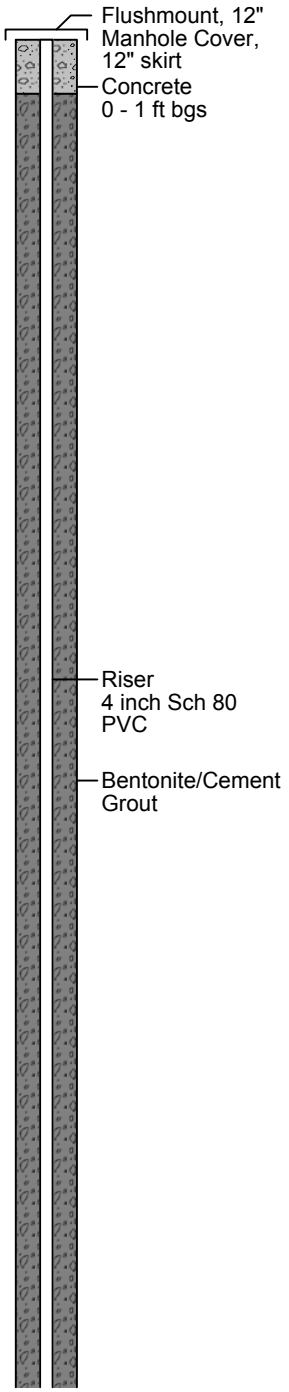
Start Date/Time	: 05/9/2017 - 0945
End Date/Time	: 05/11/2017
Northing/Easting	: 1859281.32/6789763.33
Elevation (ft) (TOC)	: 1093.72
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 223

Installation	: Former Norton AFB
AFFF Area	: 5
Station ID	: NORPMW002
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon-400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	200.14
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
0–10		53/4	SILTY SAND, 10YR 4/2 very dark grayish brown, fine to medium grained sand w/ trace coarse sand, trace fine gravel, poorly graded (0% Clay, 30% Silt, 69% Sand, 1% Gravel) damp, color change to 10YR 4/4 dark yellowish brown at 1 ft bgs	0	SM		SO	NORP05013
10–13			SAND w/ gravel, 10YR 5/4 yellowish brown, fine to medium grained sand w/ some coarse sand, trace gravel, well graded (0,10,85,5), damp		SW			
13–16			GRAVELLY SAND, 10YR 5/4 yellowish brown, fine to medium grained sand, subrounded to subangular fine gravel, trace coarse gravel (up to 1.25"), some coarse sand, well graded (0,10,65,25), damp		SW			
16–25			GRAVEL w/ sand, 2.5Y 5/3 light olive brown, fine to coarse grained sand, fine to coarse gravel and cobbles, gravel and cobles of various granitic origin subrounded cobble (3" x 2.5" x 1.5")		GW		SO	NORP05014

Well:: NORPMW002
Elev. (BGS): 1094.38



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Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW002

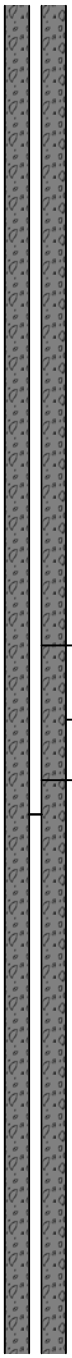
(Page 2 of 9)

Start Date/Time	: 05/9/2017 - 0945
End Date/Time	: 05/11/2017
Northing/Easting	: 1859281.32/6789763.33
Elevation (ft) (TOC)	: 1093.72
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 223

Installation	: Former Norton AFB
AFFF Area	: 5
Station ID	: NORPMW002
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon-400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	200.14
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
25								
26								
27		50+						
28								
29								
30								
31					GW			
32								
33		56/6						
34								
35								
36								
37			SAND, 2.5Y 5/3 light olive brown, fine to medium granitic sand, poorly graded (0,5,95,0), moist	0			SO	NORP05015
38								
39								
40								
41								
42								
43					SP			
44								
45								
46								
47								
48								
49								
50								

Well:: NORPMW002
Elev. (BGS): 1094.38



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Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW002

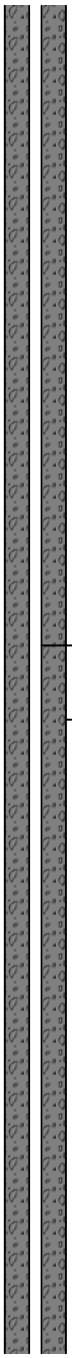
(Page 3 of 9)

Start Date/Time	: 05/9/2017 - 0945
End Date/Time	: 05/11/2017
Northing/Easting	: 1859281.32/6789763.33
Elevation (ft) (TOC)	: 1093.72
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 223

Installation	: Former Norton AFB
AFFF Area	: 5
Station ID	: NORPMW002
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon-400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	200.14
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
50								
51								
52								
53								
54								
55		62/6						
56								
57					SP			
58								
59								
60								
61								
62								
63			CLAY w/ silt, 2.5Y 4/1 dark gray, trace medium grained sand, high plasticity (90,8,2,0), moist					
64								
65								
66					CL			
67								
68								
69								
70			SILTY CLAY to CLAYEY SILT, 2.5Y 5/1 gray, organic matter (twigs and bark fragments up to 3%)					
71								
72					CL			
73								
74								
75								

Well:: NORPMW002
Elev. (BGS): 1094.38



Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW002

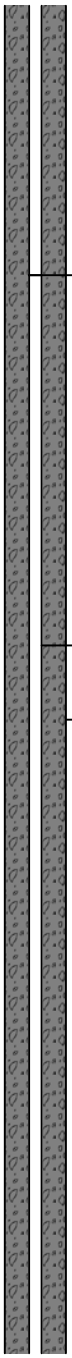
(Page 4 of 9)

Start Date/Time	: 05/9/2017 - 0945
End Date/Time	: 05/11/2017
Northing/Easting	: 1859281.32/6789763.33
Elevation (ft) (TOC)	: 1093.72
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 223

Installation	: Former Norton AFB
AFFF Area	: 5
Station ID	: NORPMW002
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon-400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	200.14
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
75								
76					CL			
77			SAND w/ gravel, 2.5Y 5/3 light olive brown, fine to coarse sand, fine to coarse gravel, gravels of various granitic origin (pink, white and gray granites), well graded					
78								
79								
80								
81								
82		60+						
83								
84								
85								
86					SW			
87								
88								
89								
90								
91								
92								
93								
94								
95		57/6						
96			GRAVEL					
97					GW			
98			SAND, 2.5Y 6/3 light yellowish brown, medium w/ some fine sand, poorly graded (0,0,100,0), moist					
99					SP			
100								

Well:: NORPMW002
Elev. (BGS): 1094.38



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Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW002

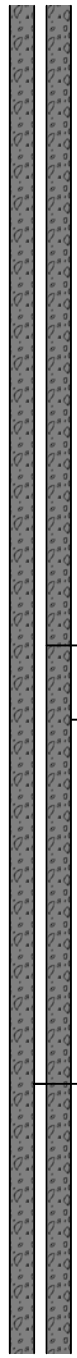
(Page 5 of 9)

Start Date/Time	: 05/9/2017 - 0945
End Date/Time	: 05/11/2017
Northing/Easting	: 1859281.32/6789763.33
Elevation (ft) (TOC)	: 1093.72
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 223

Installation	: Former Norton AFB
AFFF Area	: 5
Station ID	: NORPMW002
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon-400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	200.14
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
100		~~57/6~~						
101					SP			
102			GRAVEL		GW			
103			SAND, 2.5Y 6/3 light yellowish brown, fine to medium sand (0,0,100,0)					
104								
105								
106								
107								
108								
109								
110		68/6			SP			
111								
112								
113								
114								
115								
116								
117			GRAVEL w/ sand, 2.5Y 5/3 light olive brown, fine to coarse gravel, fine to coarse sand, gravels of various origins (pink, white, gray, orange granites)					
118								
119								
120			fine to medium grained sand, fine to coarse gravel fragments, gravel consists of granites of various origin, color change to 2.5Y 5/3 light olive brown at 150'					
121					GW			
122								
123								
124								
125								

Well:: NORPMW002
Elev. (BGS): 1094.38



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Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW002

(Page 6 of 9)

Start Date/Time	: 05/9/2017 - 0945
End Date/Time	: 05/11/2017
Northing/Easting	: 1859281.32/6789763.33
Elevation (ft) (TOC)	: 1093.72
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 223

Installation	: Former Norton AFB
AFFF Area	: 5
Station ID	: NORPMW002
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon-400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	200.14
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID	Well:: NORPMW002 Elev. (BGS): 1094.38
125									
126									
127									
128									
129									
130									
131									
132									
133									
134									
135									
136									
137		50/2			GW				Riser 4 inch Sch 80 PVC
138									Bentonite/Cement Grout
139									
140									
141									
142									
143									
144									
145									
146									
147									
148									
149									
150									

Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW002

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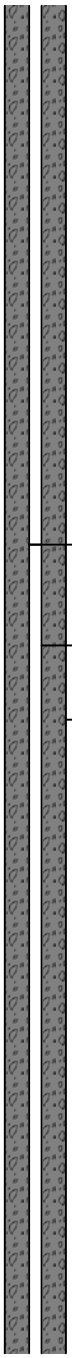
Start Date/Time	: 05/9/2017 - 0945
End Date/Time	: 05/11/2017
Northing/Easting	: 1859281.32/6789763.33
Elevation (ft) (TOC)	: 1093.72
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 223

Installation	: Former Norton AFB
AFFF Area	: 5
Station ID	: NORPMW002
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon-400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	200.14
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
150		50/2		0				
151								
152								
153								
154								
155								
156								
157								
158								
159								
160								
161					GW			
162								
163								
164								
165								
166								
167								
168								
169								
170								
171								
172								
173			SAND w/ gravel, 2.5Y 5/3 light olive brown, fine to coarse sand, fine gravel					
174					SW			
175								

Well:: NORPMW002
Elev. (BGS): 1094.38



Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW002

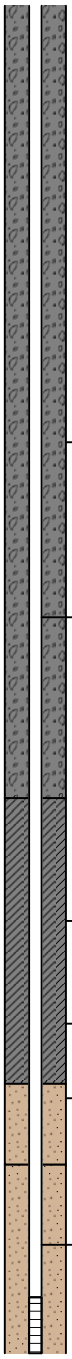
(Page 8 of 9)

Start Date/Time	: 05/9/2017 - 0945
End Date/Time	: 05/11/2017
Northing/Easting	: 1859281.32/6789763.33
Elevation (ft) (TOC)	: 1093.72
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 223

Installation	: Former Norton AFB
AFFF Area	: 5
Station ID	: NORPMW002
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon-400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	200.14
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
175								
176								
177		55/6			SW			
178								
179								
180			SILTY SAND, 10YR 5/4 yellowish brown, fine grained sand, faint orange oxide staining (0,40,60,0) moist to wet		SM			
181								
182								
183			GRAVEL w/ sand, 10YR 5/4 yellowish brown, cobbles and boulders of various origins based on drill cuttings		GW			
184								
185								
186								
187								
188								
189								
190								
191								
192								
193								
194								
195								
196								
197								
198								
199								
200								

Well:: NORPMW002
Elev. (BGS): 1094.38



Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW002

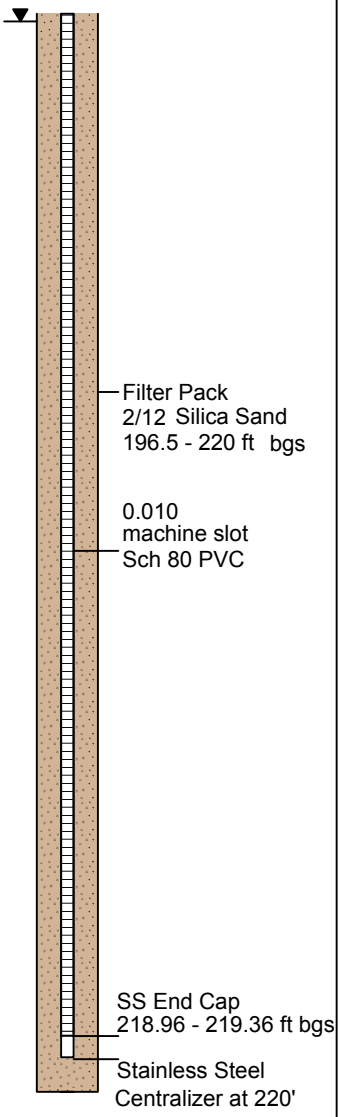
(Page 9 of 9)

Start Date/Time	: 05/9/2017 - 0945
End Date/Time	: 05/11/2017
Northing/Easting	: 1859281.32/6789763.33
Elevation (ft) (TOC)	: 1093.72
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 223

Installation	: Former Norton AFB
AFFF Area	: 5
Station ID	: NORPMW002
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon-400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	200.14
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
200								
201								
202								
203								
204								
205		50+						
206								
207								
208								
209								
210							WG	NORP05011
211					GW			
212								
213								
214								
215		70/6						
216								
217								
218								
219								
220			color change to 10YR 6/4 light yellowish brown, fine to medium sand					
221								
222								
223			End of Borehole 223 ft BGS Borehole stayed open to 220' Temporary steel drive casing (11.75") set to 19' bgs					
224								
225								

Well:: NORPMW002
Elev. (BGS): 1094.38



Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW003

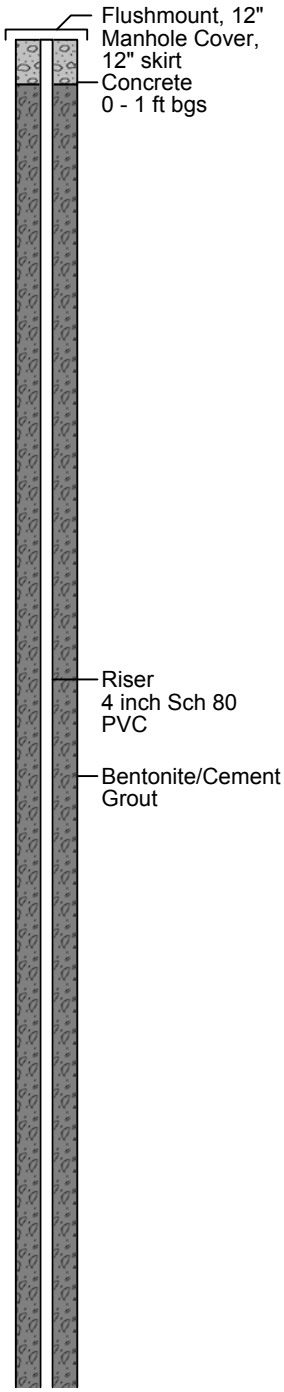
(Page 1 of 8)

Start Date/Time	: 04/12/2017 - 0945
End Date/Time	: 04/14/2017 - 1230
Northing/Easting	: 1859231.21/6789452.05
Elevation (ft) (TOC)	: 1089.85
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 236

Installation	: Former Norton AFB
AFFF Area	: 5
Station ID	: NORPMW003
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon- 400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	196.91
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
0			Borehole was cleared on 04/11/2017 to 5 ft bgs using a hand auger				SO	NORP05017
1								
2								
3								
4								
5			SAND, 10YR 5/4, yellowish brown, well graded, medium grained, damp (0,0,100,0)					
6					SW			
7		12/29 /48						
8								
9								
10								
11								
12			SAND with GRAVEL, 10YR 5/4, yellowish brown, poorly graded, medium grained sand, trace coarse grained sand, subrounded to angular gravel (up to 1 1/8" diamater), damp		SP			
13								
14					SW			
15			SAND, 10YR 5/6, yellowish brown, well graded, fine to medium grained, damp					
16			SAND, 2.5Y 6/2, light brownish gray, poorly graded, fine to medium sand, some coarse sand, trace silt, trace fine subrounded to subangular gravel (up to 3/8")		SP		SO	NORP05019
17								
18			SAND, 2.5Y 5/2, grayish brown, fine to coarse sand, trace fine gravel, gravels composed of pink and white granites, some fine black sand, (descriptions based on drill cuttings to 30 ft bgs)					
19								
20								
21								
22		84/5						
23								
24					SP			
25								
26								
27								
28								
29								
30								

Well:: NORPMW003
Elev. (BGS): 1090.62



Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW003

(Page 2 of 8)

Start Date/Time	: 04/12/2017 - 0945
End Date/Time	: 04/14/2017 - 1230
Northing/Easting	: 1859231.21/6789452.05
Elevation (ft) (TOC)	: 1089.85
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 236

Installation	: Former Norton AFB
AFFF Area	: 5
Station ID	: NORPMW003
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon- 400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	196.91
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Well:: NORPMW003
Elev. (BGS): 1090.62

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
30		84/5					SO	NORP05020
31								
32								
33					SP			
34								
35								
36			Driller reports encountering fine grained material from 36 - 42 ft bgs, SANDY SILT, 5Y 5/1, gray, fine grained sand, 5% mica flakes, (description based on pebble sized material in drill cuttings)					
37								
38								
39					ML			
40								
41								
42			SAND, 10YR 5/4, yellowish brown, fine to coarse sand, fine grain black sand, medium to coarse grain quartz and granitic sand, trace fine granitic gravel, (description based on drill cuttings and drilling conditions)					
43								
44								
45		49/48 57						
46								
47								
48								
49								
50					SW			
51								
52								
53								
54								
55								
56								
57			Driller reports encountering fine grained material from 57 to 59 ft bgs. SILTY SAND to SANDY SILT, 2.5Y 5/2, grayish brown, fine grain sand					
58					SM			
59								
60			SAND, 5Y 5/2, olive gray, poorly graded, fine sand, moist		SP			

Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW003

(Page 3 of 8)

Start Date/Time	: 04/12/2017 - 0945
End Date/Time	: 04/14/2017 - 1230
Northing/Easting	: 1859231.21/6789452.05
Elevation (ft) (TOC)	: 1089.85
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 236

Installation	: Former Norton AFB
AFFF Area	: 5
Station ID	: NORPMW003
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon- 400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	196.91
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Well:: NORPMW003
Elev. (BGS): 1090.62

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
60		49/48 57	CLAY with SILT, 5GY 4/1, dark greenish gray, trace fine sand, low plasticity, stiff, moist		CL			
61								
62			SILT with SAND, 5GY 4/1, dark greenish gray, fine sand Drillers report SAND with Gravel from 61.5 ft bgs.		ML			
63								
64								
65								
66								
67								
68								
69								
70								
71								
72								
73								
74								
75		70+/4 11						
76								
77								
78								
79								
80			SAND, 2.5Y 6/2, light yellowish brown, well graded, fine to coarse sand, fine granitic gravel, (based on drill cuttings)		SW			
81								
82								
83								
84								
85								
86								
87								
88								
89								
90								

Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW003

(Page 4 of 8)

Start Date/Time	: 04/12/2017 - 0945
End Date/Time	: 04/14/2017 - 1230
Northing/Easting	: 1859231.21/6789452.05
Elevation (ft) (TOC)	: 1089.85
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 236

Installation	: Former Norton AFB
AFFF Area	: 5
Station ID	: NORPMW003
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon- 400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	196.91
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
90		70+/4 11	Driller reports SANDY GRAVEL from 90 to 109 ft bgs interspersed with 3 - 4 inch lenses of SAND, Driller also reports at least 80% crushed rock, Drill cuttings consist of crushed gravel and coarse sand consisting of pink, white, gray and granitic fragments		GW			
91								
92								
93								
94								
95								
96								
97								
98								
99								
100								
101								
102								
103								
104								
105		21/77						
106								
107								
108								
109			Driller reports SAND from 109 - 110 ft bgs		SP			
110			SAND, 2.5Y 5/3, light olive brown, alternating layers of fine to coarse grain sand, trace silt in fine grained layers, varying thicknesses between 2 - 4 inches, layers poorly graded, moist		GW			
111								
112								
113								
114								
115								
116								
117								
118								
119								
120								

Well:: NORPMW003
Elev. (BGS): 1090.62

Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW003

(Page 5 of 8)

Start Date/Time	: 04/12/2017 - 0945
End Date/Time	: 04/14/2017 - 1230
Northing/Easting	: 1859231.21/6789452.05
Elevation (ft) (TOC)	: 1089.85
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 236

Installation	: Former Norton AFB
AFFF Area	: 5
Station ID	: NORPMW003
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon- 400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	196.91
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
120		21/77						
121								
122								
123								
124								
125								
126								
127								
128								
129								
130								
131								
132								
133								
134					GW			
135		37/92						
136								
137								
138								
139								
140								
141								
142								
143								
144								
145								
146								
147								
148			Driller reports CLAY at 148 ft bgs		CL			
149			SANDY CLAY, 2.5Y 6/2, light brownish gray, fine sand, (60% fines and 40% sand, based on drill cuttings)		SM			
150								

Well:: NORPMW003
Elev. (BGS): 1090.62

Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW003

(Page 6 of 8)

Start Date/Time	: 04/12/2017 - 0945
End Date/Time	: 04/14/2017 - 1230
Northing/Easting	: 1859231.21/6789452.05
Elevation (ft) (TOC)	: 1089.85
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 236

Installation	: Former Norton AFB
AFFF Area	: 5
Station ID	: NORPMW003
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon- 400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	196.91
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Well:: NORPMW003
Elev. (BGS): 1090.62

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
150		37/92			SM			
151			Driller reports 85% gravel 15% sand from 151 - 163 ft bgs. Sandy Gravel, 10YR 6/4, light yellowish brown, medium to coarse sand, fine to coarse gravel, well graded, (description based on drill cuttings)					
152								
153								
154								
155								
156								
157								
158								
159								
160								
161								
162								
163								
164								
165		19/57 48			GW			
166								
167								
168								
169								
170								
171								
172								
173								
174								
175								
176								
177								
178								
179								
180								

Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW003

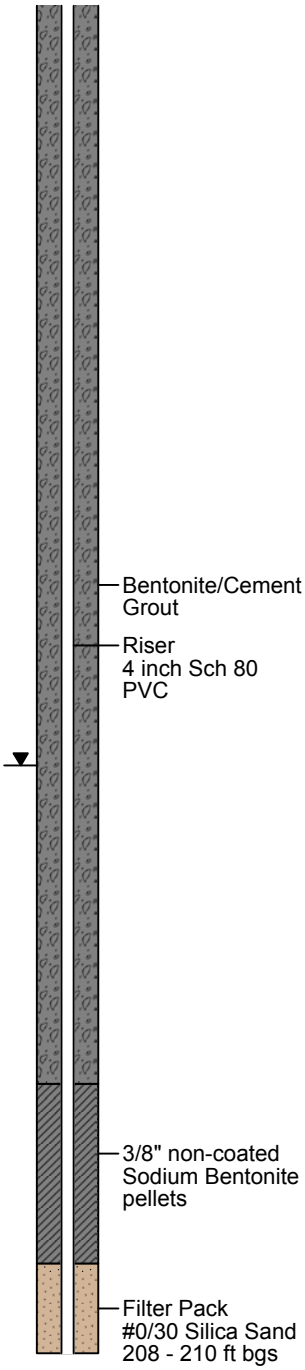
(Page 7 of 8)

Start Date/Time	: 04/12/2017 - 0945
End Date/Time	: 04/14/2017 - 1230
Northing/Easting	: 1859231.21/6789452.05
Elevation (ft) (TOC)	: 1089.85
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 236

Installation	: Former Norton AFB
AFFF Area	: 5
Station ID	: NORPMW003
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon- 400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	196.91
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
180		19/57 48	SAND with SILT, 10YR 5/4, yellowish brown, fine grain sand, moist		SM			
181					SW			
182			SAND with GRAVEL, 10YR 5/6, yellowish brown, medium to coarse sand, weathered pink gravels, poorly graded, pervasive orange oxide staining, wet along gravel faces					
183								
184			Driller reports gravel from 182 - 210 ft bgs.					
185								
186								
187								
188								
189								
190								
191								
192								
193								
194								
195		22/24 /53						
196					GW			
197								
198								
199								
200								
201								
202								
203								
204								
205								
206								
207								
208								
209								
210								

Well:: NORPMW003
Elev. (BGS): 1090.62



Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW003

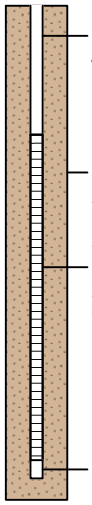
(Page 8 of 8)

Start Date/Time	: 04/12/2017 - 0945
End Date/Time	: 04/14/2017 - 1230
Northing/Easting	: 1859231.21/6789452.05
Elevation (ft) (TOC)	: 1089.85
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 236

Installation	: Former Norton AFB
AFFF Area	: 5
Station ID	: NORPMW003
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon- 400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	196.91
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
210–212		22/24/53	SANDY SILT, 2.5Y 6/3, light yellowish brown, fine grain sand, some orange oxide staining, 3 inch thick lense		ML			
212–233		36/49/61	SANDY GRAVEL, 10YR 5/4, yellowish brown, well graded, wet along fractures, fine to coarse, sand, fine to coarse gravel, decomposed white granite, some iron oxide staining Driller reports gravel to 233 ft bgs.		GW		WG	NORP05016
233–236			SANDS, 2.5Y 5/3 light olive brown and 2.5Y 7/6 pale yellow, (beds up to 8 inches thick), fine to medium grained and thin laminae (1/16 inches), to alternating to light and dark colored sands, well graded, intervedded with thin beds (up to 3 inches) of SILTY SAND 10YR 5/6 yellowish brown, wet, fine grained sand, patchy orange oxide staining		SP/SM			
236–237			CLAYEY SILT, 5Y 6/4, yellowish brown, 2 inch thick layer, moist, low plasticity		ML			
237–240			End of Borehole 236.00 ft BGS					

Well:: NORPMW003
Elev. (BGS): 1090.62



Note: When developing NORPMW003, the end cap was punctured with the surge block. Heaving sands entered the well, restricting access to the bottom 13 feet of well screen. A polyvinyl chloride (PVC) plug was inserted into the bottom of the well to seal off the sand intrusion from the remainder of the intact well screen. The final accessible well screen was approximately 7 feet in length rather than 20 feet as originally proposed.

Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW004

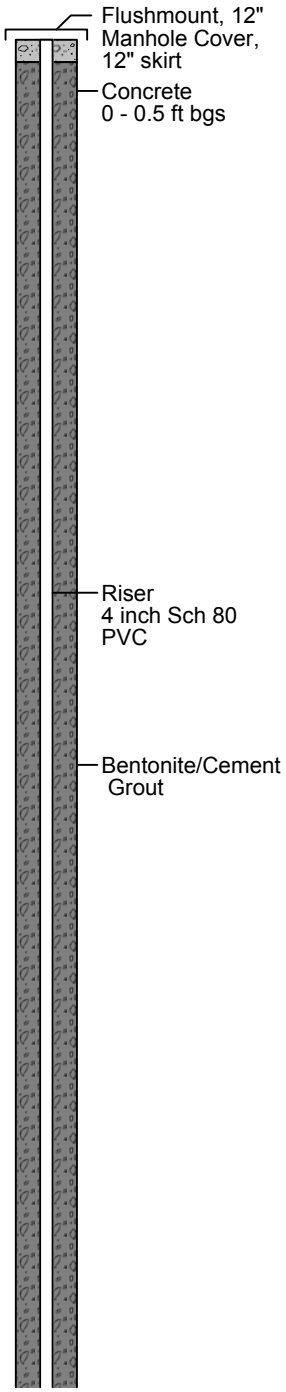
(Page 1 of 8)

Start Date/Time	: 04/15/2017 - 1300
End Date/Time	: 04/17/2017 - 1230
Northing/Easting	: 1860094.92/6790888.54
Elevation (ft) (TOC)	: 1100.05
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 224

Installation	: Former Norton AFB
AFFF Area	: 7
Station ID	: NORPMW004
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon- 400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	202.18
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
0			Hand auger borehole to 5 ft bgs on 04/15/2017.					
1			SAND with SILT and GRAVEL, 10YR 4/3, brown, fine sand, some medium sand, subrounded to angular fine to coarse gravel (up to 1.5" thick), trace concrete rubble (up to 8" x 5" x 5"), trace coarse sand, damp		SM		SO	NORP07022
2								
3								
4			SAND, 10YR 5/8, yellowish brown, fine to medium sand, trace coarse granitic subrounded gravel (up to 2.5" x 2" x 3"), damp					
5								
6			4 ft bgs, color becomes 10YR 5/4 yellowish brown, moist		SP			
7								
8		14/27/31	8 ft bgs, driller reports cobbles or boulders					
9			SAND, 5Y 6/4, light yellowish brown,poorly graded, fine to medium sand, trace coarse sand, trace fine subrounded gravel, damp					
10								
11					SP			
12								
13			SAND with GRAVEL, 10YR 5/4, yellowish brown, fine to medium sand, well graded, fine to coarse subrounded gravel, trace coarse sand, damp					
14								
15					SW			
16								
17			SAND, 2.5Y 6/4, fine sand, some medium sand, poorly graded, damp		SP		SO	NORP07023
					SM			
18			SAND with SILT, 2.5Y 5/4, light olive brown, fine sand, poorly graded, moist		SP			
19								
20			SAND, 2.5Y 6/3, fine sand, poorly graded, trace medium sand, damp					
21			Driller reports 85% gravel 15% sand from 18 - 33 ft bgs					
22			GRAVEL with SAND, 2.5Y 6/3, light yellowish brown, fine to coarse gravel					
23		30/0						
24					GW			
25								
26								
27								
28								
29								
30			Driller reports rock at 30 ft bgs					

Well:: NORPMW004
Elev. (BGS): 1100.88



Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW004

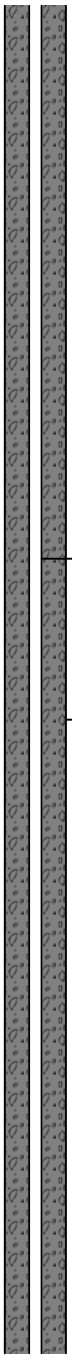
(Page 2 of 8)

Start Date/Time	: 04/15/2017 - 1300
End Date/Time	: 04/17/2017 - 1230
Northing/Easting	: 1860094.92/6790888.54
Elevation (ft) (TOC)	: 1100.05
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 224

Installation	: Former Norton AFB
AFFF Area	: 7
Station ID	: NORPMW004
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon- 400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	202.18
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
30–33		12/27/48			GW			
33–38		25/64/57	SAND, 2.5Y 5/3, light olive brown, fine to medium sand, poorly graded, moist		SP		SO	NORP07024
38–41			SANDY CLAY, 2.5Y 4/1, dark gray, fine sand (bsed on drillers report and material in drilling cuttings)		CL			
41–60			SAND, 2.5YR 6/3, light yellowish brown, fine to coarse sand, coarse sand consists of white and pink grains, 5% fine black sand, well graded (Description based on drill cuttings)		SW			

Well:: NORPMW004
Elev. (BGS): 1100.88



Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW004

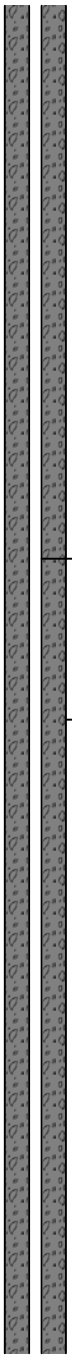
(Page 3 of 8)

Start Date/Time	: 04/15/2017 - 1300
End Date/Time	: 04/17/2017 - 1230
Northing/Easting	: 1860094.92/6790888.54
Elevation (ft) (TOC)	: 1100.05
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 224

Installation	: Former Norton AFB
AFFF Area	: 7
Station ID	: NORPMW004
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon- 400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	202.18
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
60–62		25/64 /57			SW			
63–65			SAND with SILT, grades into SAND, 2.5Y 6/3, light yellowish brown, fine sand, poorly graded, moist to wet (0.5" thick fine gravel lense at 63.5 ft bgs)		SM			
65			SILT, 2.5Y 6/3, light yellowish brown, trace fine sand, sparse extremely thin dark laminae		ML			
65–67			SAND, 2.5Y 6/2, light brownish gray, fine to medium sand, poorly graded, wet		SP			
67–72			SAND with GRAVEL, 2.5Y 5/4, light olive brown, fine to coarse sand, fine granitic gravel, well graded (Description based on drillers report and drill cuttings)		SW			
73–75			GRAVEL with SAND, 2.5Y 6/3, light yellowish brown, fine to coarse granitic gravel, fine to coarse sand (Description based on drill cuttings and drilling conditions)		GW			
75–86		25/64	SAND with GRAVEL, 2.5Y 6/4, light yellowish brown, fine to coarse sand, fine granitic gravel, well graded (Description based on drillers report and drill cuttings)		SW			
86–90			GRAVEL with SAND, 2.5Y 6/3, fine to coarse granitic gravel, fine to coarse sand, coarse sands pink, white, and gray in color (Description based on drilling conditions and drill cuttings)		GW			

Well:: NORPMW004
Elev. (BGS): 1100.88



Aerostar SES LLC

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Former Norton AFB

Log of Boring: NORPMW004

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Depth to Water(BTOC)	202.18
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
90–91			SAND with GRAVEL, 5Y 5/3, light olive brown, medium to coarse sand, fine to coarse granitic gravel, well graded, moist		SW			
91–95			GRAVEL with SAND (driller reports 9% gravels and 10% sand)		GW			
95–96			CLAY (Driller reports clay)		CL			
96–120		67/60	GRAVEL (driller reports gravel)		GW			
120			3" thick medium grained white and pink granite cobble					

Well:: NORPMW004
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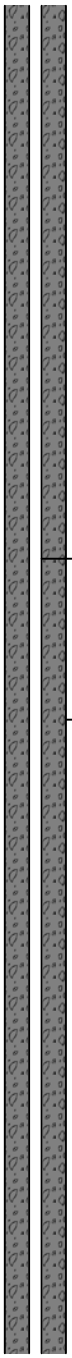

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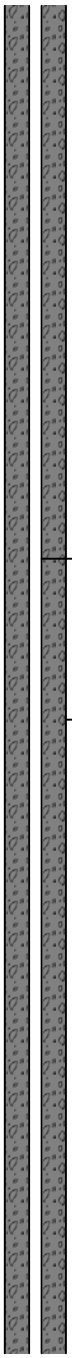
Depth to Water(BTOC)	202.18
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
120–130			(driller reports cobbles to 123 ft bgs)		GW			
130–140		52/79	SILTY CLAY with GRAVEL, 2.5Y 5/3, light olive brown, fine sand, fine gravel, moderate plasticity (Description based on drill cuttings)		CL			
140–143			GRAVEL with SAND, 2.5Y 6/3, fine to coarse sand, granitic gravels (description based on drill cuttings)		GW			
143–150			SANDY SILT to SILTY SAND, 2.5Y 4/1, dark gray, fine to coarse sand (descriptions based on drill cuttings)		ML /SM			

Well:: NORPMW004
Elev. (BGS): 1100.88



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Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
150			SAND, 10YR 6/6, brownish yellow, medium sand, trace coarse sand, trace, fine gravel, poorly graded, color becomes 2.5Y 6/6 dark olive brown with 5% mica from 150.4 ft bgs		SP			
151–152								
153–154			GRAVEL with SAND, 2.5Y 6/3, light yellowish brown, fine to coarse gravel, medium to coarse sand, more gravel than sand (descriptions based on drill cuttings, drilling conditions, and driller reports)					
155–164					GW			
165–166		9/20 /33						
167–172								
173–174			SANDY CLAY with SILT, 2.5Y 5/3, light olive brown, fine to coarse sand (description based on drill cuttings and drillers reports)		CL			
175–178			SILTY SAND to SANDY SILT, 2.5Y 5/3, light olive brown, fine grained sand, faint orange oxide staining, damp		SM/ ML			
179–180								

Well:: NORPMW004
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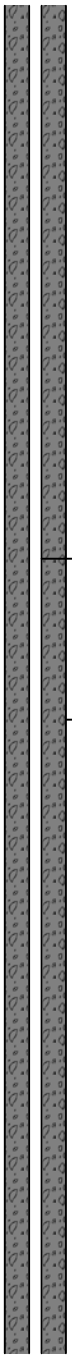

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Former Norton AFB

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Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
180–181				0	SM/ ML			
182–190		77/3	SAND with GRAVEL, 2.5Y 6/3, light yellowish brown, fine to coarse sand, coarse sands white, pink and some red grains, sand angular to subangular, fine gravel, well graded (description based on drill cuttings and drillers reports)		SW			
200–205		70/0	SAND with GRAVEL, 10YR 6/4, 10YR 6/4, yellowish brown, fine to coarse sand, fine to coarse granitic gravel, well graded, dense sand, saturated		SW			

Well:: NORPMW004
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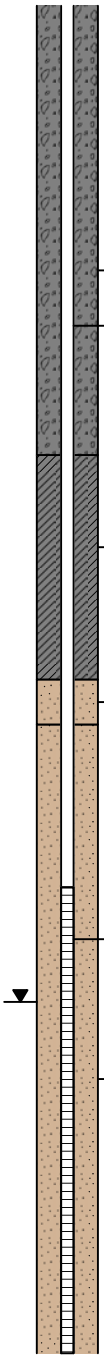

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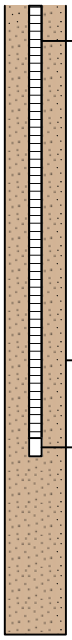
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 1020	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
210–213		47/54			SW			NORP07021
213–223		48/60	2" layer of weathered white and black speckled granite underlain by fine to coarse sand and fine gravel		SP		WG	
223–224			SAND, 10YR 6/4, yellowish brown, fine to medium sand, faint orange oxide staining, poorly graded, saturated		SP			
224–226			SILTY SAND, 2.5Y 5/4, light olive brown, fine grain sand, thin laminae of orange oxide staining, poorly graded		SM			

End of Borehole 224 ft bgs
Reamed borehole to 223' bgs
Temporary steel casing to 19' bgs
Begin mud rotary drilling from 16' bgs
Encountered GW at 63' and 200' bgs during drilling

Well:: NORPMW004
Elev. (BGS): 1100.88



Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW005

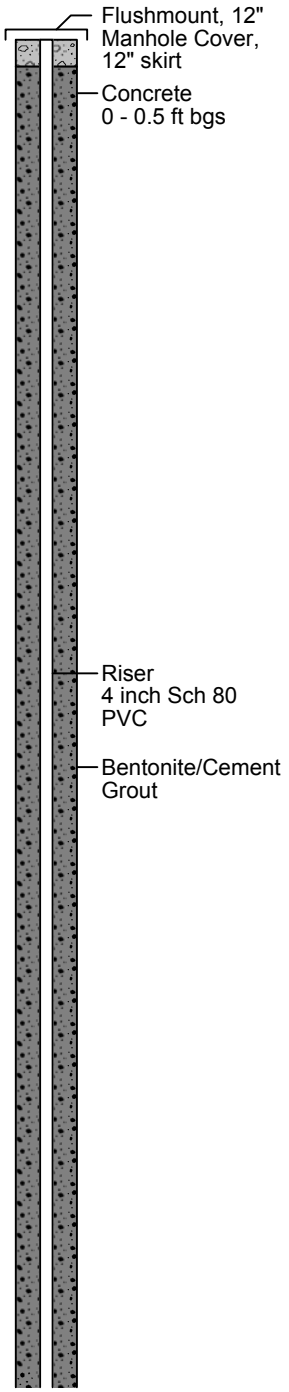
(Page 1 of 9)

Start Date/Time	: 04/18/2017 - 1120
End Date/Time	: 04/29/2017 - 1500
Northing/Easting	: 1860690.77/6789778.46
Elevation (ft) (TOC)	: 1094.48
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 223

Installation	: Former Norton AFB
AFFF Area	: 4
Station ID	: NORPMW005
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary/Air Rotary
Sampling Method	: Split Spoon- 400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	194.65
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
0			CONCRETE, 18 inches thick					
2			SAND, 10YR 4/4, dark yellowish brown, fine to coarse sand, trace silt, trace fine gravel, poorly graded, damp (color transistions to 10YR 6/4, light yellowish brown)		SP		SO	NORP04006
4			SILTY SAND, 10YR 4/4 dark yellowish brown to 10YR 6/4 light yellowish brown, fine grain sand, poorly graded, 3% mica, faint orange oxide staining		SM			
5			CLAYEY SILT, 10YR 4/3, brown, trace fine sand, pervasive orange oxide staining, low plasticity, damp		ML			
6			SILTY SAND, 10YR 6/4, light yellowish brown, fine sand, pervasive patchy orange oxide staining, damp		SM			
8		12/17/23	GRAVELLY SAND, 10YR 5/4, yellowish brown, fine to coarse sand, fine gravel, coarse sand sub rounded to rounded, gravel, subangular to subrounded (up to 1.25 x 0.5 inches), well graded		SW			
15			SAND with GRAVEL, 2.5Y 5/4, light olive brown, medium to coarse sand, some fine sand, fine gravel well graded		SW		SO	NORP04007 NORP04008
20		23/36/45	SANDY GRAVEL to GRAVELY SAND, 2.5Y 5/4, fine to coarse sand, fine to coarse gravel, subangular to subrounded gravel, well graded assortment of granitic gravels (white, pink, orange, yellow, and grays) (description based on drill cuttings, percentages reported by driller)		SW/GW			

Well:: NORPMW005
Elev. (BGS): 1095.45



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Former Norton AFB

Log of Boring: NORPMW005

(Page 2 of 9)

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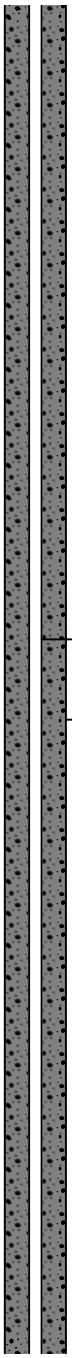
Drilling Method	: Mud Rotary/Air Rotary
Sampling Method	: Split Spoon- 400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	194.65
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
25–29		23/36/45			SW/GW			
30–40		40/63	SANDY GRAVEL, 2.5Y 5/4, light olive brown, coarse sand, fine to coarse granitic gravel, subangular to subrounded granitic gravels (insufficient sample for lab analyses, sample mostly rock)		GW			
40–41			SANDY CLAY, 2.5Y 5/4, light olive brown, fine sand (description based on drill cuttings and driller report)		CL			
41–50			GRAVEL, 2.5Y 5/4, light olive brown, fine to coarse gravel, subrounded to subangular gravel (driller reports 90% gravel and cobbles, 10% sand, description based on drill cuttings)		GW			

Well:: NORPMW005
Elev. (BGS): 1095.45



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Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
50								
51								
52								
53								
54								
55		40/63			GW			
56								
57								
58								
59								
60			SAND with GRAVEL, 2.5Y 5/4, light olive brown, medium to coarse sand, some fine sand, fine granitic gravels (pink and white), well graded, moist Driller reports rock-gravels from 60.5' to 74' bgs				SO	NORP04009
61								
62								
63								
64								
65								
66								
67		20/43 /52			SW			
68								
69								
70								
71								
72								
73								
74			SILTY CLAY with SAND, 2.5Y 5/4, light olive brown, fine grain sand, medium plasticity (60,30,10,0)		CL			
75								

Well:: NORPMW005
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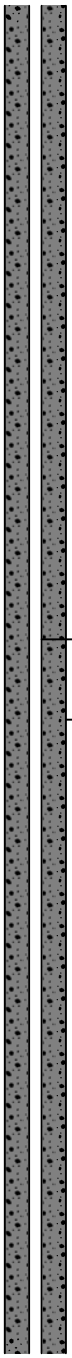

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Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
75								
76					CL			
77			GRAVEL with SAND, 2.5Y 5/4 light olive brown, fine to coarse sand, fine to coarse gravel, well graded (descriptions based on drill cuttings and drilling conditions)					
78								
79								
80								
81								
82		20/43 /52						
83					GW			
84								
85								
86								
87								
88								
89								
90			SAND, 10YR 6/4 light yellowish brown, medium to coarse sand, trace fine gravel, poorly graded (0,0,98,2), moist					
91								
92					SP			
93		14/18 /23						
94			GRAVELY SAND, 2.5Y 6/4 light yellowish brown, fine to coarse sand, fine granitic gravel, well graded, (driller reports 60% sand, 40% gravel)					
95								
96								
97					SW			
98								
99								
100								

Well:: NORPMW005
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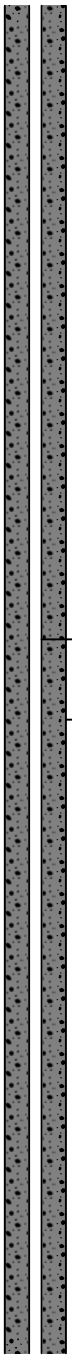

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Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
100–104			SAND, driller reports sand from 100 - 104 ft bgs, 95% sand, 5% gravel		SP			
104–106			SILTY CLAY, 2.5Y 5/6, light olive brown, some fine sand (60,30,10,0)		CL			
106–120		14/18 /23	SAND, 10YR 5/4, yellowish brown, fine to coarse sand, trace fine gravel, predominately orange-red coarse sand, (driller reports 95% sand, 5% gravel)		SP			
120–121		13/62 /3	SILTY SAND, 2.5Y 5/4, light olive brown, pervasive orange staining, fine grain sand, 3% mica, well graded (0,30,70,0), moist		SM			
121–122			SAND, 10YR 5/4 yellowish brown, fine grain sand with some medium grain sand, patchy orange oxide staining (0,10,90,0)		SP			
122–125			GRAVEL with SAND, 2.5Y 5/4, light olive brown, fine to coarse sand, fine to coarse gravel, well graded		GW			

Well:: NORPMW005
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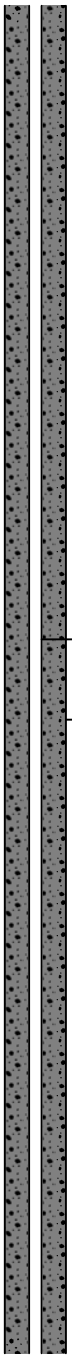

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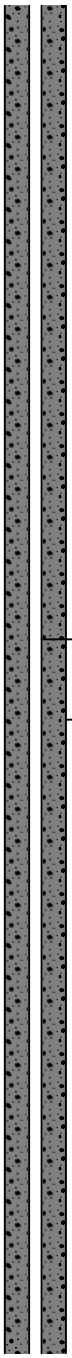
Depth to Water(BTOC)	194.65
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
125								
126								
127								
128								
129								
130								
131								
132								
133								
134								
135								
136								
137		13/62 /3			GW			
138								
139								
140								
141								
142								
143								
144								
145								
146								
147								
148								
149								
150								

Well:: NORPMW005
Elev. (BGS): 1095.45



Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW005

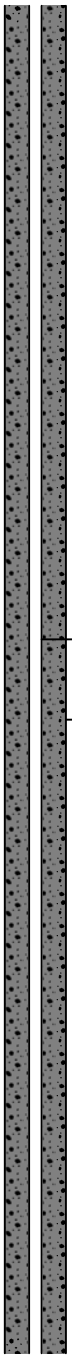
(Page 7 of 9)

Start Date/Time	: 04/18/2017 - 1120
End Date/Time	: 04/29/2017 - 1500
Northing/Easting	: 1860690.77/6789778.46
Elevation (ft) (TOC)	: 1094.48
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 223

Installation	: Former Norton AFB
AFFF Area	: 4
Station ID	: NORPMW005
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary/Air Rotary
Sampling Method	: Split Spoon- 400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	194.65
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
150–155			SAND with SILT, 2.5Y 6/3, light yellowish brown, fine to medium sand, trace fine gravel, well graded (0,20,79,1)		SP			
155–163			SILTY CLAY, 2.5Y 5/6, light olive brown, some fine grained sand		CL			
163–175		13/62/3	GRAVEL with SAND, 10YR 6/4, light yellowish brown, fine to coarse sand (white and pink granites, white quartz and dark gray gravels) (driller reports 95% medium gravel, 5% sand)		GP			

Well:: NORPMW005
Elev. (BGS): 1095.45



Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW005

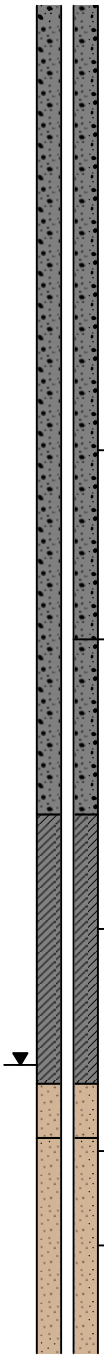
(Page 8 of 9)

Start Date/Time	: 04/18/2017 - 1120
End Date/Time	: 04/29/2017 - 1500
Northing/Easting	: 1860690.77/6789778.46
Elevation (ft) (TOC)	: 1094.48
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 223

Installation	: Former Norton AFB
AFFF Area	: 4
Station ID	: NORPMW005
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary/Air Rotary
Sampling Method	: Split Spoon- 400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	194.65
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
175–179		77/6			GP			
180–182			lens of SAND with SILT, 10YR 5/6, yellowish brown, fine to medium sand, trace coarses sand, pervasive orange oxide staining, poorly graded, wet		SP			
182–190		36/40 /53	GRAVEL with CLAY, 2.5Y 5/4, light olive brown (descriptions base on drill cuttings and driller report)		GC			
190–191			SAND, 10YR 4/6, dark yellowish brown, fine to medium sand, some coarse sand, pervasive orange oxide staining, horizons up to 3/8" thick stained darker alternating with lighter stained horizons, well graded, wet		SW			
191–200		18/60 /3	SILTY SAND, 2.5Y 5/3, light olive brown, fine sand, up to 10% mica		SM			

Well:: NORPMW005
Elev. (BGS): 1095.45



Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW005

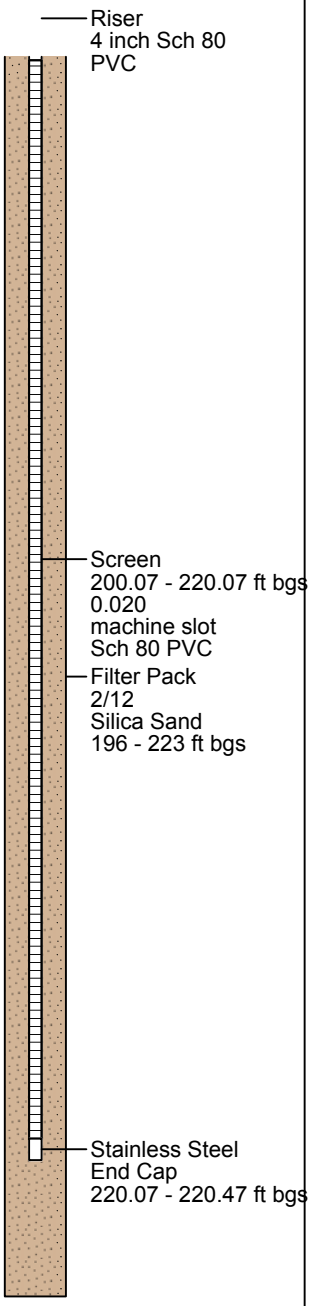
(Page 9 of 9)

Start Date/Time	: 04/18/2017 - 1120
End Date/Time	: 04/29/2017 - 1500
Northing/Easting	: 1860690.77/6789778.46
Elevation (ft) (TOC)	: 1094.48
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 223

Installation	: Former Norton AFB
AFFF Area	: 4
Station ID	: NORPMW005
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary/Air Rotary
Sampling Method	: Split Spoon- 400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	194.65
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
200		18/60/3	SILTY SAND, 2.5Y 5/2, grayish brown, fine to coarse sand, trace fine gravel, orange oxide nodules, up to 10% mica, gravel subangular to subrounded, dense (0,40,60,0)		SM			
201								
202								
203								
204								
205		44/56						
206								
207								
208								
209								
210			SILTY GRAVEL with SAND, 2.5Y 6/3, light yellowish brown, fine gravel, fine to coarse sand, well graded, wet (0,30,25,45)		GM		WG	NORP04005
211								
212								
213								
214								
215		20/53	CLAYEY SILT, 2.5Y 5/6, light olive brown, fine sand, low plasticity (30,55,15,0)		ML			
216								
217								
218								
219								
220			SAND, 2.5Y 6/3, light yellowish brown, fine to coarses sand, well graded, wet (0,15,85,0)		SW			
221								
222								
223			Bottom of boring at 223 ft bgs Temporary Steel casing set to 11 ft bgs Air Rotary Drilling from 5' to 16' bgs Mud Rotary from 16' to 223' bgs Encountered GW at 180' bgs during drilling					
224								
225								

Well:: NORPMW005
Elev. (BGS): 1095.45



Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW006

(Page 1 of 9)

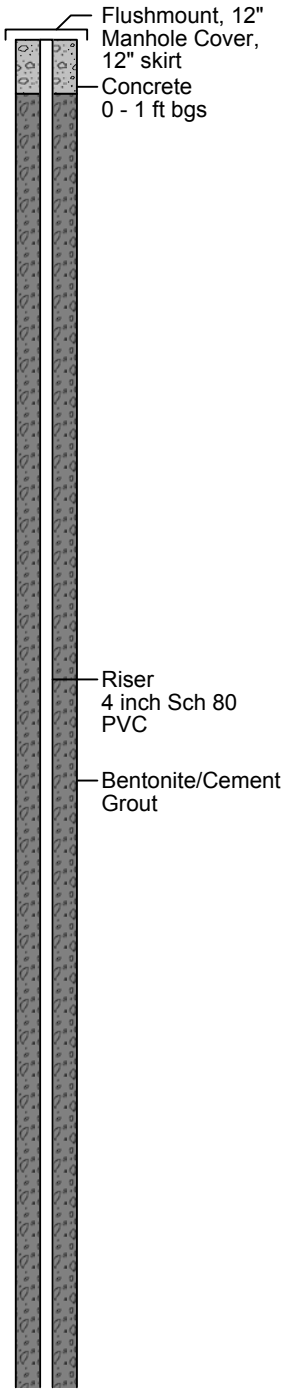
Start Date/Time	: 04/21/2017
End Date/Time	: 04/22/2017
Northing/Easting	: 1859281.32/6789763.33
Elevation (ft) (TOC)	: 1093.72
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 223

Installation	: Former Norton AFB
AFFF Area	: 4
Station ID	: NORPMW006
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon-400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	195.28
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm)	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
0			Concrete					
1								
2			SAND, 10YR 2/2 very dark brown, fine to medium grained, trace coarse sand, trace fine gravel, poorly graded (0,0,98,2), damp color change to 10YR 5/4 yellowish brown		SP			
3								
4			SANDY SILT, 10YR 3/3 dark brown, low plasticity, fine grained sand, trace clay (10,55,35,0) orange oxide staining, damp		ML			
5			SAND, 10YR 3/4 dark yellowish brown, fine grained, poorly graded (0,0,100,0) damp		SW			
6			SANDY SILT, 10YR dark brown, low plasticity, fine grained sand, trace clay (10,55,25,0), damp		ML			
7			SAND, 10YR 4/4 dark yellowish brown, medium to coarse grained, well graded (0,0,100,0), damp		SP			
8		50/3	SAND, 10YR 3/3 dark brown, fine to medium grained, poorly graded, trace silt, micaceous (0,5,95,0), damp		SP			
9								
10			GRAVEL w/ sand, 2YR 6/4 light yellowish brown, fine to coarse gravel, fine to coarse sand, well graded (0,0,30,70), damp					
11								
12								
13								
14								
15								
16			same as above w/ various granites w/ occasional cobble, driller reports gravel to 30'					
17					GW			
18								
19								
20								
21								
22								
23								
24								
25								

PID (ppm) 0 10 20

Well:: NORPMW006
Elev. (BGS): 1094.38



Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW006

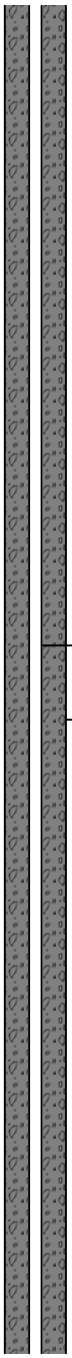
(Page 2 of 9)

Start Date/Time	: 04/21/2017
End Date/Time	: 04/22/2017
Northing/Easting	: 1859281.32/6789763.33
Elevation (ft) (TOC)	: 1093.72
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 223

Installation	: Former Norton AFB
AFFF Area	: 4
Station ID	: NORPMW006
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon-400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	195.28
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 1020	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
25								
26								
27		28/56			GW			
28								
29								
30			GRAVEL, 2.5Y 6/3 light yellowish brown, fine to coarse gravel, coarse sand, weathered granite, gravels of many different granitic origin, moist					
31								
32								
33								
34								
35								
36								
37								
38					GW			
39								
40								
41								
42								
43								
44								
45								
46			SILTY CLAY, 2.5Y 5/4 light olive brown, fine sand					
47					CL			
48			GRAVEL w/ sand, 2.5Y 6/3 light yellowish brown, fine to coarse gravel, fine to coarse sand, well graded					
49					GW			
50								

Well:: NORPMW006
Elev. (BGS): 1094.38



Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW006

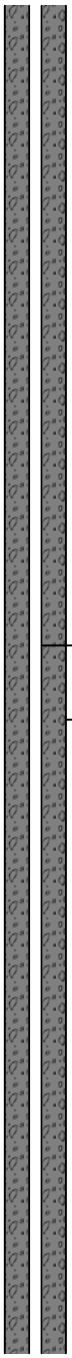
(Page 3 of 9)

Start Date/Time	: 04/21/2017
End Date/Time	: 04/22/2017
Northing/Easting	: 1859281.32/6789763.33
Elevation (ft) (TOC)	: 1093.72
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 223

Installation	: Former Norton AFB
AFFF Area	: 4
Station ID	: NORPMW006
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon-400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	195.28
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
50								
51								
52								
53					GW			
54								
55		50/3						
56								
57			Driller reports GRAVEL					
58					GW			
59								
60			SILTY SAND, 2.5Y 5/4 light olive brown, non-plastic, fine grained sand (0,30,70,0) orange oxide staining, damp					
61					SM			
62								
63			Driller reports sand w/ gravel, 2.5Y 6/3 light yellowish brown, fine to coarse sand, fine to coarse gravel (0,0,70,30)					
64								
65								
66								
67								
68					SW			
69								
70								
71								
72								
73								
74			Driller reports GRAVEL w/ clay		GW			
75								

Well:: NORPMW006
Elev. (BGS): 1094.38



Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW006

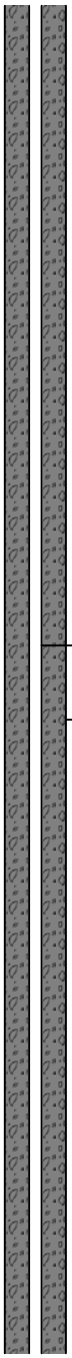
(Page 4 of 9)

Start Date/Time	: 04/21/2017
End Date/Time	: 04/22/2017
Northing/Easting	: 1859281.32/6789763.33
Elevation (ft) (TOC)	: 1093.72
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 223

Installation	: Former Norton AFB
AFFF Area	: 4
Station ID	: NORPMW006
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon-400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	195.28
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
75–82		32/47/50			GW			
90–92			SAND, 10YR 4/4 dark yellowish brown, fine grained, poorly graded, trace silt, orange oxide staining, interbedded clayey silt (0.5" layer), 7.5Y 4/1 dark gray, low plasticity, damp		SP			
94–98			Driller reports GRAVEL, multicolored, fine grained (0,0,0,100)		GW			
98–100			GRAVEL w/ sand, 2Y 6/3 light yellowish brown, fine to coarse gravel, fine to coarse sand, well graded (0,0,40,60)		SP			

Well:: NORPMW006
Elev. (BGS): 1094.38



Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW006

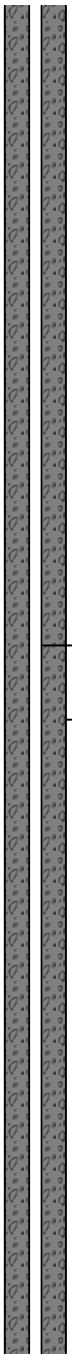
(Page 5 of 9)

Start Date/Time	: 04/21/2017
End Date/Time	: 04/22/2017
Northing/Easting	: 1859281.32/6789763.33
Elevation (ft) (TOC)	: 1093.72
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 223

Installation	: Former Norton AFB
AFFF Area	: 4
Station ID	: NORPMW006
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon-400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	195.28
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
100								
101								
102								
103								
104								
105								
106								
107								
108								
109								
110		68/3			SP			
111								
112								
113								
114								
115								
116								
117								
118								
119								
120			GRAVEL w/ sand, 2Y 6/3 light yellowish brown, fine to coarse gravel, fine to coarse gravel, granitic gravel, well graded (0,0,20,80)		GW			
121								
122								
123								
124								
125								

Well:: NORPMW006
Elev. (BGS): 1094.38



Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW006

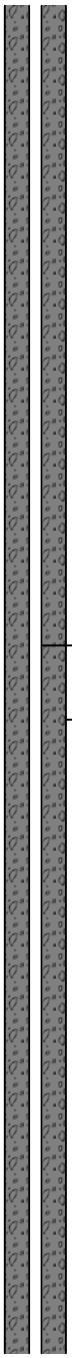
(Page 6 of 9)

Start Date/Time	: 04/21/2017
End Date/Time	: 04/22/2017
Northing/Easting	: 1859281.32/6789763.33
Elevation (ft) (TOC)	: 1093.72
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 223

Installation	: Former Norton AFB
AFFF Area	: 4
Station ID	: NORPMW006
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon-400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	195.28
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
125								
126								
127								
128								
129					GW			
130								
131								
132								
133			Driller reports GRAVEL, Hard Drilling, 2.5Y 5/4 light olive brown		GW			
134			Driller reports GRAVEL w/ clay					
135								
136								
137		68/3						
138					GW			
139								
140								
141								
142			Driller reports GRAVEL w/ sand					
143								
144								
145								
146					GW			
147								
148								
149								
150								

Well:: NORPMW006
Elev. (BGS): 1094.38



Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW006

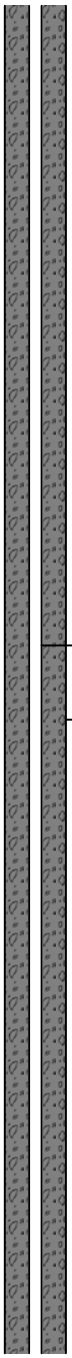
(Page 7 of 9)

Start Date/Time	: 04/21/2017
End Date/Time	: 04/22/2017
Northing/Easting	: 1859281.32/6789763.33
Elevation (ft) (TOC)	: 1093.72
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 223

Installation	: Former Norton AFB
AFFF Area	: 4
Station ID	: NORPMW006
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon-400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	195.28
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
150		68/3	SAND w/ gravel, 2Y 6/5 light yellowish brown, fine to coarse grained, fine gravel, well graded, trace clay (5,0,80,15)		SW			
151								
152								
153								
154								
155								
156								
157								
158								
159								
160			Driller reports GRAVEL from 160 to 163', fine to coarse gravel		GW			
161								
162								
163			GRAVEL w/ sand, 10YR 6/4 light yellowish brown, fine to coarse sand and gravel,		GW			
164								
165								
166								
167								
168								
169								
170								
171								
172								
173								
174								
175								

Well:: NORPMW006
Elev. (BGS): 1094.38



Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW006

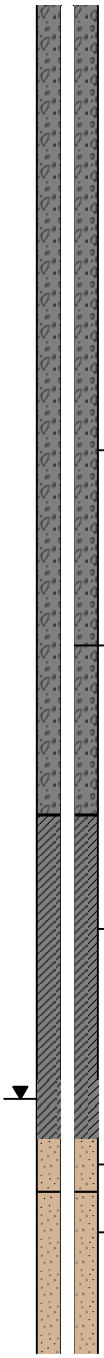
(Page 8 of 9)

Start Date/Time	: 04/21/2017
End Date/Time	: 04/22/2017
Northing/Easting	: 1859281.32/6789763.33
Elevation (ft) (TOC)	: 1093.72
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 223

Installation	: Former Norton AFB
AFFF Area	: 4
Station ID	: NORPMW006
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon-400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	195.28
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
175					GW			
176			SAND w/ gravel, 2Y 6/3 light yellowish brown, medium to coarse grained, fine gravel (0,0,80,20), well graded		SW			
177		50/3						
178			GRAVEL w/ sand,		GW			
179								
180			SAND, 10YR 6/4 light yellowish brown, fine to medium grained, some fine gravel, poorly graded (0,0,90,10), orange oxide staining		SP			
181								
182								
183								
184								
185		50	GRAVEL w/ sand		GW			
186								
187								
188								
189								
190			No recovery. Driller reports gravel/cobbles or possible boulders		GW			
191								
192								
193								
194								
195		36/54 /5						
196								
197								
198								
199								
200								

Well:: NORPMW006
Elev. (BGS): 1094.38



Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW006

(Page 9 of 9)

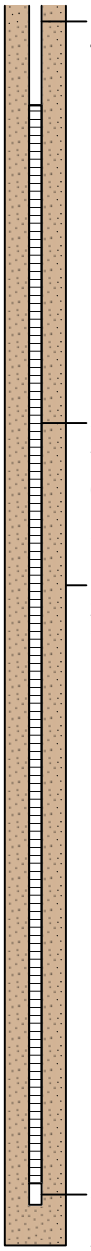
Start Date/Time	: 04/21/2017
End Date/Time	: 04/22/2017
Northing/Easting	: 1859281.32/6789763.33
Elevation (ft) (TOC)	: 1093.72
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 223

Installation	: Former Norton AFB
AFFF Area	: 4
Station ID	: NORPMW006
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon-400lb hammer
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	195.28
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	Blow Count	DESCRIPTION	PID (ppm) 0 1020	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
200–201		36/54/5	SAND w/ gravel, 10YR 6/4 light yellowish brown, fine to coarse grained, fine gravel, well graded (0,0,80,20), very moist to wet, GW encountered		SW			
201–209		28/55/5	@ 200.5' SILT w/ clay, 2.5Y 5/3 light olive brown, low plasticity (20,75,0,5), trace gravel, moist		ML			
210–215		14/33/54	SAND w/ gravel, 10YR 6/4 light yellowish brown, fine to coarse grained, fine gravel, well graded (0,0,70,30), saturated		SW		WG	NORP04010
220			SILTY CLAY, 2.5Y 5/3 light olive brown, medium plasticity, saturated		CL			
221–223			SAND w/ silt, 2.5Y 5/3 light olive brown, fine grained, non-plastic, poorly graded (0,15,85,0), saturated		SM			

End of Borehole
Terminated @ 223'
Sampled to 221.5'
Encountered GW at 200' during drilling

Well:: NORPMW006
Elev. (BGS): 1094.38



Riser
4 inch Sch 80 PVC

Screen
201.85 - 221.85 ft bgs
0.010 machine slot
Sch 80 PVC

Filter Pack
2/12
Silica Sand
197 - 223 ft bgs

SS
End Cap
221.85 - 222.25 ft bgs

Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW007R

(Page 1 of 9)

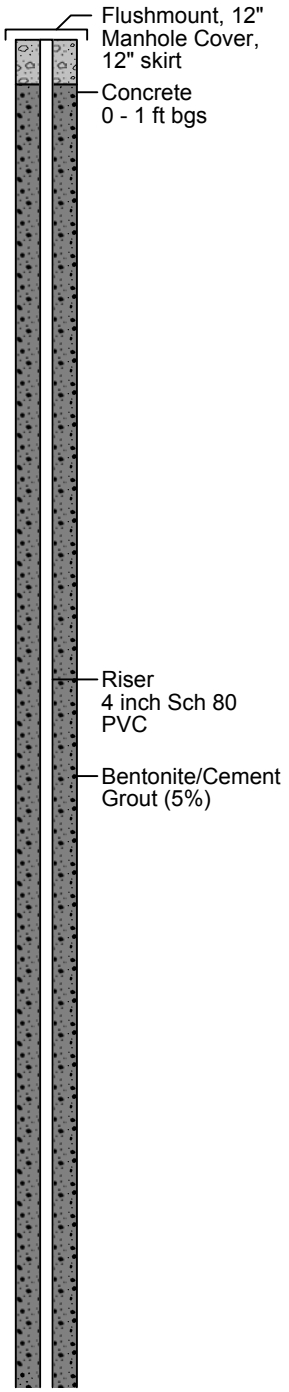
Start Date/Time	: 07/17/2017
End Date/Time	: 07/19/2017
Northing/Easting	: 1860849.80/6797523.78
Elevation (ft) (TOC)	: 1159.19
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 253

Installation	: Former Norton AFB
AFFF Area	: 8
Station ID	: NORPMW007R
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	238.26
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	% RECOVERY	DESCRIPTION	PID (ppm)	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
0–5	1		SAND, 10YR 5/3brown, dry to damp, fine to medium grained sand, trace coarse sand, fine gravel (predominately 1") trace coarse gravel subrounded (up to 2.25 x 1 x 0.5 inches), trace concrete fragments, well graded (0,0,90,10), [FILL]					
5–10	2		SAND w/ gravel, medium to coarse grained sand, some fine grained sand, fine to coarse subrounded gravel, well graded cobbles cobbles		SW			
10–16	3		GRAVELY SAND to SANDY GRAVEL, 2.5Y 5/3, light olive brown, fine to coarse grained sand, fine to coarse subangular to subrounded gravel, some cobbles damp, well graded, (cobbles up to 4 x 3.13 x 2 inches, and 6 x 4 x 2.5 inches)		SW /GW			
13–15			SAND, 2.5Y 5/3, light olive brown, damp, fine to medium grained sand, some coarse sand, trace gravel, poorly graded		SP			
15–16			SAND with GRAVEL, 2.5Y 5/3, light olive brown, fine to coarse grained sand, fine to coarse gravel, some cobbles, well graded		SW			
16–17	4		SILTY SAND with GRAVEL, 2.5Y 5/1, gray, damp, fine grained sand, some medium to coarse grained sand, fine to coarse subangular to subrounded gravel, trace cobbles (up to 2.5 x 2 x 2 inches)		SM			
17–23	5		GRAvELY SAND to SANDY GRAVEL, 2.5Y 4/3, olive brown, damp, medium to coarse grained sand, fine to coarse subangular to subrounded gravel, cobbles (up to 4 x 2.5 x 2.25 inches)		SW /GW			
23–24			SILTY CLAY to CLAYEY SILT, 10YR 6/4, light yellowish brown, trace fine sand, faint iron oxide staining, thinly laminated		CL/ML			
24–25					SW			
25–27	6		SAND with GRAVEL, 10YR 6/4, light yellowish brown, damp, fine to medium grained sand, fine gravel, trace coarse gravel (up to 2.5 x 2.5 x 1.25 inches), well graded		SW			
27–29			GRAVELLY SAND, 10YR 5/4, yellowish brown, damp, medium to coarse grained sand, some fine grained sand, fine grained gravel, trace coarse gravel, trace cobbles (up to 3.25 x 2.63 x 1.75 inches)		GW			
29–30					SP			

PID (ppm) 0 10 20

Well:: NORPMW007R
Elev. (BGS): 1159.57



Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW007R

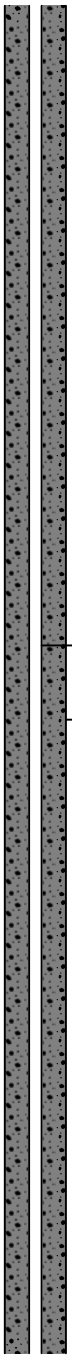
(Page 2 of 9)

Start Date/Time	: 07/17/2017
End Date/Time	: 07/19/2017
Northing/Easting	: 1860849.80/6797523.78
Elevation (ft) (TOC)	: 1159.19
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 253

Installation	: Former Norton AFB
AFFF Area	: 8
Station ID	: NORPMW007R
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	238.26
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	% RECOVERY	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
30–34	7		SAND with GRAVEL, 2.5Y 6/3, damp, fine to coarse grained sand, fine to coarse subrounded gravel, trace cobbles (up to 3.25 x 3 x 2 inch)		SW			
34–37	7		SILTY GRAVEL, 2.5Y 7/2, light gray, dry, fine grained sand, fine to coarse angular to subrounded gravel, cobbles (up to 3.5 x 2.5 x 2 inch)		GM			
37–39	7		SILTY SAND, 2.5Y 7/3, damp, fine grained sand, faint orange oxide staining		SM			
39–43	7, 8		SANDY SILT, 2.5Y 5/3, light olive brown, fine grained sand, faint orange oxide staining CLAYEY SILT, 2.5Y 5/2 grayish brown and 2.5Y 6/4 light yellowish brown patches, fine grained sand, low to no plasticity, orange oxide staining		ML			
43–47	8		SILTY SAND, 2.5Y 6/4, light yellowish brown, fine grained sand		SM			
47–52	8, 9		SAND, 2.5Y 6/3, light yellowish brown, fine to coarse grained sand, fine gravel, trace coarse gravel, well graded		SW			
52–55	9		SILTY SAND w/ gravel, 2.5Y 6/4 light yellowish brown, fine to medium grained sand, some coarse grained sand, fine to coarse subangular gravel, trace cobbles subrounded, well graded (0,30,60,10)		SM			
55–60	9		SAND w/ gravel, 2.5Y 5/3 light olive brown, fine to coarse grained sand, fine gravel, trace coarse gravel, trace cobbles, damp, (0,0,85,15)		SW			

Well:: NORPMW007R
Elev. (BGS): 1159.57



Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW007R

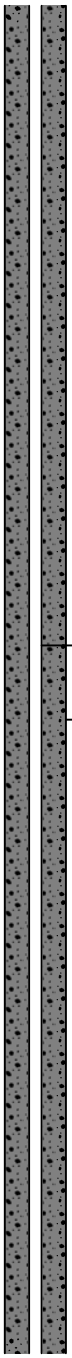
(Page 3 of 9)

Start Date/Time	: 07/17/2017
End Date/Time	: 07/19/2017
Northing/Easting	: 1860849.80/6797523.78
Elevation (ft) (TOC)	: 1159.19
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 253

Installation	: Former Norton AFB
AFFF Area	: 8
Station ID	: NORPMW007R
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	238.26
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	% RECOVERY	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
60								
61					SW			
62			SAND w/ silt, 2.5Y 5/3 light olive brown, fine to medium grained sand, trace coarse grained sand, some coarse subrounded gravel (0,20,70,10)		SM			
63								
64			SAND, 2.5Y 7/3 pale yellow, fine to coarse grained sand, trace fine subrounded gravel, well graded (0,0,95,5)		SW			
65	10							
66			SAND w/ silt, 2.5Y 6/2 light brownish gray, fine to medium grained sand, trace coarse grained sand, some fine gravel, trace coarse gravel, trace granitic cobbles, subrounded		SM			
67					ML			
68			SILT w/ clay, 2.5Y 5/4 light olive brown, fine grained sand, faint iron oxide staining, low to no plasticity (15,75,10,0)		SW			
69								
70			GRAVELLY SAND, 2.5Y 6/3 light yellowish brown, fine to coarse grained sand, fine gravel some coarse gravel, well graded (0,0,70,30), damp		SM			
71								
72			SAND, 10YR 6/6 brownish yellow, medium to coarse grained sand, faint orange oxide staining, some fine subrounded gravel, well graded		SP			
73								
74			SILTY SAND w/ gravel, 2.5Y 7/2 light gray, fine to coarse grained sand, fine to coarse subangular gravel, granitic cobble fragments, well graded (0,25,55,20), dry		SM			
75	11				ML			
76			SAND, 2.5Y 6/4 light yellowish brown, fine to medium grained sand, poorly graded (0,0,100,0), damp					
77								
78			SAND w/ silt, 2.5Y 7/4 pale yellow, fine to coarse grained sand, cemented fine gravel, a cobble, dry		SM			
79			GRAVELLY SILT, 2.5Y 6/2 light brownish gray, some fine to coarse sand, fine to coarse angular to subangular gravel (0,50,20,30)					
80								
81			SAND w/ silt, 2.5Y 6/3 light yellowish brown, fine to medium grained sand, fine gravel cobbles, well graded (5,20,50,25)					
82								
83			SAND w/ gravel, 2.5Y 5/3 light olive brown, fine to coarse grained sand, fine subangular to subrounded gravel, trace coarse subrounded gravel, well graded (0,0,80,20), damp					
84								
85	12				SW			
86								
87								
88								
89			SAND w/ silt, 2.5Y 7/1 gray, fine to medium grained sand, some fine to coarse granitic gravel (5,30,55,10) dry		SM			
90								

Well:: NORPMW007R
Elev. (BGS): 1159.57



Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW007R

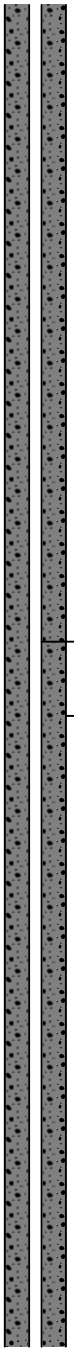
(Page 4 of 9)

Start Date/Time	: 07/17/2017
End Date/Time	: 07/19/2017
Northing/Easting	: 1860849.80/6797523.78
Elevation (ft) (TOC)	: 1159.19
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 253

Installation	: Former Norton AFB
AFFF Area	: 8
Station ID	: NORPMW007R
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	238.26
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Well:: NORPMW007R
Elev. (BGS): 1159.57

Depth in Ft BGS	INTERVAL	% RECOVERY	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
90–91			SANDY GRAVEL, 2.5Y 5/3 light olive brown, fine to coarse grained sand, fine to coarse gravel, 5 cobbles, dry to damp		GW			
92–93			SAND w/ gravel, 10YR 5/6 yellowish brown, orange oxide staining, medium to coarse grained sand, fine to coarse subrounded gravel, some cobbles, well graded (0,0,85,15), damp		SW			
94–96	13		SILTY SAND w/ gravel, 2.5Y 6/3 light yellowish brown, fine to medium grained sand, some coarse grained sand, fine subangular gravel, one cobble, damp (10,25,60,5) from 95' increase in fines		SM			
97–98			SAND w/ gravel, 10YR 6/6 brownish yellow, medium to coarse grained subangular sand, fine subrounded gravel, well graded (0,0,85,15), damp		SW SM			
99–100			SILTY SAND w/ gravel, 2.5Y 7/2 light gray, fine to medium grained sand, some coarse sand, fine gravel, trace coarse gravel, well graded (10,25,50,15), dry to damp		GW SM			
101–102			SANDY GRAVEL, 10YR 6/6 brownish yellow, fine to coarse grained sand, fine subangular gravel, trace subrounded coarse gravel, one granitic gravel (0,0,30,70), damp		SP			
103–104			SILTY SAND w/ gravel, 10YR 7/1 light gray, fine to coarse grained sand, fine subangular gravel, trace coarse subangular gravel (5,25,60,10), dry		GM			
105–107	14		SAND, 10YR 6/4 light yellowish brown, fine to medium grained sand, trace coarse grained sand, trace fine subrounded gravel, poorly to moderately graded (0,0,95,5), subrounded granitic cobble at 101' and 102.5', increase in coarse grain sand from 102.5 to 103.5' bgs		SW /GM GM			
108–109			SILTY GRAVEL w/ sand, 10YR 7/2 light gray, fine to coarse angular to subangular gravel, subangular to subrounded cobbles, fine to medium grained sand, some coarse sand, well graded (5,25,20,50), damp		SM SW SM SW			
110–111					SM			
112–113			SANDY GRAVEL to GRAVELLY SAND, 10YR 5/4 yellowish brown, fine to coarse grained sand, fine to coarse subangular to subrounded gravel, trace cobbles, granitic, (0,0,40,60) to (0,0,60,40), damp		SW /GW			
114–115	15		SILTY GRAVEL, 2.5Y 7/2 light gray, fine to coarse subangular to subrounded gravel and cobbles in a sandy silt matrix, fine to coarse grained sand, well graded (5,20,15,60), granitic cobbles, damp		GM			
116–117			SILTY SAND w/ gravel, 2.5Y 6/2 light brownish gray, fine to coarse grained sand, fine gravel (5,30,50,5) damp		SW			
118–120			SAND w/ gravel, 2.5Y 7/3 pale yellow, fine to medium grained sand, some coarse sand, fine subrounded gravel, trace subrounded coarse gravel (0,0,85,15), damp		SM \GM GW			



Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW007R

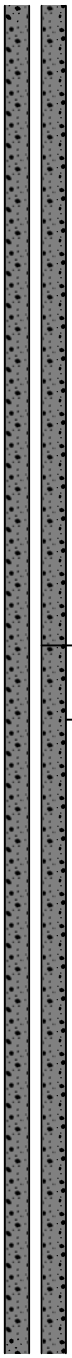
(Page 5 of 9)

Start Date/Time	: 07/17/2017
End Date/Time	: 07/19/2017
Northing/Easting	: 1860849.80/6797523.78
Elevation (ft) (TOC)	: 1159.19
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 253

Installation	: Former Norton AFB
AFFF Area	: 8
Station ID	: NORPMW007R
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	238.26
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	% RECOVERY	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
120–125	16		SAND w/ gravel, 10YR 4/6 yellowish brown, medium to coarse grained sand, fine subangular gravel, trace coarse gravel, well graded (0,0,85,15), damp cobble cobble		SW			
125–128	16		SILTY CLAY, 2.5Y 6/3 light yellowish brown, pervasive iron oxide staining-reddish yellow, nonoxide nodules from 125 to 128, fine grained sand, low to no plasticity (50,45,5,0), damp		CL			
128–130	16		CLAYEY SILT w/ sand, 7.5YR 6/8 reddish yellow, fine to coarse grained sand, no plasticity (30,45,25,0), damp color change to 10YR 6/6 brownish yellow		ML SM			
130–132	17		SILTY SAND, 7.5YR 6/8 reddish yellow, fine grained sand, some medium grained sand (5,30,65,0) pervasive iron oxide staining, damp		SW			
132–135	17		SAND w/ gravel, 10yr 5/6 yellowish brown, medium to coarse grained sand, some fine grained sand, some fine gravel, trace coarse subrounded gravel, some subrounded cobbles, well graded (,0,080,20)		SM			
135–136	17		SILTY SAND w/ gravel, 10YR 7/3 very pale brown, fine grained sand, some medium to coarse grained sand, fine gravel, cobbles		SW			
136–139	17		SAND, 7.5YR 6/6 reddish yellow, medium grained sand, some fine and coarse grained sand, trace fine to coarse subrounded gravel, one cobble, granitic, well graded (0,0,95,5), dmap		SM SW			
139–141	18		SILTY SAND, 10YR 7/4 very pale brown, fine grained sand, some medium grained sand, trace cobble, (5,30,63,2), damp		SM SW			
141–143	18		GRAVELLY SAND, 7.5YR 5/6 strong brown, medium to coarse grained sand, some fine grained sand, fine grained subangular gravel, granitic subrounded gravel, well graded (0,0,70,30), damp		CL			
143–144	18		SILTY SAND, 10YR 7/4 very pale brown, fine to coarse grained sand, trace fine gravel (0,30,65,5)		SW			
144–146	18		SAND w/ gravel, 10YR 5/6 yellowish brown, medium to coarse grained sand, some fine grained sand, fine subrounded gravel, trace coarse gravel, well graded (0,0,85,15), damp		SW			
146–150	18		SILTY CLAY, 2.5Y 6/3 light yellowish brown with patchy iron oxide staining w/ 7.5YR 5/6 strong brown color, fine grained sand, trace medium to coarse grained sand, low to no plasticity (45,40,15,0)		GW /SW			

Well:: NORPMW007R
Elev. (BGS): 1159.57



Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW007R

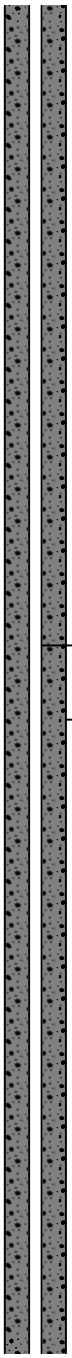
(Page 6 of 9)

Start Date/Time	: 07/17/2017
End Date/Time	: 07/19/2017
Northing/Easting	: 1860849.80/6797523.78
Elevation (ft) (TOC)	: 1159.19
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 253

Installation	: Former Norton AFB
AFFF Area	: 8
Station ID	: NORPMW007R
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	238.26
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	% RECOVERY	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
150–159	19		SAND, 10YR 5/8 yellowish brown, fine to medium grained sand, trace coarse sand, trace subrounded coarse gravel (0,0,95,5), damp		SP			
152–154			GRAVELLY SAND, 10YR 4/6 dark yellowish brown, medium to coarse grained sand, some fine grained sand, fine subrounded gravel, trace coarse gravel (0,0,70,30) damp		SW			
155–156			SANDY SILT w/ clay, 10YR 6/3 pale brown with orange oxide staining 7.5YR 5/6 strong brown laminations, fine grained sand, no plasticity (20,45,35,0)		ML			
157–159			SAND w/ silt, 10YR 7/3 very pale brown, fine grained sand, some medium grained sand (0,20,80,0), damp		SM			
160–161	20		SAND, 10YR 8/2 very pale brown, fine grained sand, some medium grained sand, poorly graded (0,0,100,0), damp		SP			
161–163			SILTY SAND w/ gravel, 10YR 5/6 yellowish brown, fine to coarse grained sand, some light cementation, fine gravel (5,20,65,10), damp └less gravel, less coarse grained sand		SM ML			
164–165			SANDY SILT, 10YR 5/2 grayish brown, fine grained sand, trace medium to coarse grained sand, damp (10,45,45,0)		GM			
166–168			SILTY GRAVEL w/ sand, 10YR 7/2 light gray, fine to coarse gravel and cobbles in a sandy silt/silty sand matrix, fine to medium grained sand, some coarse grained sand, subangular to subrounded gravel and cobbles, granitic cobbles (5,25,20,50), damp		SW SM			
169–170			SAND w/ gravel, 2.5Y 6/3 light yellowish brown, fine to coarse grained sand, fine to coarse gravel, one cobble granitic, damp		SW			
171–172	21		SILTY SAND, 10YR 7/2 light gray, fine grained sand, some medium grained sand, lightly cemented (5,30,65,0), damp					
173–174			GRAVELLY SAND, 10YR 6/4 light yellowish brown, fine to coarse grained sand, fine angular to subangular gravel, some angular to subangular coarse gravel (0,0,65,35), damp		CL			
175–177			SILTY CLAY, 10YR 6/4 light yellowish brown, faint iron oxide staining, fine grained sand, low to no plasticity (45,40,15,0), damp					
178–179	22		SAND, 10YR 7/4 pale brown, fine to coarse grained sand, trace fine gravel (0,5,93,2), damp		SW			
179–180			SILTY CLAY, 10YR 6/4 light yellowish brown, fine to coarse sand, low plasticity, faint iron oxide staining (45,40,15,0)		CL			

Well:: NORPMW007R
Elev. (BGS): 1159.57



Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW007R

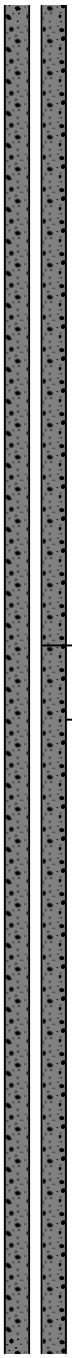
(Page 7 of 9)

Start Date/Time	: 07/17/2017
End Date/Time	: 07/19/2017
Northing/Easting	: 1860849.80/6797523.78
Elevation (ft) (TOC)	: 1159.19
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 253

Installation	: Former Norton AFB
AFFF Area	: 8
Station ID	: NORPMW007R
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	238.26
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	% RECOVERY	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
180–181			SILTY SAND, 10YR 6/6 brownish yellow, fine to medium grained sand, coarse grained sand (5,40,55,0), damp		SM			
181–184			SILTY CLAY, 10YR 5/6 yellowish brown, fine to coarse sand, low plasticity (50,35,15,0) damp		CL			
184–190	22		SILTY SAND, 10YR 6/6 brownish yellow, fine to medium grained sand, trace fine gravel, some coarse sand (5,35,55,5), damp		SM			
190–195			SAND, 10YR 6/6 brownish yellow, fine to coarse grained sand, trace fine gravel, poorly graded (0,5,90,5)		SP			
195–196			SILTY SAND, 2.5Y 7/3 pale yellow, 1.5" cemented, fine to medium grained sand		SM			
196–200	23		SAND w/ silt, 10YR 6/4 light yellowish brown, fine to medium grained sand, some coarse sand, trace fine granitic gravel (2,15,80,3), trace coarse granitic gravel, damp Increase in fine to coarse subangular to subrounded gravel		SM			
200–204			SAND w/ gravel, 10YR 7/3 very pale brown, medium to coarse grained sand, some fine grained sand, fine granitic subangular gravel (0,5,85,10), damp		SW			
204–210	24		SILTY SAND, 2.5Y 6/2 light brownish gray, fine grained sand, some medium to coarse grained sand, trace fine subangular granitic gravel, damp		SM			

Well:: NORPMW007R
Elev. (BGS): 1159.57



Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW007R

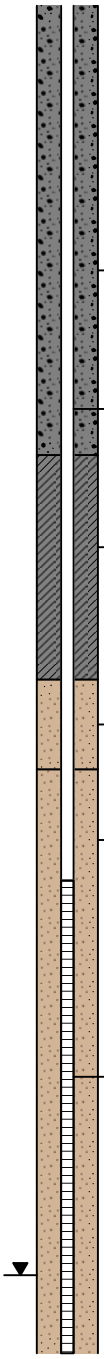
(Page 8 of 9)

Start Date/Time	: 07/17/2017
End Date/Time	: 07/19/2017
Northing/Easting	: 1860849.80/6797523.78
Elevation (ft) (TOC)	: 1159.19
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 253

Installation	: Former Norton AFB
AFFF Area	: 8
Station ID	: NORPMW007R
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	238.26
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	% RECOVERY	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
210					SM			
211			SANDY SILT, 10YR 5/6 yellowish brown, fine to medium grained sand, no plasticity (15,45,40,0), damp					
212								
213					ML			
214								
215	25							
216			SILTY SAND, 10YR 6/6 brownish yellow, fine to medium grained sand (5,30,65,0), damp					
217					SM			
218			SANDY SILT, 10YR 5/4 yellowish brown, fine to medium grained sand, trace coarse sand (5,50,45,0), damp					
219					ML			
220			SANDY CLAY to SANDY SILT, 10YR 5/4 yellowish brown, fine to coarse grained sand, no plasticity, very stiff (35,35,30,0), damp					
221					CL /ML			
222			SANDY SILT, 10YR 5/4 yellowish brown, fine to medium grained sand, trace coarse sand (5,50,45,0), damp		ML			
223								
224			SILTY SAND, 10YR 6/6 brownish yellow, fine to medium grained sand, trace decomposed granitic gravel (easily breaks apart consisting quartz, feldspar and mica minerals) (5,33,60,2), damp					
225	26							
226			0.5' fragment of sandy silt/sandy clay with no plasticity					
227								
228					SM			
229								
230								
231								
232								
233			SAND, 10YR 6/4 light yellowish brown, medium grained sand, some fine and coarse grained sand, trace fine gravel, granitic cobble fragment, well graded (0,0,95,5)		SW			
234								
235	27		0.1' thick layer of SANDY SILT/SILTY SAND, fine to coarse sand					
236								
237			SAND w/ silt, 10YR 6/3 pale brown, fine to medium grained sand, interspensed with very thin beds of sandy clay to 235' and a 3" bed at 238'. moist to wet		SM			
238								
239								
240			wet					

Well:: NORPMW007R
Elev. (BGS): 1159.57



Aerostar SES LLC

Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations

Former Norton AFB

Log of Boring: NORPMW007R

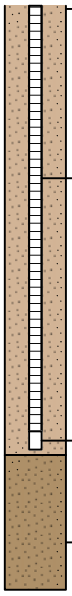
(Page 9 of 9)

Start Date/Time	: 07/17/2017
End Date/Time	: 07/19/2017
Northing/Easting	: 1860849.80/6797523.78
Elevation (ft) (TOC)	: 1159.19
Borehole Dia. (in)	: 10 5/8"
Borehole Depth (ft)	: 253

Installation	: Former Norton AFB
AFFF Area	: 8
Station ID	: NORPMW007R
Drilling Company	: Yellow Jacket Drilling
Drilling Method	: Mud Rotary
Sampling Method	: Split Spoon
Borehole Completion	: 4" Sch 80 PVC Monitoring Well
Depth to Water(BTOC)	238.26
Depth to Bedrock (ft)	: N/A
Logged By	: Heidi Dieffenbach-Carle

Depth in Ft BGS	INTERVAL	% RECOVERY	DESCRIPTION	PID (ppm) 0 10 20	USCS	GRAPHIC	SAMPLE TYPE	Sample ID
240								
241								
242					SM			
243								
244								
245	28		SAND, 10YR 6/4 light yellowish brown, medium to coarse grained sand, some fine grained sand, trace fine subrounded gravel, well graded (0,5,92,3), saturated		SW		WG	NORP08104
246								
247								
248			SAND w/ silt, 10YR 6/4 light yellowish brown, fine to coarse grained sand, saturated (5,10,82,3), 3" bed of sandy clay at 247'.					
249								
250					SM			
251								
252								
253			End of Boring at 253' BGS Borehole collapsed/caved-in from 253' to 250' bgs Logged borehole to 250' bgs					
254								
255								
256								
257								
258								
259								
260								
261								
262								
263								
264								
265								
266								
267								
268								
269								
270								

Well:: NORPMW007R
Elev. (BGS): 1159.57



AerostarSES LLC

SOIL SAMPLE COLLECTION LOG

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

ASL Project No: M3010.0019.0017.05 5

Installation: Former Norton AFB

Date: 4/18/17

Sample Technician(s): Heidi Dieffenbach-Carle

Station ID: NORPMW005

SOIL SAMPLE

Sample ID: NORP04006
Sample Collection Time: 1120
Sample Depth: 1.5-2.5
Grain Size: SP
Munsell Description: 10 YR/4/4
Plasticity: N/A
Collection Method: HA
Analysis/Method: EPA 537M
Sample Container: 4oz PE
Preservative: cool 4°C

SOIL SAMPLE *(N + FD)

Sample ID: NORP04007/04008
Sample Collection Time: 1350
Sample Depth: 16-16.5
Grain Size: SW
Munsell Description: ~~SW~~ 2.5Y 5/4
Plasticity: —
Collection Method: SPT
Analysis/Method: EPA 537M
Sample Container: 4oz PE x2
Preservative: cool 4°C

SOIL SAMPLE

Sample ID: NORP04009
Sample Collection Time: 1745
Sample Depth: 60-60.5
Grain Size: SW
Munsell Description: 2.5Y 5/4
Plasticity: —
Collection Method: SPT
Analysis/Method: EPA 537M
Sample Container: 4oz PE
Preservative: Cool 4°C

COMMENTS:

AerostarSES LLC

SOIL SAMPLE COLLECTION LOG

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

ASL Project No: M3010.0019.0017.05 5

Installation: Former Norton AFB

Date: 5/9/17

Sample Technician(s): Heidi Dieffenbach-Carle

Station ID: NORPmw002

SOIL SAMPLE

Sample ID:	NORP05013	Sample Collection Time:	0945
Sample Depth:	0.5-1.5	Grain Size:	SM
Munsell Description:	10YR 4/2	Plasticity:	N/A
Collection Method:	HA	Analysis/Method:	EPA 537M
Sample Container:	4oz PE	Preservative:	cool 4°C

SOIL SAMPLE

Sample ID:	NORP05014	Sample Collection Time:	1115
Sample Depth:	16-16.25	Grain Size:	GW
Munsell Description:	2.5Y 5/3	Plasticity:	N/A
Collection Method:	SPT	Analysis/Method:	EPA 537M
Sample Container:	4oz PE	Preservative:	cool 4°C

SOIL SAMPLE

Sample ID:	NORP05015	Sample Collection Time:	1420
Sample Depth:	37-37.25	Grain Size:	SP
Munsell Description:	2.5Y 5/3	Plasticity:	N/A
Collection Method:	SPT	Analysis/Method:	EPA 537M
Sample Container:	4oz PE	Preservative:	cool 4°C

COMMENTS:

AerostarSES LLC

SOIL SAMPLE COLLECTION LOG

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

ASL Project No: M3010.0019.0017.05

Installation: Former Norton AFB

Date: 4/11/17 – 4/12/17

Sample Technician(s): Heidi Pieffenbach-Carle, Tim Cullen

Station ID: NORPMW003

SOIL SAMPLE (4/11/17)

Sample ID:	NORP05017	Sample Collection Time:	1655
Sample Depth:	0-1'	Grain Size:	SP
Munsell Description:	10YR 4/3	Plasticity:	N/A
Collection Method:	H.A.	Analysis/Method:	EPA 537M
Sample Container:	4oz PE Jar	Preservative:	cool 4°C

SOIL SAMPLE (4/12/17)

Sample ID:	NORP05019	Sample Collection Time:	1055
Sample Depth:	15-16'	Grain Size:	SP
Munsell Description:	2.5Y 6/2	Plasticity:	N/A
Collection Method:	SPT	Analysis/Method:	EPA 537 M
Sample Container:	4oz PE Jar	Preservative:	cool 4°C

SOIL SAMPLE (4/12/17)

Sample ID:	NORP05020	Sample Collection Time:	1450
Sample Depth:	30-30.75	Grain Size:	SP
Munsell Description:	2.5Y 5/2	Plasticity:	N/A
Collection Method:	SPT	Analysis/Method:	EPA 537m
Sample Container:	4oz PE Jar	Preservative:	cool 4°C

COMMENTS:

AerostarSES LLC

SOIL SAMPLE COLLECTION LOG

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

ASL Project No: M3010.0019.0017.05 5

Installation: Former Norton AFB

Date: 4/05/17

Sample Technician(s): Heidi Pfeffenbach - Carle

Station ID: NORPMW004

SOIL SAMPLE

Sample ID:	NORP07022	Sample Collection Time:	1325
Sample Depth:	0.5-1	Grain Size:	SM
Munsell Description:	10YR 4/3	Plasticity:	—
Collection Method:	HA	Analysis/Method:	EPA 537M
Sample Container:	4oz PE	Preservative:	cool/4°C

SOIL SAMPLE

Sample ID:	NORP07023	Sample Collection Time:	1510
Sample Depth:	16-17.5	Grain Size:	SW/SP
Munsell Description:	2.5Y 5/16	Plasticity:	—
Collection Method:	SPT	Analysis/Method:	EPA 537M
Sample Container:	4oz PE	Preservative:	cool 4°C

SOIL SAMPLE

Sample ID:	NORP07024	Sample Collection Time:	1750
Sample Depth:	34-34.5	Grain Size:	SP
Munsell Description:	2.5Y 5/3	Plasticity:	—
Collection Method:	SPT	Analysis/Method:	EPA 537M
Sample Container:	4oz PE	Preservative:	cool/4°C

COMMENTS:

AerostarSES LLC

SOIL SAMPLE COLLECTION LOG

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

ASL Project No: M3010.0019.0017.05 5

Installation: Former Norton AFB

Date: 5/17/17

Sample Technician(s): Heidi Dieffenbach-Carle

Station ID: NORPSB001

SOIL SAMPLE (N)

Sample ID:	NORP07025	Sample Collection Time:	0825
Sample Depth:	0-1'	Grain Size:	SW
Munsell Description:	10 YR 6/3	Plasticity:	—
Collection Method:	HA	Analysis/Method:	EPA 537 M
Sample Container:	4 oz PE	Preservative:	cool 4°C

SOIL SAMPLE (FD)

Sample ID:	NORP07026	Sample Collection Time:	0825
Sample Depth:	0-1'	Grain Size:	SW
Munsell Description:	10 YR 6/3	Plasticity:	—
Collection Method:	HA	Analysis/Method:	EPA 537 M
Sample Container:	4 oz PE	Preservative:	cool 4°C

SOIL SAMPLE

Sample ID:	NORP07027	Sample Collection Time:	0905
Sample Depth:	15-16'	Grain Size:	SW
Munsell Description:	2.5Y 6/3	Plasticity:	—
Collection Method:	SPT	Analysis/Method:	EPA 537 M
Sample Container:	4 oz PE	Preservative:	cool 4°C

COMMENTS:

AerostarSES LLC

SOIL SAMPLE COLLECTION LOG

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

ASL Project No: M3010.0019.0017.05 5

Installation: Former Norton AFB

Date: 5/17/17

Sample Technician(s): Heidi Dietfenbach-Cole

Station ID: NORPS3001

SOIL SAMPLE

Sample ID: NORP02028

Sample Collection Time: 1025

Sample Depth: 28.5-30'

Grain Size: SW

Munsell Description: 10YR 6/4

Plasticity: —

Collection Method: SPT

Analysis/Method: EPA 537M

Sample Container: 4oz PE

Preservative: cool 4°C

SOIL SAMPLE

Sample ID:

Sample Collection Time:

Sample Depth:

Grain Size:

Munsell Description:

Plasticity:

Collection Method:

Analysis/Method: ~~EPA 537M~~

Sample Container:

Preservative: ~~cool 4°C~~

SOIL SAMPLE

Sample ID:

Sample Collection Time:

Sample Depth:

Grain Size:

Munsell Description:

Plasticity:

Collection Method:

Analysis/Method: ~~EPA 537M~~

Sample Container:

Preservative: ~~cool 4°C~~

COMMENTS:

AerostarSES LLC

SOIL SAMPLE COLLECTION LOG

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

ASL Project No: M3010.0019.0017.05

Installation: Former Norton AFB

Date: 5/12/17

Sample Technician(s): Heidi Dieffenbach-Carle

Station ID: NORPSB002

SOIL SAMPLE

Sample ID:	NORP07029	Sample Collection Time:	1115
Sample Depth:	0-1	Grain Size:	SM
Munsell Description:	10YR 4/3	Plasticity:	–
Collection Method:	HA	Analysis/Method:	EPA 537M
Sample Container:	4oz PE	Preservative:	cool 4°C

SOIL SAMPLE

Sample ID:	NORP07030	Sample Collection Time:	1215
Sample Depth:	15-15.5	Grain Size:	SW
Munsell Description:	2.5Y 6/2	Plasticity:	–
Collection Method:	SPT	Analysis/Method:	EPA 537M
Sample Container:	4oz PE	Preservative:	cool 4°C

SOIL SAMPLE

Sample ID:	NORP07031	Sample Collection Time:	1250
Sample Depth:	28-29.5	Grain Size:	SM-CL
Munsell Description:	10YR 4/3	Plasticity:	low
Collection Method:	SPT	Analysis/Method:	EPA 537M
Sample Container:	4oz PE	Preservative:	cool 4°C

COMMENTS:

AerostarSES LLC

SOIL SAMPLE COLLECTION LOG

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations
ASL Project No: M3010.0019.0017.05
Installation: Former Norton AFB
Date: 5/17/17
Sample Technician(s): Heidi Pieffenbach-Carle
Station ID: NORP SB003

SOIL SAMPLE

Sample ID:	NORP07032	Sample Collection Time:	1325
Sample Depth:	0-1	Grain Size:	SM
Munsell Description:	10YR 5/4	Plasticity:	—
Collection Method:	HA	Analysis/Method:	EPA 537M
Sample Container:	4oz PE	Preservative:	cool 4°C

SOIL SAMPLE

Sample ID:	NORP07033	Sample Collection Time:	1530
Sample Depth:	15-16.3	Grain Size:	SW
Munsell Description:	2.5Y 7/3	Plasticity:	—
Collection Method:	SPT	Analysis/Method:	EPA 537M
Sample Container:	4oz PE	Preservative:	cool 4°C

SOIL SAMPLE

Sample ID:	NORP07034	Sample Collection Time:	1555
Sample Depth:	28.5-30	Grain Size:	SW
Munsell Description:	2.5Y 8/2	Plasticity:	—
Collection Method:	SPT	Analysis/Method:	EPA 537M
Sample Container:	4oz PE	Preservative:	cool 4°C

COMMENTS:

AerostarSES LLC

SOIL SAMPLE COLLECTION LOG

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

ASL Project No: M3010.0019.0017.05 5

Installation: Former Norton AFB

Date: 5/12/17

Sample Technician(s): Heidi Dieffenbach-Carle

Station ID: NORPMW007

SOIL SAMPLE

Sample ID:	NORP08037	Sample Collection Time:	1415
Sample Depth:	0-1	Grain Size:	SW
Munsell Description:	10YR 5/3	Plasticity:	N/A
Collection Method:	HA	Analysis/Method:	EPA 537m
Sample Container:	4oz PE	Preservative:	cool 4°C

SOIL SAMPLE

Sample ID:	NORP08038	Sample Collection Time:	1455
Sample Depth:	15-15.5	Grain Size:	GW
Munsell Description:	2.5Y 5/3	Plasticity:	N/A
Collection Method:	SPT	Analysis/Method:	EPA 537m
Sample Container:	4oz PE	Preservative:	cool 4°C

SOIL SAMPLE

Sample ID:		Sample Collection Time:	
Sample Depth:		Grain Size:	
Munsell Description:		Plasticity:	
Collection Method:		Analysis/Method:	
Sample Container:		Preservative:	

COMMENTS:

Norton AR # 576414

AerostarSES LLC

SOIL SAMPLE COLLECTION LOG

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

ASL Project No: M3010.0019.0017.05 5

Installation: Former Norton AFB

Date: 5/16/17

Sample Technician(s): Heidi Pieffenbach-Carle

Station ID: NORPSB004

SOIL SAMPLE (IV)

Sample ID:	NORP08041	Sample Collection Time:	1345
Sample Depth:	0.75-2'	Grain Size:	SM
Munsell Description:	10 YR 4/3	Plasticity:	N/A
Collection Method:	HA	Analysis/Method:	EPA 537M
Sample Container:	4oz PE	Preservative:	cool 4°C

SOIL SAMPLE (FD)

Sample ID:	NORP08042	Sample Collection Time:	1345
Sample Depth:	0.75 - 2'	Grain Size:	SM
Munsell Description:	10YR 4/3	Plasticity:	N/A
Collection Method:	SPT	Analysis/Method:	EPA 537 M
Sample Container:	4oz PE	Preservative:	cool 4°C

SOIL SAMPLE

Sample ID:	NORP08043	Sample Collection Time:	1535
Sample Depth:	15 - 16.5	Grain Size:	SW
Munsell Description:	10YR 6/3	Plasticity:	–
Collection Method:	SPT	Analysis/Method:	EPA 537 M
Sample Container:	4oz PE	Preservative:	cool 4°C

COMMENTS:

AerostarSES LLC

SOIL SAMPLE COLLECTION LOG

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

ASL Project No: M3010.0019.0017.05 5

Installation: Former Norton AFB

Date: 5/16/17

Sample Technician(s): Heidi Dieffenbach-Carle

Station ID: NORPSB004

SOIL SAMPLE

Sample ID:	NORP08044	Sample Collection Time:	1610
Sample Depth:	28.5-30'	Grain Size:	SW
Munsell Description:	2.5Y 6/3	Plasticity:	N/A
Collection Method:	SPT	Analysis/Method:	EPA 537M
Sample Container:	4 oz PE	Preservative:	cool 4°C

SOIL SAMPLE

Sample ID:		Sample Collection Time:	
Sample Depth:		Grain Size:	
Munsell Description:		Plasticity:	
Collection Method:		Analysis/Method:	
Sample Container:		Preservative:	

SOIL SAMPLE

Sample ID:		Sample Collection Time:	
Sample Depth:		Grain Size:	
Munsell Description:		Plasticity:	
Collection Method:		Analysis/Method:	
Sample Container:		Preservative:	

COMMENTS:

AerostarSES LLC

SOIL SAMPLE COLLECTION LOG

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

ASL Project No: M3010.0019.0017.05 5

Installation: Former Norton AFB

Date: 5/16/17

Sample Technician(s): Heidi Pieffenbach-Carle

Station ID: NORPSB005

SOIL SAMPLE

Sample ID: NORP08045 Sample Collection Time: 1115

Sample Depth: 0.5-2 Grain Size: SM

Munsell Description: 10 YR 6/3 Plasticity: –

Collection Method: HA/PH Analysis/Method: EPA 537M

Sample Container: 4oz PE Preservative: cool 4°C

SOIL SAMPLE

Sample ID: NORP08046 Sample Collection Time: 1215

Sample Depth: 15.5-16.5 Grain Size: SW

Munsell Description: 2.5Y 7/2 Plasticity: –

Collection Method: SPT Analysis/Method: EPA 537M

Sample Container: 4oz PE Preservative: cool 4°C

SOIL SAMPLE

Sample ID: NORP08048 Sample Collection Time: 1235

Sample Depth: 28.5-30' Grain Size: SW

Munsell Description: 2.5Y 7/3 Plasticity: –

Collection Method: SPT Analysis/Method: EPA 537M

Sample Container: 4oz PE Preservative: cool 4°C

COMMENTS:

AerostarSES LLC

SOIL SAMPLE COLLECTION LOG

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

ASL Project No: M3010.0019.0017.05 5

Installation: Former Norton AFB

Date: 5/16/17

Sample Technician(s): Heidi Pfeffenbach - Carle

Station ID: NORPSB006

SOIL SAMPLE

Sample ID:	NORP08049	Sample Collection Time:	0905
Sample Depth:	1-2'	Grain Size:	SM
Munsell Description:	10YR 4/3	Plasticity:	—
Collection Method:	HA	Analysis/Method:	EPA 537M
Sample Container:	4 oz PE	Preservative:	cool 4°C

SOIL SAMPLE

Sample ID:	NORP08050	Sample Collection Time:	1005
Sample Depth:	15.5-16.5	Grain Size:	SW-GW
Munsell Description:	2.5Y 6/4	Plasticity:	—
Collection Method:	SPT	Analysis/Method:	EPA 537M
Sample Container:	4 oz PE	Preservative:	cool 4°C

SOIL SAMPLE

Sample ID:	NORP08052	Sample Collection Time:	1035
Sample Depth:	30-31.5	Grain Size:	SP
Munsell Description:	2.5Y 8/2	Plasticity:	—
Collection Method:	SPT	Analysis/Method:	EPA 537M
Sample Container:	4oz PE	Preservative:	cool 4°C

COMMENTS:

AerostarSES LLC

SOIL SAMPLE COLLECTION LOG

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

ASL Project No: M3010.0019.0017.05 5

Installation: Former Norton AFB

Date: 5/16/17

Sample Technician(s): Heidi Dieffenbach-Cole

Station ID: NORP SB006

SOIL SAMPLE (FD)

Sample ID:	NORP 08053	Sample Collection Time:	1035
Sample Depth:	30-31.5	Grain Size:	SP
Munsell Description:	2.5Y 8/2	Plasticity:	–
Collection Method:	SPT	Analysis/Method:	EPA 537 m
Sample Container:	4oz PE	Preservative:	cool 4°C

SOIL SAMPLE

Sample ID:		Sample Collection Time:	
Sample Depth:		Grain Size:	
Munsell Description:		Plasticity:	
Collection Method:		Analysis/Method:	
Sample Container:		Preservative:	

SOIL SAMPLE

Sample ID:		Sample Collection Time:	
Sample Depth:		Grain Size:	
Munsell Description:		Plasticity:	
Collection Method:		Analysis/Method:	
Sample Container:		Preservative:	

COMMENTS:

AerostarSES, LLC

WELL DEVELOPMENT LOG

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

ASL Project No: M3010.0019.0017.05.15TM

Installation: 5.11.17

Date: 5.15.17

Sample Technician: Heidi Dieffenbach-Carle / Dale Gorius Yellowjacket

Well ID No.: NORPMW002

Initial Measurements

Well Total Depth: 218.7 ft below TOC — Water Level: 194.84 ft below TOC

Calculated Well Volume: 12.04 Gallons (using DTW = 200.27) — Well Diameter: 4 inches

Calculations: 1" diameter = 0.041 gal/ft — 2" diameter = 0.163 gal/ft — 4" diameter = 0.653 gal/ft

SS Bailer / Submersible Well Purging Activites

Purging Method (pump type): SS 4Q50 pump — Flow rate (incl. units):

Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. ~~(mS/Cm~~ µS	pH	Salinity (%)	DO (mg/l)	ORP	Total Gal Pumped	Comments
0913	bailer		18.4	1040	7.55		~~35.4~~	186.0	10	drilling mud in appearance
swab 0926			18.2	860	7.29		3.62	194.0	20	brown
1034			19.1	740	7.37		4.44	181.4	40	brown
1040			18.7	710	7.20		3.63	189.5	50	brown
1045			18.3	690	7.11		4.40	192.7	60	brown
swab 1050			18.6	670	6.97		3.65	197.8	70	brown
1152			18.8	670	7.12		4.84	188.2	80	brown
1158			18.4	660	7.15		5.18	188.2	90	brown
1204			18.9	760	7.06		4.57	181.9	100	brown
1209			17.8	670	7.05		4.73	190.6	110	brown
	submersible pump 6.5 gpm									
1350			26.6	720	7.32		4.51	174.2	112	brown
1356 ~~1400~~			20.2	620	7.28		4.36	171.8	150	light brown
1400			19.9	600	7.10		4.10	177.9	175	lighter brown
move pump up and down inside well 1410			19.3	580	6.97		5.07	182.6	240	cloudy
1420		8.43	19.4	570	6.87		5.14	185.2	305	clear
1430		1.80	19.4	560	6.79		5.00	189.2	370	clear
Results At End Of Purging:										

bailed — 30 gallons

* see separate YSP - Dev. Log for additional details

COMMENTS:
using initial measurements 1 CV = 15.58 gallons
bailed 30 gallons ; DTW = 200.50' TD = 215.70 hard bottom ; swab well
removing some fine sand after first swab by bailing
total bailed 70 gallons ; DTW = 200.36' ; swab well TD = 218.40
total bailed 110 gallons ; DTW = 200.27' // submersible pump set at midscreen DTW 200.23 prior to start of pumping

1400 DTW 200.82'
1412 DTW 200.82'
1438 DTW 200.82'

used developers
La Motte 2020we SN 5101-5014 turbidity meter
Amco primary turbidity standard 0.0 NTU — calibrate prior to measuring NTU

AerostarSES, LLC

WELL DEVELOPMENT LOG

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

ASL Project No: M3010.0019.0017.05.15TM

Installation: 5·11·17

Date: 5·15·17

Sample Technician: Heidi Dieffenbach-Carle / Dale Gaiws Yellow Jacket

Well ID No.: NORPMW002

Initial Measurements

Well Total Depth: 218.70 ft below TOC

Water Level: 194.84 ft below TOC prior to bailing muddy water

Calculated Well Volume: 12.04 Gallons using DTW = 200.27

Well Diameter: 4 inches

Calculations: 1" diameter = 0.041 gal/ft 2" diameter = 0.163 gal/ft 4" diameter = 0.653 gal/ft

Well Purging Activites

Purging Method (pump type): submersible 5S4Q50 Flow rate (incl. units): 6.5 gallons/minute (gpm)

Time	Flow Rate (~~ml/min~~) gpm	Turbidity (NTUs)	Temp (°C)	Cond. ~~(mS~~ µS/Cm	pH	Salinity (%)	DO (mg/l)	ORP	Total Gal Pumped	Comments
1440	6.5	1.94	19.4	555	6.77		4.66	187.1	475	clear
1450	6.5	1.07	19.2	549	6.82		4.96	186.3	500	clear
1500	6.5	0.93	19.5	552	6.79		5.38	186.3	565	clear
1510	6.5	1.92	19.3	542	6.82		5.02	182.7	630	clear
1520	6.5	1.28	19.4	541	6.80		5.07	181.7	695	clear
1530	6.5	0.70	19.4	545	6.87		4.86	179.2	760	clear
1540	6.5	0.59	19.5	547	6.88		4.70	177.7	825	clear
1550	6.5	0.21	19.6	545	6.99		5.02	173.6	890	clear
1552	6.5	0.69	19.4	546	7.06		4.80	171.2	900	clear
Results At End Of Purging:		0.69	19.4	546	7.06		4.80	171.2	900	clear

move pump up and down

COMMENTS:

1450 DTW 200.82

1515 recalibrate turbidity meter against 0.0 standard – reads 0.05

DTW 200.82

Norton AFB - MW002

Yellow Jacket Drilling	PROJECT NAME: Aerostar - Norton AFB		WELL NUMBER: NORP - MW002
WELL DEVELOPMENT LOG	JOB NUMBER: 17-041L CA	SITE: Norton AFB	PREPARED BY: Dale Goins
METHOD: Pump / Bailer / Other	DEVELOPMENT CRITERIA: Swab - Bail - Pump 4"		
	Remarks:		

DEVELOPMENT LOG					TOTAL	WATER QUALITY					COMMENTS
DATE	TIME	FLOW RATE (gpm)	DEPTH TO WATER (ft-btoc)	WATER REMOVAL (gal)	WATER REMOVAL (gal)	PH	SPECIFIC Conductivity (mS/cm)	TURBIDITY (NTU)	TEMPERATURE (Degrees C)		
5/15	8:50	—	194.84	—	Well	Measurements			— T.D.		218.70
	9:00	Bail									
	9:30	Stop	200.50	30	30	—			T.D.		218.70 Hard
	9:45	Swab									
	10:15	Stop	200.41	—	—				T.D.		218.20
	10:30	Bail									
	10:55	Stop	200.36	40	70				T.D.		218.70 Hard
	11:00	Swab									
	11:30	Stop	200.32	—	—				T.D.		218.40
	11:45	Bail									
	12:15	Stop	200.27	40	110				T.D.		218.70 Hard
	12:45	Install	SSQ450	To	212'	+	Prep To	Pump			
	1:50	6.50	200.23	—	110	—	Begin Pumping				
	2:20	6.50	200.82	195	305	6.87	570	8.43	19.4		
	2:50	6.50	200.82	390	500	6.85	549	1.07	19.2		
	3:20	6.50	200.82	585	695	6.80	541	1.28	19.4		
	3:50	6.50	200.82	780	890	6.87	546	0.21	19.6		
	3:50	—	Stop	Pumping	—	Trip out					
	4:25	—	200.27	Final	Measurements			—	T.D.		218.70

AerostarSES, LLC

WELL DEVELOPMENT LOG

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

ASL Project No: M3010.0019.0017.05.15TM

Installation: Former Norton AFB

Date: 4/17/17 – 4/18/17

Sample Technician: * Developed by Dale Gibbs / Albert Strother - XDD / Tim Allen - Aerostar

Well ID No.: NORP MW 003

*well repaired - new TD: = 219.75'

Initial Measurements

Well Total Depth: ~~232.50~~ 232.75 (TC) ft below TOC

Water Level: 148.40 ft below TOC

Calculated Well Volume: (Initial) 54.665 Gallons

Well Diameter: ~ 4 inches (sch-80)

Calculations: 1" diameter = 0.041 gal/ft 2" diameter = 0.163 gal/ft 4" diameter = 0.653 gal/ft

Well Purging Activites

Purging Method (pump type): SS Bailer

Flow rate (incl. units): *varies

	Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. (mS/Cm	pH	Salinity (%)	DO (mg/l)	ORP	Total Gal Pumped	Comments
4/17/17	0900	–	over range	P. Brown/gray	– drilling mud					60	– via SS Bailer
*let recharge	0925	–	over range								WL: 200' BTOC
	0940	–	over range	19.48	0.494	7.05	–	8.72	175.7	61	prior
											* see separate XDD-Dev. log
	1025										begin swabbing/surging
	1030										stop – broken end cap?
											swabbing well?
4/18/17	1435	swab/surge screen			(uS/cm)						– well repaired/replace
	1519			22.85	606	8.02	–	5.88	158.2		*see separate XDD log
	1613			21.44	575	7.49	–	8.86	157.2		Brown/turbid w/ fines
	1630									+ 55	– stop bailing
										55 gal	after grout
Results At End Of Purging:										~116	gal 4/17-4/18 total

for additional details

COMMENTS: 0800 – development int. on 4/17/17 w/ SS Bailer
* primarily drilling mud @ beginning of development.
*see separate XDD-Well Development log (NORPMW003) for additional details
* 4/18 – air lift out sand / install PVC pump (new bottom) in well

AerostarSES LLC

WELL DEVELOPMENT LOG

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

ASL Project No: M3010.0019.0017.05.15TM

Installation: Former Norton AFB

Date: 4/19/17

Sample Technician: Dale Goins / Albert Strother, YSD, Tim Allen-Akosh

Well ID No.: NORPMW003

Initial Measurements (4/19/17)

Well Total Depth: ~~232.5~~ 219.75 ~~219.25~~ ft below TOC (R)

Water Level: ~~148.48~~ 196.39 ft below TOC

Calculated Well Volume: ~~54.665~~ 15.18 ~~44.44~~ Gallons

Well Diameter: ~4 inches

Calculations: 1" diameter = 0.041 gal/ft 2" diameter = 0.163 gal/ft 4" diameter = 0.653 gal/ft

Well Purging Activites

Purging Method (pump type): SS Bailer / Grundfos pump

Flow rate (incl. units): varies

Time	Flow Rate (gpm) ~~(ml/min)~~	Turbidity (NTUs)	Temp (°C)	Cond. (mS/cm) ~~(mS/Cm)~~	pH	Salinity (%)	DO (mg/l)	ORP	Total Gal Pumped	Comments
0740										DTW = 196.39 / TD: 218.6
										- swab/bail/purge (/scre
1050	* see	separate	YSD	Dev.	Log.					- pump installed / begin pump
1055	~3.5		21.51	544	7.12	-	6.18	105.2		
1100			22.03	523	7.00	-	5.94	107.6	~135	
1105		71.3	22.16	521	6.93	-	5.87	111.9		
* additional parameters collected * see separate YSD Dev. Log.										
~~1200~~									345	
* additional parameters collected * see separate YSD Dev log										
~~1200~~	—									
~~*~~										
1230									450	~~End~~
Results At End Of Purging:										

COMMENTS:

AerostarSES

WELL DEVELOPMENT LOG

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

ASL Project No: M3010.0019.0017.05.15TM

Installation: Former Norton AFB

Date: 4/19/17

Sample Technician: Tim Cullen-Aerostar, Dale/Albert - XDP

Well ID No.: NORP MW003

Initial Measurements (4/19/17)

Well Total Depth: ~~232.5~~ 218.75 ft below TOC (TC) Water Level: ~~148.40~~ 196.39 ft below TOC

Calculated Well Volume: ~~54.665~~ 15.718 Gallons Well Diameter: ~4 inches

Calculations: 1" diameter = 0.041 gal/ft 2" diameter = 0.163 gal/ft 4" diameter = 0.653 gal/ft

Well Purging Activites

Purging Method (pump type): pump - SS. Grundfos Flow rate (incl. units): ~3.5 gpm

Time	Flow Rate gpm ~~(ml/min)~~	Turbidity (NTUs)	Temp (°C)	Cond. (mS/Cm	pH	Salinity (%)	DO (mg/l)	ORP	Total Gal Pumped	Comments
1240	~3.5	2.96	22.35	0.502	6.84	—	6.66	122.0		
1245			22.35	0.503	6.86	—	6.65	122.1		
1250			22.35	0.504	6.87		6.62	121.7		
* Additional parameters collected * see seperate XDP-Dev. Log.										
~~1530~~										
1730	~3.5	4.21	22.09	0.485	6.85		—	—	~1500	- stop pumping
Results At End Of Purging:										

COMMENTS:

AerostarSES, LLC

WELL DEVELOPMENT LOG

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

ASL Project No: M3010.0019.0017.05.15TM

Installation: Former Norton AFB

Date: 4/20/17

Sample Technician: Tim Collin - Aerostar, Dale / Albert - YJD.

Well ID No.: NORPMW003

Initial Measurements on 4/19/17

Well Total Depth: 219.75 ft below TOC

Water Level: 196.39 ft below TOC

Calculated Well Volume: ~ 15.18 Gallons

Well Diameter: ~ 4 inches (4") Sch-80 pvc

Calculations: 1" diameter = 0.041 gal/ft 2" diameter = 0.163 gal/ft 4" diameter = 0.653 gal/ft

Well Purging Activites

Purging Method (pump type): SS Grundfos

Flow rate (incl. units): ~ 3.5 gpm

Time	Flow Rate gpm ~~(ml/min)~~	Turbidity (NTUs)	Temp (°C)	Cond. ~~(mS/Cm)~~ (us/cm)	pH	Salinity (%)	DO (mg/l)	ORP	Total Gal Pumped	Comments
0720										IDTW: 196.40
0730	~ 3.5									* resume development/pumping
0800		1.68	21.84	486	7.01	—	—	—	1605	
0825			21.70	485	7.12	—	5.67	50.8		
0830			21.71	484	7.07	—	—	—	1710	
* Additional parameters collected * see separate YJD. Dev. Log (NORPMW003)										
1330		0.80	22.06	480	7.27	—			2265	
1400		0.63	22.07	479	7.24	—			2865	
1430		0.89	22.16	480	7.24	—			2970	
1430									2970	Stop pumping
1520										Final DTW: 196.24
										Final TD: 219.75
Results At End Of Purging:		0.89	22.16	480	7.24				2970	

COMMENTS: * Development completed by Yellow Jacket Drilling (YJD)
NORPMW003
TD: 219.75
SC: 213.2 - 219.75
4" Sch-80 PVC
0.020" slot screen
Tot. gal pumped ~ 2970
Final Water Level: ~~219.75~~ 196.24

Norton AR # [illegible]

Date	Time	Work Hours	Description		Total	Water Quality				Comment
7/2	5:00	—	[illegible]	—	[illegible]	[illegible]	[illegible]	[illegible]	TD	[illegible]
	7:00	[illegible]								
	7:00	[illegible]	[illegible]							
	7:00		[illegible]							
	7:00		[illegible]							
	7:00		[illegible]							
	7:00		[illegible]							
	7:00		[illegible]							
	7:00		[illegible]							
	7:00		[illegible]							
	7:00		[illegible]							
	7:00		[illegible]							
	7:00		[illegible]							
	7:00		[illegible]							
	7:00		[illegible]							
	7:00		[illegible]							
	7:00		[illegible]						TD	[illegible]
	10:00	—	[illegible]	—						
	10:05	—	Pump [illegible]							
	10:10	—	Stop [illegible]						TD	217.00
			well Pump [illegible]						well	
	10:20	—	Flush well							
	10:25	—	Begin [illegible]							
	10:35	—	Stop [illegible] - [illegible]							[illegible]
7/10	9:00	—	1930	well Measurement						226.00
	9:15	—	Start Air Lift	[illegible]	+	Prep to	Air Lift			
	10:00	—	Air Lift out 6' and Trip out							
	11:45	—	Tag Bottom						TD	230.00
	11:45	—	Start [illegible]							
	12:00	—	Tag Bottom w/ Bailer						TD	219.75

Jacket Drilling
DEVELOPMENT LOG
METHOD
Pump
Bailer
Other

PROJECT NAME: Aeros Air - Norton AFB
JOB NUMBER: 17-0911 CA
DEVELOPMENT CRITERIA:
Remarks:
WELL NUMBER: NORB MW-003
SITE: Norton AFB
PREPARED BY: Dale Gorr

DEVELOPMENT LOG

DATE	TIME	FLOW RATE (gpm)	DEPTH TO WATER (ft-toc)	WATER REMOVAL (gal)	TOTAL WATER REMOVAL (gal)	WATER QUALITY PH	SPECIFIC Conductivity (mS/cm)	TURBIDITY (NTU)	TEMPERATURE (Degrees C)	COMMENTS
7/18	2:35	—	196.92	Swab					T.D.	219.75
	2:50	Stop	193.95						T.D.	218.50
	3:00	Bail								
	3:30	Stop	198.70	20					T.D.	219.75
	3:35	Swab								
	3:45	Stop	190.27	—					T.D.	219.75
	3:50	Bail								
	4:30	Stop	197.60	35	55				T.D.	219.75
7/19	7:40	—	196.39	—	well Measurements				T.D.	218.60
	7:50	Swab								
	8:10	Stop	195.80						T.D.	219.25
	8:35	Bail								
	9:15	Stop	196.49	40	95				T.D.	219.75
		Install Pump + Prep For Pumping								
	10:50	6.00	196.40	Begin Pumping						
	10:52	3.50	213.50	Reduce Flow Rate						
	11:00	3.50	211.65	40	135	6.99	0.523	71.3	22.10	
	11:30	3.50	212.13	145	240	6.94	0.511	21.1	22.43	
	12:00	3.50	212.48	250	345	6.90	0.507	18.0	22.45	
	12:30	3.50	212.42	355	450	6.91	0.504	12.1	22.35	
	1:00	3.50	212.30	460	555	6.85	0.501	1.71	22.33	
	1:30	3.50	212.40	565	660	6.88	0.499	1.11	22.32	
	2:00	3.50	212.61	670	765	6.87	0.497	2.35	22.24	
	2:30	3.50	212.76	775	870	6.84	0.496	1.65	22.23	
	3:00	3.50	212.62	880	975	6.85	0.493	1.91	22.20	
	3:30	3.50	212.83	985	1080	6.87	0.491	4.37	22.17	
	4:00	3.50	212.60	1090	1185	6.87	0.490	2.62	22.16	
	4:30	3.50	212.35	1195	1290	6.85	0.487	2.39	22.17	
	5:00	3.50	212.40	1300	1395	6.84	0.486	2.94	22.03	
	5:30	3.50	212.23	1405	1500	6.85	0.485	4.21	22.09	

Jacket Drilling
WELL DEVELOPMENT LOG

METHOD:
Pump
Bailer
Other

PROJECT NAME: Aerostar - New Lon AFB
JOB NUMBER: 17-0977 CA
WELL NUMBER: NORT MW-003
SITE: Norton AFB
PREPARED BY: Wile Gomez
DEVELOPMENT CRITERIA:
Remarks:

DEVELOPMENT LOG

DATE	TIME	FLOW RATE (gpm)	DEPTH TO WATER (ft-btoc)	WATER REMOVAL (gal)	TOTAL WATER REMOVAL (gal)	WATER QUALITY PH	SPECIFIC Conductivity (mS/cm)	TURBIDITY (NTU)	TEMPERATURE (Degrees C)		COMMENTS
4/20	7:20	—	196.40								
	7:30	3.50	196.40	Begin Pumping							
	8:00	3.50	205.82	1510	1605	7.01	0.486	1.68	21.84		
	8:30	3.50	206.96	1615	1710	7.07	0.484	1.49	21.71		
	9:00	3.50	206.93	1720	1815	7.12	0.483	0.70	21.70		
	9:30	3.50	206.95	1825	1920	7.16	0.482	1.05	21.75		
	10:00	3.50	206.67	1930	2025	7.18	0.481	0.63	21.77		
	10:30	3.50	206.03	2035	2130	7.20	0.481	0.66	21.91		
	11:00	3.50	206.11	2140	2235	7.20	0.480	0.39	21.93		
	11:30	3.50	205.98	2245	2340	7.22	0.480	0.74	21.99		
PM	12:00	3.50	205.94	2350	2445	7.21	0.481	0.42	21.98		
	12:30	3.50	205.48	2455	2550	7.23	0.480	0.45	22.12		
	1:00	3.50	205.53	2560	2655	7.23	0.480	1.08	22.10		
	1:30	3.50	205.60	2665	2760	7.27	0.480	0.80	22.06		
	2:00	3.50	205.56	2770	2865	7.24	0.479	0.63	22.07		
	2:30	3.50	205.34	2875	2970	7.24	0.480	0.89	22.16		
	2:30	—	Stop Pumping								
	—	—	Tripout	—							
	3:20	—	196.24	— Final Measurements — TD:							219.75

AerostarSES LLC

WELL DEVELOPMENT LOG

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

ASL Project No: M3010.0019.0017.05.15TM

Installation: Former Norton AFB

Date: 4/20/17

Sample Technician: Tim Cullen - Aerostar, Dale Gong - YJD

Well ID No.: NORP MW004

Initial Measurements

Well Total Depth: 219.20 ft below TOC Water Level: 146.65 ft below TOC

Calculated Well Volume: 47.16 Gallons Well Diameter: ~4 inches

Calculations: 1" diameter = 0.041 gal/ft 2" diameter = 0.163 gal/ft 4" diameter = 0.653 gal/ft

Well Purging Activites

Purging Method (pump type): SS Bailer Flow rate (incl. units): ~1.4 gpm

Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. (mS/Cm	pH	Salinity (%)	DO (mg/l)	ORP	Total Gal Pumped	Comments
0900										Init. measurements
0905										Begin Bailing
0915		>1000 over range	21.00	0.852	6.10	–	4.39	225.6	~20	* Drill mud - Brown/tan w/ fines (fine sand)
0920		>1000	19.41	0.834	6.49	–	2.42	223.1		
0925		> 1,000	19.03	0.794	6.86	–	3.82	221.7	~45	
0950									90	
1030		>1000 over range	18.52	0.585	6.76	–	4.49	227.1	180	
1050										swab / surge screen
1130		>1000	19.26	0.577	7.24	–	4.28	166.0		resume - bailing
1145		>1000	18.96	0.545	7.03	–	4.13	201.2	~~230~~	stop bailing
1150									230	@ 1150 DTW ~202'
Results At End Of Purging:										

COMMENTS: 0830 - setup @ MW004
* Development conducted by YJD
* see seperate YJD Dev. Log for additional details

AerostarSES LLC

WELL DEVELOPMENT LOG

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

ASL Project No: M3010.0019.0017.05.15TM

Installation: Former Norton AFB

Date: 4/21/17

Sample Technician: Tim Collier - (Aerostar), Dale Goins / Albert Strothers - XSD

Well ID No.: NORP MW004

Initial Measurements – 4/20/17

Well Total Depth: 219.20 ft below TOC Water Level: 146.65 ft below TOC

Calculated Well Volume: 47.16 Gallons Well Diameter: ~4 inches

Calculations: 1" diameter = 0.041 gal/ft 2" diameter = 0.163 gal/ft 4" diameter = 0.653 gal/ft

Well Purging Activites

Purging Method (pump type): SS Bailer / SS Grundfos Pump Flow rate (incl. units): *varies, pump = ~6.5 gpm

Time	Flow Rate ~~(ml/min)~~	Turbidity (NTUs)	Temp (°C)	Cond. (mS/Cm	pH	Salinity (%)	DO (mg/l)	ORP	Total Gal Pumped	Comments
0810										DTW: 201.77 / TD: 219.20
0815										Swab / surge screen
0905									—	Begin Bailing
0910		>1000	18.93	0.558	7.62	—	6.31	134.4		- Brown / Nodes
0920		>1000	18.64	0.542	7.34	—	4.38	150.2	275	
0935									305	stop bailing
										* set pump
1030	~6.5 gpm									begin purging
1032			19.55	0.517	7.24	—	5.28	57.5		
1035		360	19.52	0.515	7.22		5.05	56.8		
1038		57.5	19.49	0.513	7.21		5.04	57.0		
1050		6.70	19.32	0.507	7.18		4.91	52.5		
1100		4.65	19.30	0.507	7.18				500	
1120		2.95	19.27	0.505	7.20	—	-	51.5		
* Additional parameters collected * see separate XSD Dev. Log										
1300		0.68	19.18	0.500	7.08		4.95	48.6	1280	
1305		0.81	19.10	0.499	7.08	-	4.96	49.2		
Results At End Of Purging:										

COMMENTS: 0730 - Setup
* see separate XSD Dev. log for additional details

AerostarSES, LLC

WELL DEVELOPMENT LOG

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

ASL Project No: M3010.0019.0017.05.15TM

Installation: Former Norton AFB

Date: 4/21/17

Sample Technician: Tim Cullen - Aerostar, Dale / Albert - YSD

Well ID No.: NORPMW004

Initial Measurements - 4/20/17

Well Total Depth: 219.20 ft below TOC Water Level: 146.65 ft below TOC

Calculated Well Volume: 47.16 Gallons Well Diameter: ~4 inches

Calculations: 1" diameter = 0.041 gal/ft 2" diameter = 0.163 gal/ft 4" diameter = 0.653 gal/ft

Well Purging Activites

Purging Method (pump type): SS Grundfos pump Flow rate (incl. units): ~6.5 gpm

Time	Flow Rate ~~(ml/min)~~	Turbidity (NTUs)	Temp (°C)	Cond. (mS/Cm	pH	Salinity (%)	DO (mg/l)	ORP	Total Gal Pumped	Comments
1310	~6.5 gpm	0.60	19.16	0.498	7.05	--	4.93	49.5		- clear no odor
1315		0.45	19.15	0.497	7.04		4.94	49.3		
1320		0.50	19.15	0.496	7.06		4.96	49.0		
1330									1475	- stop pump
										- remove pump
1420										DTW: 201.79
Results At End Of Purging:		0.50	19.15	0.496	7.06	--	4.96	49.0	1475	

COMMENTS: * Development conducted by YSD
Final TD: 219.20
Final DTW: 201.79 @ 1420
* See separate YSD - Dev. Log for additional details

Nor Ten AFB — MW 004

Date	Time	Flow Rate (gpm)	Water Level (ft)	Drawdown (ft)	Total (gal)	pH	Temperature (°C)	Conductivity (mS/cm)	Turbidity (NTU)	Comments
7/20	9:00	—	146.65	—	well	measurement			T.D.	219.20
	9:05	Bail								
	10:30	Stop	202.05	180					T.D.	219.20 Hard
	10:50	Start								
	11:20	Stop	202.15	—					T.D.	219.20 Hard
	11:30	Bail								
	11:50	Stop	202.00	50	230				T.D.	219.20 Hard
7/21	8:10	—	201.77	—	well	measurement			T.D.	219.20 Hard
	8:45	Start								
	8:55	Stop	202.90						T.D.	219.20
	9:05	Bail								
	9:55	Stop	201.95	75	305				T.D.	219.20 Hard
	10:30	6.50	201.90	—	Begin Pumping					
	11:00	6.50	202.38	195	500	7.18	0.507	4.56	19.30	
	11:30	6.50	202.40	390	695	7.13	0.505	2.09	19.29	
9AM	12:00	6.50	202.39	585	890	7.20	0.505	1.36	19.30	
	12:30	6.50	202.41	780	1085	7.03	0.504	0.91	19.27	
	1:00	6.50	202.40	975	1280	7.08	0.500	0.68	19.18	
	1:30	6.50	202.39	1170	1475	7.06	0.499	0.38	19.13	
	1:30	—	Stop	Pumping						
			Trip	out	Pump + Tubing					
	2:20	—	201.79	—	Final	measurement				219.20 Hard

AerostarSES LLC

WELL DEVELOPMENT LOG

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

ASL Project No: M3010.0019.0017.05.15TM

Installation: Former Norton AFB

Date: 4/22/17

Sample Technician: Tim Collier - Aerostar, Pate / Albert - YSD

Well ID No.: HORP MW005

Initial Measurements - 4/22/17

Well Total Depth: 219.5 ft below TOC Water Level: 112.75 ft below TOC

Calculated Well Volume: 69.39 Gallons Well Diameter: ~4 inches

Calculations: 1" diameter = 0.041 gal/ft 2" diameter = 0.163 gal/ft 4" diameter = 0.653 gal/ft

Well Purging Activites

Purging Method (pump type): SS. Bailer Flow rate (incl. units):

Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. ~~(mS/Cm~~ uS/cm	pH	Salinity (%)	DO (mg/l)	ORP	Total Gal Pumped	Comments
1015										# DTW: 112.75 / TD: 219.50
1025										- Begin bailing
1100		- Brown / Turbid w/ fines							~65	stop
1240-1340										- surge / surge well / screen
# additional parameters collected - see separate YSD log.										- cont. Bailing
1348		>1000 - over range	22.07	893	8.23	—	6.10	-5.8		
1350			22.13	888	8.20	-	6.79	-39.2		
1515			22.48	804	8.09		4.20	-17.0		# surge / surge
1520			20.47	684	7.92		5.53	-29.0	105	# surge / surge
1645			22.53	758	8.11		3.20	-29.3		
1650			22.53	756	8.01		3.92	-9.6		
1655			20.71	704	7.92		5.17	-14.0		
1700			19.72	633	7.70		6.35	-10.7		
1705			19.93	636	7.74		4.53	-14.9		
1715		over range	19.53	613	7.71	—	6.60	-10.7	200	
Results At End Of Purging:										

* see separate YSD-Dev. Log for additional details

COMMENTS: 1000 - begin setup

AerostarSES, LLC

WELL DEVELOPMENT LOG

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

ASL Project No: M3010.0019.0017.05.15TM

Installation: Former Norton AFB

Date: 4/23/17

Sample Technician: Jim Collier / Kaleb Brumbaugh - Aerostar, Dale/Abbot - YSD

Well ID No.: NORP MW005

(4/23/17) Initial Measurements

Well Total Depth: 219.5 ft below TOC Water Level: 195.75 ft below TOC

Calculated Well Volume: 15.44 Gallons Well Diameter: ~4 inches

Calculations: 1" diameter = 0.041 gal/ft 2" diameter = 0.163 gal/ft 4" diameter = 0.653 gal/ft

Well Purging Activites

Purging Method (pump type): SS Bailer / SS Grundfos pump Flow rate (incl. units): ~4 gpm

IDTW: 195.25
TD: 219.5

Time	Flow Rate ~~(ml/min)~~	Turbidity (NTUs)	Temp (°C)	Cond. ~~(mS/cm)~~	pH	Salinity (%)	DO (mg/l)	ORP	Total Gal Pumped	Comments
8-820									200	Swab/surge screen
825-840		Bail							~250	Bail
0920										Begin pumping DTW 192.81
0925		over range	21.28	0.236	7.11	-	8.87	55.4		
0930	~4 gpm		21.14	749	7.32	-	6.45	21.3	310	DTW: 214.05 * additional measurement taken * See separate YSD log
0935		126	21.92	661	7.18	-	5.65	6.1	330	set pump @ 219
0940		46.5	21.8	620	7.19	-	5.66	8.6	350	
0945		11.7	27.7	659	7.17	-	5.71	7.7	370	
0950		12.50	21.61	649	7.17	-	5.78	6.2	390	DTW 213.70
1020		4.95	21.51	625	7.15	-	5.84	18.9	510	
1025		4.09	21.49	623	7.15	-	5.82	20	530	
1030	~4 gpm	4.52	21.44	621	7.15	-	6.28	20.5	550	
1035		8.29	21.42	620	7.14	-	5.93	23.6	570	DTW 214.21
1040		8.05	21.42	620	7.14	-	5.86	23.7	590	
1120		10.5	21.42	608	7.15	-	5.68	31.7	750	DTW 214.76
1125		12.5	21.42	607	7.14	-	5.69	35.8	770	
1130	~4 gpm	25.6	21.42	605	7.14	-	5.66	39.9	790	
Results At End Of Purging:										

COMMENTS: * Development Conducted by YSD

AerostarSES LLC

WELL DEVELOPMENT LOG

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

ASL Project No: M3010.0019.0017.05.15TM

Installation: Former Norton AFB

Date: 4/23/17

Sample Technician: Tim Collier, Kaleb Brumbaugh - Aerostar, Patel/Albert - YSD

Well ID No.: NORPMW005

4/23/17 Initial Measurements

Well Total Depth: 219.5 ft below TOC

Water Level: 195.75 ft below TOC

Calculated Well Volume: 15 ~~gal~~ Gallons

Well Diameter: ~4 inches

Calculations: 1" diameter = 0.041 gal/ft 2" diameter = 0.163 gal/ft 4" diameter = 0.653 gal/ft

Well Purging Activites

Purging Method (pump type): SS. Grundfos pump Gopher

Flow rate (incl. units): ~4 gpm

Time	Flow Rate (~~ml/min~~)	Turbidity (NTUs)	Temp (°C)	Cond. (~~mS/Cm~~)	pH	Salinity (%)	DO (mg/l)	ORP	Total Gal Pumped	Comments
1135	~4 gpm	22.9	21.41	603	7.14	–	5.73	41.7	810	DTW: 214.6
1140		11.9	21.38	603	7.15	–	5.68	43.8		
1145		14.2	21.37	601	7.15	–	5.64	44.7		
1210		15.1	21.40	602	7.13	–	5.90	49.1		
1215		13.7	21.39	601	7.13	–	5.73	50.9	970	DTW 214.8
1220		11.9	21.40	602	7.13	–	5.66	48.6		
1225	~4 gpm	14.5	21.42	606	7.13	–	5.67	48.0	1010	(1019 gal ref)
1300										DTW: 195.04
Results At End Of Purging:		14.5	21.42	606	7.13	–	5.67	48.0	1010	

* see separate YSD-dev. log for additional measurements/details

COMMENTS: * Development conducted by YSD

Final TD: 219.50

DTW - 195.04

Performed Drilling
Well Construction

PROJECT NAME: [illegible] Nordh AR 576448 F 15 WELL NUMBER: [illegible] 1946162223
DATE: 1/-2-11 [illegible] WELL OPERATOR: [illegible]

OTHER:
Pump
Bailer
Other

DEVELOPMENT CRITERIA:

Remarks:

DEVELOPMENT LOG					TOTAL	WATER QUALITY				COMMENTS
DATE	TIME	FLOW RATE (gpm)	DEPTH TO WATER (feet)	DRAW DOWN (feet)	PUMPED (gallons)	pH	SPECIFIC CONDUCTANCE (µS/cm)	TURBIDITY (NTU)	TEMPERATURE (degrees C)	
1/22	10:15	—	192.75	—	[illegible]	Measure [illegible]			7.12	219.50
	10:25	Bail								
	11:00	Stop	219.25	6.5						
	11:13	—	218.00							
	11:23	—	217.00			Raw Recharge Rate				
	—	—	216.00							
	11:30	—	211.90							
	12:10	Sub								
	1:10	Stop	196.95						7.12	219.50
	1:15	Bail								
	1:55	Stop	218.00	20	85				7.12	219.50
	1:57	—	215.00							
	2:05	—	212.00							
	2:08	—	209.00			Raw Recharge Rate				
	2:14	—	206.00							
	2:20	—	203.00							
	2:29	—	200.00							
	2:35	Sub								
	3:05	Stop	193.05						7.12	219.50
	3:10	Bail								
	3:20	Stop	215.50	20	105					
	3:24	—	212.00							
	3:28	—	209.00			Raw Recharge Rate				
	3:38	—	206.00							
	3:42	Sub								
	4:10	Stop	183.50						7.12	219.50
	4:15	Bail		25						
	5:15	Stop	210.00	[illegible]	200					

Yellow Jacket Drilling	PROJECT NAME: Aeros Tax	WELL NUMBER: NORP MW 003	
WELL DEVELOPMENT LOG	JOB NUMBER: 17-0771 CA	SITE: Norton AFB	PREPARED BY: Dale
METHOD:	DEVELOPMENT CRITERIA		
Pump			
Bailer	Remarks:		
Other			

DEVELOPMENT LOG					TOTAL	WATER QUALITY				COMMENTS
DATE	TIME	FLOW RATE (gpm)	DEPTH TO WATER (ft bgs)	WATER REMOVAL (gal)	WATER REMOVAL (gal)	PH	SPECIFIC CONDUCTIVITY (mS/cm)	TURBIDITY (NTU)	TEMPERATURE (Degrees C)	
7/25	7:50	—	195.75	—	well	Measurements —			T.D.	219.50
	8:00	Swab		—	200				T.D.	219.50
	8:20	Stop	184.07							
	8:25	Bail							T.D.	219.50
	8:40	Stop	202.50	50	250					
	9:20	6.50	192.81	Begin	Pumping					
	9:28	4.00	216.00	52	302	—	Produce	Flow Rate		
	9:30	4.00	214.35	60	310					
	10:00	4.00	213.76	180	430	7.21	0.639	6.57	21.64	
	10:30	4.00	214.15	300	550	7.18	0.623	45.2	21.44	
	11:00	4.00	214.44	420	670	7.16	0.611	5.95	21.42	
	11:30	4.00	214.60	540	790	7.16	0.604	25.0	21.43	
	12:00	4.00	214.81	660	910	7.20	0.603	19.03	21.39	
12/25	12:30	4.00	214.80	760	1010	7.32	0.526	14.90	21.48	
	12:25	—	Stop	Pumping						
	—	—	Trip	out	Pump	+	Pipe			
	1:00	—	195.07	—	Final	Measurements	—	T.D.		

AerostarSES, LLC

WELL DEVELOPMENT LOG

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

ASL Project No: M3010.0019.0017.05.15TM

Installation: Former Norton AFB

Date: 4/24/17

Sample Technician: Tim Collier, Jens Walker, Pirle/Albert - YSD

Well ID No.: NORPMW006

Initial Measurements

Well Total Depth: 221.6 ft below TOC Water Level: 163.54 ft below TOC

Calculated Well Volume: 37.74 Gallons Well Diameter: ~4 inches

Calculations: 1" diameter = 0.041 gal/ft 2" diameter = 0.163 gal/ft 4" diameter = 0.653 gal/ft

Well Purging Activites

Purging Method (pump type): SS. Bailer Flow rate (incl. units):

Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. (mS/Cm	pH	Salinity (%)	DO (mg/l)	ORP	Total Gal Pumped	Comments
1205										IDTW: 163.54 TD: 221.60
1210		>1000	21.10	1.048	7.82	–	2.06	130.8	25	Begin bailing - drill mud
1235		Brown/Turbid							40	
1435-1535										swab/surge screen
1540			23.12	0.805	7.95	–	2.12	173.0		
1555			21.74	0.916	7.86	–	2.14	163.3		
1600		>1000 orange	20.75	0.798	7.72	–	4.03	160.8	80	
1610 (1615-1700) surge			20.15	0.732	7.52	=	6.30	158.3	100	swab/surge
1705		>1000	22.05	0.729	7.61	–	3.36	135.5		resume bailing
1710		↓	21.06	0.794	7.74	–	3.34	142.1		
1715			20.69	0.743	7.65	–	4.33	140.7		
1720			20.33	0.735	7.54	–	5.25	140.2	150	stop development
* see separate YSD - Dev. log for additional details										
Results At End Of Purging:										

COMMENTS: * Development conducted by YSD.
* Additional measurements collected * see separate YSD development logs
* see separate well dev. logs for completion of development @ NORPMW006
cont. on 4/25/17

Project Name: [illegible]

Well Project No.: [illegible]

Location: Forney Norton AFB

Date: 9/25/17

Technician: Kalob Rosebaugh

Weather: Mostly cloudy

Pg 1 of 2

Initial Measurements

Well Sounded Depth: [illegible] Water Level: 193.49

Measured Well Volume: 18.362 Casing: 4

Condition: [illegible]

Well Purging Activities

Purging Method Used and Equipment: Sub/Bailer/Sub/Submersible Avg. 3 gal/min

Time	Flow Rate (gal/min)	Volume (gal)	Temp (°C)	Cond (µS/cm)	pH	Eh (mV)	DO (mg/L)	Turbidity (NTU)	Comments
0915									Start
0919	Bailer Sub	0.5	24.75	0.624	7.50				5 gal bail
0920	" "	0.5	24.89	0.621	7.47				20 gal bail
0925	" "	0.5	24.87	0.621	7.40				40 gal bail
0945	" "	0.5	24.84	0.623	7.33				55 gal bail
0955									DTW w/pump: 193.49'
0955									Pump Start
0955	6.5 gal/min	0.5	24.85	0.619	7.45		3.94	767	825
0955	4 gal/min	0.5	24.84	0.619	7.44		3.92	759	110
0960		0.5	24.0	0.619	7.41		6.01	755	130
0965	4 gal/min	0.5	24.59	0.615	7.38		5.13	745	146
0970	3 gal/min	0.5	24.06	0.615	7.39		5.06	735	209
0975	" "	1.50	23.95	0.609	7.43		5.66	7.4	204
0980	" "	1.50	23.81	0.609	7.32		5.31	7.20	209
0985	" "	2.17	23.60	0.606	7.33		5.23	7.24	329
0990	" "	1.50	23.55	0.605	7.35		5.17	7.10	344
0995	" "	1.50	23.59	0.603	7.35		5.12	6.95	464
1000	" "	2.68	23.50	0.604	7.33		5.10	6.99	344
1040	" "	3.15							

Sample Collected Points

SEE NEXT PAGE

COMMENTS: DTW

0930 Tag @ 195.10', TOB 224.60

0935 Swab

0945 Stop Swab, Tag DTW @ 193.47

0950 Bail

0955 DTW: 196.20'

0955 Pump Start

0955 Pump Shut Off

Hyd/min

[illegible] 2 gal/min, [illegible]

[illegible]

Move 150 gal Bailed DR 9/24/17

@ Total 3 gal/min

OR = Out of Range

Pg 2 of 2

WELL DEVELOPMENT LOG

Project Name:
Well Tested for:
Technician:
Date: 4/25/17
Well ID No.:

Site Description or Reference Concerning Well Location (Map, GPS, Landmark):
Former Vulcan AES
Lakeb Brookhaven
MRF MW06

Development Method: Surge

Initial Measurements

Water Table Depth: 22.6 Feet TOC
Water Level: 132.95 Feet TOC
Calculated Well Volume: 15.363 Gallons
Well Diameter: 4 Inches
Calculation: 1" diameter - 0.041 gal/ft; 2" diameter - 0.163 gal/ft; 4" diameter - 0.653 gal/ft

Well Purging Activities

Purging Method (pump type): 2 only/Bailer(s)/submersible/centrifugal/other: Surge/Air

Time	Flow Rate (gpm)	Turbidity (NTU)	Temp (°C)	DO (mg/L)	pH	Water Level (ft)	DO (mg/L)	ORP (mV)	Total Gal Purged	Comments
1155	3gal/min	3.24	22.43	0.61	7.25		5.17	66.5	309	DTW 212.45'
1150	" "	3.41	22.48	0.62	7.25		5.20	66.4	324	
1155	" "	2.24	22.49	0.61	7.25		5.18	66.4	339	DTW 212.55'
1200	" "	2.96	22.43	0.61	7.26		5.18	65.8	354	DTW 212.70'
		pump shut off								
Result of Well Purging:		2.96	22.43	0.61	7.26		5.18	65.8	354	

Pump from 4/24/17

COMMENTS:

NGRPM0006

4/24	1205	—	163.54	—	Well	T.P. 221.60
	1210					
	1235			40		
	1240	—				
	1245	—				
	1250	—				
	1255	—				
	1300	—				
	1305	—				
	1310	—				
	1315	—				
	1320	—				
	1325	—				
	1330	—				
	1335	—				
	1340	—				
	1345	—				
	1350	—				
	1355	—				
	1400	—				
	1405	—				
	1410	—				
	1415	—				
	2:35	Swab				
	3:35	Stop				T.P. 221.60
	3:40	Bail				
	4:10	Stop		60	100	
	4:11					
	4:12					
	4:13					
	4:14					
	4:15					
	4:16					
	4:17					
	4:18					
	4:19					
	4:20	Swab				
	5:00	Stop				T.P. 221.60
		Bail				

9/25	20	5/8			150					
9/25	730	—	195 M	—						
					200					
9	25	6.5		—	Rear Pumps					
					260					
10:00	100				360					
10:30					450	25	0.608	170	22.59	
11:00					540	25	0.604	199	22.59	
11:30					630	25	0.602	269	22.59	
12:00	100				720	25	0.602	296	22.50	
12:00	—	Stop	Pumping	—					FD	221.60
12:35	—	195.21	—	Final						

AerostarSES LLC

WELL DEVELOPMENT LOG

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

ASL Project No: M3010.0019.0017.05.15TM

Installation: Former Norton AFB

Date: 5/16 – 5/18

Sample Technician: Heidi Dieffenbach - Cycle - Cardno, Dale/Albert - YSD, Tim Miller - Arcadis

Well ID No.: NORPMW007

Initial Measurements

Well Total Depth: 219.0 ft below TOC (soft)

Water Level: 156.30 ft below TOC

Calculated Well Volume: _____ Gallons

Well Diameter: ~4 inches

Calculations: 1" diameter = 0.041 gal/ft 2" diameter = 0.163 gal/ft 4" diameter = 0.653 gal/ft

Well Purging Activites

Purging Method (pump type): SS Bailer

Flow rate (incl. units): _____

Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. (mS/Cm	pH	Salinity (%)	DO (mg/l)	ORP	Total Gal Pumped	Comments
0855										TOW: 156.30 TD: 219.0
0900										Begin bailing
0930									40	stop bailing "Dry"
* Additional details / measurements collected *										
* see separate YSD - Development logs 5/16 – 5/18/17										
5/18/17 1620										- End well development attempts
Results At End Of Purging:										

COMMENTS: * Dry well - no apparent recharge after removing drilling mud from sandpack

5/16 Norton AFB - MW007

Yellow Jacket Drilling	PROJECT NAME: Aeres Lar - Norton AFB	WELL NUMBER: NORP MW 007	
WELL DEVELOPMENT LOG	JOB NUMBER: 17-0411 CA	SITE: Norton AFB	PREPARED BY: Dale Gow
METHOD: Pump / Bailer / Other	DEVELOPMENT CRITERIA: Swab - Bail - Pump 4"		
	Remarks:		

DEVELOPMENT LOG					TOTAL	WATER QUALITY				COMMENTS
DATE	TIME	FLOW RATE (gpm)	DEPTH TO WATER (ft-toc)	WATER REMOVAL (gal)	WATER REMOVAL (gal)	PH	SPECIFIC Conductivity (mS/cm)	TURBIDITY (NTU)	TEMPERATURE (Degrees C)	
5/16	8:55	—	156.30	—	Well	Measurements	—		T.D.	219.00 SOFT
	9:00	Bail								
	9:30	STop	219.18	40	40				T.D.	219.20 Hard
	10:10	—	219.00	—	—					
	10:40	—	219.00	—	—					
	10:55	—	219.00	—	—					
	11:30	—	219.00	—	—					
	12:00	—	219.00	—	—					
	12:00	—	Add	15	Gals.	of	water			
	12:20	Swab	196.70							
	1:20	STop	195.35						T.D.	219.00 SOFT
	1:35	Bail								
	1:50	STop	218.95	15	55				T.D.	219.20
	2:05	—	218.00							
	2:05	—	Add	15	Gals.	of	water			
	2:15	Swab	195.62							
	3:15	STop	197.55						T.D.	219.10 SOFT
	3:20	Bail								
	3:35	STop	219.05	15	70				T.D.	219.20
	3:50	—	218.67							
	3:50	—	Add	15	Gals.	of	water			
	4:00	Swab	196.50							
	4:30	STop	200.27						T.D.	219.20
	4:35	Bail								
	4:50	STop	219.00	15	85				T.D.	219.20

5/17 Norton AFB - MW 007

Yellow Jacket Drilling	PROJECT NAME: Aerostar - Norton AFB	WELL NUMBER: NORP MW 007	
WELL DEVELOPMENT LOG	JOB NUMBER: 17-0411CA	SITE: Norton AFB	PREPARED BY: Dale Goin
METHOD: Pump ___ Bailer ___ Other ___	DEVELOPMENT CRITERIA: Swab + Bail		4"
	Remarks:		

DEVELOPMENT LOG					TOTAL	WATER QUALITY					COMMENTS
DATE	TIME	FLOW RATE (gpm)	DEPTH TO WATER (ft-btoc)	WATER REMOVAL (gal)	WATER REMOVAL (gal)	PH	SPECIFIC Conductivity (mS/cm)	TURBIDITY (NTU)	TEMPERATURE (Degrees C)		
5/17	7:45	—	216.29	—	well	Measurements —			T.D.		219.20
	—	—	Add	10	Gals.	of	water				
	8:00	Swab	208.00								
	9:00	Stop	207.79						T.D.		219.20
	9:05	Bail	~~218.80~~	~~15~~	~~95~~						
	9:15	Stop	218.80	10	95				T.D.		219.20
	9:21	—	218.00								
	9:28	—	217.00								
	9:32	—	216.00								
	9:46	—	215.45								
	—	—	Add	6	Gals.	of	water				
	10:00	Swab	209.82								
	11:00	Stop	210.55						T.D.		219.20
	11:10	—	210.00								
	11:15	Bail	—								
	11:25	Stop	218.92	7	102				T.D.		219.20
	11:30	—	Take	Trailer	To	Fill	Fresh	water	Tank		
	12:25	—	216.00								
	—	—	Add	15	Gals	of	water				
	12:35	Swab	203.45								
	1:35	Stop	207.31						T.D.		219.20
	1:45	Bail	—								
	2:19	Stop	218.70	15	117						
	2:30	—	218.31								
	—	—	Add	20	Gals.	of	water				
	2:45	Swab	200.70								
	3:45	Stop	207.39								
	3:50	—	207.00								
	3:55	—	206.91								
	4:00	Bail	206.95								
	4:45	Stop	219.10	20	137						

5/18

Norton AFB - MW007

Yellow Jacket Drilling	PROJECT NAME: Aerostar - Norton AFB		WELL NUMBER: NORT MW 007
WELL DEVELOPMENT LOG	JOB NUMBER: 17-0911 CA	SITE: Norton AFB	PREPARED BY: Dale Gowns
METHOD: Pump ___ Bailer ___ Other ___	DEVELOPMENT CRITERIA: Swab + Bail		
	Remarks:		

DEVELOPMENT LOG					TOTAL	WATER QUALITY				COMMENTS
DATE	TIME	FLOW RATE (gpm)	DEPTH TO WATER (ft-btoc)	WATER REMOVAL (gal)	WATER REMOVAL (gal)	PH	SPECIFIC Conductivity (mS/cm)	TURBIDITY (NTU)	TEMPERATURE (Degrees C)	
5/18	7:10	—	218.58	—	well	Measurements		—	T.D.	219.20
	7:15	Bail								
	7:20	Stop	219.20	0.50	137.50				T.D.	219.20
	7:55	—	219.20							
	8:20	—	219.19							
	8:50	—	219.19							
	9:20	—	219.19							
	9:30	—	Add	30	Gals.	of	water			
	9:45	Swab	206.60							
	10:45	Stop	211.90						T.D.	219.20
	10:50	Bail								
	11:45	Stop	219.12	10	147.50				T.D.	219.20
	—	—	Add	50	Gals.	of	water			
	12:05	Swab	200.80							
	1:05	Stop	212.00						T.D.	219.20
	1:10	Bail								
	2:10	Stop	219.11	10	157.50				T.D.	219.20
	—	—	Add	100	Gals.	of	water			
	2:30	Swab	202.80							
	3:30	Stop	212.35						T.D.	219.20
	3:55	Bail								
	4:20	Stop	219.13	10	167.50				T.D.	219.20

WELL DEVELOPMENT LOG

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

ASL Project No: M3010.0019.0017.05.~~02TM~~ TB

Installation: Former ~~Eaker Air Force Base~~ Norton AFB

Date: 7/24/17

Sample Technician: Tyler Bowling, Tom Burke, Yellow Jacket Drilling

Well ID No.: NORPMW007R

Initial Measurements

Well Total Depth: 249.50 ft below TOC

Water Level: ~~239.45~~ 238.08 ft below TOC

Calculated Well Volume: 6.56 Gallons

Well Diameter: 4 inches

Calculations: 1" diameter = 0.041 gal/ft 2" diameter = 0.163 gal/ft 4" diameter = 0.653 gal/ft

Well Purging Activites

Purging Method (pump type): Bailer / Grundfos 552450

Flow rate (incl. units): 6.0 gal/min

WL	Time	Flow Rate (ml/min)	Turbidity (NTUs)	Temp (°C)	Cond. (mS/Cm	pH	Salinity (%)	DO (mg/l)	ORP	Total Gal Pumped	Comments
	0803	—	ovr rng.	19.2	1081	7.64	—	—	—	0	Bailer Rig
	0832	—	ovr rng.	19.1	465	7.08	—	—	—	40	
	0840										swab screen
	0923	—	ovr rng.	21.4	512	7.21	—	—	—	—	
	0956	—	ovr rng.	19.4	483	7.31	—	—	—	90	
	☆ Install Grundfos Pump - 552450 ☆										
238.15	1050	22, 710								90	Begin purge w/ pump
239.60	1105	22, 710	11.34	19.3	413	6.93	—	—	—	180	
239.61	1110	22, 710	1.97	19.2	412	6.93	—	—	—	210	
239.63	1115	22, 710	0.97	19.1	412	6.93	—	—	—	240	
239.64	1120	22, 710	0.41	19.1	411	6.92	—	—	—	270	
239.64	1125	22, 710	0.30	19.1	411	6.92	—	—	—	300	
239.66	1130	22, 710	0.08	19.1	410	6.92	—	—	—	330	Stop pump/purge
						TB					
Results At End Of Purging:			0.08	19.1	410	6.92	—	—	—	330	

COMMENTS:

☆ Yellow Jacket Drilling completed well development of the well.

☆ Well Development Complete.

- Final ~~Read~~ Measurements:
  TD - 249.80
  WL - 238.15

GROUNDWATER SAMPLING LOG

PROJECT: Site Investigation of PFC Release Areas at Multiple BRAC Installations	INSTALLATION: Former ~~March~~ Norton Air Force Base, ~~Riverside~~ San Bernardino, California

WELL NO: MW-274	SAMPLE ID: NORPXX056	DATE: 5/18/17

PURGING DATA

WELL DIAMETER (inches): SS? 4.3	TUBING DIAMETER (inches): 1/4 3/8	WELL SCREEN INTERVAL DEPTH 201 feet to 221 feet	STATIC DEPTH TO WATER (feet): 200.15	PURGE PUMP TYPE OR BAILER: BP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (221 feet – 200.15 feet) X 0.69 gallons/foot = 14.39 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 211	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 211	PID RESULT AT WELLHEAD (PPM): –	PURGING ENDED AT: 1110	TOTAL VOLUME PURGED (gallons): 1.54

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	ORP (mV)	ODOR/ COLOR (describe)
1045	0.08	0.08	60 ml/min	200.13	7.04	22.2	770	4.94	4.60	225.4	none/clear
1050	0.08	0.96	0.016	NM	7.14	21.7	770	4.71	0.71	220.7	none clear
1055	0.08	1.04	0.033	NM	7.16	21.5	770	3.54	0.59	215.1	none clear
1100	0.165	1.21	0.033	200.15	7.17	21.4	770	3.40	0.76	212.3	none clear
1105	0.165	1.37	0.033	200.15	7.17	21.4	770	3.47	0.35	210.0	none clear
1110	0.165	1.54	0.033	200.14	7.12	21.4	770	4.31	0.51	210.1	none clear

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016
PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tim Cullen / Aerost	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: 1110	SAMPLING ENDED AT: 1118
PUMP OR TUBING DEPTH IN WELL (feet): 211	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y (N) Filtration Equipment Type:	FILTER SIZE: ____ µm
FIELD DECONTAMINATION: PUMP (Y) N	TUBING Y (N replaced)	DUPLICATE: Y (N) * MS/SD	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
NORPXX056	2	PE	125mL	Cool/4°C	–	–	EPA537m	BP	125
↓	2	PE	125	Cool/4°C	–	–	EPA537m	BP	125
↓	2	PE	125	Cool/4°C	–	–	EPA537m	BP	125

Type
IN
MS
SD

REMARKS:
Well Measurement Method: (Probe) Tape Other
925 - PI
955 - stop / 1020 - resume
Pump ~ 202
Intake @ 211

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)
SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

PR: 60 - 125 ml/min vary

NM = not measured

30 + 25 = 55 min

* collect MS/MSD

GROUNDWATER SAMPLING LOG

Norton San Bernardino

PROJECT: Site Investigation of PFC Release Areas at Multiple BRAC Installations	INSTALLATION: Former ~~March~~ Air Force Base, ~~Riverside,~~ California

WELL NO: MW-289	SAMPLE ID: NORPXX057	DATE: 5/18/17

PURGING DATA

WELL DIAMETER (inches): 4	TUBING DIAMETER (inches): 1/4/3/8	WELL SCREEN INTERVAL DEPTH: 216 feet to 236 feet	STATIC DEPTH TO WATER (feet): 176.82	PURGE PUMP TYPE OR BAILER: BP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (236 feet – 176.82 feet) X 0.65 gallons/foot = 38.47 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 226	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 226	PID RESULT AT WELLHEAD (PPM): –	PURGING ENDED AT: 2025	TOTAL VOLUME PURGED (gallons): 0.84

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or (µS/cm)	DISSOLVED OXYGEN (circle units) (mg/L) or % saturation	TURBIDITY (NTUs)	ORP (mV)	ODOR/ COLOR (describe)
2000	0.315	0.315	0.021	176.85	6.77	21.4	497	3.80	1.35	218.6	none/colorless
2005	0.105	0.42	0.021	176.85	6.93	21.2	610	3.67	0.94	209.2	
2010	0.105	0.525	0.021	176.85	6.99	21.1	620	3.35	0.79	204.4	
2015	0.105	0.63	0.021	176.84	7.00	21.0	620	3.32	0.71	202.7	
2020	0.105	0.735	0.021	176.84	7.01	21.0	620	3.44	0.74	201.3	
2025	0.105	0.84	0.021	176.84	7.02	21.1	610	3.29	0.58	200.1	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Jim Cullen / Aerostar	SAMPLER(S) SIGNATURE(S): [signature]	SAMPLING INITIATED AT: 2025	SAMPLING ENDED AT: 2029
PUMP OR TUBING DEPTH IN WELL (feet): 226	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y (N) Filtration Equipment Type:	FILTER SIZE: ____ µm
FIELD DECONTAMINATION: PUMP (Y) N	TUBING Y (N) (replaced)	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
NORPXX057	2	PE	125mL	Cool 4°C	–	–	EPA537m	BP	80

REMARKS:
1945 - PI
1955 - First water
Pump @ Tubing Intake @ 226'

Well Measurement Method: (Probe) Tape Other

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

80ml/min

GROUNDWATER SAMPLING LOG

PROJECT: Site Investigation of PFC Release Areas at Multiple BRAC Installations | INSTALLATION: Former ~~March~~ Northern Air Force Base, ~~Riverside~~ San Bernardino, California

WELL NO: MW 401 | SAMPLE ID: NORPX4058 | DATE: 5/16/17

PURGING DATA

WELL DIAMETER (inches): ~4" (3.75) | TUBING DIAMETER (inches): 0.25" | WELL SCREEN INTERVAL DEPTH: 125 feet to 190 feet | STATIC DEPTH TO WATER (feet): 187.22 | PURGE PUMP TYPE OR BAILER: BP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (190 feet – 187.22 feet) X 0.65 gallons/foot = 1.81 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 188.5 | FINAL PUMP OR TUBING DEPTH IN WELL (feet): 188.5 | PID RESULT AT WELLHEAD (PPM): 0 | PURGING ENDED AT: 1920 | TOTAL VOLUME PURGED (gallons): 0.715

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or mS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	ORP (mV)	ODOR/ COLOR (describe)
1850	0.325	0.325	(50ml/min)	187.26	7.03	21.1	650	7.20	5.72	254.1	none/clear
1855	0.065	0.39	0.013	NM	6.98	21.0	650	6.86	4.70	254.2	none/clear
1900	0.065	0.455	0.013	187.26	7.02	20.9	650	6.81	4.13	249.5	none/clear
1905	0.065	0.52	0.013	187.26	7.07	21.0	650	7.63	3.51	243.3	none/clear
1910	0.065	0.585	0.013	187.26	7.08	20.8	660	7.03	3.06	240.1	none/clear
1915	0.065	0.65	0.013	187.26	7.07	20.8	660	7.34	2.01	238.1	none/clear
1920	0.065	0.715	0.013								

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tim Cullen Aerostar / Heidi Dieffenbach-Carle | SAMPLER(S) SIGNATURE(S): [signature] | SAMPLING INITIATED AT: 1920 | SAMPLING ENDED AT: 1922

PUMP OR TUBING DEPTH IN WELL (feet): 188.5 | TUBING MATERIAL CODE: PE | FIELD-FILTERED: Y (N) Filtration Equipment Type: | FILTER SIZE: ____ µm

FIELD DECONTAMINATION: PUMP (Y) N TUBING (Y) N (replaced) | DUPLICATE: Y (N)

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
NORPXX058	2	PE	125 ml	ice/4°C	none	none	EPA 537m	BP	50

REMARKS:
Well Measurement Method: Probe Tape Other 1825 – PI 1844 Firstwater

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

NM – not measured

GROUNDWATER SAMPLING LOG

PROJECT: Site Investigation of PFC Release Areas at Multiple BRAC Installations	INSTALLATION: Former ~~March~~ Norton Air Force Base, ~~Riverside~~ San Bernardino, California

WELL NO: ~~NORPMW~~ 403	SAMPLE ID: NORP01 403	DATE: 5/12/17

PURGING DATA

WELL DIAMETER (inches): ~4	TUBING DIAMETER (inches): 0.25	WELL SCREEN INTERVAL DEPTH: 152 feet to 192 feet	STATIC DEPTH TO WATER (feet): 187.01	PURGE PUMP TYPE OR BAILER: BP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (192 feet – 187.01 feet) X 0.65 gallons/foot = 3.24 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 191	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 191.5	PID RESULT AT WELLHEAD (PPM): 0	PURGING ENDED AT: 1110	TOTAL VOLUME PURGED (gallons): 1.04

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm mS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	ORP (mV)	ODOR/ COLOR (describe)
1005	0.26	0.26	0.013	188.41	6.85	24.9	0.80	3.61	62.7	202.9	none/clear/colorless
1010	0.065	0.325	0.013	188.65	6.85	25.0	0.80	2.97	35.6	204.2	
1020	0.13	0.455	0.013	188.98	6.96	24.4	0.75	4.80	9.23	199.5	
1025	0.065	0.52	0.013	189.23	6.95	24.2	0.72	4.89	5.80	200.4	
1030	0.065	0.585	0.013	189.51	7.00	24.4	0.69	5.01	7.47	198.1	
1035	0.065	0.65		189.65							*5min purge - pump use resume
1050	0.13	0.78	0.013	189.85	7.27	25.6	0.66	5.29	5.98	181.0	none/clear/colorless
1055	0.065	0.845	0.013	189.89	7.26	25.8	0.65	5.57	5.29	183.6	
1100	0.065	0.91	0.013	189.99	7.25	25.9	0.64	5.36	5.05	185.3	
1105	0.065	0.975	0.013	190.05	7.28	26.0	0.63	5.68	5.10	185.1	
1110	0.065	1.04	0.013	190.12	7.29	26.1	0.62	5.59	4.23	184.6	

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tim Cullen / Aerostar	SAMPLER(S) SIGNATURE(S): [signature]	SAMPLING INITIATED AT: 1110	SAMPLING ENDED AT: 1130
PUMP OR TUBING DEPTH IN WELL (feet): 191.5	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y (N) Filtration Equipment Type:	FILTER SIZE: ____ µm
FIELD DECONTAMINATION: PUMP (Y) N	TUBING Y (N) (replaced)	DUPLICATE: (Y) N * NORP01404	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
01403	2	PE	125mL	cool 4°C	—	—	EPA537m	BP	50
01404	2	PE	125mL	cool 4°C	—	—	EPA537m	BP	50

REMARKS:
0945 – PURGE Initiated (PI)
0955 – first water

Well Measurement Methods: Probe Tape Other

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

50 ml/min =
- 0.65 gal/ft = 4"
~ 0.61 gal/ft = 3.75" SC: 152 - 192' BTOC?

GROUNDWATER SAMPLING LOG

PROJECT: Site Investigation of PFC Release Areas at Multiple BRAC Installations	INSTALLATION: Former ~~March~~ Norton Air Force Base, ~~Riverside~~ San Bernardino, California

WELL NO: NORPMW002	SAMPLE ID: NORP05011	DATE: 5·18·17

PURGING DATA

WELL DIAMETER (inches): ~4" (8.25")	TUBING DIAMETER (inches): 1/4	WELL SCREEN INTERVAL DEPTH: 198.9 feet to 218.20 feet	STATIC DEPTH TO WATER (feet): 200.14	PURGE PUMP TYPE OR BAILER: BP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (218.70 feet – 200.14 feet) X 0.65 gallons/foot = 12.06 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 208	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 208	PID RESULT AT WELLHEAD (PPM): —	PURGING ENDED AT: 1830	TOTAL VOLUME PURGED (gallons): 1.13

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	ORP (mV)	ODOR/ COLOR (describe)
1800	0.4	0.4	0.016	200.16	6.98	24.7	600	4.52	4.38	245.6	none/colorless
1805	0.08	0.48	0.026	200.16	6.85	24.2	600	4.16	4.29	249.8	none/colorless
1810	0.13	0.61	0.026	200.16	7.03	23.7	590	3.83	3.38	229.1	
1815	0.13	0.74	0.026	200.16	7.10	23.7	590	3.84	2.35	220.7	
1820	0.13	0.87	0.026	200.16	7.12	23.7	590	3.93	1.90	218.2	
1825	0.13	1.0	0.026	200.17	7.14	23.6	590	3.98	1.89	211.2	
1830	0.13	1.13	0.026	200.17	7.16	23.5	590	3.95	1.95	210.0	none/colorless

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tim Cullen/Aerostar	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: 1830	SAMPLING ENDED AT: 1835
PUMP OR TUBING DEPTH IN WELL (feet): 208	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y (N) Filtration Equipment Type:	FILTER SIZE: ____ µm
FIELD DECONTAMINATION: PUMP (Y) (N)	TUBING Y (N) (replaced)	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
NORP05011	2	PE	125mL	cool 4°C	—	—	EPA 537m	BP	100

REMARKS:
Well Measurement Method: Probe Tape Other
1735 - PI
1752 - first water

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

Note collected equipment blank – poured lab water through pump and pump filter prior to sampling
60mL/min – 100mL/min variable

GROUNDWATER SAMPLING LOG

PROJECT: Site Investigation of PFC Release Areas at Multiple BRAC Installations | INSTALLATION: Former ~~March~~ Norton Air Force Base, ~~Riverside~~ San Bernardino, California

WELL NO: NORPMW003 | SAMPLE ID: NORP05D16 | DATE: 5.14.17

PURGING DATA

WELL DIAMETER (inches): 4	TUBING DIAMETER (inches): 1/4" / 3/8"	WELL SCREEN INTERVAL DEPTH: 200' / 215' feet to 219.75'	STATIC DEPTH TO WATER (feet): 196.91 below TOC	PURGE PUMP TYPE OR BAILER: Geotech bladder pump

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (219.75 feet – 196.91 feet) X 0.65 gallons/foot = 14.85 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): ~215	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 215	PID RESULT AT WELLHEAD (PPM): 0	PURGING ENDED AT: 1600	TOTAL VOLUME PURGED (gallons): 3.96

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/l or % saturation	TURBIDITY (NTUs)	ORP (mV)	ODOR/ COLOR (describe)
1505	1.65	1.65	250 milliliter/min	196.91	6.90	23.0	540	3.81	3.75	225.1	none clear
1510	0.33	1.98	0.066	196.93	6.69	22.8	540	3.37	4.66	241.7	none clear
1520	0.66	2.64	0.066	196.95	6.88	22.7	540	2.88	2.12	231.6	none clear
1525	0.33	2.97	0.066	196.94	6.93	22.4	540	2.95	2.13	224.3	none clear
stopped pumping											
1545	0	2.97	0.066	196.95	7.09	23.5	540	3.20	2.95	208.6	none clear
1550	0.33	3.30	0.066	196.93	7.11	23.0	540	3.18	2.11	207.2	none clear
1555	0.33	3.63	0.066		7.11	23.5	540	3.11	3.06	204.3	none clear
1600	0.33	3.96	0.066	196.93	7.14	23.2	540	3.06	1.93	203.4	none clear

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tim Cullen / Aerostar	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: 1600	SAMPLING ENDED AT: 1605

PUMP OR TUBING DEPTH IN WELL (feet): 215 | TUBING MATERIAL CODE: PE Polyethylene | FIELD-FILTERED: Y N Filtration Equipment Type: | FILTER SIZE: ____ µm

FIELD DECONTAMINATION: PUMP Y N TUBING Y N replaced | DUPLICATE: Y N

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
NORP05D16	2	PE	125 ml	cool 4°C	—	—	EPA 537M	BP	250

REMARKS:
1440 - purge Int.
1500 - 1st water - surface

Well Measurement Method: Probe Tape Other

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

GROUNDWATER SAMPLING LOG

PROJECT: Site Investigation of PFC Release Areas at Multiple BRAC Installations	INSTALLATION: Former ~~March~~ Norton Air Force Base, ~~Riverside~~ San Bernardino, California

WELL NO: NORPMW004	SAMPLE ID: NORP07021	DATE: 5/12/17

PURGING DATA

WELL DIAMETER (inches): 3.75	TUBING DIAMETER (inches): 1/4/3/8	WELL SCREEN INTERVAL DEPTH: 199.40 feet to 219.79 feet	STATIC DEPTH TO WATER (feet): 202.18	PURGE PUMP TYPE OR BAILER: BP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (219.2 feet – 202.18 feet) X 0.65 gallons/foot = 11.06 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 209	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 209	PID RESULT AT WELLHEAD (PPM): 0	PURGING ENDED AT: 2000	TOTAL VOLUME PURGED (gallons): 1.4

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	ORP (mV)	ODOR/ COLOR (describe)
1930	0.8	0.8	75 ml/min	202.18	6.93	20.6	590	5.12	3.41	243.2	none/clear
1935	0.1	0.9	0.02	NM	7.28	20.1	590	4.68	0.90	233.6	none/clear
1940	0.1	1.0	0.02	202.19	7.32	19.9	580	4.70	0.64	221.4	none/clear
1945	0.1	1.1	0.02	202.19	7.32	19.8	580	4.47	0.66	221.2	none/clear
1950	0.1	1.2	75 ml/min	202.18	7.32	19.8	580	4.36	0.69	220.8	none/clear
1955	0.1	1.3	0.02	202.18	7.26	19.8	580	4.56	0.48	223.1	none/clear
2000	0.1	1.4	0.02	—	7.31	19.7	580	4.34	0.49	221.9	none/clear

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tim Cullen / Aerostar	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: 2000	SAMPLING ENDED AT: 2005
PUMP OR TUBING DEPTH IN WELL (feet): 209	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y (N) Filtration Equipment Type:	FILTER SIZE: ____ µm

FIELD DECONTAMINATION: PUMP (Y) N TUBING Y (N) (replaced) DUPLICATE: Y (N)

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
NORP 07021	2	PE	125mL	Cool/4°C	—	—	EPA537m	BP	>5

REMARKS:
Well Measurement Method: Probe Tape Other
1850 - PI
1920 - First water
pump @ 204
Intake @ 209'

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NM = Not Measured

GROUNDWATER SAMPLING LOG

PROJECT: Site Investigation of PFC Release Areas at Multiple BRAC Installations	INSTALLATION: Former ~~March~~ Norton Air Force Base, ~~Riverside~~ San Bernardino, California

WELL NO: NORPMW005	SAMPLE ID: NORP04005	DATE: 5/17/17

PURGING DATA

SC: 199.4 – 218.70

WELL DIAMETER (inches): ~~2~~ 4"	TUBING DIAMETER (inches): 0.25 / 0.375	WELL SCREEN INTERVAL DEPTH: ~~199.7~~ feet to ~~219~~ 218.70 feet (TC)	STATIC DEPTH TO WATER (feet): 194.65	PURGE PUMP TYPE OR BAILER: BP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
219.20 = (~~219.80~~ feet – 194.65 feet) X 0.65 gallons/foot = 15.96 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 209	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 209	PID RESULT AT WELLHEAD (PPM): 0	PURGING ENDED AT: 1745	TOTAL VOLUME PURGED (gallons): 3.55

TIME (TC)	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	ORP (mV)	ODOR/ COLOR (describe)
1818	1.95	1.95	0.059	194.75	7.24	22.0	730	3.75	0.63	232.0	none/clear
1820	0.12	2.07	0.059	194.75	7.15	22.0	730	3.90	0.65	229.7	
1825	0.295	2.37	0.059	194.76	7.08	21.9	730	3.59	0.46	227.2	
1830	0.295	2.67	0.059	194.76	7.09	21.8	730	3.61	0.37	224.5	
1835	0.295	2.96	0.059	194.76	7.09	21.8	730	3.49	0.43	223.9	
1840	0.295	3.26	0.059	194.76	7.10	21.8	730	3.39	0.64	222.4	
1745 1845	0.295	3.55	0.059	194.76	7.11	21.8	730	3.37	0.54	221.7	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tim Cullu / Aerostar	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: 1845 (TC)	SAMPLING ENDED AT: 1747
PUMP OR TUBING DEPTH IN WELL (feet): 209'	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y (N) Filtration Equipment Type:	FILTER SIZE: ____ µm
FIELD DECONTAMINATION: PUMP (Y) ~~(N)~~	TUBING Y (N replaced)	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
NORP04005	2	PE	125mL	cool 4°C	—	—	EPA537m	BP	225

REMARKS:
1645 ~~1845~~ (TC) – PI
1515 – first water
pump @ 200
Intake @ 209

Well Measurement Method: Probe Tape Other

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

TD: 219.20 225 mL/min Flow cell ~~[illegible]~~ mL

GROUNDWATER SAMPLING LOG

PROJECT: Site Investigation of PFC Release Areas at Multiple BRAC Installations	INSTALLATION: Former ~~March~~ Norton Air Force Base, ~~Riverside,~~ San Bernardino California

WELL NO: NORPMW006	SAMPLE ID: NORP04010	DATE: 5/17/17

PURGING DATA

WELL DIAMETER (inches): ~4" 0.25	TUBING DIAMETER (inches): 0.25 0.375	WELL SCREEN INTERVAL DEPTH 201.8 feet to 221.10 feet	STATIC DEPTH TO WATER (feet): 195.28	PURGE PUMP TYPE OR BAILER: BP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (221.60 feet – 195.28 feet) X 0.65 gallons/foot = 17.11 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 210	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 210	PID RESULT AT WELLHEAD (PPM): 0	PURGING ENDED AT: 1345	TOTAL VOLUME PURGED (gallons): 0.925

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	ORP (mV)	ODOR/ COLOR (describe)
1315	0.585	0.585	0.013	195.29	7.13	22.5	680	4.81	1.02	205.3	none/colless
1320	0.065	0.65	0.013	195.29	7.14	22.4	680	4.49	0.92	202.3	↓
1325	0.065	0.715	0.013	195.29	7.16	22.3	680	4.24	0.93	200.2	↓
1330	0.065	0.78	0.013	195.29	7.19	22.4	680	4.10	0.92	199.2	↓
1335	0.065	0.845	0.013	195.29	7.20	22.3	680	3.99	0.74	198.7	↓
1340	0.065	0.91	0.013	195.29	7.22	22.3	680	3.85	0.74	197.2	↓
1345	0.065	0.925	0.013	195.29	7.23	22.4	680	3.71	0.53	193.1	↓

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Tim Cullen / Aerostar	SAMPLER(S) SIGNATURE(S): [signature]	SAMPLING INITIATED AT: 1345	SAMPLING ENDED AT: 1350
PUMP OR TUBING DEPTH IN WELL (feet): 210	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y (N) Filtration Equipment Type:	FILTER SIZE: ____ µm

FIELD DECONTAMINATION: PUMP Y (N) TUBING Y (N) (replaced) DUPLICATE: Y (N)

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
*	2	PE	125mL	cool 4°C	—	—	EPA537m	BP	50mL

REMARKS: 1230 - PI - First water *pump @ ~200 Intake @ 210'

Well Measurement Method: Probe Tape Other

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

*NORP04010

PR: 50mL/min

Appendix B

Survey Reports

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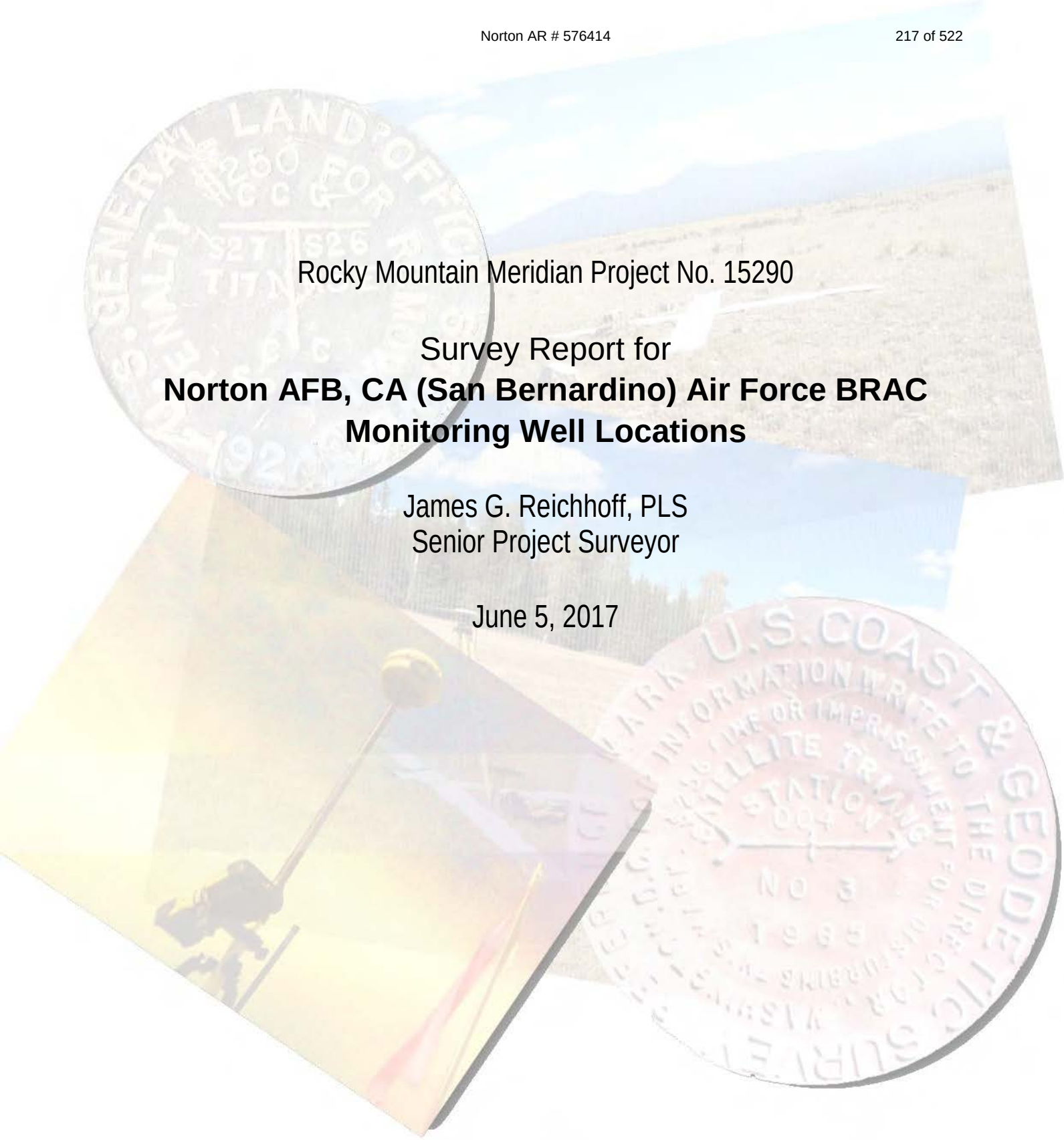


Rocky Mountain Meridian Project No. 15290

Survey Report for
Norton AFB, CA (San Bernardino) Air Force BRAC Monitoring Well Locations

James G. Reichhoff, PLS
Senior Project Surveyor

June 5, 2017

ROCKY MOUNTAIN MERIDIAN INC
Professional Surveying and Mapping

Introduction:

On May 19, 2017, Rocky Mountain Meridian (RM Meridian) was engaged by Aerostar SES LLC to provide Professional Land Surveying Services for the site investigation of Perflourinated Compound (PFC) release at the Norton AFB, CA (San Bernardino) Air Force BRAC installation site. RM Meridian's scope of work was to verify/establish project horizontal and vertical control, and measure the horizontal and vertical (top of well casing) locations for six (6) newly placed monitoring wells (NORPMW002, NORPMW003, NORPMW004, NORPMW005, NORPMW006, and NORPMW007). RM Meridian also obtained measurements on two (2) existing monitoring wells (MW-402 and MW-403) for use in referencing the information to previously completed facilities.

The purpose of this report is to document the methodology and findings of RM Meridian while verifying and establishing survey control points and locating the six (6) newly placed monitoring wells.

The final values for the control verification and monitoring wells located by RM Meridian are being reported using the following Horizontal System and Vertical Datum:

> Grid Coordinates based upon the California Coordinate System of 1983 (CCS83), Zone 5, North American Datum of 1983 (NAD 83 (2011)), having a vertical datum associated to the North American Vertical Datum of 1988 (NAVD 88). Units in US Survey Feet unless otherwise noted.

All the information contained in this project survey report was based upon listed CALVRS RTN Network coordinate values for reference station "Corona2" (TCGC). A complete listing of the published CALVRS RTN Network reference station Corona2 (TCGC) coordinate values is shown in Table A below. A complete listing of the published NGS mark Z-38 Reset Data Sheet referenced herein is provided as Attachment A to this report.

Control Verification Methodology:

Field observations for the control verification and monitoring well location were performed on May 19, 2017 by Steven Dozler, under the direct supervision of James G. Reichhoff, CA PLS 9203.

Real Time Kinematic (RTK) GPS vectors were established from the published coordinates for CALVRS RTN Network reference station "Corona2" (TCGC), using VRS network corrections from the CALVRS RTN Network. The CALVRS RTN network is administered by AZGPS, LLC and utilizes forty-three (43) reference stations located throughout southern CA. An additional check was performed on NGS control mark Z 38 Reset.

Equipment used for the RTK VRS session was supplied on a daily lease basis by Allen Instruments & Supplies of Anaheim, CA. The equipment consisted of a Trimble R10 GPS VRS network enabled rover utilizing GNSS technology.

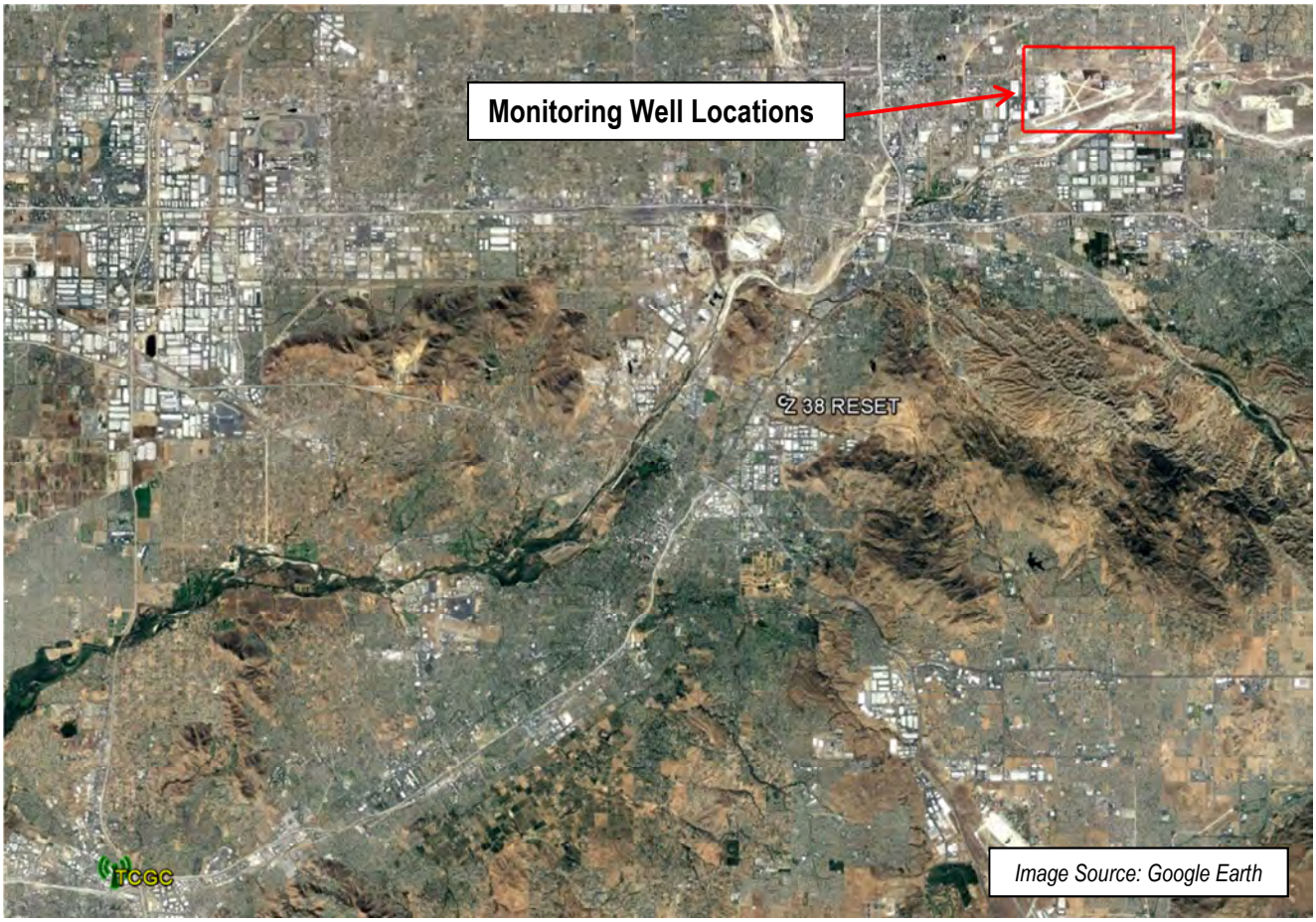
Trimble RTK positions for all marks checked or established were 60 seconds or 1 minute in length. All reported RTK positions are relative to the CALVRS RTN Network "Corona2" (TCGC) reference station noted above.

Direct observation of orthometric heights by differential leveling was not a part of the scope for this survey, and in our opinion is not required to achieve the tasks required. Therefore, orthometric heights were determined using observations of ellipsoidal heights on the Geographic Reference System of 1980 (GRS80) and referencing known geoid separations with Geoid-12A.

Project Control Specifications:

Units:	US Survey Feet
Horizontal Datum:	NAD83 (2011)
Vertical Datum:	NAVD88
Projection:	Lambert Conformal Conic
State Plane and/or UTM Zone:	California Coordinate System of 1983 (CCS83), Zone 5
Basis of Bearing:	Grid Bearings
Modification Method Used:	No Modification
Field Methodology:	Real Time Kinematic – Based on CALVRS RTN Network "Corona2" (TCGC) Reference Station
Equipment Used:	Trimble GPS Equipment (R10 GNSS Dual Frequency Receiver)
Observation Date:	May 19, 2017
Adjustment/Publication Date:	Corona2 (TCGC) was last adjusted in 2013.

Figure 1 – Survey Control Locations



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Primary Control Used:

The 2017 Broadcast Coordinate values listed in Table A below for primary control for this project were provided by AZGPS, LLC (administrators of the CALVRS RTN Network). All GPS vectors and values being reported were derived from reference station Corona2 (TCGC). NGS control point Z 38 Reset was checked using reference station Corona2 (TCGC) and single-base network corrections from the CALVRS RTN Network.

Table A – Primary Control

CALVRS Broadcast Coordinate Values for 2017 (NAD83 NSRS2007 Epoch 2011.00)				
Station Name	**Station Code**	**Latitude**	**Longitude**	**Height [m]**
Corona2	TCGC	N33°53'06.71114"	W117°33'19.15999"	158.184

Check to Existing Control

Published coordinates values for Z 38 Reset listed below were provided by NGS. The published values for Z 38 Reset as well as the values determined by RM Meridian via four (4) RTK observations are shown in Table B below. The differences (delta) between the individual and average observation values and published values are provided. Units in US Survey Feet.

Table B – Existing Control Verification

Mark		Calculated Northing NGS	Calculated Easting NGS	Published Elev. NGS	RMM Point	Observed Northing RMM	Observed Easting RMM	Observed Elev. RMM	Delta Northing	Delta Easting	Delta Elevation
Z 38 Reset		1828571.31	6763519.40	951.31	99	1828571.24	6763519.40	951.31	0.06	0.00	0.00
Z 38 Reset		1828571.31	6763519.40	951.31	100	1828571.22	6763519.41	951.24	0.09	-0.02	0.07
Z 38 Reset		1828571.31	6763519.40	951.31	101	1828571.22	6763519.43	951.31	0.09	-0.03	0.00
Z 38 Reset		1828571.31	6763519.40	951.31	5000	1828571.27	6763519.41	951.31	0.04	-0.02	0.00
RMM Observation Average						**1828571.24**	**6763519.41**	**951.29**	**0.07**	**-0.02**	**0.02**

Note: Calculated NGS northing and easting values shown above for point Z 38 Reset are referenced to California Coordinate System of 1983 (CCS83), Zone 5, and are based on published California Coordinate System of 1983 (CCS83), Zone 6 values.

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Monitoring Well Locations:

Six (6) newly placed monitoring wells were located at the direction of the client. Multiple observation epochs were performed at each well location. A general overview map of the installation where the monitoring wells are located is shown in Figure 2 below. The final horizontal location and top of well casing elevation values for the six (6) new monitoring wells requested by the client are shown in Table C below. The horizontal location and top of well casing elevation values for the two (2) existing monitoring wells observed as reference points are shown in Table D below.

Figure 2 – Installation Overview Map

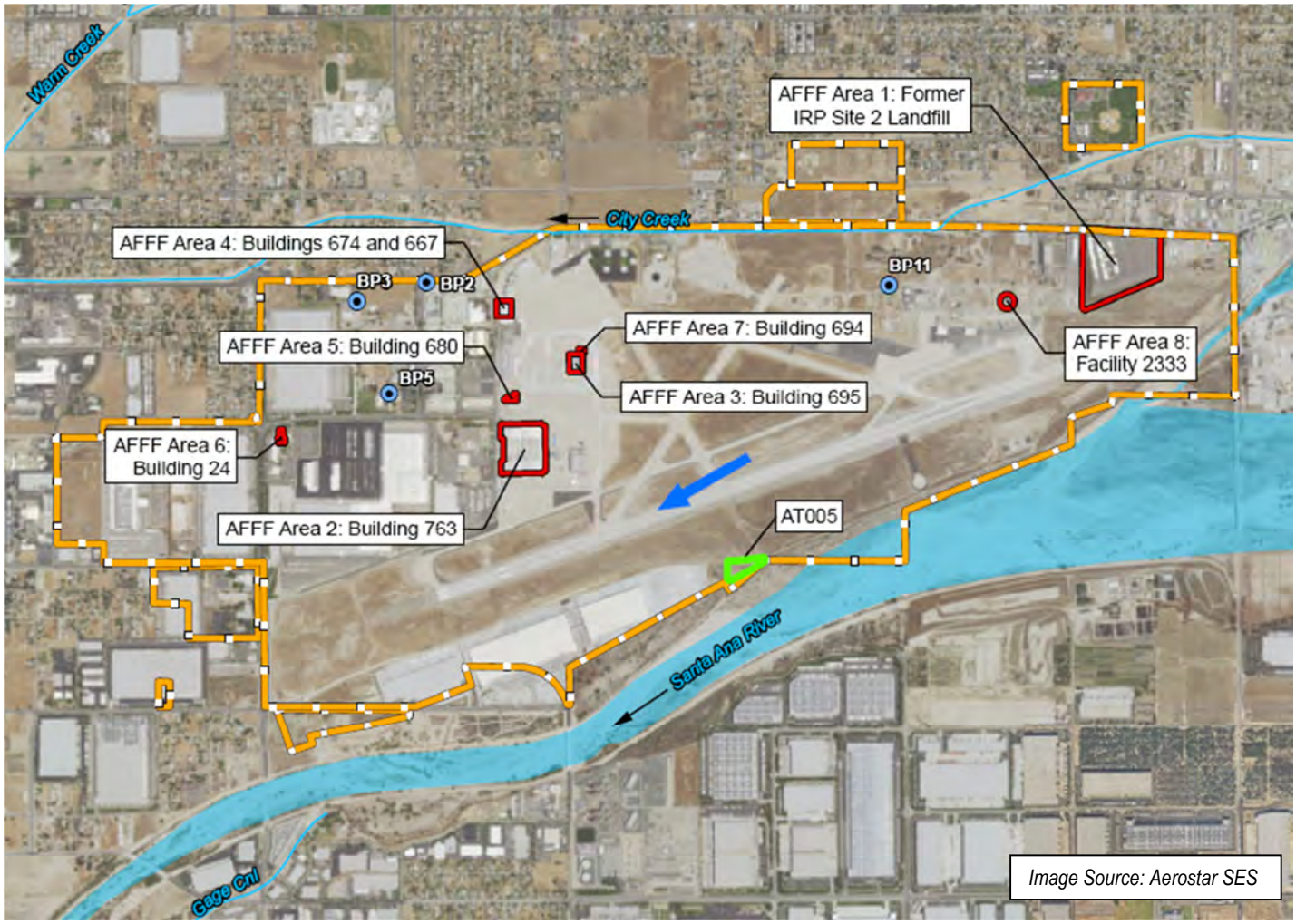

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Table C – New Monitoring Well Observations

Grid Coordinates based upon the California Coordinate System of 1983 (CCS83), Zone 5, North American Datum of 1983 (NAD83 NSRS2007 Epoch 2011.00), having a vertical datum associated to the North American Vertical Datum of 1988 (NAVD 88). Distance units in US Survey Feet.

RMM POINT	Grid Northing	Grid Easting	Point Elevation	Description	Longitude	Latitude	Convergence
2	1859281.35	6789763.33	1093.72	NORPMW002 NE-TOP OF PVC	W117° 14' 47.6123"	N34° 05' 56.5613"	0° 25' 46.0933"
102	1859281.32	6789763.36	1093.81	NORPMW002 NE-TOP OF PVC	W117° 14' 47.6120"	N34° 05' 56.5609"	0° 25' 46.0935"
202	1859281.30	6789763.34	1093.73	NORPMW002 NE-TOP OF PVC	W117° 14' 47.6121"	N34° 05' 56.5608"	0° 25' 46.0934"
302	1859281.29	6789763.30	1093.61	NORPMW002 NE-TOP OF PVC	W117° 14' 47.6126"	N34° 05' 56.5606"	0° 25' 46.0931"
	1859281.32	**6789763.33**	**1093.72**	**NORPMW002 TOP OF PVC OBSERVATION AVERAGE**	**W117°14' 47.6123"**	**N34° 05' 56.5609"**	**0° 25' 46.0933"**
402	1859281.13	6789763.25	1094.31	NORPMW002 TOP CENTER OF WELL CASING	W117° 14' 47.6133"	N34° 05' 56.5590"	0° 25' 46.0927"
502	1859281.19	6789763.20	1094.44	NORPMW002 TOP CENTER OF WELL CASING	W117° 14' 47.6139"	N34° 05' 56.5597"	0° 25' 46.0923"
	1859281.16	**6789763.22**	**1094.38**	**NORPMW002 TOP CENTER OF WELL CASING OBSERVATION AVERAGE**	**W117° 14' 47.6136"**	**N34° 05' 56.5594"**	**0° 25' 46.0925"**
3	1859231.18	6789452.00	1089.73	NORPMW003 E-TOP OF PVC	W117° 14' 51.3188"	N34° 05' 56.0880"	0° 25' 43.9805"
103	1859231.25	6789452.08	1089.89	NORPMW003 E-TOP OF PVC	W117° 14' 51.3178"	N34° 05' 56.0887"	0° 25' 43.9811"
203	1859231.23	6789452.09	1089.92	NORPMW003 E-TOP OF PVC	W117° 14' 51.3177"	N34° 05' 56.0885"	0° 25' 43.9811"
303	1859231.20	6789452.05	1089.84	NORPMW003 E-TOP OF PVC	W117° 14' 51.3182"	N34° 05' 56.0882"	0° 25' 43.9809"
	1859231.21	**6789452.05**	**1089.85**	**NORPMW003 TOP OF PVC OBSERVATION AVERAGE**	**W117° 14' 51.3181"**	**N34° 05' 56.0884"**	**0° 25' 43.9809"**
403	1859231.18	6789451.94	1090.62	NORPMW003 TOP CENTER OF WELL CASING	W117° 14' 51.3195"	N34° 05' 56.0880"	0° 25' 43.9801"
	1859231.18	**6789451.94**	**1090.62**	**NORPMW003 TOP CENTER OF WELL CASING OBSERVATION AVERAGE**	**W117° 14' 51.3195"**	**N34° 05' 56.0880"**	**0° 25' 43.9801"**
104	1860094.89	6790888.53	1100.05	NORPMW004 N-TOP OF PVC	W117° 14' 34.1597"	N34° 06' 04.5252"	0° 25' 53.7614"
204	1860094.90	6790888.53	1100.04	NORPMW004 N-TOP OF PVC	W117° 14' 34.1597"	N34° 06' 04.5252"	0° 25' 53.7614"
304	1860094.97	6790888.57	1100.07	NORPMW004 N-TOP OF PVC	W117° 14' 34.1593"	N34° 06' 04.5260"	0° 25' 53.7616"
	1860094.92	**6790888.54**	**1100.05**	**NORPMW004 TOP OF PVC OBSERVATION AVERAGE**	**W117° 14' 34.1596"**	**N34° 06' 04.5255"**	**0° 25' 53.7615"**
404	1860094.81	6790888.53	1100.93	NORPMW004 TOP CENTER OF WELL CASING	W117° 14' 34.1597"	N34° 06' 04.5244"	0° 25' 53.7614"
504	1860094.82	6790888.55	1100.82	NORPMW004 TOP CENTER OF WELL CASING	W117° 14' 34.1595"	N34° 06' 04.5245"	0° 25' 53.7615"
	1860094.82	**6790888.54**	**1100.88**	**NORPMW004 TOP CENTER OF WELL CASING OBSERVATION AVERAGE**	**W117° 14' 34.1596"**	**N34° 06' 04.5245"**	**0° 25' 53.7615"**
5	1860690.74	6789778.54	1094.47	NORPMW005 NW-TOP OF PVC	W117° 14' 47.3058"	N34° 06' 10.5018"	0° 25' 46.2679"
105	1860690.89	6789778.50	1094.50	NORPMW005 NW-TOP OF PVC	W117° 14' 47.3063"	N34° 06' 10.5034"	0° 25' 46.2677"
605	1860690.75	6789778.33	1094.43	NORPMW005 NW-TOP OF PVC	W117° 14' 47.3083"	N34° 06' 10.5020"	0° 25' 46.2666"
705	1860690.71	6789778.48	1094.52	NORPMW005 NW-TOP OF PVC	W117° 14' 47.3065"	N34° 06' 10.5015"	0° 25' 46.2675"
	1860690.77	**6789778.46**	**1094.48**	**NORPMW005 TOP OF PVC OBSERVATION AVERAGE**	**W117° 14' 51.3181"**	**N34° 06' 56.0884"**	**0° 25' 46.9809"**
405	1860690.51	6789778.53	1095.42	NORPMW005 TOP CENTER OF WELL CASING	W117° 14' 47.3059"	N34° 06' 10.4995"	0° 25' 46.2679"
505	1860690.27	6789778.51	1095.48	NORPMW005 TOP CENTER OF WELL CASING	W117° 14' 47.3061"	N34° 06' 10.4972"	0° 25' 46.2678"
	1860690.39	**6789778.52**	**1095.45**	**NORPMW005 TOP CENTER OF WELL CASING OBSERVATION AVERAGE**	**W117° 14' 47.3060"**	**N34° 06' 10.4984"**	**0° 25' 46.2679"**
6	1860622.98	6789621.39	1094.27	NORPMW006 S-TOP OF PVC	W117° 14' 49.1806"	N34° 06' 09.8432"	0° 25' 45.1993"
106	1860622.98	6789621.38	1094.35	NORPMW006 S-TOP OF PVC	W117° 14' 49.1807"	N34° 06' 09.8432"	0° 25' 45.1993"
206	1860622.85	6789621.37	1094.24	NORPMW006 S-TOP OF PVC	W117° 14' 49.1808"	N34° 06' 09.8419"	0° 25' 45.1992"
306	1860622.90	6789621.39	1094.17	NORPMW006 S-TOP OF PVC	W117° 14' 49.1806"	N34° 06' 09.8424"	0° 25' 45.1993"
	1860622.93	**6789621.38**	**1094.26**	**NORPMW006 TOP OF PVC OBSERVATION AVERAGE**	**W117° 14' 49.3181"**	**N34° 06' 09.0884"**	**0° 25' 45.1993"**
406	1860622.96	6789621.42	1094.91	NORPMW006 TOP CENTER OF WELL CASING	W117° 14' 49.1803"	N34° 06' 09.8430"	0° 25' 45.1995"
506	1860622.97	6789621.44	1094.90	NORPMW006 TOP CENTER OF WELL CASING	W117° 14' 49.1800"	N34° 06' 09.8431"	0° 25' 45.1996"
	1860622.97	**6789621.43**	**1094.91**	**NORPMW006 TOP CENTER OF WELL CASING OBSERVATION AVERAGE**	**W117° 14' 49.1802"**	**N34° 06' 09.8431"**	**0° 25' 45.1996"**
507	1860868.35	6797547.65	1159.02	NORPMW007 E-TOP OF PVC	W117° 13' 14.9032"	N34° 06' 11.6728"	0° 26' 38.9386"
607	1860868.34	6797547.68	1159.11	NORPMW007 E-TOP OF PVC	W117° 13' 14.9028"	N34° 06' 11.6728"	0° 26' 38.9388"
707	1860868.35	6797547.70	1159.13	NORPMW007 E-TOP OF PVC	W117° 13' 14.9026"	N34° 06' 11.6728"	0° 26' 38.9389"
807	1860868.33	6797547.71	1159.13	NORPMW007 E-TOP OF PVC	W117° 13' 14.9025"	N34° 06' 11.6726"	0° 26' 38.9390"
	1860868.34	**6797547.69**	**1159.10**	**NORPMW007 TOP OF PVC OBSERVATION AVERAGE**	**W117° 13' 14.9028"**	**N34° 06' 11.6728"**	**0° 26' 38.9388"**
107	1860868.36	6797547.64	1159.91	NORPMW007 TOP CENTER OF WELL CASING	W117° 13' 14.9034"	N34° 06' 11.6729"	0° 26' 38.9385"
907	1860868.43	6797547.60	1159.86	NORPMW007 TOP CENTER OF WELL CASING	W117° 13' 14.9038"	N34° 06' 11.6736"	0° 26' 38.9382"
	1860868.39	**6797547.62**	**1159.89**	**NORPMW007 TOP CENTER OF WELL CASING OBSERVATION AVERAGE**	**W117° 13' 14.9036"**	**N34° 06' 6733"**	**0° 26' 38.9384"**

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Table D – Existing Monitoring Well Observations

Grid Coordinates based upon the California Coordinate System of 1983 (CCS83), Zone 5, North American Datum of 1983 (NAD83 NSRS2007 Epoch 2011.00), having a vertical datum associated to the North American Vertical Datum of 1988 (NAVD 88). Distance units in US Survey Feet.

RMM POINT	Grid Northing	Grid Easting	Point Elevation	Description	Longitude	Latitude	Convergence
2402	1860278.11	6789538.01	1092.37	MW 402 W-TOP OF PVC	W117° 14' 50.2028"	N34° 06' 06.4379"	0° 25' 44.6166"
3402	1860278.09	6789538.00	1092.47	MW 402 W-TOP OF PVC	W117° 14' 50.2029"	N34° 06' 06.4377"	0° 25' 44.6166"
4402	1860278.07	6789538.00	1092.40	MW 402 W-TOP OF PVC	W117° 14' 50.2029"	N34° 06' 06.4375"	0° 25' 44.6166"
5402	1860278.10	6789538.00	1092.40	MW 402 W-TOP OF PVC	W117° 14' 50.2029"	N34° 06' 06.4378"	0° 25' 44.6166"
	1860278.09	**6789538.00**	**1092.41**	**MW-402 TOP OF PVC OBSERVATION AVERAGE**	**W117°14' 50.2029"**	**N34° 06' 06.4377"**	**0° 25' 44.6166"**
6402	1860278.14	6789538.12	1092.88	MW 402 TOP CENTER OF WELL CASING	W117° 14' 50.2015"	N34° 06' 06.4382"	0° 25' 44.6174"
7403	1860278.14	6789538.12	1092.84	MW 402 TOP CENTER OF WELL CASING	W117° 14' 50.2014"	N34° 06' 06.4382"	0° 25' 44.6174"
	1860278.14	**6789538.12**	**1092.86**	**MW-402 TOP OF WELL CASING OBSERVATION AVERAGE**	**W117° 14' 50.2015"**	**N34° 065' 06.4382"**	**0° 25' 44.6174"**
1403	1861417.22	6798773.21	1169.24	MW-403 N-TOP OF PVC	W117° 13' 00.2786"	N34° 06' 17.0080"	0° 26' 47.2747"
2403	1861417.17	6798773.21	1169.20	MW-403 N-TOP OF PVC	W117° 13' 00.2785"	N34° 06' 17.0075"	0° 26' 47.2748"
3403	1861417.20	6798773.22	1169.19	MW-403 N-TOP OF PVC	W117° 13' 00.2784"	N34° 06' 17.0079"	0° 26' 47.2748"
	1861417.20	**6798773.21**	**1169.21**	**MW-403 TOP OF PVC OBSERVATION AVERAGE**	**W117° 13' 00.2785"**	**N34° 06' 17.0078"**	**0° 26' 47.2748"**
4403	1861417.11	6798773.28	1170.06	MW-403 TOP CENTER OF WELL CASING	W117° 13' 00.2778"	N34° 06' 17.0069"	0° 26' 47.2752"
5404	1861417.09	6798773.28	1170.05	MW-403 TOP CENTER OF WELL CASING	W117° 13' 00.2778"	N34° 06' 17.0068"	0° 26' 47.2752"
	1861417.10	**6798773.28**	**1170.06**	**MW-403 TOP OF WELL CASING OBSERVATION AVERAGE**	**W117° 13' 00.2778"**	**N34° 06' 17.0069"**	**0° 26' 47.2752"**

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Certification of Survey Report:

I, **James G. Reichhoff**, a Licensed Professional Land Surveyor in the State of California (PLS No. 9203), do hereby certify that this Survey Report was prepared by me or under my direct supervision based on an actual survey on the ground as described herein.

PROFESSIONAL LAND SURVEYOR
JAMES GREGORY REICHHOFF
PLS 9203
STATE OF CALIFORNIA

June 5, 2017

James G. Reichhoff., P.L.S. 9203 Date
Rocky Mountain Meridian, Inc.
10700 East Bethany Drive – Suite 100
Aurora, CO 80014
(303).481.8567

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Attachment A – Z 38 Reset NGS Data Sheet

The NGS Data Sheet

See file dsdata.pdf for more information about the datasheet.

```
PROGRAM = datasheet95, VERSION = 8.12.1
1         National Geodetic Survey,   Retrieval Date = JUNE  2, 2017
 EV1120 ***********************************************************************
 EV1120  CBN         -  This is a Cooperative Base Network Control Station.
 EV1120  DESIGNATION -  Z 38 RESET
 EV1120  PID         -  EV1120
 EV1120  STATE/COUNTY-  CA/RIVERSIDE
 EV1120  COUNTRY     -  US
 EV1120  USGS QUAD   -  SAN BERNARDINO SOUTH (1980)
 EV1120
 EV1120                        *CURRENT SURVEY CONTROL
 EV1120  ______________________________________________________________________
 EV1120* NAD 83(2011) POSITION- 34 00 54.60900(N) 117 20 02.09950(W)   ADJUSTED
 EV1120* NAD 83(2011) ELLIP HT-   256.960 (meters)        (06/27/12)   ADJUSTED
 EV1120* NAD 83(2011) EPOCH   -  2010.00
 EV1120* NAVD 88 ORTHO HEIGHT -   289.961 (meters)      951.31  (feet) ADJUSTED
 EV1120  ______________________________________________________________________
 EV1120  GEOID HEIGHT    -        -32.950 (meters)                     GEOID12B
 EV1120  NAD 83(2011) X  - -2,430,200.197 (meters)                     COMP
 EV1120  NAD 83(2011) Y  - -4,701,595.832 (meters)                     COMP
 EV1120  NAD 83(2011) Z  -  3,547,985.126 (meters)                     COMP
 EV1120  LAPLACE CORR    -          3.45  (seconds)                   DEFLEC12B
 EV1120  DYNAMIC HEIGHT  -        289.641 (meters)      950.26  (feet) COMP
 EV1120  MODELED GRAVITY -    979,525.6   (mgal)                       NAVD 88
 EV1120
 EV1120  VERT ORDER      -  FIRST     CLASS I
 EV1120
 EV1120  Network accuracy estimates per FGDC Geospatial Positioning Accuracy
 EV1120  Standards:
 EV1120         FGDC (95% conf, cm)     Standard deviation (cm)     CorrNE
 EV1120            Horiz  Ellip           SD_N   SD_E   SD_h      (unitless)
 EV1120  ---------------------------------------------------------------------
 EV1120  NETWORK    0.28   0.74           0.12   0.11   0.38     -0.05695964
 EV1120  ---------------------------------------------------------------------
 EV1120  Click here for local accuracies and other accuracy information.
 EV1120
 EV1120
 EV1120.The horizontal coordinates were established by GPS observations
 EV1120.and adjusted by the National Geodetic Survey in June 2012.
 EV1120
 EV1120.NAD 83(2011) refers to NAD 83 coordinates where the reference frame has
 EV1120.been affixed to the stable North American tectonic plate. See
```

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```
EV1120.NA2011 for more information.
EV1120
EV1120.The horizontal coordinates are valid at the epoch date displayed above
EV1120.which is a decimal equivalence of Year/Month/Day.
EV1120
EV1120.The orthometric height was determined by differential leveling and
EV1120.adjusted by the NATIONAL GEODETIC SURVEY
EV1120.in June 1991.
EV1120
EV1120.WARNING-Repeat measurements at this control monument indicate possible
EV1120.vertical movement.
EV1120
EV1120.Significant digits in the geoid height do not necessarily reflect accuracy.
EV1120.GEOID12B height accuracy estimate available here.
EV1120
EV1120.The X, Y, and Z were computed from the position and the ellipsoidal ht.
EV1120
EV1120.The Laplace correction was computed from DEFLEC12B derived deflections.
EV1120
EV1120.The ellipsoidal height was determined by GPS observations
EV1120.and is referenced to NAD 83.
EV1120
EV1120.The dynamic height is computed by dividing the NAVD 88
EV1120.geopotential number by the normal gravity value computed on the
EV1120.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
EV1120.degrees latitude (g = 980.6199 gals.).
EV1120
EV1120.The modeled gravity was interpolated from observed gravity values.
EV1120
EV1120. The following values were computed from the NAD 83(2011) position.
EV1120
EV1120;                     North         East     Units Scale Factor Converg.
EV1120;SPC CA 6     -   705,531.905 1,899,879.739   MT  1.00002469   -0 35 44.3
EV1120;SPC CA 6     - 2,314,732.59  6,233,188.78   sFT  1.00002469   -0 35 44.3
EV1120;UTM  11      - 3,763,888.165   469,168.949   MT  0.99961172   -0 11 12.5
EV1120
EV1120!             -  Elev Factor  x  Scale Factor =   Combined Factor
EV1120!SPC CA 6     -   0.99995966  x   1.00002469  =   0.99998435
EV1120!UTM  11      -   0.99995966  x   0.99961172  =   0.99957140
EV1120
EV1120_U.S. NATIONAL GRID SPATIAL ADDRESS: 11SMT6916863888(NAD 83)
EV1120
EV1120                          SUPERSEDED SURVEY CONTROL
EV1120
EV1120  NAD 83(2007)-  34 00 54.60696(N)    117 20 02.09770(W) AD(2007.00) 0
EV1120  ELLIP H (02/10/07)  256.967  (m)                       GP(2007.00)
EV1120  NAD 83(1998)-  34 00 54.60146(N)    117 20 02.09215(W) AD(2000.35) A
EV1120  ELLIP H (04/03/01)  256.987  (m)                       GP(2000.35) 1 1
EV1120  NAD 83(1998)-  34 00 54.59973(N)    117 20 02.09111(W) AD(1998.50) A
EV1120  ELLIP H (04/06/00)  256.975  (m)                       GP(1998.50) 3 1
EV1120  NAVD 88 (04/03/01)  289.9    (m)  UNKNOWN model used   GPS OBS
EV1120  NAVD 88             289.96   (m)          951.3    (f) LEVELING    3
```

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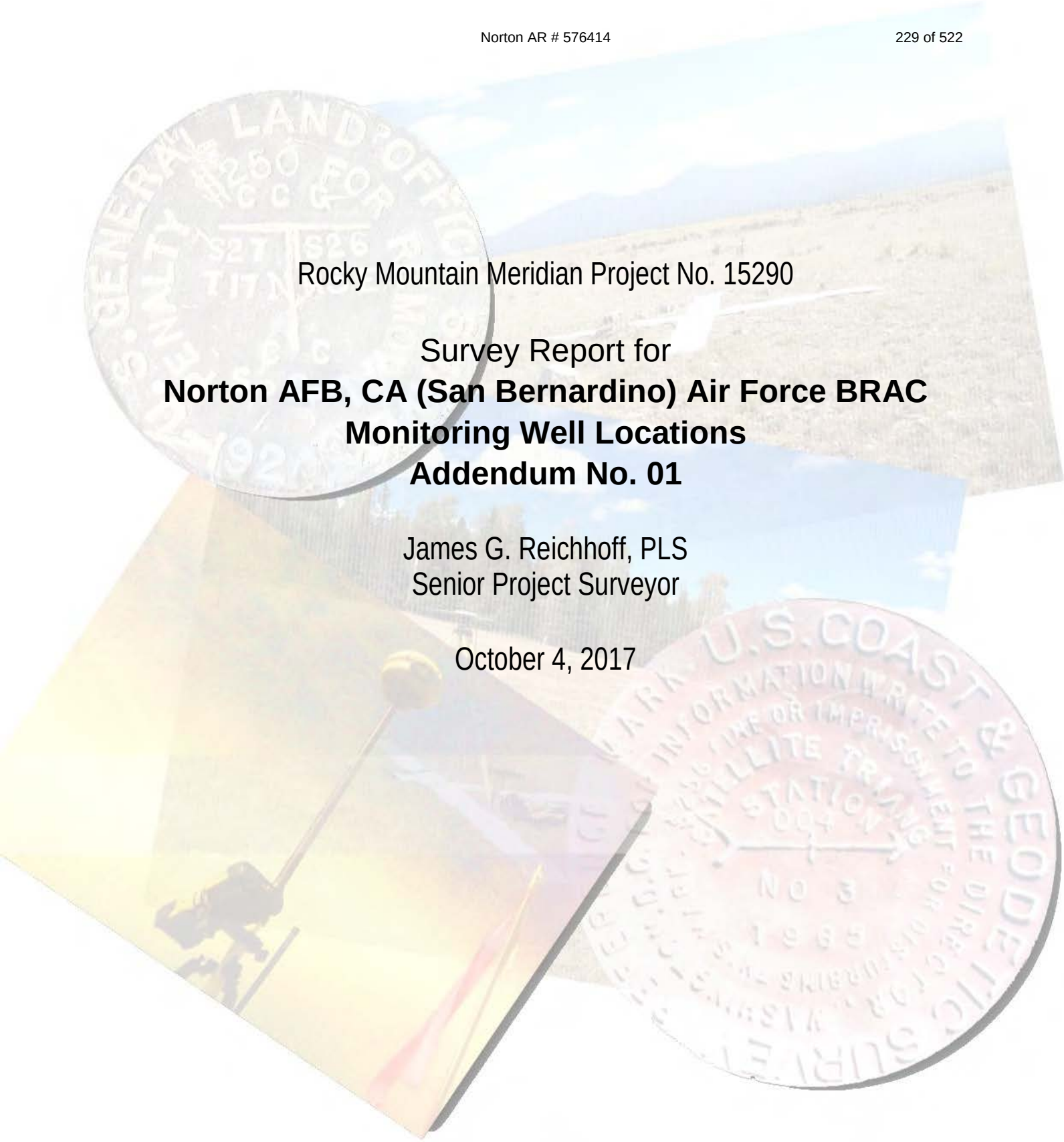
```
EV1120  NGVD 29 (??/??/92)  289.208  (m)          948.84   (f) ADJ UNCH    1 1
EV1120
EV1120.Superseded values are not recommended for survey control.
EV1120
EV1120.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
EV1120.See file dsdata.pdf to determine how the superseded data were derived.
EV1120
EV1120_MARKER: DB = BENCH MARK DISK
EV1120_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
EV1120_STAMPING: Z 38 RESET 1946
EV1120_MARK LOGO: CGS
EV1120_PROJECTION: FLUSH
EV1120_MAGNETIC: N = NO MAGNETIC MATERIAL
EV1120_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
EV1120+STABILITY: SURFACE MOTION
EV1120_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
EV1120+SATELLITE: SATELLITE OBSERVATIONS - November 17, 2011
EV1120
EV1120  HISTORY     - Date     Condition        Report By
EV1120  HISTORY     - 1946     MONUMENTED       CGS
EV1120  HISTORY     - 1961     GOOD             CGS
EV1120  HISTORY     - 1978     GOOD             NGS
EV1120  HISTORY     - 1988     GOOD             NGS
EV1120  HISTORY     - 19980611 GOOD             MWDSC
EV1120  HISTORY     - 20000501 GOOD             MWDSC
EV1120  HISTORY     - 20111117 GOOD             ATKNA
EV1120
EV1120                          STATION DESCRIPTION
EV1120
EV1120'DESCRIBED BY COAST AND GEODETIC SURVEY 1961
EV1120'AT HIGHGROVE.
EV1120'AT HIGHGROVE, 205 FEET SOUTH ALONG THE ATCHISON, TOPEKA AND
EV1120'SANTA FE RAILWAY FROM THE CROSSING OF CENTER STREET, IN THE TOP
EV1120'OF THE CONCRETE FOUNDATION OF THE FORMER HIGHGROVE RAILWAY
EV1120'STATION, 156 FEET SOUTH OF THE HIGHGROVE STATION SIGN, 29 FEET
EV1120'EAST OF THE EAST RAIL OF THE MAIN TRACK, 52 FEET WEST OF THE WEST
EV1120'RAIL OF A SPUR TRACK, 38 1/2 FEET SOUTHWEST OF THE SOUTHWEST
EV1120'CORNER OF A SMALL WOODEN BUILDING, 2 FEET WEST OF THE WEST
EV1120'EDGE OF THE FOUNDATION, AND ABOUT LEVEL WITH THE TRACK.
EV1120
EV1120                          STATION RECOVERY (1978)
EV1120
EV1120'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1978
EV1120'RECOVERED IN GOOD CONDITION.
EV1120
EV1120                          STATION RECOVERY (1988)
EV1120
EV1120'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1988
EV1120'RECOVERED IN GOOD CONDITION.
EV1120
EV1120                          STATION RECOVERY (1998)
EV1120
```

```
EV1120'RECOVERY NOTE BY METRO WATER DISTR SO. CALIFORNIA 1998 (JDG)
EV1120'THE STATION WAS RECOVERED WITH THE FOLLOWING REVISIONS.  DISTANCE
EV1120'CHANGED FROM 156 FT (47.5 M) SOUTH TO 116 FT (35.4 M) SOUTH OF
EV1120'HIGHGROVE STATION SIGN, FROM 29 FT (8.8 M) TO 32 FT (9.8 M) EAST OF
EV1120'EAST RAIL OF MAIN TRACK, FROM 52 FT (15.8 M) TO 49 FT (14.9 M) WEST OF
EV1120'WEST RAIL OF SPUR TRACK, AND 1 FT (0.3 M) LOWER THAN MAIN TRACK DUE TO
EV1120'RECENT CHANGES IN THE RAILYARD AREA.
EV1120
EV1120                          STATION RECOVERY (2000)
EV1120
EV1120'RECOVERY NOTE BY METRO WATER DISTR SO. CALIFORNIA 2000 (MEI)
EV1120'THIS STATION WAS OBSERVED IN MAY, 2000 AS PART OF THE HECTOR MINE
EV1120'EARTHQUAKE FBN/CBN REOBSERVATION SURVEY.
EV1120'
EV1120
EV1120                          STATION RECOVERY (2011)
EV1120
EV1120'RECOVERY NOTE BY ATKINS NORTH AMERICA INC 2011
EV1120'RECOVERED IN GOOD CONDITION.

*** retrieval complete.
Elapsed Time = 00:00:02
```



Rocky Mountain Meridian Project No. 15290

Survey Report for
Norton AFB, CA (San Bernardino) Air Force BRAC Monitoring Well Locations
Addendum No. 01

James G. Reichhoff, PLS
Senior Project Surveyor

October 4, 2017

ROCKY MOUNTAIN MERIDIAN INC
Professional Surveying and Mapping

Introduction:

Note: This report is intended as an addendum to the "Survey Report for Norton AFB, CA (San Bernardino) Air Force BRAC Monitoring Well Locations" prepared by James G. Reichhoff, PLS 9203, of Rocky Mountain Meridian, Inc., dated June 5, 2017.

On August 3, 2017, Rocky Mountain Meridian (RM Meridian) was engaged by Aerostar SES LLC to provide Professional Land Surveying Services for the site investigation of Perflourinated Compound (PFC) release at the Norton AFB, CA (San Bernardino) Air Force BRAC installation site. RM Meridian's scope of work was to measure the horizontal and vertical (top of PVC and top of well casing) locations for one (1) newly placed monitoring well (NORPMW007R). This newly placed well was installed subsequent to the placement of the six (6) previously placed monitoring wells which were surveyed by RM Meridian on May 19, 2017. The location of MW007R is shown below in Figure 1.

The purpose of this report is to document the methodology and findings of RM Meridian while locating the one (1) newly placed monitoring well.

The final values for the monitoring well located by RM Meridian are being reported using the following Horizontal System and Vertical Datum:

> Grid Coordinates based upon the California Coordinate System of 1983 (CCS83), Zone 5, North American Datum of 1983 (NAD 83 (2011) (EPOCH:2010.0000)), having a vertical datum associated to the North American Vertical Datum of 1988 (NAVD 88). Units in US Survey Feet unless otherwise noted.

All the information contained in this project survey report was based upon computed coordinate and elevation values for the newly placed and monitoring well using NOAA's National Geodetic Survey (NGS) Online Positioning User Service (OPUS). A brief description of NOAA's Online Positioning User Service (OPUS) is provided as Attachment A to this report.

Field Survey Methodology:

Field observations for the monitoring well location were performed on August 4 2017 by Steven Dozler, under the direct supervision of James G. Reichhoff, CA PLS 9203.

A Fast-Static GNSS observation was performed on the one (1) newly placed monitoring well using a Trimble R6 Model 2 GNSS receiver. The Fast-Static observation for the located monitoring well was measured for 40 minutes.

After the field observation was completed, the Trimble raw data file for the Fast-Static observation was converted to a Receiver Independent Exchange Format (RINEX) v2.11 data file and uploaded to NOAA's National Geodetic Survey (NGS) Online Positioning User Service (OPUS) for processing.

Direct observation of orthometric heights by differential leveling was not a part of the scope for this survey, and in our opinion is not required to achieve the tasks required. Therefore, the orthometric height for the top of PVC at the well was determined using GNSS survey observations of ellipsoidal heights on the Geographic Reference System of 1980 (GRS80) and referencing known geoid separations with Geoid-12B. Top of well casing elevation at the well location was determined by taping vertical distances from the top of PVC to this feature.

Project Control Specifications:

Units:	US Survey Feet
Horizontal Datum:	NAD83 (2011) (EPOCH:2010.0000)
Vertical Datum:	NAVD88
Projection:	Lambert Conformal Conic
State Plane and/or UTM Zone:	California Coordinate System of 1983 (CCS83), Zone 5
Basis of Bearing:	Grid Bearings
Modification Method Used:	No Modification
Field Methodology:	Fast-Static Observations
Equipment Used:	Trimble GPS Equipment (R6 GNSS Dual Frequency Receiver)
Observation Date:	August 4, 2017

Monitoring Well Location:

One (1) newly placed monitoring well was located at the direction of the client. A Fast-Static observation was performed at the well location. A general overview map of the installation where the monitoring well is located is shown in Figure 1 below. The final horizontal location and top of PVC elevation values for the new monitoring well requested by the client are shown in Table A below. A summary of the NGS OPUS-RS solution report results for the well location are included as Attachment B to this report.

Figure 1 – Monitoring Well Location

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Table A – New Monitoring Well Observations

Grid Coordinates based upon the California Coordinate System of 1983 (CCS83), Zone 5, North American Datum of 1983 NAD83 (2011) (EPOCH:2010.0000), having a vertical datum associated to the North American Vertical Datum of 1988 (NAVD 88). Distance units in US Survey Feet unless otherwise shown.

RMM Observation File	Description	Grid Northing (meters)	Grid Easting (meters)	Point Elevation (meters)	Grid Northing (USft)	Grid Easting (USft)	Point Elevation (USft)	Longitude (DMS)	Latitude (DMS)	Combined Factor
41222160edited.17o	NORPMW007R-TOP OF PVC	567188.154	2071889.392	353.323	1860849.80	6797523.78	1159.19	W117° 13' 15.18877"	N34° 06' 11.49116"	0.99993526
	NORPMW007R-TOP OF WELL CASING						1159.57			

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Certification of Survey Report:

I, **James G. Reichhoff**, a Licensed Professional Land Surveyor in the State of California (PLS No. 9203), do hereby certify that this Survey Report was prepared by me or under my direct supervision based on an actual survey on the ground as described herein.

October 4, 2017

James G. Reichhoff., P.L.S. 9203 Date
Rocky Mountain Meridian, Inc.
10700 East Bethany Drive – Suite 100
Aurora, CO 80014
(303).481.8567

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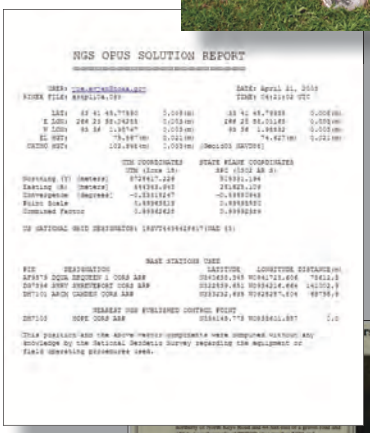
National Geodetic Survey Positioning America for the Future **geodesy.noaa.gov**

NOAA's Online Positioning User Service (OPUS)



NOAA's National Geodetic Survey (NGS) provides simplified access to high-accuracy **National Spatial Reference System (NSRS)** coordinates via a Web service called the **Online Positioning User Service (OPUS)**. A user may upload to OPUS a GPS data file collected with a survey-grade receiver and obtain an NSRS position via email.

OPUS is one of the most popular of the NGS suite of geodetic tools. Every month, users voluntarily upload tens of thousands of GPS data files; each is automatically processed using standard NGS data and models to compute an accurate position.

OPUS requires minimal user input and uses software which computes coordinates for NGS' **Continuously Operating Reference Station (CORS)** network. The resulting positions are accurate and consistent with other National Spatial Reference System users.

OPUS provides several report formats, including a streamlined option for sharing reports on monumented survey control, such as tidal bench marks and other survey disks. The features provided by OPUS processing, storage, and formatting make the user's survey results more consistent, reliable, and accessible.

For more information, contact NGS:

- **On the Web**
  geodesy.noaa.gov/OPUS
- **By email**
  ngs.OPUS@noaa.gov

OPUS

NSRS Coordinates

Attachment B

FILE: 41222160edited.17o OP1506722363150

NGS OPUS-RS SOLUTION REPORT
==========

All computed coordinate accuracies are listed as 1-sigma RMS values.
For additional information: https://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: jreichhoff@rmmeridian.com DATE: September 29, 2017
RINEX FILE: 4122216o.17o TIME: 22:01:24 UTC

SOFTWARE: rsgps 1.38 RS90.prl 1.99.3 START: 2017/08/04 14:17:38
EPHEMERIS: igs19605.eph [precise] STOP: 2017/08/04 14:57:39
NAV FILE: brdc2160.17n OBS USED: 4320 / 4644 : 93%
ANT NAME: TRMR6-2 NONE QUALITY IND. 21.80/ 95.34
ARP HEIGHT: 1.60 NORMALIZED RMS: 0.225

REF FRAME: NAD_83(2011)(EPOCH:2010.0000) IGS08 (EPOCH:2017.59071)

X:	-2418443.116(m)	0.019(m)	-2418444.057(m)	0.019(m)
Y:	-4701565.005(m)	0.025(m)	-4701563.548(m)	0.025(m)
Z:	3556110.090(m)	0.023(m)	3556110.073(m)	0.023(m)

LAT:	34 6 11.49116	0.006(m)	34 6 11.50646	0.006(m)
E LON:	242 46 44.81123	0.008(m)	242 46 44.75258	0.008(m)
W LON:	117 13 15.18877	0.008(m)	117 13 15.24742	0.008(m)
EL HGT:	320.681(m)	0.038(m)	319.955(m)	0.038(m)
ORTHO HGT:	353.323(m)	0.044(m) [NAVD88 (Computed using GEOID12B)]		

	UTM COORDINATES (UTM (Zone 11))	STATE PLANE COORDINATES (SPC (0405 CA 5))
Northing (Y) [meters]	3773619.816	567188.154
Easting (X) [meters]	479626.358	2071889.392
Convergence [degrees]	-0.12384779	0.44410438
Point Scale	0.99960512	0.99998560
Combined Factor	0.99955480	0.99993526

US NATIONAL GRID DESIGNATOR: 11SMT7962673619(NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
DH4117	P589 BLACKMTQRYCS2005 CORS ARP	N343714.387	W1170636.633	58311.3
AF9684	BILL LAKE SKINNER CORS ARP	N333441.663	W1170352.513	60001.2
DM7578	SBCC SBCC_SCGN_CS1999 CORS ARP	N333310.788	W1173941.302	73403.5
DN9092	AZU1 AZUSA CORS ARP	N340733.654	W1175347.306	62383.7
DN5674	RDMT RDMT_SCGN_CS1999 CORS ARP	N343838.172	W1163728.823	81299.3
DN5633	DSSC DSSC_SCGN_CS1998 CORS ARP	N334359.979	W1164243.475	62449.0
DK4141	TRAK BOMMER CANYON CORS ARP	N333704.554	W1174812.318	76178.9
DN7425	P582 EL_MIRAGE_CS2008 CORS ARP	N343803.317	W1173255.845	66192.8
DK6384	BMHL BMHL_SCGN_CS1999 CORS ARP	N341505.188	W1160310.673	108929.7

NEAREST NGS PUBLISHED CONTROL POINT

EV3549	NORTON AFB EAST WATER TANK	N340620.008	W1171323.929	345.1

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

Appendix C

Analytical Data Packages

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April 18, 2017

Vista Work Order No. 1700445

Ms. Jenny Vance
Aerostar SES LLC
1006 Floyd Court
Oak Ridge, TN 37830

Dear Ms. Vance,

Enclosed are the amended results for the sample set received at Vista Analytical Laboratory on April 13, 2017. This sample set was analyzed on a rush turn-around time, under your Project Name 'Former Norton AFB/M3010.0019.0017.05.15TM'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Karen Lopez for

Martha Maier
Laboratory Director

Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Analytical Laboratory 1104 Windfield Way El Dorado Hills, CA 95762 ph: 916-673-1520 fx: 916-673-0106 www.vista-analytical.com

Vista Work Order No. 1700445
Case Narrative

Sample Condition on Receipt:

One wastewater sample and one QC water sample were received in good condition and within the method temperature requirements. The samples were received and stored securely in accordance with Vista standard operating procedures and EPA methodology. This report was amended on April 18, 2017 to change the report format to less than the Limit of Detection (LOD) per the project requirements.

Analytical Notes:

Modified EPA Method 537

Sample "NORPWW069" contained a "gel like substance" and was centrifuged prior to extraction.

The samples were extracted and analyzed for a selected list of 14 PFAS using Modified EPA Method 537.

Holding Times

The samples were extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Method Blank and Ongoing Precision and Recovery (OPR) sample were extracted and analyzed with the preparation batch. No analytes were detected in the Method Blank above 1/2 the LOQ. The OPR recoveries were within the method acceptance criteria

The labeled standard recoveries for all QC and field samples were within the acceptance criteria.

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Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
1700445-01	NORP01001	11-Apr-17 16:30	13-Apr-17 09:35	HDPE Bottle, 125 mL
				HDPE Bottle, 125 mL
1700445-02	NORPWW069	12-Apr-17 14:10	13-Apr-17 09:35	HDPE Bottle, 125 mL
				HDPE Bottle, 125 mL

ANALYTICAL RESULTS

Sample ID: Method Blank — Modified EPA Method 537

Matrix: Aqueous
Sample Size: 0.125 L

QC Batch: B7D0064
Date Extracted: 13-Apr-2017 10:45

Lab Sample: B7D0064-BLK1
Date Analyzed: 14-Apr-17 16:20 Column: BEH C18
14-Apr-17 20:46 Column: BEH C18

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFBS	<4.00	1.79	4.00	8.00	
PFHxA	<4.00	2.18	4.00	8.00	
PFHpA	<2.00	0.591	2.00	8.00	
PFHxS	<2.00	0.947	2.00	8.00	
PFOA	<2.00	0.651	2.00	8.00	
PFOS	<0.900	0.807	0.900	8.00	
PFNA	<2.00	0.810	2.00	8.00	
PFDA	<4.00	1.49	4.00	8.00	
MeFOSAA	<4.00	1.65	4.00	8.00	
PFUnA	<4.00	1.05	4.00	8.00	
EtFOSAA	<4.00	1.37	4.00	8.00	
PFDoA	1.67	0.792	2.00	8.00	J
PFTrDA	<1.00	0.494	1.00	8.00	
PFTeDA	<2.00	0.755	2.00	8.00	

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	98.1	60 - 150	
IS	13C2-PFHxA	93.3	60 - 150	
IS	13C4-PFHpA	90.1	60 - 150	
IS	18O2-PFHxS	87.7	60 - 150	
IS	13C2-PFOA	80.8	60 - 150	
IS	13C8-PFOS	80.6	60 - 150	
IS	13C5-PFNA	81.7	50 - 150	
IS	13C2-PFDA	87.4	60 - 150	
IS	d3-MeFOSAA	70.5	20 - 150	
IS	13C2-PFUnA	87.8	50 - 150	
IS	d5-EtFOSAA	79.5	20 - 150	
IS	13C2-PFDoA	82.1	30 - 150	
IS	13C2-PFTeDA	64.0	20 - 150	

DL - Sample specifc estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
Only the linear isomer is reported for all other analytes.

Sample ID: OPR

Modified EPA Method 537

Matrix:	Aqueous	QC Batch:	B7D0064	Lab Sample:	B7D0064-BS1
Sample Size:	0.125 L	Date Extracted:	13-Apr-2017 10:45	Date Analyzed:	14-Apr-17 15:42 Column: BEH C18
					14-Apr-17 20:08 Column: BEH C18

Analyte	Amt Found (ng/L)	Spike Amt	%R	Limits		Labeled Standard	%R	LCL-UCL
PFBS	83.8	80.0	105	60 - 130	IS	13C3-PFBS	97.8	60 - 150
PFHxA	89.6	80.0	112	70 - 130	IS	13C2-PFHxA	92.9	60 - 150
PFHpA	86.6	80.0	108	70 - 130	IS	13C4-PFHpA	97.8	60 - 150
PFHxS	88.6	80.0	111	70 - 130	IS	18O2-PFHxS	95.5	60 - 150
PFOA	78.0	80.0	97.4	70 - 130	IS	13C2-PFOA	89.7	60 - 150
PFOS	87.4	80.0	109	70 - 130	IS	13C8-PFOS	87.9	60 - 150
PFNA	85.6	80.0	107	50 - 130	IS	13C5-PFNA	91.4	50 - 150
PFDA	76.8	80.0	96.0	70 - 130	IS	13C2-PFDA	96.9	60 - 150
MeFOSAA	76.2	80.0	95.2	70 - 130	IS	d3-MeFOSAA	84.8	20 - 150
PFUnA	86.9	80.0	109	70 - 130	IS	13C2-PFUnA	87.5	50 - 150
EtFOSAA	92.1	80.0	115	70 - 130	IS	d5-EtFOSAA	82.1	20 - 150
PFDoA	91.9	80.0	115	70 - 130	IS	13C2-PFDoA	83.8	30 - 150
PFTrDA	98.0	80.0	123	20 - 130	IS	13C2-PFTeDA	62.3	20 - 150
PFTeDA	93.7	80.0	117	20 - 130				

LCL-UCL - Lower control limit - upper control limit

Sample ID: NORP01001 — Modified EPA Method 537

Client Data

Name: Aerostar SES LLC
Project: Former Norton AFB/M3010.0019.0017.05.15T
Date Collected: 11-Apr-2017 16:30
Location:

Sample Data

Matrix: QC Water
Sample Size: 0.129 L

Laboratory Data

Lab Sample: 1700445-01 — Date Received: 13-Apr-2017 9:35
QC Batch: B7D0064 — Date Extracted: 13-Apr-2017 10:45
Date Analyzed: 14-Apr-17 17:24 Column: BEH C18
14-Apr-17 21:11 Column: BEH C18

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFBS	<3.88	1.73	3.88	7.74	
PFHxA	<3.88	2.11	3.88	7.74	
PFHpA	<1.94	0.572	1.94	7.74	
PFHxS	<1.94	0.917	1.94	7.74	
PFOA	<1.94	0.630	1.94	7.74	
PFOS	1.12	0.781	0.872	7.74	J
PFNA	<1.94	0.784	1.94	7.74	
PFDA	<3.88	1.44	3.88	7.74	
MeFOSAA	<3.88	1.60	3.88	7.74	
PFUnA	<3.88	1.02	3.88	7.74	
EtFOSAA	<3.88	1.33	3.88	7.74	
PFDoA	1.17	0.767	1.94	7.74	J, B
PFTrDA	<0.969	0.478	0.969	7.74	
PFTeDA	0.793	0.731	1.94	7.74	J

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	98.1	60 - 150	
IS	13C2-PFHxA	96.6	60 - 150	
IS	13C4-PFHpA	87.9	60 - 150	
IS	18O2-PFHxS	96.6	60 - 150	
IS	13C2-PFOA	95.6	60 - 150	
IS	13C8-PFOS	91.8	60 - 150	
IS	13C5-PFNA	95.3	50 - 150	
IS	13C2-PFDA	98.3	60 - 150	
IS	d3-MeFOSAA	70.5	20 - 150	
IS	13C2-PFUnA	85.9	50 - 150	
IS	d5-EtFOSAA	81.1	20 - 150	
IS	13C2-PFDoA	85.4	30 - 150	
IS	13C2-PFTeDA	64.4	20 - 150	

DL - Sample specifc estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL - Lower control limit - upper control limit

Results reported to DL.

When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORPWW069 — Modified EPA Method 537

Client Data

Name: Aerostar SES LLC
Project: Former Norton AFB/M3010.0019.0017.05.15T
Date Collected: 12-Apr-2017 14:10
Location:

Sample Data

Matrix: Wastewater
Sample Size: 0.0900 L

Laboratory Data

Lab Sample: 1700445-02 — Date Received: 13-Apr-2017 9:35
QC Batch: B7D0064 — Date Extracted: 13-Apr-2017 10:45
Date Analyzed: 14-Apr-17 17:36 Column: BEH C18
14-Apr-17 21:23 Column: BEH C18

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFBS	<5.56	2.49	5.56	11.1	
PFHxA	<5.56	3.03	5.56	11.1	
PFHpA	<2.78	0.821	2.78	11.1	
PFHxS	<2.78	1.32	2.78	11.1	
PFOA	1.28	0.905	2.78	11.1	J
PFOS	1.25	1.12	1.25	11.1	J
PFNA	<2.78	1.13	2.78	11.1	
PFDA	<5.56	2.07	5.56	11.1	
MeFOSAA	<5.56	2.29	5.56	11.1	
PFUnA	<5.56	1.46	5.56	11.1	
EtFOSAA	<5.56	1.90	5.56	11.1	
PFDoA	1.47	1.10	2.78	11.1	J, B
PFTrDA	<1.39	0.686	1.39	11.1	
PFTeDA	<2.78	1.05	2.78	11.1	

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	99.4	60 - 150	
IS	13C2-PFHxA	92.2	60 - 150	
IS	13C4-PFHpA	81.4	60 - 150	
IS	18O2-PFHxS	95.6	60 - 150	
IS	13C2-PFOA	101	60 - 150	
IS	13C8-PFOS	102	60 - 150	
IS	13C5-PFNA	88.3	50 - 150	
IS	13C2-PFDA	86.4	60 - 150	
IS	d3-MeFOSAA	60.8	20 - 150	
IS	13C2-PFUnA	85.0	50 - 150	
IS	d5-EtFOSAA	63.0	20 - 150	
IS	13C2-PFDoA	76.6	30 - 150	
IS	13C2-PFTeDA	61.0	20 - 150	

DL - Sample specifc estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL - Lower control limit - upper control limit

Results reported to DL.

When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

DATA QUALIFIERS & ABBREVIATIONS

B	**This compound was also detected in the method blank.**
D	**Dilution**
E	**The associated compound concentration exceeded the calibration range of the instrument.**
H	**Recovery and/or RPD was outside laboratory acceptance limits.**
I	**Chemical Interference**
J	**The amount detected is below the Reporting Limit/LOQ.**
M	**Estimated Maximum Possible Concentration. (CA Region 2 projects only)**
*****	**See Cover Letter**
Conc.	**Concentration**
NA	**Not applicable**
ND	**Not Detected**
TEQ	**Toxic Equivalency**

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

CERTIFICATIONS

Accrediting Authority	Certificate Number
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2016026
Minnesota Department of Health	1175673
Nevada Division of Environmental Protection	CA004132017-1
New Hampshire Environmental Accreditation Program	207716
New Jersey Department of Environmental Protection	CA003
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-008
Pennsylvania Department of Environmental Protection	013
South Carolina Department of Health	87002001
Texas Commission on Environmental Quality	T104704189-17-8
Virginia Department of General Services	8621
Washington Department of Ecology	C584
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	**Method**
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23

MATRIX: Biological Tissue	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	**Method**
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537

MATRIX: Non-Potable Water	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	**Method**
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope	EPA 1613B

Dilution GC/HRMS	
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

1700445 3.2°C

1 of 1

AerostarSES LLC

1007 Floyd Culler Court
Oak Ridge, TN 37830
865-481-7837

Chain of Custody Record/Analysis Request Number: 0047

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

Job No.: M3010.0019.0017.05 15TM
Installation: Former Norton AFB

TAT: ~~10 business days~~ *Rush 3-day

Aerostar Project Manager: Paula Bond, pbond@aerostar.net, 865-813-2759
Send Data to: Jenny Vance, jvance@aerostar.net, 865-483-7904

Sampler (s): Tim Cullen

Laboratory Name/Address: Vista Analytical Lab
~~Accutest Laboratories~~
~~4405 Vineland Rd.~~
~~Suite C-15~~
~~Orlando, FL 32811~~

Lab Phone Number (for Fed Ex shipment): ~~407-425-6700~~

Contact: Andrea Colby
Phone: 386-615-8479
email: andrea.colby@sgs.com

ANALYSIS

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

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

Station ID	Sample ID	Date Collected	Time Collected	Sample Type	Matrix	Depth (feet)	PFAS (see list of 14 analytes below)	PFOS/PFOA					NOTES
				Preservative (Trizma, HCl, HNO_3, Ice, etc.)									
FIELD QC	NORP01001	4/11/17	1630	AB	WQ	—	2						Drillers water
FIELD QC	NORP WW069	4/12/16	1410	N	WW	—	2						Drilling Fluid/Mud
						Total # of Containers							

JC

RELINQUISHED BY:		RECEIVED BY:	
Signature:	Date/Time: 4/12/17 1655	Signature:	Date/Time: 4/13/17 0941
Printed Name: Tim Cullen	Firm: Aerostar	Printed Name: Marissa Sparks	Firm: Vah
Signature:	Date/Time:	Signature:	Date/Time:
Printed Name:	Firm:	Printed Name:	Firm:

ANALYTE	ERPIMS PAR CODE	CAS	Contaminant	ERPIMS PAR CODE	CAS
Perfluorooctanesulfonic acid	PFOS	1763-23-1	Perfluorohexanoic acid	PFHXA	307-24-4
Perfluorooctanoic acid	PFOA	335-67-1	Perfluoropentadecanoic acid	PFTEA	376-06-7
Perfluorononanoic acid	PFNA	375-95-1	Perfluorotridecanoic acid	PFTRIA	72629-94-8
Perfluorohexanesulfonic acid	PFHXSA	355-46-4	Perfluoroundecanoic acid	PFUNA	2058-94-8
Perfluoroheptanoic acid	PFHPA	375-85-9	Perfluorododecanoic acid	PFDOA	307-55-1
Perfluorobutanesulfonic acid	PFBSA	375-73-5	Perfluorodecanoic acid	PFDA	335-76-2
N-methyl perfluorooctane sulfonamidoacetic acid	NMEFOSAA	2355-31-9	N-ethyl perfluorooctane sulfonamidoacetic acid	NETFOSAA	2991-50-6

SAMPLE LOG-IN CHECKLIST

Vista Analytical Laboratory

Vista Project #: 1700445 TAT 2

Samples Arrival:	Date/Time 4/13/17 0935	Initials: WWS	Location: WR-2 Shelf/Rack: N/a
Logged In:	Date/Time 04/13/17 0950	Initials: BLB WWS	Location: WR-2 Shelf/Rack: E5

Delivered By:	FedEx	UPS	On Trac	DHL	Hand Delivered	Other
Preservation:	Ice	Blue Ice	Dry Ice	None		

Temp °C: 2.9 (uncorrected)	Time: 0940	Thermometer ID: IR-1
Temp °C: 3.2 (corrected)	Probe used: Yes☐ No☑	

	YES	NO	NA
Adequate Sample Volume Received?	✓		
Holding Time Acceptable?	✓		
Shipping Container(s) Intact?	✓		
Shipping Custody Seals Intact?	✓		
Shipping Documentation Present?	✓		
Airbill Trk # ~~7788 3005 4928~~ WWS 4/13/17 7862 2769 4566	✓		
Sample Container Intact?	✓		
Sample Custody Seals Intact?			✓
Chain of Custody / Sample Documentation Present?	✓		
COC Anomaly/Sample Acceptance Form completed?		✓	

If Chlorinated or Drinking Water Samples, Acceptable Preservation?					✓
Preservation Documented:	$Na_2S_2O_3$	Trizma	Yes	No	NA
Shipping Container	Vista	Client	Retain	Return	Dispose

Comments: station ID: FIELDQC sample ID: NORP01001 cap label: Drillers (a,b)
(A) *sample label: station ID: NORPIDW11 sample ID: NORPWW069 (a,b)
COC ID: station ID: FIELDQC sample ID: NORPWW069 (a,b)
* sample NORPWW069 is "cloudy" (a,b)
(A) COC collection date: 4/12/16 Label collection date 4/12/17

BLA 09/06/2016

L:/QA/Forms/sample control/Sample LoginNov-2016 (IR-1) F11.1
L:/Controlled Forms/Sample LoginNov-2016 (IR-1) F11.1

April 27, 2017

Vista Work Order No. 1700446

Ms. Jenny Vance
Aerostar SES LLC
1006 Floyd Court
Oak Ridge, TN 37830

Dear Ms. Vance,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on April 13, 2017. This sample set was analyzed on a rush turn-around time, under your Project Name 'Former Norton AFB/M3010.0019.0017.05.15TM'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Karen Lopez for

Martha Maier
Laboratory Director

Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Analytical Laboratory 1104 Windfield Way El Dorado Hills, CA 95762 ph: 916-673-1520 fx: 916-673-0106 www.vista-analytical.com

Vista Work Order No. 1700446
Case Narrative

Sample Condition on Receipt:

Two aqueous samples and three solid samples were received in good condition and within the method temperature requirements. The samples were received and stored securely in accordance with Vista standard operating procedures and EPA methodology.

Analytical Notes:

Modified EPA Method 537

The aqueous samples were extracted and analyzed for a selected list of 14 PFAS using Modified EPA Method 537.

Holding Times

The samples were extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Method Blank and Ongoing Precision and Recovery (OPR) sample were extracted and analyzed with the preparation batch. No analytes were detected in the Method Blank above 1/2 the LOQ. The OPR recoveries were within the method acceptance criteria

The labeled standard recoveries for all QC and field samples were within the acceptance criteria.

VAL-PFAS

The solid samples were extracted and analyzed for a selected list of 14 PFAS using VAL Method PFAS.

Holding Times

The samples were extracted and analyzed within the hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Method Blank and Ongoing Precision and Recovery (OPR) sample were extracted and analyzed with the preparation batch. No analytes were detected in the Method Blank above 1/2 the LOQ. The OPR recoveries were within the method acceptance criteria.

The labeled standard recoveries outside the acceptance criteria are listed in the table below.

QC Anomalies

LabNumber	SampleName	Analysis	Analyte	Flag	%Rec
1700446-02	NORP05017	VAL - PFAS	13C2-PFTeDA	H	12.0

H = Recovery was outside laboratory acceptance criteria.

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Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
1700446-01	NORP01002	11-Apr-17 16:25	13-Apr-17 09:35	HDPE Bottle, 125 mL
				HDPE Bottle, 125 mL
1700446-02	NORP05017	11-Apr-17 16:55	13-Apr-17 09:35	HDPE Jar
1700446-03	NORP05018	12-Apr-17 14:00	13-Apr-17 09:35	HDPE Bottle, 125 mL
				HDPE Bottle, 125 mL
1700446-04	NORP05019	12-Apr-17 10:55	13-Apr-17 09:35	HDPE Jar
1700446-05	NORP05020	12-Apr-17 14:50	13-Apr-17 09:35	HDPE Jar

ANALYTICAL RESULTS

Sample ID: Method Blank — Modified EPA Method 537

Matrix: Aqueous
Sample Size: 0.125 L

QC Batch: B7D0070
Date Extracted: 14-Apr-2017 10:56

Lab Sample: B7D0070-BLK1
Date Analyzed: 17-Apr-17 20:19 Column: BEH C18
18-Apr-17 01:35 Column: BEH C18

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFBS	<5.00	2.18	5.00	8.00	
PFHxA	<5.00	2.18	5.00	8.00	
PFHpA	<5.00	2.18	5.00	8.00	
PFHxS	<5.00	2.18	5.00	8.00	
PFOA	<5.00	2.18	5.00	8.00	
PFOS	<5.00	2.18	5.00	8.00	
PFNA	<5.00	2.18	5.00	8.00	
PFDA	<5.00	2.18	5.00	8.00	
MeFOSAA	<5.00	2.18	5.00	8.00	
PFUnA	<5.00	2.18	5.00	8.00	
EtFOSAA	<5.00	2.18	5.00	8.00	
PFDoA	<5.00	2.18	5.00	8.00	
PFTrDA	<5.00	2.18	5.00	8.00	
PFTeDA	<5.00	2.18	5.00	8.00	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	98.9	60 - 150	
IS	13C2-PFHxA	97.7	60 - 150	
IS	13C4-PFHpA	98.7	60 - 150	
IS	18O2-PFHxS	94.3	60 - 150	
IS	13C2-PFOA	85.6	60 - 150	
IS	13C8-PFOS	88.3	60 - 150	
IS	13C5-PFNA	95.7	50 - 150	
IS	13C2-PFDA	84.8	60 - 150	
IS	d3-MeFOSAA	58.1	20 - 150	
IS	13C2-PFUnA	78.6	50 - 150	
IS	d5-EtFOSAA	67.2	20 - 150	
IS	13C2-PFDoA	67.3	30 - 150	
IS	13C2-PFTeDA	47.5	20 - 150	

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
Only the linear isomer is reported for all other analytes.

Sample ID: OPR

Modified EPA Method 537

Matrix:	Aqueous	QC Batch:	B7D0070	Lab Sample:	B7D0070-BS1
Sample Size:	0.125 L	Date Extracted:	14-Apr-2017 10:56	Date Analyzed:	17-Apr-17 19:28 Column: BEH C18
					18-Apr-17 00:32 Column: BEH C18

Analyte	Amt Found (ng/L)	Spike Amt	%R	Limits		Labeled Standard	%R	LCL-UCL
PFBS	81.7	80.0	102	60 - 130	IS	13C3-PFBS	97.2	60 - 150
PFHxA	85.8	80.0	107	70 - 130	IS	13C2-PFHxA	93.1	60 - 150
PFHpA	87.1	80.0	109	70 - 130	IS	13C4-PFHpA	101	60 - 150
PFHxS	84.1	80.0	105	70 - 130	IS	18O2-PFHxS	96.6	60 - 150
PFOA	78.2	80.0	97.8	70 - 130	IS	13C2-PFOA	85.5	60 - 150
PFOS	96.1	80.0	120	70 - 130	IS	13C8-PFOS	78.2	60 - 150
PFNA	78.6	80.0	98.2	50 - 130	IS	13C5-PFNA	92.2	50 - 150
PFDA	91.2	80.0	114	70 - 130	IS	13C2-PFDA	73.4	60 - 150
MeFOSAA	95.9	80.0	120	70 - 130	IS	d3-MeFOSAA	58.4	20 - 150
PFUnA	79.2	80.0	99.0	70 - 130	IS	13C2-PFUnA	75.4	50 - 150
EtFOSAA	83.3	80.0	104	70 - 130	IS	d5-EtFOSAA	67.2	20 - 150
PFDoA	82.7	80.0	103	70 - 130	IS	13C2-PFDoA	60.6	30 - 150
PFTrDA	91.3	80.0	114	20 - 130	IS	13C2-PFTeDA	31.0	20 - 150
PFTeDA	88.5	80.0	111	20 - 130				

LCL-UCL - Lower control limit - upper control limit

Sample ID: NORP01002

Modified EPA Method 537

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	QC Water	Lab Sample:	1700446-01	Date Received:	13-Apr-2017 9:35
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	0.124 L	QC Batch:	B7D0070	Date Extracted:	14-Apr-2017 10:56
Date Collected:	11-Apr-2017 16:25			Date Analyzed:	17-Apr-17 22:25 Column: BEH C18		
Location:	FIELD QC				18-Apr-17 03:16 Column: BEH C18		

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFBS	<5.04	2.19	5.04	8.05	
PFHxA	<5.04	2.19	5.04	8.05	
PFHpA	<5.04	2.19	5.04	8.05	
PFHxS	<5.04	2.19	5.04	8.05	
PFOA	<5.04	2.19	5.04	8.05	
PFOS	<5.04	2.19	5.04	8.05	
PFNA	<5.04	2.19	5.04	8.05	
PFDA	<5.04	2.19	5.04	8.05	
MeFOSAA	<5.04	2.19	5.04	8.05	
PFUnA	<5.04	2.19	5.04	8.05	
EtFOSAA	<5.04	2.19	5.04	8.05	
PFDoA	<5.04	2.19	5.04	8.05	
PFTrDA	<5.04	2.19	5.04	8.05	
PFTeDA	<5.04	2.19	5.04	8.05	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	99.4	60 - 150	
IS	13C2-PFHxA	93.6	60 - 150	
IS	13C4-PFHpA	96.9	60 - 150	
IS	18O2-PFHxS	95.8	60 - 150	
IS	13C2-PFOA	83.6	60 - 150	
IS	13C8-PFOS	96.0	60 - 150	
IS	13C5-PFNA	91.6	50 - 150	
IS	13C2-PFDA	76.1	60 - 150	
IS	d3-MeFOSAA	65.0	20 - 150	
IS	13C2-PFUnA	84.1	50 - 150	
IS	d5-EtFOSAA	71.0	20 - 150	
IS	13C2-PFDoA	71.2	30 - 150	
IS	13C2-PFTeDA	64.0	20 - 150	

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP05018

Modified EPA Method 537

Client Data

Name:	Aerostar SES LLC
Project:	Former Norton AFB/M3010.0019.0017.05.15T
Date Collected:	12-Apr-2017 14:00
Location:	NORPMW003

Sample Data

Matrix:	QC Water
Sample Size:	0.120 L

Laboratory Data

Lab Sample:	1700446-03	Date Received:	13-Apr-2017 9:35
QC Batch:	B7D0070	Date Extracted:	14-Apr-2017 10:56
Date Analyzed:	17-Apr-17 22:38 Column: BEH C18		
	18-Apr-17 03:28 Column: BEH C18		

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFBS	<5.21	2.27	5.21	8.33	
PFHxA	<5.21	2.27	5.21	8.33	
PFHpA	<5.21	2.27	5.21	8.33	
PFHxS	<5.21	2.27	5.21	8.33	
PFOA	<5.21	2.27	5.21	8.33	
PFOS	<5.21	2.27	5.21	8.33	
PFNA	<5.21	2.27	5.21	8.33	
PFDA	<5.21	2.27	5.21	8.33	
MeFOSAA	<5.21	2.27	5.21	8.33	
PFUnA	<5.21	2.27	5.21	8.33	
EtFOSAA	<5.21	2.27	5.21	8.33	
PFDoA	<5.21	2.27	5.21	8.33	
PFTrDA	<5.21	2.27	5.21	8.33	
PFTeDA	<5.21	2.27	5.21	8.33	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	100	60 - 150	
IS	13C2-PFHxA	94.9	60 - 150	
IS	13C4-PFHpA	80.0	60 - 150	
IS	18O2-PFHxS	101	60 - 150	
IS	13C2-PFOA	88.1	60 - 150	
IS	13C8-PFOS	90.6	60 - 150	
IS	13C5-PFNA	85.3	50 - 150	
IS	13C2-PFDA	87.7	60 - 150	
IS	d3-MeFOSAA	60.8	20 - 150	
IS	13C2-PFUnA	78.7	50 - 150	
IS	d5-EtFOSAA	74.1	20 - 150	
IS	13C2-PFDoA	58.1	30 - 150	
IS	13C2-PFTeDA	40.5	20 - 150	

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: Method Blank — VAL - PFAS

Matrix: Solid
Sample Size: 1.00 g

QC Batch: B7D0079
Date Extracted: 17-Apr-2017 14:50

Lab Sample: B7D0079-BLK1
Date Analyzed: 19-Apr-17 17:02 Column: BEH C18
20-Apr-17 00:13 Column: BEH C18

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	<1.00	0.285	1.00	2.00	
PFHxA	<1.00	0.285	1.00	2.00	
PFHpA	<1.00	0.285	1.00	2.00	
PFHxS	<1.00	0.285	1.00	2.00	
PFOA	<1.00	0.285	1.00	2.00	
PFOS	<1.00	0.285	1.00	2.00	
PFNA	<1.00	0.285	1.00	2.00	
PFDA	<1.00	0.285	1.00	2.00	
MeFOSAA	<1.00	0.285	1.00	2.00	
PFUnA	<1.00	0.285	1.00	2.00	
EtFOSAA	<1.00	0.285	1.00	2.00	
PFDoA	<1.00	0.285	1.00	2.00	
PFTrDA	<1.00	0.285	1.00	2.00	
PFTeDA	<1.00	0.285	1.00	2.00	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	109	60 - 150	
IS	13C2-PFHxA	93.5	60 - 150	
IS	13C4-PFHpA	97.8	60 - 150	
IS	18O2-PFHxS	90.8	60 - 150	
IS	13C2-PFOA	81.1	60 - 150	
IS	13C8-PFOS	67.0	60 - 150	
IS	13C5-PFNA	88.7	50 - 150	
IS	13C2-PFDA	99.5	60 - 150	
IS	d3-MeFOSAA	63.3	20 - 150	
IS	13C2-PFUnA	77.6	50 - 150	
IS	d5-EtFOSAA	74.2	20 - 150	
IS	13C2-PFDoA	59.6	30 - 150	
IS	13C2-PFTeDA	21.6	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
Only the linear isomer is reported for all other analytes.

Sample ID: OPR

VAL - PFAS

Matrix:	Solid	QC Batch:	B7D0079	Lab Sample:	B7D0079-BS1
Sample Size:	1.00 g	Date Extracted:	17-Apr-2017 14:50	Date Analyzed:	19-Apr-17 16:12 Column: BEH C18
					19-Apr-17 23:47 Column: BEH C18

Analyte	Amt Found (ng/g)	Spike Amt	%R	Limits		Labeled Standard	%R	LCL-UCL
PFBS	10.2	10.0	102	60 - 130	IS	13C3-PFBS	107	60 - 150
PFHxA	11.6	10.0	116	70 - 130	IS	13C2-PFHxA	91.1	60 - 150
PFHpA	9.81	10.0	98.1	70 - 130	IS	13C4-PFHpA	89.1	60 - 150
PFHxS	10.3	10.0	103	70 - 130	IS	18O2-PFHxS	84.2	60 - 150
PFOA	11.1	10.0	111	70 - 130	IS	13C2-PFOA	76.1	60 - 150
PFOS	9.34	10.0	93.4	70 - 130	IS	13C8-PFOS	82.0	60 - 150
PFNA	11.4	10.0	114	50 - 130	IS	13C5-PFNA	92.9	50 - 150
PFDA	9.76	10.0	97.6	70 - 130	IS	13C2-PFDA	110	60 - 150
MeFOSAA	10.1	10.0	101	70 - 130	IS	d3-MeFOSAA	71.3	20 - 150
PFUnA	11.1	10.0	111	70 - 130	IS	13C2-PFUnA	82.8	50 - 150
EtFOSAA	11.8	10.0	118	70 - 130	IS	d5-EtFOSAA	78.2	20 - 150
PFDoA	10.1	10.0	101	70 - 130	IS	13C2-PFDoA	64.7	30 - 150
PFTrDA	10.3	10.0	103	20 - 130	IS	13C2-PFTeDA	25.0	20 - 150
PFTeDA	10.2	10.0	102	20 - 130				

LCL-UCL - Lower control limit - upper control limit

Sample ID: NORP05017

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700446-02	Date Received:	13-Apr-2017 9:35
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.09 g	QC Batch:	B7D0079	Date Extracted:	17-Apr-2017 14:50
Date Collected:	11-Apr-2017 16:55	% Solids:	95.5	Date Analyzed:	19-Apr-17 18:18 Column: BEH C18		
Location:	NORPMW003				20-Apr-17 00:25 Column: BEH C18		

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	<0.961	0.274	0.961	1.92	
PFHxA	<0.961	0.274	0.961	1.92	
PFHpA	<0.961	0.274	0.961	1.92	
PFHxS	0.510	0.274	0.961	1.92	J
PFOA	<0.961	0.274	0.961	1.92	
PFOS	1.58	0.274	0.961	1.92	J
PFNA	<0.961	0.274	0.961	1.92	
PFDA	<0.961	0.274	0.961	1.92	
MeFOSAA	<0.961	0.274	0.961	1.92	
PFUnA	<0.961	0.274	0.961	1.92	
EtFOSAA	<0.961	0.274	0.961	1.92	
PFDoA	<0.961	0.274	0.961	1.92	
PFTrDA	<0.961	0.274	0.961	1.92	
PFTeDA	<0.961	0.274	0.961	1.92	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	106	60 - 150	
IS	13C2-PFHxA	95.8	60 - 150	
IS	13C4-PFHpA	83.7	60 - 150	
IS	18O2-PFHxS	86.6	60 - 150	
IS	13C2-PFOA	77.1	60 - 150	
IS	13C8-PFOS	81.5	60 - 150	
IS	13C5-PFNA	91.9	50 - 150	
IS	13C2-PFDA	102	60 - 150	
IS	d3-MeFOSAA	82.4	20 - 150	
IS	13C2-PFUnA	102	50 - 150	
IS	d5-EtFOSAA	53.4	20 - 150	
IS	13C2-PFDoA	49.2	30 - 150	
IS	13C2-PFTeDA	12.0	20 - 150	H

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP05019

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700446-04	Date Received:	13-Apr-2017 9:35
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.04 g	QC Batch:	B7D0079	Date Extracted:	17-Apr-2017 14:50
Date Collected:	12-Apr-2017 10:55	% Solids:	97.2	Date Analyzed:	19-Apr-17 18:31 Column: BEH C18		
Location:	NORPMW003				20-Apr-17 00:38 Column: BEH C18		

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	<0.989	0.282	0.989	1.98	
PFHxA	<0.989	0.282	0.989	1.98	
PFHpA	<0.989	0.282	0.989	1.98	
PFHxS	<0.989	0.282	0.989	1.98	
PFOA	<0.989	0.282	0.989	1.98	
PFOS	<0.989	0.282	0.989	1.98	
PFNA	<0.989	0.282	0.989	1.98	
PFDA	<0.989	0.282	0.989	1.98	
MeFOSAA	<0.989	0.282	0.989	1.98	
PFUnA	<0.989	0.282	0.989	1.98	
EtFOSAA	<0.989	0.282	0.989	1.98	
PFDoA	<0.989	0.282	0.989	1.98	
PFTrDA	<0.989	0.282	0.989	1.98	
PFTeDA	<0.989	0.282	0.989	1.98	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	112	60 - 150	
IS	13C2-PFHxA	89.0	60 - 150	
IS	13C4-PFHpA	95.5	60 - 150	
IS	18O2-PFHxS	94.3	60 - 150	
IS	13C2-PFOA	76.6	60 - 150	
IS	13C8-PFOS	70.9	60 - 150	
IS	13C5-PFNA	83.9	50 - 150	
IS	13C2-PFDA	100	60 - 150	
IS	d3-MeFOSAA	61.6	20 - 150	
IS	13C2-PFUnA	75.2	50 - 150	
IS	d5-EtFOSAA	66.4	20 - 150	
IS	13C2-PFDoA	57.1	30 - 150	
IS	13C2-PFTeDA	26.6	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP05020

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700446-05	Date Received:	13-Apr-2017 9:35
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.15 g	QC Batch:	B7D0079	Date Extracted:	17-Apr-2017 14:50
Date Collected:	12-Apr-2017 14:50	% Solids:	89.7	Date Analyzed:	19-Apr-17 18:43 Column: BEH C18		
Location:	NORPMW003				20-Apr-17 00:50 Column: BEH C18		

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	<0.970	0.276	0.970	1.94	
PFHxA	<0.970	0.276	0.970	1.94	
PFHpA	<0.970	0.276	0.970	1.94	
PFHxS	<0.970	0.276	0.970	1.94	
PFOA	<0.970	0.276	0.970	1.94	
PFOS	<0.970	0.276	0.970	1.94	
PFNA	<0.970	0.276	0.970	1.94	
PFDA	<0.970	0.276	0.970	1.94	
MeFOSAA	<0.970	0.276	0.970	1.94	
PFUnA	<0.970	0.276	0.970	1.94	
EtFOSAA	<0.970	0.276	0.970	1.94	
PFDoA	<0.970	0.276	0.970	1.94	
PFTrDA	<0.970	0.276	0.970	1.94	
PFTeDA	<0.970	0.276	0.970	1.94	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	111	60 - 150	
IS	13C2-PFHxA	95.0	60 - 150	
IS	13C4-PFHpA	83.6	60 - 150	
IS	18O2-PFHxS	89.3	60 - 150	
IS	13C2-PFOA	80.8	60 - 150	
IS	13C8-PFOS	90.7	60 - 150	
IS	13C5-PFNA	91.6	50 - 150	
IS	13C2-PFDA	91.3	60 - 150	
IS	d3-MeFOSAA	80.5	20 - 150	
IS	13C2-PFUnA	86.7	50 - 150	
IS	d5-EtFOSAA	91.1	20 - 150	
IS	13C2-PFDoA	69.6	30 - 150	
IS	13C2-PFTeDA	32.2	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

DATA QUALIFIERS & ABBREVIATIONS

B	**This compound was also detected in the method blank.**
D	**Dilution**
E	**The associated compound concentration exceeded the calibration range of the instrument.**
H	**Recovery and/or RPD was outside laboratory acceptance limits.**
I	**Chemical Interference**
J	**The amount detected is below the Reporting Limit/LOQ.**
M	**Estimated Maximum Possible Concentration. (CA Region 2 projects only)**
*****	**See Cover Letter**
Conc.	**Concentration**
NA	**Not applicable**
ND	**Not Detected**
TEQ	**Toxic Equivalency**

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

CERTIFICATIONS

Accrediting Authority	Certificate Number
Arkansas Department of Environmental Quality	17-015-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-18
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2016026
Minnesota Department of Health	1175673
Nevada Division of Environmental Protection	CA004132017-1
New Hampshire Environmental Accreditation Program	207716
New Jersey Department of Environmental Protection	CA003
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-008
Pennsylvania Department of Environmental Protection	013
South Carolina Department of Health	87002001
Texas Commission on Environmental Quality	T104704189-17-8
Virginia Department of General Services	8621
Washington Department of Ecology	C584
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	**Method**
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23

MATRIX: Biological Tissue	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	**Method**
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537

MATRIX: Non-Potable Water	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	**Method**
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope	EPA 1613B

Dilution GC/HRMS	
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

AerostarSES LLC
1007 Floyd Culler Court
Oak Ridge, TN 37830
865-481-7837

Chain of Custody Record/Analysis Request Number: 0047

1 of 1

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

Job No.: M3010.0019.0017.05 .15TW
Installation: Former Norton AFB

TAT: 10 business days

Aerostar Project Manager: Paula Bond, pbond@aerostar.net, 865-813-2759
Send Data to: Jenny Vance, jvance@aerostar.net, 865-483-7904

Sampler (s): Tim Culler

Laboratory Name/Address: Vista Analytical Lab.
~~Accutest Laboratories~~
~~4405 Vineland Rd.~~
~~Suite C-15~~
~~Orlando, FL 32811~~

Lab Phone Number (for Fed Ex shipment): ~~407-425-6700~~

Contact: Andrea Colby
Phone: 386-615-8479
email: andrea.colby@sgs.com

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

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

Station ID	Sample ID	Date Collected	Time Collected	Sample Type	Matrix	Depth (feet)	PFAS (see list of 14 analytes below)	PFOS/PFOA					NOTES
			Preservative (Trizma, HCl, HNO_3, Ice, etc.)										
FIELD QC	NORP01002	4/11/17	1625	AB	WQ	—	2						PFC Free water
NORPMW003	NORP05017	4/11/17	1655	N	S	0-1	1						
NORPMW003	NORP05018	4/12/17	1400	EB	WQ	—	2						
NORPMW003	NORP05019	4/12/17	1055	N	SO	15-16	1						
NORPMW003	NORP05020	4/12/17	1450	N	SO	30,30,25	1						
						Total # of Containers							

TC

RELINQUISHED BY:		RECEIVED BY:	
Signature:	Date/Time: 4/12/17 1655	Signature: MSparks	Date/Time: 4/13/17 0942
Printed Name: Tim Culler	Firm: Aerostar	Printed Name: Marissa Sparks	Firm: VAL
Signature:	Date/Time:	Signature:	Date/Time:
Printed Name:	Firm:	Printed Name:	Firm:

ANALYTE	ERPIMS PAR CODE	CAS	Contaminant	ERPIMS PAR CODE	CAS
Perfluorooctanesulfonic acid	PFOS	1763-23-1	Perfluorohexanoic acid	PFHXA	307-24-4
Perfluorooctanoic acid	PFOA	335-67-1	Perfluorotetradecanoic acid	PFTEA	376-06-7
Perfluorononanoic acid	PFNA	375-95-1	Perfluorotridecanoic acid	PFTRA	72629-94-8
Perfluorohexanesulfonic acid	PFHXSA	355-46-4	Perfluoroundecanoic acid	PFUNA	2058-94-8
Perfluoroheptanoic acid	PFHPA	375-85-9	Perfluorododecanoic acid	PFDOA	307-55-1
Perfluorobutanesulfonic acid	PFBSA	375-73-5	Perfluorodecanoic acid	PFDA	335-76-2
N-methyl perfluorooctane sulfonamidoacetic acid	NMEFOSAA	2355-31-9	N-methyl perfluorooctane sulfonamidoacetic acid	NETFOSAA	2991-50-6

SAMPLE LOG-IN CHECKLIST

Vista Analytical Laboratory

Vista Project #: 1700446 **TAT** 14 days

Samples Arrival:	**Date/Time** 4/13/17 0935	**Initials:** WWS	**Location:** WR-2 **Shelf/Rack:** N/a
Logged In:	**Date/Time** 4/13/17 1024	**Initials:** WWS	**Location:** WR-2 **Shelf/Rack:** E-5

Delivered By:	FedEx	UPS	On Trac	DHL	Hand Delivered	Other
Preservation:	Ice	Blue Ice	Dry Ice	None		

Temp °C: 2.9 (uncorrected)	**Time:** 0940	**Thermometer ID:** IR-1
Temp °C: 3.2 (corrected)	**Probe used: Yes☐ No☑**	

		YES	NO	NA
Adequate Sample Volume Received?		✓		
Holding Time Acceptable?		✓		
Shipping Container(s) Intact?		✓		
Shipping Custody Seals Intact?		✓		
Shipping Documentation Present?	WWS 4/13/17	✓		
Airbill	Trk # ~~7788 3005 1428~~ 786227694566	✓		
Sample Container Intact?		✓		
Sample Custody Seals Intact?				✓
Chain of Custody / Sample Documentation Present?		✓		
COC Anomaly/Sample Acceptance Form completed?			✓	

If Chlorinated or Drinking Water Samples, Acceptable Preservation?						✓
Preservation Documented:	$Na_2S_2O_3$	Trizma			Yes	No	NA
Shipping Container	Vista	Client	Retain	Return	Dispose	

Comments:

BLA 09/06/2016

L:/QA/Forms/sample control Sample LoginNov-2016 (IR-1) F11.1
L:/Controlled Forms/Sample LoginNov-2016 (IR-1) F11.1

May 05, 2017

Vista Work Order No. 1700509

Ms. Jenny Vance
Aerostar SES LLC
1006 Floyd Court
Oak Ridge, TN 37830

Dear Ms. Vance,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on April 22, 2017. This sample set was analyzed on a rush turn-around time, under your Project Name 'Former Norton AFB/M3010.0019.0017.05.15TM'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Martha Maier
Laboratory Director

Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Analytical Laboratory 1104 Windfield Way El Dorado Hills, CA 95762 ph: 916-673-1520 fx: 916-673-0106 www.vista-analytical.com

Vista Work Order No. 1700509
Case Narrative

Sample Condition on Receipt:

Seven soil samples were received in good condition and within the method temperature requirements. The samples were received and stored securely in accordance with Vista standard operating procedures and EPA methodology.

Analytical Notes:

VAL-PFAS

The samples were extracted and analyzed for a selected list of 14 PFAS using VAL Method PFAS.

Holding Times

The samples were extracted and analyzed within the hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Method Blank and Ongoing Precision and Recovery (OPR) sample were extracted and analyzed with the preparation batch. No analytes were detected in the Method Blank above 1/2 the LOQ. The OPR recoveries were within the method acceptance criteria.

The labeled standard recoveries outside the acceptance criteria are listed in the table below.

As requested, an MS/MSD was performed on sample "NORP07022".

QC Anomalies

LabNumber	SampleName	Analysis	Analyte	Flag	%Rec
B7D0138-MSD1	B7D0138-MSD1	VAL - PFAS	13C8-PFOS	H	39.9

H = Recovery was outside laboratory acceptance criteria.

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Sample Inventory Report

Vista Sample ID	Client Sample ID		Sampled	Received	Components/Containers
1700509-01	NORP07022	MS/MSD	15-Apr-17 13:25	22-Apr-17 10:16	HDPE Jar, 6 oz
		MS/MSD			HDPE Jar, 6 oz
		MS/MSD			HDPE Jar, 6 oz
1700509-02	NORP07023		15-Apr-17 15:10	22-Apr-17 10:16	HDPE Jar, 6 oz
1700509-03	NORP07024		15-Apr-17 15:10	22-Apr-17 10:16	HDPE Jar, 6 oz
1700509-04	NORP04006		18-Apr-17 11:20	22-Apr-17 10:16	HDPE Jar, 6 oz
1700509-05	NORP04007		18-Apr-17 13:50	22-Apr-17 10:16	HDPE Jar, 6 oz
1700509-06	NORP04008		18-Apr-17 13:50	22-Apr-17 10:16	HDPE Jar, 6 oz
1700509-07	NORP04009		18-Apr-17 17:45	22-Apr-17 10:16	HDPE Jar, 6 oz

ANALYTICAL RESULTS

Sample ID: Method Blank — VAL - PFAS

Matrix: Solid
Sample Size: 1.00 g

QC Batch: B7D0138
Date Extracted: 26-Apr-2017 13:02

Lab Sample: B7D0138-BLK1
Date Analyzed: 01-May-17 19:39 Column: BEH C18
30-Apr-17 18:09 Column: BEH C18

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	<1.00	0.285	1.00	2.00	
PFHxA	<1.00	0.285	1.00	2.00	
PFHpA	<1.00	0.285	1.00	2.00	
PFHxS	<1.00	0.285	1.00	2.00	
PFOA	<1.00	0.285	1.00	2.00	
PFOS	<1.00	0.285	1.00	2.00	
PFNA	<1.00	0.285	1.00	2.00	
PFDA	<1.00	0.285	1.00	2.00	
MeFOSAA	<1.00	0.285	1.00	2.00	
PFUnA	<1.00	0.285	1.00	2.00	
EtFOSAA	<1.00	0.285	1.00	2.00	
PFDoA	<1.00	0.285	1.00	2.00	
PFTrDA	<1.00	0.285	1.00	2.00	
PFTeDA	<1.00	0.285	1.00	2.00	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	99.8	60 - 150	
IS	13C2-PFHxA	88.7	60 - 150	
IS	13C4-PFHpA	79.0	60 - 150	
IS	18O2-PFHxS	84.1	60 - 150	
IS	13C2-PFOA	64.4	60 - 150	
IS	13C8-PFOS	70.0	60 - 150	
IS	13C5-PFNA	84.4	50 - 150	
IS	13C2-PFDA	84.0	60 - 150	
IS	d3-MeFOSAA	54.8	20 - 150	
IS	13C2-PFUnA	77.7	50 - 150	
IS	d5-EtFOSAA	64.1	20 - 150	
IS	13C2-PFDoA	74.4	30 - 150	
IS	13C2-PFTeDA	54.8	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
Only the linear isomer is reported for all other analytes.

Sample ID: OPR

VAL - PFAS

Matrix:	Solid	QC Batch:	B7D0138	Lab Sample:	B7D0138-BS1
Sample Size:	1.00 g	Date Extracted:	26-Apr-2017 13:02	Date Analyzed:	01-May-17 19:14 Column: BEH C18
					30-Apr-17 17:31 Column: BEH C18

Analyte	Amt Found (ng/g)	Spike Amt	%R	Limits		Labeled Standard	%R	LCL-UCL
PFBS	10.7	10.0	107	60 - 130	IS	13C3-PFBS	95.7	60 - 150
PFHxA	11.6	10.0	116	70 - 130	IS	13C2-PFHxA	91.4	60 - 150
PFHpA	10.2	10.0	102	70 - 130	IS	13C4-PFHpA	86.5	60 - 150
PFHxS	10.9	10.0	109	70 - 130	IS	18O2-PFHxS	90.2	60 - 150
PFOA	10.6	10.0	106	70 - 130	IS	13C2-PFOA	72.2	60 - 150
PFOS	11.1	10.0	111	70 - 130	IS	13C8-PFOS	81.9	60 - 150
PFNA	9.96	10.0	99.6	50 - 130	IS	13C5-PFNA	88.8	50 - 150
PFDA	10.4	10.0	104	70 - 130	IS	13C2-PFDA	75.1	60 - 150
MeFOSAA	9.21	10.0	92.1	70 - 130	IS	d3-MeFOSAA	73.1	20 - 150
PFUnA	11.3	10.0	113	70 - 130	IS	13C2-PFUnA	81.8	50 - 150
EtFOSAA	11.9	10.0	119	70 - 130	IS	d5-EtFOSAA	71.5	20 - 150
PFDoA	11.5	10.0	115	70 - 130	IS	13C2-PFDoA	78.6	30 - 150
PFTrDA	11.0	10.0	110	20 - 130	IS	13C2-PFTeDA	64.6	20 - 150
PFTeDA	9.98	10.0	99.8	20 - 130				

LCL-UCL - Lower control limit - upper control limit

Sample ID: NORP07022

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700509-01	Date Received:	22-Apr-2017 10:16
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.22 g	QC Batch:	B7D0138	Date Extracted:	26-Apr-2017 13:02
Date Collected:	15-Apr-2017 13:25	% Solids:	82.1	Date Analyzed:	01-May-17 20:05 Column: BEH C18		
Location:					30-Apr-17 18:46 Column: BEH C18		

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	15.2	0.285	0.998	2.00	
PFHxA	56.6	0.285	0.998	2.00	
PFHpA	2.87	0.285	0.998	2.00	
PFHxS	27.5	0.285	0.998	2.00	
PFOA	25.1	0.285	0.998	2.00	
PFOS	159	1.42	4.99	9.98	D
PFNA	1.72	0.285	0.998	2.00	J
PFDA	<0.998	0.285	0.998	2.00	
MeFOSAA	<0.998	0.285	0.998	2.00	
PFUnA	<0.998	0.285	0.998	2.00	
EtFOSAA	<0.998	0.285	0.998	2.00	
PFDoA	<0.998	0.285	0.998	2.00	
PFTrDA	<0.998	0.285	0.998	2.00	
PFTeDA	<0.998	0.285	0.998	2.00	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	113	60 - 150	
IS	13C2-PFHxA	93.3	60 - 150	
IS	13C4-PFHpA	80.3	60 - 150	
IS	18O2-PFHxS	82.9	60 - 150	
IS	13C2-PFOA	73.6	60 - 150	
IS	13C8-PFOS	85.6	60 - 150	D
IS	13C5-PFNA	94.5	50 - 150	
IS	13C2-PFDA	74.4	60 - 150	
IS	d3-MeFOSAA	57.3	20 - 150	
IS	13C2-PFUnA	77.4	50 - 150	
IS	d5-EtFOSAA	76.3	20 - 150	
IS	13C2-PFDoA	76.8	30 - 150	
IS	13C2-PFTeDA	72.9	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Matrix Spike Results

VAL - PFAS

Source Client ID: NORP07022
Source LabNumber: 1700509-01
Matrix: Solid
Sample Size: 1.21/1.23 g

QC Batch: B7D0138
Date Extracted: 26-Apr-2017 13:02

Lab Sample: B7D0138-MS1/B7D0138-MSD1
Date Analyzed: 30-Apr-17 18:59 Column: BEH C18
30-Apr-17 19:12 Column: BEH C18

Analyte	Spike-MS (ng/g)	MS %R	MS Qual.	Spike-MSD (ng/g)	MSD %R	RPD	MSD Qual.	%R Limit	%RPD Limit
PFBS	10.1	125		9.90	112	11.0		60 - 130	25
PFHxA	10.1	**140**	H	9.90	**69.1**	**67.8**	H	70 - 130	25
PFHpA	10.1	97.7		9.90	103	5.28		70 - 130	25
PFHxS	10.1	89.4		9.90	79.5	11.7		70 - 130	25
PFOA	10.1	114		9.90	**69.7**	**48.2**	H	70 - 130	25
PFOS	10.1	**-218**	D, H	9.90	**-17.5**	**170**	D, H	70 - 130	25
PFNA	10.1	117		9.90	107	8.93		50 - 130	25
PFDA	10.1	95.9		9.90	100	4.19		70 - 130	25
MeFOSAA	10.1	110		9.90	111	0.905		70 - 130	25
PFUnA	10.1	118		9.90	109	7.93		70 - 130	25
EtFOSAA	10.1	108		9.90	120	10.5		70 - 130	25
PFDoA	10.1	123		9.90	124	0.810		70 - 130	25
PFTrDA	10.1	121		9.90	109	10.4		20 - 130	25
PFTeDA	10.1	118		9.90	108	8.85		20 - 130	25

	Labeled Standard	MS %R	MS Qualifiers	MSD %R	MS Qual.
IS	13C3-PFBS	103		101	
IS	13C2-PFHxA	91.6		95.5	
IS	13C4-PFHpA	85.2		82.3	
IS	18O2-PFHxS	88.5		87.2	
IS	13C2-PFOA	61.1		67.4	
IS	13C8-PFOS	66.4	D	39.9	D, H
IS	13C5-PFNA	84.8		90.7	
IS	13C2-PFDA	93.5		77.4	
IS	d3-MeFOSAA	82.4		66.8	
IS	13C2-PFUnA	89.3		86.3	
IS	d5-EtFOSAA	74.8		68.9	
IS	13C2-PFDoA	90.8		85.5	
IS	13C2-PFTeDA	84.9		75.2	

When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
Only the linear isomer is reported for all other analytes.

Sample ID: NORP07023

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700509-02	Date Received:	22-Apr-2017 10:16
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.13 g	QC Batch:	B7D0138	Date Extracted:	26-Apr-2017 13:02
Date Collected:	15-Apr-2017 15:10	% Solids:	89.4	Date Analyzed:	01-May-17 20:43 Column: BEH C18		
Location:					30-Apr-17 19:24 Column: BEH C18		

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	<0.990	0.282	0.990	1.98	
PFHxA	8.13	0.282	0.990	1.98	
PFHpA	2.85	0.282	0.990	1.98	
PFHxS	199	1.41	4.95	9.90	D
PFOA	162	1.41	4.95	9.90	D
PFOS	9.42	0.282	0.990	1.98	
PFNA	<0.990	0.282	0.990	1.98	
PFDA	<0.990	0.282	0.990	1.98	
MeFOSAA	<0.990	0.282	0.990	1.98	
PFUnA	<0.990	0.282	0.990	1.98	
EtFOSAA	<0.990	0.282	0.990	1.98	
PFDoA	<0.990	0.282	0.990	1.98	
PFTrDA	<0.990	0.282	0.990	1.98	
PFTeDA	<0.990	0.282	0.990	1.98	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	105	60 - 150	
IS	13C2-PFHxA	94.1	60 - 150	
IS	13C4-PFHpA	116	60 - 150	
IS	18O2-PFHxS	91.2	60 - 150	D
IS	13C2-PFOA	115	60 - 150	D
IS	13C8-PFOS	72.8	60 - 150	
IS	13C5-PFNA	86.8	50 - 150	
IS	13C2-PFDA	79.0	60 - 150	
IS	d3-MeFOSAA	75.9	20 - 150	
IS	13C2-PFUnA	83.0	50 - 150	
IS	d5-EtFOSAA	75.3	20 - 150	
IS	13C2-PFDoA	82.4	30 - 150	
IS	13C2-PFTeDA	77.2	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP07024

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700509-03	Date Received:	22-Apr-2017 10:16
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.24 g	QC Batch:	B7D0138	Date Extracted:	26-Apr-2017 13:02
Date Collected:	15-Apr-2017 15:10	% Solids:	83.0	Date Analyzed:	01-May-17 20:55 Column: BEH C18		
Location:					30-Apr-17 19:37 Column: BEH C18		

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	<0.972	0.277	0.972	1.94	
PFHxA	9.88	0.277	0.972	1.94	
PFHpA	1.74	0.277	0.972	1.94	J
PFHxS	73.7	0.277	0.972	1.94	
PFOA	46.3	0.277	0.972	1.94	
PFOS	72.9	0.277	0.972	1.94	
PFNA	1.35	0.277	0.972	1.94	J
PFDA	<0.972	0.277	0.972	1.94	
MeFOSAA	<0.972	0.277	0.972	1.94	
PFUnA	<0.972	0.277	0.972	1.94	
EtFOSAA	<0.972	0.277	0.972	1.94	
PFDoA	<0.972	0.277	0.972	1.94	
PFTrDA	<0.972	0.277	0.972	1.94	
PFTeDA	<0.972	0.277	0.972	1.94	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	121	60 - 150	
IS	13C2-PFHxA	98.5	60 - 150	
IS	13C4-PFHpA	97.5	60 - 150	
IS	18O2-PFHxS	83.8	60 - 150	
IS	13C2-PFOA	66.4	60 - 150	
IS	13C8-PFOS	65.4	60 - 150	
IS	13C5-PFNA	89.0	50 - 150	
IS	13C2-PFDA	93.4	60 - 150	
IS	d3-MeFOSAA	55.1	20 - 150	
IS	13C2-PFUnA	80.0	50 - 150	
IS	d5-EtFOSAA	65.7	20 - 150	
IS	13C2-PFDoA	75.1	30 - 150	
IS	13C2-PFTeDA	70.9	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP04006

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700509-04	Date Received:	22-Apr-2017 10:16
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.06 g	QC Batch:	B7D0138	Date Extracted:	26-Apr-2017 13:02
Date Collected:	18-Apr-2017 11:20	% Solids:	94.8	Date Analyzed:	01-May-17 21:08 Column: BEH C18		
Location:					30-Apr-17 19:49 Column: BEH C18		

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	<0.995	0.284	0.995	1.99	
PFHxA	<0.995	0.284	0.995	1.99	
PFHpA	<0.995	0.284	0.995	1.99	
PFHxS	<0.995	0.284	0.995	1.99	
PFOA	<0.995	0.284	0.995	1.99	
PFOS	<0.995	0.284	0.995	1.99	
PFNA	<0.995	0.284	0.995	1.99	
PFDA	<0.995	0.284	0.995	1.99	
MeFOSAA	<0.995	0.284	0.995	1.99	
PFUnA	<0.995	0.284	0.995	1.99	
EtFOSAA	<0.995	0.284	0.995	1.99	
PFDoA	<0.995	0.284	0.995	1.99	
PFTrDA	<0.995	0.284	0.995	1.99	
PFTeDA	<0.995	0.284	0.995	1.99	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	101	60 - 150	
IS	13C2-PFHxA	88.3	60 - 150	
IS	13C4-PFHpA	86.3	60 - 150	
IS	18O2-PFHxS	90.4	60 - 150	
IS	13C2-PFOA	64.2	60 - 150	
IS	13C8-PFOS	73.6	60 - 150	
IS	13C5-PFNA	83.4	50 - 150	
IS	13C2-PFDA	82.2	60 - 150	
IS	d3-MeFOSAA	75.3	20 - 150	
IS	13C2-PFUnA	81.0	50 - 150	
IS	d5-EtFOSAA	71.8	20 - 150	
IS	13C2-PFDoA	77.0	30 - 150	
IS	13C2-PFTeDA	63.1	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP04007

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700509-05	Date Received:	22-Apr-2017 10:16
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.00 g	QC Batch:	B7D0138	Date Extracted:	26-Apr-2017 13:02
Date Collected:	18-Apr-2017 13:50	% Solids:	98.1	Date Analyzed:	01-May-17 21:21 Column: BEH C18		
Location:					30-Apr-17 20:02 Column: BEH C18		

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	<1.02	0.291	1.02	2.04	
PFHxA	<1.02	0.291	1.02	2.04	
PFHpA	<1.02	0.291	1.02	2.04	
PFHxS	0.303	0.291	1.02	2.04	J
PFOA	<1.02	0.291	1.02	2.04	
PFOS	<1.02	0.291	1.02	2.04	
PFNA	<1.02	0.291	1.02	2.04	
PFDA	<1.02	0.291	1.02	2.04	
MeFOSAA	<1.02	0.291	1.02	2.04	
PFUnA	<1.02	0.291	1.02	2.04	
EtFOSAA	<1.02	0.291	1.02	2.04	
PFDoA	<1.02	0.291	1.02	2.04	
PFTrDA	<1.02	0.291	1.02	2.04	
PFTeDA	<1.02	0.291	1.02	2.04	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	103	60 - 150	
IS	13C2-PFHxA	92.6	60 - 150	
IS	13C4-PFHpA	84.8	60 - 150	
IS	18O2-PFHxS	85.7	60 - 150	
IS	13C2-PFOA	64.0	60 - 150	
IS	13C8-PFOS	80.0	60 - 150	
IS	13C5-PFNA	88.8	50 - 150	
IS	13C2-PFDA	80.1	60 - 150	
IS	d3-MeFOSAA	62.7	20 - 150	
IS	13C2-PFUnA	75.7	50 - 150	
IS	d5-EtFOSAA	70.0	20 - 150	
IS	13C2-PFDoA	71.4	30 - 150	
IS	13C2-PFTeDA	68.2	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP04008

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700509-06	Date Received:	22-Apr-2017 10:16
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.05 g	QC Batch:	B7D0138	Date Extracted:	26-Apr-2017 13:02
Date Collected:	18-Apr-2017 13:50	% Solids:	98.0	Date Analyzed:	01-May-17 22:11 Column: BEH C18		
Location:					30-Apr-17 20:52 Column: BEH C18		

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	<0.972	0.277	0.972	1.94	
PFHxA	<0.972	0.277	0.972	1.94	
PFHpA	<0.972	0.277	0.972	1.94	
PFHxS	<0.972	0.277	0.972	1.94	
PFOA	<0.972	0.277	0.972	1.94	
PFOS	<0.972	0.277	0.972	1.94	
PFNA	<0.972	0.277	0.972	1.94	
PFDA	<0.972	0.277	0.972	1.94	
MeFOSAA	<0.972	0.277	0.972	1.94	
PFUnA	<0.972	0.277	0.972	1.94	
EtFOSAA	<0.972	0.277	0.972	1.94	
PFDoA	<0.972	0.277	0.972	1.94	
PFTrDA	<0.972	0.277	0.972	1.94	
PFTeDA	<0.972	0.277	0.972	1.94	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	99.0	60 - 150	
IS	13C2-PFHxA	86.2	60 - 150	
IS	13C4-PFHpA	85.8	60 - 150	
IS	18O2-PFHxS	89.7	60 - 150	
IS	13C2-PFOA	72.1	60 - 150	
IS	13C8-PFOS	82.3	60 - 150	
IS	13C5-PFNA	87.5	50 - 150	
IS	13C2-PFDA	84.0	60 - 150	
IS	d3-MeFOSAA	70.8	20 - 150	
IS	13C2-PFUnA	86.5	50 - 150	
IS	d5-EtFOSAA	79.8	20 - 150	
IS	13C2-PFDoA	85.0	30 - 150	
IS	13C2-PFTeDA	80.6	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP04009 VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700509-07	Date Received:	22-Apr-2017 10:16
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.11 g	QC Batch:	B7D0138	Date Extracted:	26-Apr-2017 13:02
Date Collected:	18-Apr-2017 17:45	% Solids:	90.5	Date Analyzed:	01-May-17 22:24 Column: BEH C18		
Location:					30-Apr-17 21:05 Column: BEH C18		

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	<0.995	0.284	0.995	1.99	
PFHxA	<0.995	0.284	0.995	1.99	
PFHpA	<0.995	0.284	0.995	1.99	
PFHxS	<0.995	0.284	0.995	1.99	
PFOA	<0.995	0.284	0.995	1.99	
PFOS	<0.995	0.284	0.995	1.99	
PFNA	<0.995	0.284	0.995	1.99	
PFDA	<0.995	0.284	0.995	1.99	
MeFOSAA	<0.995	0.284	0.995	1.99	
PFUnA	<0.995	0.284	0.995	1.99	
EtFOSAA	<0.995	0.284	0.995	1.99	
PFDoA	<0.995	0.284	0.995	1.99	
PFTrDA	<0.995	0.284	0.995	1.99	
PFTeDA	<0.995	0.284	0.995	1.99	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	99.6	60 - 150	
IS	13C2-PFHxA	96.2	60 - 150	
IS	13C4-PFHpA	84.5	60 - 150	
IS	18O2-PFHxS	91.0	60 - 150	
IS	13C2-PFOA	63.3	60 - 150	
IS	13C8-PFOS	75.8	60 - 150	
IS	13C5-PFNA	90.0	50 - 150	
IS	13C2-PFDA	95.9	60 - 150	
IS	d3-MeFOSAA	60.0	20 - 150	
IS	13C2-PFUnA	79.5	50 - 150	
IS	d5-EtFOSAA	62.8	20 - 150	
IS	13C2-PFDoA	73.9	30 - 150	
IS	13C2-PFTeDA	67.9	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

DATA QUALIFIERS & ABBREVIATIONS

B	**This compound was also detected in the method blank.**
D	**Dilution**
E	**The associated compound concentration exceeded the calibration range of the instrument.**
H	**Recovery and/or RPD was outside laboratory acceptance limits.**
I	**Chemical Interference**
J	**The amount detected is below the Reporting Limit/LOQ.**
M	**Estimated Maximum Possible Concentration. (CA Region 2 projects only)**
*****	**See Cover Letter**
Conc.	**Concentration**
NA	**Not applicable**
ND	**Not Detected**
TEQ	**Toxic Equivalency**

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

CERTIFICATIONS

Accrediting Authority	Certificate Number
Arkansas Department of Environmental Quality	17-015-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-18
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2016026
Minnesota Department of Health	1175673
Nevada Division of Environmental Protection	CA004132017-1
New Hampshire Environmental Accreditation Program	207716
New Jersey Department of Environmental Protection	CA003
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-008
Pennsylvania Department of Environmental Protection	013
Texas Commission on Environmental Quality	T104704189-17-8
Virginia Department of General Services	8621
Washington Department of Ecology	C584
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	**Method**
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23

MATRIX: Biological Tissue	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	**Method**
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537

MATRIX: Non-Potable Water	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	**Method**
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope	EPA 1613B

Dilution GC/HRMS	
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

AerostarSES LLC

1007 Floyd Culler Court
Oak Ridge, TN 37830
865-481-7837

Chain of Custody Record/Analysis Request Number: 0047 1700509

1 of 1

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

Job No.: M3010.0019.0017.05 . 15TW
Installation: Former Norton AFB

ANALYSIS 0.4°C

TAT: 10 business days

Aerostar Project Manager: Paula Bond, pbond@aerostar.net, 865-813-2759
Send Data to: Jenny Vance, jvance@aerostar.net, 865-483-7904

Sampler (s): Tim Cullen
Heidi Dieffenbach-Carle

Laboratory Name/Address:
~~Accutest Laboratories~~ Vista Analytical Lab
~~4405 Vineland Rd.~~
~~Suite C-15~~
~~Orlando, FL 32811~~

Lab Phone Number (for Fed Ex shipment): ~~407-425-6700~~

Contact: Andrea Colby
Phone: 386-615-8479
email: andrea.colby@sgs.com

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

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

Station ID	Sample ID	Date Collected	Time Collected	Sample Type	Matrix	Depth (feet)	PFAS (see list of 14 analytes below)	PFOS/PFOA					NOTES
			Preservative (Trizma, HCl, HNO_3, Ice, etc.)										
NORPMW004	NORP07022	4/15/17	1325	N	SO	0.5-1'	3						*MS/SD
NORPMW004	NORP07023	4/15/17	1510	N	SO	16-17.5	1						
NORPMW004	NORP07024	4/15/17	1750	N	SO	34-34.5	1						
NORPMW005	NORP04006	4/18/17	1120	N	SO	1.5-2.5	1						
NORPMW005	NORP04007	4/18/17	1350	N	SO	16-16.5	1						
NORPMW005	NORP04008	4/18/17	1350	FD	SO	16-16.5	1						
NORPMW005	NORP04009	4/18/17	1745	N	SO	60-60.5	1						
						Total # of Containers	9						

RELINQUISHED BY:		RECEIVED BY:	
Signature:	Date/Time: 4/21/17 1615	Signature:	Date/Time: 04/22/17 1024
Printed Name: Tim Cullen	Firm: Aerostar	Printed Name: B. Benedict	Firm: VAL
Signature:	Date/Time:	Signature:	Date/Time:
Printed Name:	Firm:	Printed Name:	Firm:

ANALYTE	ERPIMS PAR CODE	CAS	Contaminant	ERPIMS PAR CODE	CAS
Perfluorooctanesulfonic acid	PFOS	1763-23-1	Perfluorohexanoic acid	PFHXA	307-24-4
Perfluorooctanoic acid	PFOA	335-67-1	Perfluorotetradecanoic acid	PFTEA	376-06-7
Perfluorononanoic acid	PFNA	375-95-1	Perfluorotridecanoic acid	PFTRIA	72629-94-8
Perfluorohexanesulfonic acid	PFHXSA	355-46-4	Perfluoroundecanoic acid	PFUNA	2058-94-8
Perfluoroheptanoic acid	PFHPA	375-85-9	Perfluorododecanoic acid	PFDOA	307-55-1
Perfluorobutanesulfonic acid	PFBSA	375-73-5	Perfluorodecanoic acid	PFDA	335-76-2
N-methyl perfluorooctane sulfonamidoacetic acid	NMEFOSAA	2355-31-9	N-ethyl perfluorooctane sulfonamidoacetic acid	NEFOSAA	2991-50-6

SAMPLE LOG-IN CHECKLIST

Vista Analytical Laboratory

Vista Project #: 1700509 TAT 13

Samples Arrival:	Date/Time 04/22/17 1016	Initials: BJB	Location: WR-2 Shelf/Rack: NA
Logged In:	Date/Time 04/22/17 1511	Initials: BJB	Location: WR-2 Shelf/Rack: A5

Delivered By:	FedEx	UPS	On Trac	DHL	Hand Delivered	Other
Preservation:	Ice	Blue Ice	Dry Ice	None		

Temp °C: 0.1 (uncorrected)	Time: 1022	Thermometer ID: IR-1
Temp °C: 0.4 (corrected)	Probe used: Yes☐ No☑	

	YES	NO	NA
Adequate Sample Volume Received?	✓		
Holding Time Acceptable?	✓		
Shipping Container(s) Intact?	✓		
Shipping Custody Seals Intact?	✓		
Shipping Documentation Present?	✓		
Airbill Trk # 7863 2298 2815	✓		
Sample Container Intact?	✓		
Sample Custody Seals Intact?			✓
Chain of Custody / Sample Documentation Present?	✓		
COC Anomaly/Sample Acceptance Form completed?		✓	

If Chlorinated or Drinking Water Samples, Acceptable Preservation?					✓
Preservation Documented:	$Na_2S_2O_3$	Trizma NONE	Yes	No	NA
Shipping Container	Vista	Client	Retain	Return	Dispose

Comments:

BLA 09/06/2016

L:/QA Forms/sample control/Sample LoginNov-2016 (IR-1) F11.1
L:/Controlled Forms/Sample LoginNov-2016 (IR-1) F11.1

May 17, 2017

Vista Work Order No. 1700602

Ms. Jenny Vance
Aerostar SES LLC
1006 Floyd Court
Oak Ridge, TN 37830

Dear Ms. Vance,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on May 13, 2017. This sample set was analyzed on a rush turn-around time, under your Project Name 'Former Norton AFB/M3010.0019.0017.05.15TM'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Martha Maier
Laboratory Director

Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Analytical Laboratory 1104 Windfield Way El Dorado Hills, CA 95762 ph: 916-673-1520 fx: 916-673-0106 www.vista-analytical.com

Vista Work Order No. 1700602
Case Narrative

Sample Condition on Receipt:

Two groundwater samples were received in good condition and within the method temperature requirements. The samples were received and stored securely in accordance with Vista standard operating procedures and EPA methodology.

Analytical Notes:

Modified EPA Method 537

The samples were extracted and analyzed for a selected list of 14 PFAS using Modified EPA Method 537.

Holding Times

The samples were extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Method Blank and Ongoing Precision and Recovery (OPR) sample were extracted and analyzed with the preparation batch. No analytes were detected in the Method Blank above 1/2 the LOQ. The OPR recoveries were within the method acceptance criteria

The labeled standard recoveries for all QC and field samples were within the acceptance criteria.

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Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
1700602-01	NORP01403	12-May-17 11:10	13-May-17 12:22	HDPE Bottle, 125 mL
				HDPE Bottle, 125 mL
1700602-02	NORP01404	12-May-17 11:10	13-May-17 12:22	HDPE Bottle, 125 mL
				HDPE Bottle, 125 mL

ANALYTICAL RESULTS

Sample ID: Method Blank — Modified EPA Method 537

Matrix: Aqueous
Sample Size: 0.250 L

QC Batch: B7E0073
Date Extracted: 15-May-2017 8:17

Lab Sample: B7E0073-BLK1
Date Analyzed: 16-May-17 16:06 Column: BEH C18

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFBS	<2.50	1.09	2.50	4.00	
PFHxA	<2.50	1.09	2.50	4.00	
PFHpA	<2.50	1.09	2.50	4.00	
PFHxS	<2.50	1.09	2.50	4.00	
PFOA	<2.50	1.09	2.50	4.00	
PFOS	<2.50	1.09	2.50	4.00	
PFNA	<2.50	1.09	2.50	4.00	
PFDA	<2.50	1.09	2.50	4.00	
MeFOSAA	<2.50	1.09	2.50	4.00	
PFUnA	<2.50	1.09	2.50	4.00	
EtFOSAA	<2.50	1.09	2.50	4.00	
PFDoA	<2.50	1.09	2.50	4.00	
PFTrDA	<2.50	1.09	2.50	4.00	
PFTeDA	<2.50	1.09	2.50	4.00	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	144	60 - 150	
IS	13C2-PFHxA	95.9	60 - 150	
IS	13C4-PFHpA	87.5	60 - 150	
IS	18O2-PFHxS	92.4	60 - 150	
IS	13C2-PFOA	90.9	60 - 150	
IS	13C8-PFOS	102	60 - 150	
IS	13C5-PFNA	83.6	50 - 150	
IS	13C2-PFDA	86.9	60 - 150	
IS	d3-MeFOSAA	44.8	20 - 150	
IS	13C2-PFUnA	63.8	50 - 150	
IS	d5-EtFOSAA	46.3	20 - 150	
IS	13C2-PFDoA	47.3	30 - 150	
IS	13C2-PFTeDA	45.3	20 - 150	

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
Only the linear isomer is reported for all other analytes.

Sample ID: OPR

Modified EPA Method 537

Matrix:	Aqueous	QC Batch:	B7E0073	Lab Sample:	B7E0073-BS1
Sample Size:	0.250 L	Date Extracted:	15-May-2017 8:17	Date Analyzed:	16-May-17 15:44 Column: BEH C18

Analyte	Amt Found (ng/L)	Spike Amt	%R	Limits		Labeled Standard	%R	LCL-UCL
PFBS	44.5	40.0	111	60 - 130	IS	13C3-PFBS	135	60 - 150
PFHxA	43.9	40.0	110	70 - 130	IS	13C2-PFHxA	88.3	60 - 150
PFHpA	37.4	40.0	93.4	70 - 130	IS	13C4-PFHpA	80.3	60 - 150
PFHxS	46.3	40.0	116	70 - 130	IS	18O2-PFHxS	78.7	60 - 150
PFOA	41.3	40.0	103	70 - 130	IS	13C2-PFOA	79.9	60 - 150
PFOS	39.4	40.0	98.4	70 - 130	IS	13C8-PFOS	90.3	60 - 150
PFNA	44.5	40.0	111	50 - 130	IS	13C5-PFNA	77.7	50 - 150
PFDA	45.5	40.0	114	70 - 130	IS	13C2-PFDA	77.6	60 - 150
MeFOSAA	46.4	40.0	116	70 - 130	IS	d3-MeFOSAA	69.4	20 - 150
PFUnA	42.3	40.0	106	70 - 130	IS	13C2-PFUnA	79.0	50 - 150
EtFOSAA	40.5	40.0	101	70 - 130	IS	d5-EtFOSAA	75.7	20 - 150
PFDoA	44.6	40.0	111	70 - 130	IS	13C2-PFDoA	70.1	30 - 150
PFTrDA	39.3	40.0	98.3	20 - 130	IS	13C2-PFTeDA	63.7	20 - 150
PFTeDA	43.1	40.0	108	20 - 130				

LCL-UCL - Lower control limit - upper control limit

Sample ID: NORP01403 — Modified EPA Method 537

Client Data

Name:	Aerostar SES LLC
Project:	Former Norton AFB/M3010.0019.0017.05.15T
Date Collected:	12-May-2017 11:10
Location:	NORPMW403

Sample Data

Matrix:	Groundwater
Sample Size:	0.126 L

Laboratory Data

Lab Sample:	1700602-01	Date Received:	13-May-2017 12:22
QC Batch:	B7E0073	Date Extracted:	15-May-2017 8:17
Date Analyzed:	16-May-17 17:44 Column: BEH C18		

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFBS	12.4	2.16	4.96	7.93	
PFHxA	66.6	2.16	4.96	7.93	
PFHpA	5.13	2.16	4.96	7.93	J
PFHxS	47.9	2.16	4.96	7.93	
PFOA	5.37	2.16	4.96	7.93	J
PFOS	4.37	2.16	4.96	7.93	J
PFNA	<4.96	2.16	4.96	7.93	
PFDA	<4.96	2.16	4.96	7.93	
MeFOSAA	<4.96	2.16	4.96	7.93	
PFUnA	<4.96	2.16	4.96	7.93	
EtFOSAA	<4.96	2.16	4.96	7.93	
PFDoA	<4.96	2.16	4.96	7.93	
PFTrDA	<4.96	2.16	4.96	7.93	
PFTeDA	<4.96	2.16	4.96	7.93	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	126	60 - 150	
IS	13C2-PFHxA	83.1	60 - 150	
IS	13C4-PFHpA	82.8	60 - 150	
IS	18O2-PFHxS	96.4	60 - 150	
IS	13C2-PFOA	75.6	60 - 150	
IS	13C8-PFOS	87.2	60 - 150	
IS	13C5-PFNA	70.0	50 - 150	
IS	13C2-PFDA	74.6	60 - 150	
IS	d3-MeFOSAA	61.8	20 - 150	
IS	13C2-PFUnA	68.4	50 - 150	
IS	d5-EtFOSAA	75.7	20 - 150	
IS	13C2-PFDoA	51.5	30 - 150	
IS	13C2-PFTeDA	43.8	20 - 150	

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP01404

Modified EPA Method 537

Client Data

Name:	Aerostar SES LLC
Project:	Former Norton AFB/M3010.0019.0017.05.15T
Date Collected:	12-May-2017 11:10
Location:	NORPMW403

Sample Data

Matrix:	Groundwater
Sample Size:	0.124 L

Laboratory Data

Lab Sample:	1700602-02	Date Received:	13-May-2017 12:22
QC Batch:	B7E0073	Date Extracted:	15-May-2017 8:17
Date Analyzed:	16-May-17 17:55 Column: BEH C18		

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFBS	12.8	2.20	5.04	8.06	
PFHxA	63.1	2.20	5.04	8.06	
PFHpA	4.59	2.20	5.04	8.06	J
PFHxS	55.0	2.20	5.04	8.06	
PFOA	4.64	2.20	5.04	8.06	J
PFOS	4.20	2.20	5.04	8.06	J
PFNA	<5.04	2.20	5.04	8.06	
PFDA	<5.04	2.20	5.04	8.06	
MeFOSAA	<5.04	2.20	5.04	8.06	
PFUnA	<5.04	2.20	5.04	8.06	
EtFOSAA	<5.04	2.20	5.04	8.06	
PFDoA	<5.04	2.20	5.04	8.06	
PFTrDA	<5.04	2.20	5.04	8.06	
PFTeDA	<5.04	2.20	5.04	8.06	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	140	60 - 150	
IS	13C2-PFHxA	83.7	60 - 150	
IS	13C4-PFHpA	89.5	60 - 150	
IS	18O2-PFHxS	81.9	60 - 150	
IS	13C2-PFOA	72.8	60 - 150	
IS	13C8-PFOS	90.7	60 - 150	
IS	13C5-PFNA	75.2	50 - 150	
IS	13C2-PFDA	73.6	60 - 150	
IS	d3-MeFOSAA	65.3	20 - 150	
IS	13C2-PFUnA	69.8	50 - 150	
IS	d5-EtFOSAA	73.6	20 - 150	
IS	13C2-PFDoA	65.9	30 - 150	
IS	13C2-PFTeDA	61.2	20 - 150	

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

DATA QUALIFIERS & ABBREVIATIONS

B	**This compound was also detected in the method blank.**
D	**Dilution**
E	**The associated compound concentration exceeded the calibration range of the instrument.**
H	**Recovery and/or RPD was outside laboratory acceptance limits.**
I	**Chemical Interference**
J	**The amount detected is below the Reporting Limit/LOQ.**
M	**Estimated Maximum Possible Concentration. (CA Region 2 projects only)**
*****	**See Cover Letter**
Conc.	**Concentration**
NA	**Not applicable**
ND	**Not Detected**
TEQ	**Toxic Equivalency**

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

CERTIFICATIONS

Accrediting Authority	Certificate Number
Arkansas Department of Environmental Quality	17-015-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-18
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2016026
Minnesota Department of Health	1175673
Nevada Division of Environmental Protection	CA004132017-1
New Hampshire Environmental Accreditation Program	207716
New Jersey Department of Environmental Protection	CA003
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-008
Pennsylvania Department of Environmental Protection	013
Texas Commission on Environmental Quality	T104704189-17-8
Virginia Department of General Services	8621
Washington Department of Ecology	C584
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	**Method**
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23

MATRIX: Biological Tissue	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	**Method**
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537

MATRIX: Non-Potable Water	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	**Method**
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope	EPA 1613B

Dilution GC/HRMS	
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

AerostarSES LLC

1007 Floyd Culler Court
Oak Ridge, TN 37830
865-481-7837

Chain of Custody Record/Analysis Request Number: 0010

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

Job No.: M3010.0019.0017.05 , 15TM
Installation: Former Norton AFB

TAT: ~~10 business days~~ *Rush 72 hrs

Aerostar Project Manager: Paula Bond, pbond@aerostar.net, 865-813-2759
Send Data to: Jenny Vance, jvance@aerostar.net, 865-483-7904

Sampler (s): Tim Cullen

Laboratory Name/Address:
Vista Analytical Laboratory
1104 Windfield Way
El Dorado Hills, CA 95762

Contact: Martha Maier
Phone: 916-673-1520
email: mmaier@vista-analytical.com

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

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

Station ID	Sample ID	Date Collected	Time Collected	Sample Type	Matrix	Depth (feet)	PFAS (see list of 14 analytes below)	PFOS/PFOA					NOTES
Preservative (Trizma, HCl, HNO_3, Ice, etc.)													
NORP MW403	NORP01403	5/12/17	1110	N	WG	152-192	2						
NORP MW403	NORP01404	5/12/17	1110	FD	WG	152-192	2						
						Total # of Containers	4						

TC

RELINQUISHED BY:
Signature: Date/Time: 5/12/17 1615
Printed Name: Tim Cullen Firm: Aerostar
Signature: Date/Time:
Printed Name: Firm:

RECEIVED BY:
Signature: Date/Time: 05/13/17 1228
Printed Name: B. Benedict Firm: VAL
Signature: Date/Time:
Printed Name: Firm:

ANALYTE	ERPIMS PAR CODE	CAS	Contaminant	ERPIMS PAR CODE	CAS
Perfluorooctanesulfonic acid	PFOS	1763-23-1	Perfluorooctanoic acid	PFOA	335-67-1
Perfluorooctanoic acid	PFOA	335-67-1	Perfluorotetradecanoic acid	PFTeA	376-06-7
Perfluorononanoic acid	PFNA	375-95-1	Perfluorotetradecanoic acid	PFTeDA	52629-94-8
Perfluorohexanesulfonic acid	PFHxSA	355-46-4	Perfluorooctadecanoic acid	PFODA	2058-94-8
Perfluoroheptanoic acid	PFHpA	375-85-9	Perfluorododecanoic acid	PFDoA	307-55-1
Perfluorobutanesulfonic acid	PFBSA	375-73-5	Perfluorodecanoic acid	PFDA	335-76-2
N-methyl perfluorooctane sulfonamidoacetic acid	NMEFOSAA	2355-31-9	N-methyl perfluorooctane sulfonamidoacetic acid	NETFOSAA	2991-50-6

SAMPLE LOG-IN CHECKLIST

Vista Analytical Laboratory

Vista Project #: 1700602 TAT 3

Samples Arrival:	Date/Time 05/13/17 1222	Initials: VBLB	Location: WR-2 Shelf/Rack: NA
Logged In:	Date/Time 05/13/17 1242	Initials: VBLB	Location: WR-2 Shelf/Rack: F4

Delivered By:	FedEx	UPS	On Trac	DHL	Hand Delivered	Other
Preservation:	Ice	Blue Ice	Dry Ice	None		

Temp °C: 0.0 (uncorrected)	Time: 1240	Thermometer ID: DT-3
Temp °C: -0.7 (corrected)	Probe used: Yes☑ No☐	

		YES	NO	NA
Adequate Sample Volume Received?		✓		
Holding Time Acceptable?		✓		
Shipping Container(s) Intact?		✓		
Shipping Custody Seals Intact?		✓		
Shipping Documentation Present?		✓		
Airbill	Trk # 7865 5634 0036	✓		
Sample Container Intact?		✓		
Sample Custody Seals Intact?				✓
Chain of Custody / Sample Documentation Present?		✓		
COC Anomaly/Sample Acceptance Form completed?			✓	✓

If Chlorinated or Drinking Water Samples, Acceptable Preservation?					✓
Preservation Documented:	$Na_2S_2O_3$	Trizma	Yes	No	NA
Shipping Container	Vista	Client	Retain	Return	Dispose

Comments: Sample label ID
NORP01403
NORP01403
NORP01403
NORP01403

rec'd ABCD bottles 2nd set of bottles used as Field Duplicate.

BLA 09/06/2016

L:/QA/Forms/sample control/Sample LoginNov-2016 (IR-1) F11.1
L:/Controlled Forms/Sample LoginNov-2016 (IR-1) F11.1

June 01, 2017

Vista Work Order No. 1700603

Ms. Jenny Vance
Aerostar SES LLC
1006 Floyd Court
Oak Ridge, TN 37830

Dear Ms. Vance,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on May 13, 2017. This sample set was analyzed on a rush turn-around time, under your Project Name 'Former Norton AFB/M3010.0019.0017.05.15TM'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Karen Lopez for

Martha Maier
Laboratory Director

Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Analytical Laboratory 1104 Windfield Way El Dorado Hills, CA 95762 ph: 916-673-1520 fx: 916-673-0106 www.vista-analytical.com

Vista Work Order No. 1700603
Case Narrative
Sample Condition on Receipt:

Six solid samples and one QC watersample were received in good condition and within the method temperature requirements. The samples were received and stored securely in accordance with Vista standard operating procedures and EPA methodology.

Analytical Notes:

Modified EPA Method 537

The QC water sample was extracted and analyzed for a selected list of 14 PFAS using Modified EPA Method 537.

Holding Times

The sample was extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Method Blank and Ongoing Precision and Recovery (OPR) sample were extracted and analyzed with the preparation batch. No analytes were detected in the Method Blank above 1/2 the LOQ. The OPR recoveries were within the method acceptance criteria

The labeled standard recoveries for all QC and field samples were within the acceptance criteria.

VAL-PFAS

The solid samples were extracted and analyzed for a selected list of 14 PFAS using VAL Method PFAS.

Holding Times

The samples were extracted and analyzed within the hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Method Blank and Ongoing Precision and Recovery (OPR) sample were extracted and analyzed with the preparation batch. No analytes were detected in the Method Blank above 1/2 the LOQ. The OPR recoveries were within the method acceptance criteria.

The labeled standard recoveries for all QC and field samples were within the acceptance criteria.

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Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
1700603-01	NORP05013	09-May-17 09:45	13-May-17 12:22	HDPE Jar, 6 oz
1700603-02	NORP05014	09-May-17 11:15	13-May-17 12:22	HDPE Jar, 6 oz
1700603-03	NORP05015	09-May-17 14:20	13-May-17 12:22	HDPE Jar, 6 oz
1700603-04	NORP08037	12-May-17 14:15	13-May-17 12:22	HDPE Jar, 6 oz
1700603-05	NORP08038	12-May-17 14:55	13-May-17 12:22	HDPE Jar, 6 oz
1700603-06	NORP08039	12-May-17 15:05	13-May-17 12:22	HDPE Bottle, 125 mL
				HDPE Bottle, 125 mL

ANALYTICAL RESULTS

Sample ID: Method Blank — VAL - PFAS

Matrix:	Solid	QC Batch:	B7E0130	Lab Sample:	B7E0130-BLK1
Sample Size:	1.00 g	Date Extracted:	23-May-2017 17:31	Date Analyzed:	24-May-17 17:26 Column: BEH C18
					26-May-17 01:25 Column: BEH C18

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	<1.00	0.285	1.00	2.00	
PFHxA	<1.00	0.285	1.00	2.00	
PFHpA	<1.00	0.285	1.00	2.00	
PFHxS	<1.00	0.285	1.00	2.00	
PFOA	<1.00	0.285	1.00	2.00	
PFOS	<1.00	0.285	1.00	2.00	
PFNA	<1.00	0.285	1.00	2.00	
PFDA	<1.00	0.285	1.00	2.00	
MeFOSAA	<1.00	0.285	1.00	2.00	
PFUnA	<1.00	0.285	1.00	2.00	
EtFOSAA	<1.00	0.285	1.00	2.00	
PFDoA	<1.00	0.285	1.00	2.00	
PFTrDA	<1.00	0.285	1.00	2.00	
PFTeDA	<1.00	0.285	1.00	2.00	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	78.1	60 - 150	
IS	13C2-PFHxA	75.0	60 - 150	
IS	13C4-PFHpA	88.7	60 - 150	
IS	18O2-PFHxS	72.3	60 - 150	
IS	13C2-PFOA	78.3	60 - 150	
IS	13C8-PFOS	85.9	60 - 150	
IS	13C5-PFNA	67.1	50 - 150	
IS	13C2-PFDA	68.0	60 - 150	
IS	d3-MeFOSAA	92.9	20 - 150	
IS	13C2-PFUnA	74.7	50 - 150	
IS	d5-EtFOSAA	121	20 - 150	
IS	13C2-PFDoA	67.8	30 - 150	
IS	13C2-PFTeDA	60.3	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
Only the linear isomer is reported for all other analytes.

Sample ID: OPR

VAL - PFAS

Matrix:	Solid	QC Batch:	B7E0130	Lab Sample:	B7E0130-BS1
Sample Size:	1.00 g	Date Extracted:	23-May-2017 17:31	Date Analyzed:	24-May-17 16:48 Column: BEH C18
					26-May-17 00:47 Column: BEH C18

Analyte	Amt Found (ng/g)	Spike Amt	%R	Limits		Labeled Standard	%R	LCL-UCL
PFBS	9.29	10.0	92.9	60 - 130	IS	13C3-PFBS	71.6	60 - 150
PFHxA	9.08	10.0	90.8	70 - 130	IS	13C2-PFHxA	74.7	60 - 150
PFHpA	9.46	10.0	94.6	70 - 130	IS	13C4-PFHpA	82.8	60 - 150
PFHxS	9.07	10.0	90.7	70 - 130	IS	18O2-PFHxS	68.0	60 - 150
PFOA	10.1	10.0	101	70 - 130	IS	13C2-PFOA	74.1	60 - 150
PFOS	9.26	10.0	92.6	70 - 130	IS	13C8-PFOS	84.5	60 - 150
PFNA	9.84	10.0	98.4	50 - 130	IS	13C5-PFNA	62.6	50 - 150
PFDA	8.18	10.0	81.8	70 - 130	IS	13C2-PFDA	64.9	60 - 150
MeFOSAA	9.53	10.0	95.3	70 - 130	IS	d3-MeFOSAA	107	20 - 150
PFUnA	10.7	10.0	107	70 - 130	IS	13C2-PFUnA	66.4	50 - 150
EtFOSAA	8.48	10.0	84.8	70 - 130	IS	d5-EtFOSAA	111	20 - 150
PFDoA	11.2	10.0	112	70 - 130	IS	13C2-PFDoA	68.8	30 - 150
PFTrDA	10.8	10.0	108	20 - 130	IS	13C2-PFTeDA	53.8	20 - 150
PFTeDA	11.2	10.0	112	20 - 130				

LCL-UCL - Lower control limit - upper control limit

Sample ID: NORP05013

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700603-01	Date Received:	13-May-2017 12:22
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.55 g	QC Batch:	B7E0130	Date Extracted:	23-May-2017 17:31
Date Collected:	09-May-2017 9:45	% Solids:	68.4	Date Analyzed:	24-May-17 18:42 Column: BEH C18		
Location:	NORPMW002				26-May-17 02:28 Column: BEH C18		

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	<0.943	0.269	0.943	1.89	
PFHxA	1.18	0.269	0.943	1.89	J
PFHpA	0.769	0.269	0.943	1.89	J
PFHxS	2.73	0.269	0.943	1.89	
PFOA	2.80	0.269	0.943	1.89	
PFOS	423	1.34	4.71	9.43	D
PFNA	0.953	0.269	0.943	1.89	J
PFDA	1.29	0.269	0.943	1.89	J
MeFOSAA	<0.943	0.269	0.943	1.89	
PFUnA	<0.943	0.269	0.943	1.89	
EtFOSAA	<0.943	0.269	0.943	1.89	
PFDoA	0.554	0.269	0.943	1.89	J
PFTrDA	<0.943	0.269	0.943	1.89	
PFTeDA	<0.943	0.269	0.943	1.89	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	74.7	60 - 150	
IS	13C2-PFHxA	74.8	60 - 150	
IS	13C4-PFHpA	76.2	60 - 150	
IS	18O2-PFHxS	67.9	60 - 150	
IS	13C2-PFOA	70.1	60 - 150	
IS	13C8-PFOS	73.3	60 - 150	D
IS	13C5-PFNA	68.6	50 - 150	
IS	13C2-PFDA	70.8	60 - 150	
IS	d3-MeFOSAA	94.0	20 - 150	
IS	13C2-PFUnA	81.0	50 - 150	
IS	d5-EtFOSAA	106	20 - 150	
IS	13C2-PFDoA	72.0	30 - 150	
IS	13C2-PFTeDA	62.6	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP05014

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700603-02	Date Received:	13-May-2017 12:22
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.06 g	QC Batch:	B7E0130	Date Extracted:	23-May-2017 17:31
Date Collected:	09-May-2017 11:15	% Solids:	97.2	Date Analyzed:	24-May-17 18:54 Column: BEH C18		
Location:	NORPMW002				26-May-17 02:40 Column: BEH C18		

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	<0.971	0.277	0.971	1.94	
PFHxA	1.22	0.277	0.971	1.94	J
PFHpA	0.486	0.277	0.971	1.94	J
PFHxS	4.43	0.277	0.971	1.94	
PFOA	1.57	0.277	0.971	1.94	J
PFOS	2.83	0.277	0.971	1.94	
PFNA	<0.971	0.277	0.971	1.94	
PFDA	<0.971	0.277	0.971	1.94	
MeFOSAA	<0.971	0.277	0.971	1.94	
PFUnA	<0.971	0.277	0.971	1.94	
EtFOSAA	<0.971	0.277	0.971	1.94	
PFDoA	<0.971	0.277	0.971	1.94	
PFTrDA	<0.971	0.277	0.971	1.94	
PFTeDA	<0.971	0.277	0.971	1.94	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	74.5	60 - 150	
IS	13C2-PFHxA	76.0	60 - 150	
IS	13C4-PFHpA	86.7	60 - 150	
IS	18O2-PFHxS	73.8	60 - 150	
IS	13C2-PFOA	71.3	60 - 150	
IS	13C8-PFOS	68.3	60 - 150	
IS	13C5-PFNA	73.3	50 - 150	
IS	13C2-PFDA	72.8	60 - 150	
IS	d3-MeFOSAA	92.7	20 - 150	
IS	13C2-PFUnA	78.2	50 - 150	
IS	d5-EtFOSAA	120	20 - 150	
IS	13C2-PFDoA	68.6	30 - 150	
IS	13C2-PFTeDA	70.0	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP05015

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700603-03	Date Received:	13-May-2017 12:22
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.29 g	QC Batch:	B7E0130	Date Extracted:	23-May-2017 17:31
Date Collected:	09-May-2017 14:20	% Solids:	84.2	Date Analyzed:	24-May-17 19:07 Column: BEH C18		
Location:	NORPMW002				27-May-17 05:19 Column: BEH C18		

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	<0.921	0.262	0.921	1.84	
PFHxA	<0.921	0.262	0.921	1.84	
PFHpA	<0.921	0.262	0.921	1.84	
PFHxS	1.90	0.262	0.921	1.84	
PFOA	0.446	0.262	0.921	1.84	J
PFOS	<0.921	0.262	0.921	1.84	
PFNA	<0.921	0.262	0.921	1.84	
PFDA	<0.921	0.262	0.921	1.84	
MeFOSAA	<0.921	0.262	0.921	1.84	
PFUnA	<0.921	0.262	0.921	1.84	
EtFOSAA	<0.921	0.262	0.921	1.84	
PFDoA	<0.921	0.262	0.921	1.84	
PFTrDA	<0.921	0.262	0.921	1.84	
PFTeDA	<0.921	0.262	0.921	1.84	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	76.8	60 - 150	
IS	13C2-PFHxA	75.5	60 - 150	
IS	13C4-PFHpA	78.7	60 - 150	
IS	18O2-PFHxS	70.2	60 - 150	
IS	13C2-PFOA	75.6	60 - 150	
IS	13C8-PFOS	72.9	60 - 150	
IS	13C5-PFNA	69.5	50 - 150	
IS	13C2-PFDA	84.5	60 - 150	
IS	d3-MeFOSAA	71.5	20 - 150	
IS	13C2-PFUnA	61.3	50 - 150	
IS	d5-EtFOSAA	88.5	20 - 150	
IS	13C2-PFDoA	50.7	30 - 150	
IS	13C2-PFTeDA	51.8	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP08037

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700603-04	Date Received:	13-May-2017 12:22
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.02 g	QC Batch:	B7E0130	Date Extracted:	23-May-2017 17:31
Date Collected:	12-May-2017 14:15	% Solids:	99.6	Date Analyzed:	24-May-17 19:20 Column: BEH C18		
Location:	NORPMW007				27-May-17 05:31 Column: BEH C18		

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	0.543	0.280	0.984	1.97	J
PFHxA	4.28	0.280	0.984	1.97	
PFHpA	2.11	0.280	0.984	1.97	
PFHxS	15.9	0.280	0.984	1.97	
PFOA	3.15	0.280	0.984	1.97	
PFOS	104	1.40	4.92	9.84	D
PFNA	0.681	0.280	0.984	1.97	J
PFDA	2.33	0.280	0.984	1.97	
MeFOSAA	<0.984	0.280	0.984	1.97	
PFUnA	7.93	0.280	0.984	1.97	
EtFOSAA	<0.984	0.280	0.984	1.97	
PFDoA	2.32	0.280	0.984	1.97	
PFTrDA	0.380	0.280	0.984	1.97	J
PFTeDA	<0.984	0.280	0.984	1.97	

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	70.9	60 - 150	
IS	13C2-PFHxA	69.3	60 - 150	
IS	13C4-PFHpA	76.9	60 - 150	
IS	18O2-PFHxS	67.0	60 - 150	
IS	13C2-PFOA	71.9	60 - 150	
IS	13C8-PFOS	65.5	60 - 150	D
IS	13C5-PFNA	69.6	50 - 150	
IS	13C2-PFDA	71.2	60 - 150	
IS	d3-MeFOSAA	66.3	20 - 150	
IS	13C2-PFUnA	53.4	50 - 150	
IS	d5-EtFOSAA	66.9	20 - 150	
IS	13C2-PFDoA	44.6	30 - 150	
IS	13C2-PFTeDA	42.9	20 - 150	

MDL - Detection limit

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP08038

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700603-05	Date Received:	13-May-2017 12:22
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.20 g	QC Batch:	B7E0130	Date Extracted:	23-May-2017 17:31
Date Collected:	12-May-2017 14:55	% Solids:	89.5	Date Analyzed:	24-May-17 19:32 Column: BEH C18		
Location:	NORPMW007				27-May-17 05:44 Column: BEH C18		

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	<0.931	0.265	0.931	1.86	
PFHxA	<0.931	0.265	0.931	1.86	
PFHpA	<0.931	0.265	0.931	1.86	
PFHxS	0.504	0.265	0.931	1.86	J
PFOA	0.749	0.265	0.931	1.86	J
PFOS	29.3	0.265	0.931	1.86	
PFNA	<0.931	0.265	0.931	1.86	
PFDA	<0.931	0.265	0.931	1.86	
MeFOSAA	<0.931	0.265	0.931	1.86	
PFUnA	<0.931	0.265	0.931	1.86	
EtFOSAA	<0.931	0.265	0.931	1.86	
PFDoA	<0.931	0.265	0.931	1.86	
PFTrDA	<0.931	0.265	0.931	1.86	
PFTeDA	<0.931	0.265	0.931	1.86	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	75.3	60 - 150	
IS	13C2-PFHxA	75.5	60 - 150	
IS	13C4-PFHpA	90.6	60 - 150	
IS	18O2-PFHxS	75.1	60 - 150	
IS	13C2-PFOA	76.4	60 - 150	
IS	13C8-PFOS	71.9	60 - 150	
IS	13C5-PFNA	72.5	50 - 150	
IS	13C2-PFDA	77.0	60 - 150	
IS	d3-MeFOSAA	69.7	20 - 150	
IS	13C2-PFUnA	59.4	50 - 150	
IS	d5-EtFOSAA	65.4	20 - 150	
IS	13C2-PFDoA	50.8	30 - 150	
IS	13C2-PFTeDA	50.7	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: Method Blank — Modified EPA Method 537

Matrix: Aqueous
Sample Size: 0.250 L

QC Batch: B7E0073
Date Extracted: 15-May-2017 8:17

Lab Sample: B7E0073-BLK1
Date Analyzed: 16-May-17 16:06 Column: BEH C18

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFBS	<2.50	1.09	2.50	4.00	
PFHxA	<2.50	1.09	2.50	4.00	
PFHpA	<2.50	1.09	2.50	4.00	
PFHxS	<2.50	1.09	2.50	4.00	
PFOA	<2.50	1.09	2.50	4.00	
PFOS	<2.50	1.09	2.50	4.00	
PFNA	<2.50	1.09	2.50	4.00	
PFDA	<2.50	1.09	2.50	4.00	
MeFOSAA	<2.50	1.09	2.50	4.00	
PFUnA	<2.50	1.09	2.50	4.00	
EtFOSAA	<2.50	1.09	2.50	4.00	
PFDoA	<2.50	1.09	2.50	4.00	
PFTrDA	<2.50	1.09	2.50	4.00	
PFTeDA	<2.50	1.09	2.50	4.00	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	144	60 - 150	
IS	13C2-PFHxA	95.9	60 - 150	
IS	13C4-PFHpA	87.5	60 - 150	
IS	18O2-PFHxS	92.4	60 - 150	
IS	13C2-PFOA	90.9	60 - 150	
IS	13C8-PFOS	102	60 - 150	
IS	13C5-PFNA	83.6	50 - 150	
IS	13C2-PFDA	86.9	60 - 150	
IS	d3-MeFOSAA	44.8	20 - 150	
IS	13C2-PFUnA	63.8	50 - 150	
IS	d5-EtFOSAA	46.3	20 - 150	
IS	13C2-PFDoA	47.3	30 - 150	
IS	13C2-PFTeDA	45.3	20 - 150	

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
Only the linear isomer is reported for all other analytes.

Sample ID: OPR

Modified EPA Method 537

Matrix:	Aqueous	QC Batch:	B7E0073	Lab Sample:	B7E0073-BS1
Sample Size:	0.250 L	Date Extracted:	15-May-2017 8:17	Date Analyzed:	16-May-17 15:44 Column: BEH C18

Analyte	Amt Found (ng/L)	Spike Amt	%R	Limits		Labeled Standard	%R	LCL-UCL
PFBS	44.5	40.0	111	60 - 130	IS	13C3-PFBS	135	60 - 150
PFHxA	43.9	40.0	110	70 - 130	IS	13C2-PFHxA	88.3	60 - 150
PFHpA	37.4	40.0	93.4	70 - 130	IS	13C4-PFHpA	80.3	60 - 150
PFHxS	46.3	40.0	116	70 - 130	IS	18O2-PFHxS	78.7	60 - 150
PFOA	41.3	40.0	103	70 - 130	IS	13C2-PFOA	79.9	60 - 150
PFOS	39.4	40.0	98.4	70 - 130	IS	13C8-PFOS	90.3	60 - 150
PFNA	44.5	40.0	111	50 - 130	IS	13C5-PFNA	77.7	50 - 150
PFDA	45.5	40.0	114	70 - 130	IS	13C2-PFDA	77.6	60 - 150
MeFOSAA	46.4	40.0	116	70 - 130	IS	d3-MeFOSAA	69.4	20 - 150
PFUnA	42.3	40.0	106	70 - 130	IS	13C2-PFUnA	79.0	50 - 150
EtFOSAA	40.5	40.0	101	70 - 130	IS	d5-EtFOSAA	75.7	20 - 150
PFDoA	44.6	40.0	111	70 - 130	IS	13C2-PFDoA	70.1	30 - 150
PFTrDA	39.3	40.0	98.3	20 - 130	IS	13C2-PFTeDA	63.7	20 - 150
PFTeDA	43.1	40.0	108	20 - 130				

LCL-UCL - Lower control limit - upper control limit

Sample ID: NORP08039

Modified EPA Method 537

Client Data

Name: Aerostar SES LLC
Project: Former Norton AFB/M3010.0019.0017.05.15T
Date Collected: 12-May-2017 15:05
Location: NORPMW007

Sample Data

Matrix: QC Water
Sample Size: 0.129 L

Laboratory Data

Lab Sample: 1700603-06
Date Received: 13-May-2017 12:22
QC Batch: B7E0073
Date Extracted: 15-May-2017 8:17
Date Analyzed: 16-May-17 18:06 Column: BEH C18

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFBS	<4.84	2.12	4.84	7.78	
PFHxA	<4.84	2.12	4.84	7.78	
PFHpA	<4.84	2.12	4.84	7.78	
PFHxS	<4.84	2.12	4.84	7.78	
PFOA	<4.84	2.12	4.84	7.78	
PFOS	60.1	2.12	4.84	7.78	
PFNA	<4.84	2.12	4.84	7.78	
PFDA	<4.84	2.12	4.84	7.78	
MeFOSAA	<4.84	2.12	4.84	7.78	
PFUnA	<4.84	2.12	4.84	7.78	
EtFOSAA	<4.84	2.12	4.84	7.78	
PFDoA	<4.84	2.12	4.84	7.78	
PFTrDA	<4.84	2.12	4.84	7.78	
PFTeDA	<4.84	2.12	4.84	7.78	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	148	60 - 150	
IS	13C2-PFHxA	90.0	60 - 150	
IS	13C4-PFHpA	89.7	60 - 150	
IS	18O2-PFHxS	79.5	60 - 150	
IS	13C2-PFOA	79.2	60 - 150	
IS	13C8-PFOS	94.2	60 - 150	
IS	13C5-PFNA	76.0	50 - 150	
IS	13C2-PFDA	90.9	60 - 150	
IS	d3-MeFOSAA	73.2	20 - 150	
IS	13C2-PFUnA	73.8	50 - 150	
IS	d5-EtFOSAA	81.1	20 - 150	
IS	13C2-PFDoA	70.6	30 - 150	
IS	13C2-PFTeDA	65.7	20 - 150	

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

DATA QUALIFIERS & ABBREVIATIONS

B	**This compound was also detected in the method blank.**
D	**Dilution**
E	**The associated compound concentration exceeded the calibration range of the instrument.**
H	**Recovery and/or RPD was outside laboratory acceptance limits.**
I	**Chemical Interference**
J	**The amount detected is below the Reporting Limit/LOQ.**
M	**Estimated Maximum Possible Concentration. (CA Region 2 projects only)**
*****	**See Cover Letter**
Conc.	**Concentration**
NA	**Not applicable**
ND	**Not Detected**
TEQ	**Toxic Equivalency**

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

CERTIFICATIONS

Accrediting Authority	Certificate Number
Arkansas Department of Environmental Quality	17-015-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-18
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2016026
Minnesota Department of Health	1175673
Nevada Division of Environmental Protection	CA004132017-1
New Hampshire Environmental Accreditation Program	207716
New Jersey Department of Environmental Protection	CA003
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-008
Pennsylvania Department of Environmental Protection	013
Texas Commission on Environmental Quality	T104704189-17-8
Virginia Department of General Services	8621
Washington Department of Ecology	C584
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	**Method**
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23

MATRIX: Biological Tissue	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	**Method**
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537

MATRIX: Non-Potable Water	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	**Method**
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope	EPA 1613B

Dilution GC/HRMS	
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

Aerostar SES LLC

1007 Floyd Culler Court
Oak Ridge, TN 37830
865-481-7837

Chain of Custody Record/Analysis Request Number: 0008

1700603 -0.7°C

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

Job No.: M3010.0019.0017.05 .15Tm
Installation: Former Norton AFB

TAT: 10 business days

Aerostar Project Manager: Paula Bond, pbond@aerostar.net, 865-813-2759
Send Data to: Jenny Vance, jvance@aerostar.net, 865-483-7904

Sampler (s): Tim Cullen | Lab: Vista Analytical Laboratory 1104 Windfield way, EL Dorado Hills, CA 95762

Laboratory Name/Address: ~~TestAmerica~~ Test America ~~880 Riverside Parkway~~ 4955 Yarrow St. ~~West Sacramento, CA 95605~~ Arvada, ~~CO 80002~~ TC

Contact: David Alltucker
Phone: 916-374-4383
email: david.alltucker@testamericainc.com

ANALYSIS

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

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

Station ID	Sample ID	Date Collected	Time Collected	Sample Type	Matrix	Depth (feet)	PFAS (see list of 14 analytes below)	PFOS/PFOA					NOTES
				Preservative (Trizma, HCl, HNO_3, Ice, etc.)									
NORPMW002	NORP05013	5/9/17	0945	N	SO	0.5-1.5'	1						
NORPMW002	NORP05014	5/9/17	1115	N	SO	16-16.25	1						
NORPMW002	NORP05015	5/9/17	1420	N	SO	37-37.25	1						
NORPMW007	NORP08037	5/12/17	1415	N	SO	0-1'	1						
NORPMW007	NORP08038	5/12/17	1455	N	SO	15-15.5'	1						
NORPMW007	NORP08039	5/12/17	1505	EB	WQ	—	2						NORP08040 / SPT5ugfe
						Total # of Containers	7						

TC

RELINQUISHED BY:
Signature: Date/Time: 5/12/17 1615
Printed Name: Tim Cullen Firm: Aerostar
Signature: Date/Time:
Printed Name: Firm:

RECEIVED BY:
Signature: Bettini Benedict Date/Time: 05/13/17 1228
Printed Name: Bettini Benedict Firm: VAL
Signature: Date/Time:
Printed Name: Firm:

ANALYTE	ERPIMS PAR CODE	CAS	Contaminant	ERPIMS PAR CODE	CAS
Perfluorooctanesulfonic acid	PFOS	1763-23-1	Perfluorobutanoic acid	PFBXA	375-22-4
Perfluorooctanoic acid	PFOA	335-67-1	Perfluoroheptanoic acid	PFHpA	375-85-9
Perfluorononanoic acid	PFNA	375-95-1	Perfluorohexanoic acid	PFHxA	307-24-4
Perfluorohexanesulfonic acid	PFHXSA	355-46-4	Perfluorodecanoic acid	PFDA	335-76-2
Perfluorobutanesulfonic acid	PFBSA	375-73-5	Perfluoroundecanoic acid	PFUnA	2058-94-8
Perfluoroheptanoic acid	PFHpA	375-85-9	Perfluorododecanoic acid	PFDoA	307-55-1
Perfluorobutanoic acid	PFBA	375-22-4	Perfluorotridecanoic acid	PFTrDA	72629-94-8
N-methyl perfluorooctane sulfonamidoacetic acid	NMeFOSAA	2355-31-9	Perfluorotetradecanoic acid	PFTeDA	376-06-7
			N-ethyl perfluorooctane sulfonamidoacetic acid	NEtFOSAA	2991-50-6

SAMPLE LOG-IN CHECKLIST

Vista Analytical Laboratory

Vista Project #: 1700603 TAT 10

Samples Arrival:	Date/Time 05/13/17 1222	Initials: VBLB	Location: WR-2 Shelf/Rack: NA
Logged In:	Date/Time 05/13/17 1308	Initials: VBLB	Location: WR-2 Shelf/Rack: F4

Delivered By:	FedEx	UPS	On Trac	DHL	Hand Delivered	Other
Preservation:	Ice	Blue Ice		Dry Ice		None

Temp °C: 0.0 (uncorrected)	Time: 1240	Thermometer ID: DT-3
Temp °C: -0.7 (corrected)	Probe used: Yes☑ No☐	

	YES	NO	NA
Adequate Sample Volume Received?	✓		
Holding Time Acceptable?	✓		
Shipping Container(s) Intact?	✓		
Shipping Custody Seals Intact?	✓		
Shipping Documentation Present?	✓		
Airbill Trk # 7865 5634 0036	✓		
Sample Container Intact?	✓		
Sample Custody Seals Intact?			✓
Chain of Custody / Sample Documentation Present?	✓		
COC Anomaly/Sample Acceptance Form completed?		✓	✓

If Chlorinated or Drinking Water Samples, Acceptable Preservation?						✓
Preservation Documented:	$Na_2S_2O_3$	Trizma			Yes	No NA
Shipping Container	Vista	Client	Retain	Return	Dispose	

Comments: Sample ID

NORP 08038
08037
05013
05015
05014*

* Limited Volume

BLA 09 06 2016

L:/QA/Forms sample control/Sample LoginNov-2016 (IR-1) F11.1
L:/Controlled Forms/Sample LoginNov-2016 (IR-1) F11.1

June 06, 2017

Vista Work Order No. 1700632

Ms. Jenny Vance
Aerostar SES LLC
1006 Floyd Court
Oak Ridge, TN 37830

Dear Ms. Vance,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on May 20, 2017. This sample set was analyzed on a rush turn-around time, under your Project Name 'Former Norton AFB/M3010.0019.0017.05.15TM'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Karen Lopez for

Martha Maier
Laboratory Director

Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Analytical Laboratory 1104 Windfield Way El Dorado Hills, CA 95762 ph: 916-673-1520 fx: 916-673-0106 www.vista-analytical.com

Vista Work Order No. 1700632
Case Narrative

Sample Condition on Receipt:

Eleven solid samples and two QC water samples were received in good condition and within the method temperature requirements. The samples were received and stored securely in accordance with Vista standard operating procedures and EPA methodology.

Analytical Notes:

Modified EPA Method 537

The QC water samples were extracted and analyzed for a selected list of 14 PFAS using Modified EPA Method 537.

Holding Times

The samples were extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Method Blank and Ongoing Precision and Recovery (OPR) sample were extracted and analyzed with the preparation batch. No analytes were detected in the Method Blank above 1/2 the LOQ. The OPR recoveries were within the method acceptance criteria

The labeled standard recoveries outside the acceptance criteria are listed in the table below.

VAL-PFAS

The solid samples were extracted and analyzed for a selected list of 14 PFAS using VAL Method PFAS. Results qualified with an "E" are above the Upper Calibration Limit.

Holding Times

The samples were extracted and analyzed within the hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Method Blank and Ongoing Precision and Recovery (OPR) sample were extracted and analyzed with the preparation batch. No analytes were detected in the Method Blank above 1/2 the LOQ. The OPR recoveries were within the method acceptance criteria.

The labeled standard recoveries outside the acceptance criteria are listed in the table below.

QC Anomalies

LabNumber	SampleName	Analysis	Analyte	Flag	%Rec
1700632-01	NORP08041	VAL - PFAS	13C3-PFBS	H	158
1700632-02	NORP08042	VAL - PFAS	13C3-PFBS	H	161
1700632-02	NORP08042	VAL - PFAS	18O2-PFHxS	H	49.5
1700632-13	NORP08053	VAL - PFAS	13C3-PFBS	H	151
B7E0139-BLK1	B7E0139-BLK1	Modified EPA Method 537	13C3-PFBS	H	151

H = Recovery was outside laboratory acceptance criteria.

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Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
1700632-01	NORP08041	16-May-17 13:45	20-May-17 09:00	HDPE Jar, 6 oz
1700632-02	NORP08042	16-May-17 13:45	20-May-17 09:00	HDPE Jar, 6 oz
1700632-03	NORP08043	16-May-17 15:35	20-May-17 09:00	HDPE Jar, 6 oz
1700632-04	NORP08044	16-May-17 16:10	20-May-17 09:00	HDPE Jar, 6 oz
1700632-05	NORP08045	16-May-17 11:15	20-May-17 09:00	HDPE Jar, 6 oz
1700632-06	NORP08046	16-May-17 12:15	20-May-17 09:00	HDPE Jar, 6 oz
1700632-07	NORP08047	16-May-17 00:00	20-May-17 09:00	HDPE Bottle, 125 mL
				HDPE Bottle, 125 mL
1700632-08	NORP08048	16-May-17 12:35	20-May-17 09:00	HDPE Jar, 6 oz
1700632-09	NORP08049	16-May-17 09:05	20-May-17 09:00	HDPE Jar, 6 oz
1700632-10	NORP08050	16-May-17 10:05	20-May-17 09:00	HDPE Jar, 6 oz
1700632-11	NORP08051	17-May-17 10:15	20-May-17 09:00	HDPE Bottle, 125 mL
				HDPE Bottle, 125 mL
1700632-12	NORP08052	16-May-17 10:35	20-May-17 09:00	HDPE Jar, 6 oz
1700632-13	NORP08053	16-May-17 10:35	20-May-17 09:00	HDPE Jar, 6 oz

ANALYTICAL RESULTS

Sample ID: Method Blank — VAL - PFAS

Matrix:	Solid	QC Batch:	B7E0142	Lab Sample:	B7E0142-BLK1
Sample Size:	1.00 g	Date Extracted:	25-May-2017 11:56	Date Analyzed:	26-May-17 17:55 Column: BEH C18

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	<1.00	0.285	1.00	2.00	
PFHxA	<1.00	0.285	1.00	2.00	
PFHpA	<1.00	0.285	1.00	2.00	
PFHxS	<1.00	0.285	1.00	2.00	
PFOA	<1.00	0.285	1.00	2.00	
PFOS	<1.00	0.285	1.00	2.00	
PFNA	<1.00	0.285	1.00	2.00	
PFDA	<1.00	0.285	1.00	2.00	
MeFOSAA	<1.00	0.285	1.00	2.00	
PFUnA	<1.00	0.285	1.00	2.00	
EtFOSAA	<1.00	0.285	1.00	2.00	
PFDoA	<1.00	0.285	1.00	2.00	
PFTrDA	<1.00	0.285	1.00	2.00	
PFTeDA	<1.00	0.285	1.00	2.00	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	133	60 - 150	
IS	13C2-PFHxA	98.0	60 - 150	
IS	13C4-PFHpA	81.2	60 - 150	
IS	18O2-PFHxS	98.9	60 - 150	
IS	13C2-PFOA	88.9	60 - 150	
IS	13C8-PFOS	108	60 - 150	
IS	13C5-PFNA	89.6	50 - 150	
IS	13C2-PFDA	81.3	60 - 150	
IS	d3-MeFOSAA	78.5	20 - 150	
IS	13C2-PFUnA	80.0	50 - 150	
IS	d5-EtFOSAA	71.6	20 - 150	
IS	13C2-PFDoA	90.0	30 - 150	
IS	13C2-PFTeDA	83.1	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
Only the linear isomer is reported for all other analytes.

Sample ID: OPR

VAL - PFAS

Matrix:	Solid	QC Batch:	B7E0142	Lab Sample:	B7E0142-BS1
Sample Size:	1.00 g	Date Extracted:	25-May-2017 11:56	Date Analyzed:	26-May-17 17:11 Column: BEH C18

Analyte	Amt Found (ng/g)	Spike Amt	%R	Limits		Labeled Standard	%R	LCL-UCL
PFBS	9.76	10.0	97.6	60 - 130	IS	13C3-PFBS	135	60 - 150
PFHxA	10.2	10.0	102	70 - 130	IS	13C2-PFHxA	93.7	60 - 150
PFHpA	9.72	10.0	97.2	70 - 130	IS	13C4-PFHpA	77.6	60 - 150
PFHxS	10.2	10.0	102	70 - 130	IS	18O2-PFHxS	93.1	60 - 150
PFOA	10.3	10.0	103	70 - 130	IS	13C2-PFOA	91.9	60 - 150
PFOS	9.97	10.0	99.7	70 - 130	IS	13C8-PFOS	97.8	60 - 150
PFNA	9.58	10.0	95.8	50 - 130	IS	13C5-PFNA	97.1	50 - 150
PFDA	10.5	10.0	105	70 - 130	IS	13C2-PFDA	80.4	60 - 150
MeFOSAA	8.89	10.0	88.9	70 - 130	IS	d3-MeFOSAA	67.3	20 - 150
PFUnA	9.45	10.0	94.5	70 - 130	IS	13C2-PFUnA	70.3	50 - 150
EtFOSAA	10.4	10.0	104	70 - 130	IS	d5-EtFOSAA	58.8	20 - 150
PFDoA	8.44	10.0	84.4	70 - 130	IS	13C2-PFDoA	71.7	30 - 150
PFTrDA	8.94	10.0	89.4	20 - 130	IS	13C2-PFTeDA	56.5	20 - 150
PFTeDA	10.2	10.0	102	20 - 130				

LCL-UCL - Lower control limit - upper control limit

Sample ID: NORP08041

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700632-01	Date Received:	20-May-2017 9:00
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.05 g	QC Batch:	B7E0142	Date Extracted:	25-May-2017 11:56
Date Collected:	16-May-2017 13:45	% Solids:	95.2	Date Analyzed:	04-Jun-17 10:07 Column: BEH C18		
Location:	NORPSB004				26-May-17 21:45 Column: BEH C18		

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	376	1.43	5.00	10.0	D
PFHxA	1160	7.13	25.0	50.0	D
PFHpA	331	1.43	5.00	10.0	D
PFHxS	4860	7.13	25.0	50.0	E, D
PFOA	431	1.43	5.00	10.0	D
PFOS	1600	7.13	25.0	50.0	D
PFNA	8.75	0.285	1.00	2.00	
PFDA	1.41	0.285	1.00	2.00	J
MeFOSAA	<1.00	0.285	1.00	2.00	
PFUnA	0.326	0.285	1.00	2.00	J
EtFOSAA	<1.00	0.285	1.00	2.00	
PFDoA	<1.00	0.285	1.00	2.00	
PFTrDA	<1.00	0.285	1.00	2.00	
PFTeDA	<1.00	0.285	1.00	2.00	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	158	60 - 150	D, H
IS	13C2-PFHxA	135	60 - 150	D
IS	13C4-PFHpA	92.8	60 - 150	D
IS	18O2-PFHxS	130	60 - 150	D
IS	13C2-PFOA	102	60 - 150	D
IS	13C8-PFOS	145	60 - 150	D
IS	13C5-PFNA	94.9	50 - 150	
IS	13C2-PFDA	76.3	60 - 150	
IS	d3-MeFOSAA	84.4	20 - 150	
IS	13C2-PFUnA	81.5	50 - 150	
IS	d5-EtFOSAA	85.0	20 - 150	
IS	13C2-PFDoA	82.2	30 - 150	
IS	13C2-PFTeDA	86.2	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP08042

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700632-02	Date Received:	20-May-2017 9:00
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.02 g	QC Batch:	B7E0142	Date Extracted:	25-May-2017 11:56
Date Collected:	16-May-2017 13:45	% Solids:	98.0	Date Analyzed:	04-Jun-17 10:41 Column: BEH C18		
Location:	NORPSB004				26-May-17 21:55 Column: BEH C18		

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	489	2.85	10.0	20.0	D
PFHxA	1870	14.3	50.0	100	D
PFHpA	412	2.85	10.0	20.0	D
PFHxS	15300	14.3	50.0	100	E, D
PFOA	569	2.85	10.0	20.0	D
PFOS	1430	14.3	50.0	100	D
PFNA	8.10	0.285	1.00	2.00	
PFDA	1.17	0.285	1.00	2.00	J
MeFOSAA	<1.00	0.285	1.00	2.00	
PFUnA	<1.00	0.285	1.00	2.00	
EtFOSAA	<1.00	0.285	1.00	2.00	
PFDoA	<1.00	0.285	1.00	2.00	
PFTrDA	<1.00	0.285	1.00	2.00	
PFTeDA	<1.00	0.285	1.00	2.00	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	161	60 - 150	D, H
IS	13C2-PFHxA	111	60 - 150	D
IS	13C4-PFHpA	93.0	60 - 150	D
IS	18O2-PFHxS	49.5	60 - 150	D, H
IS	13C2-PFOA	97.0	60 - 150	D
IS	13C8-PFOS	106	60 - 150	D
IS	13C5-PFNA	87.8	50 - 150	
IS	13C2-PFDA	87.2	60 - 150	
IS	d3-MeFOSAA	58.6	20 - 150	
IS	13C2-PFUnA	62.0	50 - 150	
IS	d5-EtFOSAA	72.7	20 - 150	
IS	13C2-PFDoA	70.3	30 - 150	
IS	13C2-PFTeDA	75.8	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP08043

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700632-03	Date Received:	20-May-2017 9:00
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.03 g	QC Batch:	B7E0142	Date Extracted:	25-May-2017 11:56
Date Collected:	16-May-2017 15:35	% Solids:	98.0	Date Analyzed:	26-May-17 22:06 Column: BEH C18		
Location:	NORPSB004						

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	1.89	0.282	0.991	1.98	J
PFHxA	5.50	0.282	0.991	1.98	
PFHpA	1.17	0.282	0.991	1.98	J
PFHxS	17.6	0.282	0.991	1.98	
PFOA	1.35	0.282	0.991	1.98	J
PFOS	30.4	0.282	0.991	1.98	
PFNA	<0.991	0.282	0.991	1.98	
PFDA	<0.991	0.282	0.991	1.98	
MeFOSAA	<0.991	0.282	0.991	1.98	
PFUnA	<0.991	0.282	0.991	1.98	
EtFOSAA	<0.991	0.282	0.991	1.98	
PFDoA	<0.991	0.282	0.991	1.98	
PFTrDA	<0.991	0.282	0.991	1.98	
PFTeDA	<0.991	0.282	0.991	1.98	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	127	60 - 150	
IS	13C2-PFHxA	94.0	60 - 150	
IS	13C4-PFHpA	77.7	60 - 150	
IS	18O2-PFHxS	97.7	60 - 150	
IS	13C2-PFOA	93.5	60 - 150	
IS	13C8-PFOS	96.6	60 - 150	
IS	13C5-PFNA	92.3	50 - 150	
IS	13C2-PFDA	87.4	60 - 150	
IS	d3-MeFOSAA	61.4	20 - 150	
IS	13C2-PFUnA	71.6	50 - 150	
IS	d5-EtFOSAA	59.2	20 - 150	
IS	13C2-PFDoA	67.4	30 - 150	
IS	13C2-PFTeDA	77.1	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP08044

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700632-04	Date Received:	20-May-2017 9:00
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.02 g	QC Batch:	B7E0142	Date Extracted:	25-May-2017 11:56
Date Collected:	16-May-2017 16:10	% Solids:	97.0	Date Analyzed:	26-May-17 22:17 Column: BEH C18		
Location:	NORPSB004						

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	0.518	0.288	1.01	2.02	J
PFHxA	1.32	0.288	1.01	2.02	J
PFHpA	<1.01	0.288	1.01	2.02	
PFHxS	4.23	0.288	1.01	2.02	
PFOA	<1.01	0.288	1.01	2.02	
PFOS	5.16	0.288	1.01	2.02	
PFNA	<1.01	0.288	1.01	2.02	
PFDA	<1.01	0.288	1.01	2.02	
MeFOSAA	<1.01	0.288	1.01	2.02	
PFUnA	<1.01	0.288	1.01	2.02	
EtFOSAA	<1.01	0.288	1.01	2.02	
PFDoA	<1.01	0.288	1.01	2.02	
PFTrDA	<1.01	0.288	1.01	2.02	
PFTeDA	<1.01	0.288	1.01	2.02	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	141	60 - 150	
IS	13C2-PFHxA	99.1	60 - 150	
IS	13C4-PFHpA	80.3	60 - 150	
IS	18O2-PFHxS	97.0	60 - 150	
IS	13C2-PFOA	91.0	60 - 150	
IS	13C8-PFOS	98.2	60 - 150	
IS	13C5-PFNA	92.9	50 - 150	
IS	13C2-PFDA	81.3	60 - 150	
IS	d3-MeFOSAA	72.6	20 - 150	
IS	13C2-PFUnA	78.6	50 - 150	
IS	d5-EtFOSAA	69.3	20 - 150	
IS	13C2-PFDoA	83.9	30 - 150	
IS	13C2-PFTeDA	88.8	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP08045

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700632-05	Date Received:	20-May-2017 9:00
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.06 g	QC Batch:	B7E0142	Date Extracted:	25-May-2017 11:56
Date Collected:	16-May-2017 11:15	% Solids:	97.4	Date Analyzed:	04-Jun-17 10:53 Column: BEH C18		
Location:	NORPSB005				26-May-17 22:28 Column: BEH C18		

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	21.7	0.276	0.969	1.94	
PFHxA	145	5.52	19.4	38.8	D
PFHpA	21.7	0.276	0.969	1.94	
PFHxS	454	5.52	19.4	38.8	D
PFOA	58.6	0.276	0.969	1.94	
PFOS	1570	5.52	19.4	38.8	D
PFNA	4.42	0.276	0.969	1.94	
PFDA	<0.969	0.276	0.969	1.94	
MeFOSAA	<0.969	0.276	0.969	1.94	
PFUnA	<0.969	0.276	0.969	1.94	
EtFOSAA	<0.969	0.276	0.969	1.94	
PFDoA	<0.969	0.276	0.969	1.94	
PFTrDA	<0.969	0.276	0.969	1.94	
PFTeDA	<0.969	0.276	0.969	1.94	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	139	60 - 150	
IS	13C2-PFHxA	94.0	60 - 150	D
IS	13C4-PFHpA	80.6	60 - 150	
IS	18O2-PFHxS	77.6	60 - 150	D
IS	13C2-PFOA	89.3	60 - 150	
IS	13C8-PFOS	93.3	60 - 150	D
IS	13C5-PFNA	91.1	50 - 150	
IS	13C2-PFDA	91.3	60 - 150	
IS	d3-MeFOSAA	87.8	20 - 150	
IS	13C2-PFUnA	91.5	50 - 150	
IS	d5-EtFOSAA	87.0	20 - 150	
IS	13C2-PFDoA	91.9	30 - 150	
IS	13C2-PFTeDA	96.2	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP08046

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700632-06	Date Received:	20-May-2017 9:00
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.01 g	QC Batch:	B7E0142	Date Extracted:	25-May-2017 11:56
Date Collected:	16-May-2017 12:15	% Solids:	99.2	Date Analyzed:	26-May-17 22:39 Column: BEH C18		
Location:	NORPSB005						

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	0.492	0.285	0.998	2.00	J
PFHxA	2.03	0.285	0.998	2.00	
PFHpA	0.342	0.285	0.998	2.00	J
PFHxS	5.94	0.285	0.998	2.00	
PFOA	1.09	0.285	0.998	2.00	J
PFOS	23.9	0.285	0.998	2.00	
PFNA	<0.998	0.285	0.998	2.00	
PFDA	<0.998	0.285	0.998	2.00	
MeFOSAA	<0.998	0.285	0.998	2.00	
PFUnA	<0.998	0.285	0.998	2.00	
EtFOSAA	<0.998	0.285	0.998	2.00	
PFDoA	<0.998	0.285	0.998	2.00	
PFTrDA	<0.998	0.285	0.998	2.00	
PFTeDA	<0.998	0.285	0.998	2.00	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	138	60 - 150	
IS	13C2-PFHxA	99.6	60 - 150	
IS	13C4-PFHpA	82.4	60 - 150	
IS	18O2-PFHxS	95.1	60 - 150	
IS	13C2-PFOA	87.9	60 - 150	
IS	13C8-PFOS	99.3	60 - 150	
IS	13C5-PFNA	95.3	50 - 150	
IS	13C2-PFDA	82.0	60 - 150	
IS	d3-MeFOSAA	69.1	20 - 150	
IS	13C2-PFUnA	74.7	50 - 150	
IS	d5-EtFOSAA	66.1	20 - 150	
IS	13C2-PFDoA	70.2	30 - 150	
IS	13C2-PFTeDA	79.7	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP08048

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700632-08	Date Received:	20-May-2017 9:00
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.05 g	QC Batch:	B7E0142	Date Extracted:	25-May-2017 11:56
Date Collected:	16-May-2017 12:35	% Solids:	95.7	Date Analyzed:	30-May-17 09:58 Column: BEH C18		
Location:	NORPSB005						

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	0.793	0.284	0.995	1.99	J
PFHxA	2.05	0.284	0.995	1.99	
PFHpA	<0.995	0.284	0.995	1.99	
PFHxS	5.41	0.284	0.995	1.99	
PFOA	0.941	0.284	0.995	1.99	J
PFOS	6.53	0.284	0.995	1.99	
PFNA	<0.995	0.284	0.995	1.99	
PFDA	<0.995	0.284	0.995	1.99	
MeFOSAA	<0.995	0.284	0.995	1.99	
PFUnA	<0.995	0.284	0.995	1.99	
EtFOSAA	<0.995	0.284	0.995	1.99	
PFDoA	<0.995	0.284	0.995	1.99	
PFTrDA	<0.995	0.284	0.995	1.99	
PFTeDA	<0.995	0.284	0.995	1.99	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	133	60 - 150	
IS	13C2-PFHxA	93.1	60 - 150	
IS	13C4-PFHpA	78.0	60 - 150	
IS	18O2-PFHxS	96.6	60 - 150	
IS	13C2-PFOA	98.5	60 - 150	
IS	13C8-PFOS	107	60 - 150	
IS	13C5-PFNA	96.4	50 - 150	
IS	13C2-PFDA	71.5	60 - 150	
IS	d3-MeFOSAA	71.6	20 - 150	
IS	13C2-PFUnA	75.5	50 - 150	
IS	d5-EtFOSAA	72.5	20 - 150	
IS	13C2-PFDoA	71.8	30 - 150	
IS	13C2-PFTeDA	81.6	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP08049

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700632-09	Date Received:	20-May-2017 9:00
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.02 g	QC Batch:	B7E0142	Date Extracted:	25-May-2017 11:56
Date Collected:	16-May-2017 9:05	% Solids:	95.9	Date Analyzed:	04-Jun-17 11:04 Column: BEH C18		
Location:	NORPSB006				30-May-17 10:09 Column: BEH C18		

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	5.70	0.291	1.02	2.05	
PFHxA	63.1	0.291	1.02	2.05	
PFHpA	26.6	0.291	1.02	2.05	
PFHxS	545	14.6	51.1	102	D
PFOA	196	2.91	10.2	20.5	D
PFOS	4490	14.6	51.1	102	D
PFNA	12.6	0.291	1.02	2.05	
PFDA	1.26	0.291	1.02	2.05	J
MeFOSAA	<1.02	0.291	1.02	2.05	
PFUnA	<1.02	0.291	1.02	2.05	
EtFOSAA	<1.02	0.291	1.02	2.05	
PFDoA	0.481	0.291	1.02	2.05	J
PFTrDA	<1.02	0.291	1.02	2.05	
PFTeDA	<1.02	0.291	1.02	2.05	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	143	60 - 150	
IS	13C2-PFHxA	97.4	60 - 150	
IS	13C4-PFHpA	82.8	60 - 150	
IS	18O2-PFHxS	129	60 - 150	D
IS	13C2-PFOA	105	60 - 150	D
IS	13C8-PFOS	110	60 - 150	D
IS	13C5-PFNA	93.9	50 - 150	
IS	13C2-PFDA	90.1	60 - 150	
IS	d3-MeFOSAA	82.0	20 - 150	
IS	13C2-PFUnA	84.1	50 - 150	
IS	d5-EtFOSAA	84.1	20 - 150	
IS	13C2-PFDoA	83.0	30 - 150	
IS	13C2-PFTeDA	91.8	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP08050

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700632-10	Date Received:	20-May-2017 9:00
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.02 g	QC Batch:	B7E0142	Date Extracted:	25-May-2017 11:56
Date Collected:	16-May-2017 10:05	% Solids:	98.0	Date Analyzed:	30-May-17 10:20 Column: BEH C18		
Location:	NORPSB006						

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	0.317	0.285	1.00	2.00	J
PFHxA	1.96	0.285	1.00	2.00	J
PFHpA	0.316	0.285	1.00	2.00	J
PFHxS	5.35	0.285	1.00	2.00	
PFOA	2.37	0.285	1.00	2.00	
PFOS	99.7	0.285	1.00	2.00	
PFNA	<1.00	0.285	1.00	2.00	
PFDA	<1.00	0.285	1.00	2.00	
MeFOSAA	<1.00	0.285	1.00	2.00	
PFUnA	<1.00	0.285	1.00	2.00	
EtFOSAA	<1.00	0.285	1.00	2.00	
PFDoA	<1.00	0.285	1.00	2.00	
PFTrDA	<1.00	0.285	1.00	2.00	
PFTeDA	<1.00	0.285	1.00	2.00	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	146	60 - 150	
IS	13C2-PFHxA	99.1	60 - 150	
IS	13C4-PFHpA	85.8	60 - 150	
IS	18O2-PFHxS	101	60 - 150	
IS	13C2-PFOA	91.4	60 - 150	
IS	13C8-PFOS	94.0	60 - 150	
IS	13C5-PFNA	92.0	50 - 150	
IS	13C2-PFDA	85.8	60 - 150	
IS	d3-MeFOSAA	78.6	20 - 150	
IS	13C2-PFUnA	77.1	50 - 150	
IS	d5-EtFOSAA	80.6	20 - 150	
IS	13C2-PFDoA	81.5	30 - 150	
IS	13C2-PFTeDA	90.0	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP08052

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700632-12	Date Received:	20-May-2017 9:00
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.05 g	QC Batch:	B7E0142	Date Extracted:	25-May-2017 11:56
Date Collected:	16-May-2017 10:35	% Solids:	96.5	Date Analyzed:	04-Jun-17 11:38 Column: BEH C18		
Location:	NORPSB006				30-May-17 10:31 Column: BEH C18		

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	0.474	0.281	0.987	1.97	J
PFHxA	3.62	0.281	0.987	1.97	
PFHpA	1.67	0.281	0.987	1.97	J
PFHxS	43.1	0.281	0.987	1.97	
PFOA	13.2	0.281	0.987	1.97	
PFOS	238	2.81	9.87	19.7	D
PFNA	0.308	0.281	0.987	1.97	J
PFDA	<0.987	0.281	0.987	1.97	
MeFOSAA	<0.987	0.281	0.987	1.97	
PFUnA	<0.987	0.281	0.987	1.97	
EtFOSAA	<0.987	0.281	0.987	1.97	
PFDoA	<0.987	0.281	0.987	1.97	
PFTrDA	<0.987	0.281	0.987	1.97	
PFTeDA	<0.987	0.281	0.987	1.97	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	139	60 - 150	
IS	13C2-PFHxA	94.3	60 - 150	
IS	13C4-PFHpA	79.0	60 - 150	
IS	18O2-PFHxS	92.5	60 - 150	
IS	13C2-PFOA	84.5	60 - 150	
IS	13C8-PFOS	116	60 - 150	D
IS	13C5-PFNA	89.9	50 - 150	
IS	13C2-PFDA	85.2	60 - 150	
IS	d3-MeFOSAA	88.7	20 - 150	
IS	13C2-PFUnA	77.5	50 - 150	
IS	d5-EtFOSAA	91.0	20 - 150	
IS	13C2-PFDoA	85.1	30 - 150	
IS	13C2-PFTeDA	92.6	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP08053

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700632-13	Date Received:	20-May-2017 9:00
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.05 g	QC Batch:	B7E0142	Date Extracted:	25-May-2017 11:56
Date Collected:	16-May-2017 10:35	% Solids:	96.9	Date Analyzed:	04-Jun-17 11:50 Column: BEH C18		
Location:	NORPSB006				05-Jun-17 12:40 Column: BEH C18		

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	0.798	0.280	0.983	1.97	J
PFHxA	4.59	0.280	0.983	1.97	
PFHpA	2.13	0.280	0.983	1.97	
PFHxS	53.4	0.280	0.983	1.97	
PFOA	15.6	0.280	0.983	1.97	
PFOS	221	1.40	4.91	9.83	D
PFNA	0.318	0.280	0.983	1.97	J
PFDA	<0.983	0.280	0.983	1.97	
MeFOSAA	<0.983	0.280	0.983	1.97	
PFUnA	<0.983	0.280	0.983	1.97	
EtFOSAA	<0.983	0.280	0.983	1.97	
PFDoA	<0.983	0.280	0.983	1.97	
PFTrDA	<0.983	0.280	0.983	1.97	
PFTeDA	<0.983	0.280	0.983	1.97	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	151	60 - 150	H
IS	13C2-PFHxA	92.7	60 - 150	
IS	13C4-PFHpA	77.5	60 - 150	
IS	18O2-PFHxS	98.4	60 - 150	
IS	13C2-PFOA	94.4	60 - 150	
IS	13C8-PFOS	101	60 - 150	D
IS	13C5-PFNA	87.7	50 - 150	
IS	13C2-PFDA	83.8	60 - 150	
IS	d3-MeFOSAA	71.0	20 - 150	
IS	13C2-PFUnA	65.7	50 - 150	
IS	d5-EtFOSAA	85.9	20 - 150	
IS	13C2-PFDoA	116	30 - 150	
IS	13C2-PFTeDA	86.2	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: Method Blank — Modified EPA Method 537

Matrix: Aqueous
Sample Size: 0.125 L

QC Batch: B7E0139
Date Extracted: 25-May-2017 8:08

Lab Sample: B7E0139-BLK1
Date Analyzed: 25-May-17 17:51 Column: BEH C18

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFBS	<5.00	2.18	5.00	8.00	
PFHxA	<5.00	2.18	5.00	8.00	
PFHpA	<5.00	2.18	5.00	8.00	
PFHxS	<5.00	2.18	5.00	8.00	
PFOA	<5.00	2.18	5.00	8.00	
PFOS	<5.00	2.18	5.00	8.00	
PFNA	<5.00	2.18	5.00	8.00	
PFDA	<5.00	2.18	5.00	8.00	
MeFOSAA	<5.00	2.18	5.00	8.00	
PFUnA	<5.00	2.18	5.00	8.00	
EtFOSAA	<5.00	2.18	5.00	8.00	
PFDoA	<5.00	2.18	5.00	8.00	
PFTrDA	<5.00	2.18	5.00	8.00	
PFTeDA	<5.00	2.18	5.00	8.00	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	151	60 - 150	H
IS	13C2-PFHxA	102	60 - 150	
IS	13C4-PFHpA	82.4	60 - 150	
IS	18O2-PFHxS	100	60 - 150	
IS	13C2-PFOA	93.6	60 - 150	
IS	13C8-PFOS	111	60 - 150	
IS	13C5-PFNA	94.8	50 - 150	
IS	13C2-PFDA	84.1	60 - 150	
IS	d3-MeFOSAA	80.5	20 - 150	
IS	13C2-PFUnA	73.5	50 - 150	
IS	d5-EtFOSAA	76.6	20 - 150	
IS	13C2-PFDoA	72.6	30 - 150	
IS	13C2-PFTeDA	67.8	20 - 150	

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
Only the linear isomer is reported for all other analytes.

Sample ID: OPR

Modified EPA Method 537

Matrix:	Aqueous	QC Batch:	B7E0139	Lab Sample:	B7E0139-BS1
Sample Size:	0.125 L	Date Extracted:	25-May-2017 8:08	Date Analyzed:	25-May-17 17:29 Column: BEH C18

Analyte	Amt Found (ng/L)	Spike Amt	%R	Limits		Labeled Standard	%R	LCL-UCL
PFBS	80.0	80.0	100	60 - 130	IS	13C3-PFBS	140	60 - 150
PFHxA	79.8	80.0	99.8	70 - 130	IS	13C2-PFHxA	96.3	60 - 150
PFHpA	77.9	80.0	97.4	70 - 130	IS	13C4-PFHpA	80.0	60 - 150
PFHxS	82.3	80.0	103	70 - 130	IS	18O2-PFHxS	103	60 - 150
PFOA	88.0	80.0	110	70 - 130	IS	13C2-PFOA	89.2	60 - 150
PFOS	80.9	80.0	101	70 - 130	IS	13C8-PFOS	97.1	60 - 150
PFNA	85.1	80.0	106	50 - 130	IS	13C5-PFNA	76.5	50 - 150
PFDA	80.8	80.0	101	70 - 130	IS	13C2-PFDA	82.8	60 - 150
MeFOSAA	72.9	80.0	91.1	70 - 130	IS	d3-MeFOSAA	75.2	20 - 150
PFUnA	85.1	80.0	106	70 - 130	IS	13C2-PFUnA	71.5	50 - 150
EtFOSAA	76.1	80.0	95.1	70 - 130	IS	d5-EtFOSAA	78.7	20 - 150
PFDoA	76.8	80.0	96.0	70 - 130	IS	13C2-PFDoA	70.3	30 - 150
PFTrDA	81.9	80.0	102	20 - 130	IS	13C2-PFTeDA	77.1	20 - 150
PFTeDA	87.1	80.0	109	20 - 130				

LCL-UCL - Lower control limit - upper control limit

Sample ID: NORP08047 — Modified EPA Method 537

Client Data

Name:	Aerostar SES LLC
Project:	Former Norton AFB/M3010.0019.0017.05.15T
Date Collected:	16-May-2017 0:00
Location:	NORPSB004

Sample Data

Matrix:	QC Water
Sample Size:	0.121 L

Laboratory Data

Lab Sample:	1700632-07	Date Received:	20-May-2017 9:00
QC Batch:	B7E0139	Date Extracted:	25-May-2017 8:08
Date Analyzed:	25-May-17 18:24 Column: BEH C18		

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFBS	<5.17	2.26	5.17	8.28	
PFHxA	2.35	2.26	5.17	8.28	J
PFHpA	<5.17	2.26	5.17	8.28	
PFHxS	5.68	2.26	5.17	8.28	J
PFOA	<5.17	2.26	5.17	8.28	
PFOS	68.8	2.26	5.17	8.28	
PFNA	<5.17	2.26	5.17	8.28	
PFDA	<5.17	2.26	5.17	8.28	
MeFOSAA	<5.17	2.26	5.17	8.28	
PFUnA	<5.17	2.26	5.17	8.28	
EtFOSAA	<5.17	2.26	5.17	8.28	
PFDoA	<5.17	2.26	5.17	8.28	
PFTrDA	<5.17	2.26	5.17	8.28	
PFTeDA	<5.17	2.26	5.17	8.28	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	136	60 - 150	
IS	13C2-PFHxA	88.6	60 - 150	
IS	13C4-PFHpA	70.7	60 - 150	
IS	18O2-PFHxS	96.9	60 - 150	
IS	13C2-PFOA	86.4	60 - 150	
IS	13C8-PFOS	87.5	60 - 150	
IS	13C5-PFNA	92.1	50 - 150	
IS	13C2-PFDA	88.4	60 - 150	
IS	d3-MeFOSAA	93.3	20 - 150	
IS	13C2-PFUnA	78.7	50 - 150	
IS	d5-EtFOSAA	106	20 - 150	
IS	13C2-PFDoA	89.7	30 - 150	
IS	13C2-PFTeDA	82.4	20 - 150	

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP08051

Modified EPA Method 537

Client Data

Name: Aerostar SES LLC
Project: Former Norton AFB/M3010.0019.0017.05.15T
Date Collected: 17-May-2017 10:15
Location: NORPSB006

Sample Data

Matrix: QC Water
Sample Size: 0.122 L

Laboratory Data

Lab Sample: 1700632-11 Date Received: 20-May-2017 9:00
QC Batch: B7E0139 Date Extracted: 25-May-2017 8:08
Date Analyzed: 25-May-17 18:35 Column: BEH C18

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFBS	<5.12	2.23	5.12	8.19	
PFHxA	<5.12	2.23	5.12	8.19	
PFHpA	<5.12	2.23	5.12	8.19	
PFHxS	3.15	2.23	5.12	8.19	J
PFOA	3.02	2.23	5.12	8.19	J
PFOS	11.0	2.23	5.12	8.19	
PFNA	<5.12	2.23	5.12	8.19	
PFDA	<5.12	2.23	5.12	8.19	
MeFOSAA	<5.12	2.23	5.12	8.19	
PFUnA	<5.12	2.23	5.12	8.19	
EtFOSAA	<5.12	2.23	5.12	8.19	
PFDoA	<5.12	2.23	5.12	8.19	
PFTrDA	<5.12	2.23	5.12	8.19	
PFTeDA	<5.12	2.23	5.12	8.19	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	136	60 - 150	
IS	13C2-PFHxA	90.0	60 - 150	
IS	13C4-PFHpA	73.9	60 - 150	
IS	18O2-PFHxS	100	60 - 150	
IS	13C2-PFOA	84.0	60 - 150	
IS	13C8-PFOS	100	60 - 150	
IS	13C5-PFNA	96.5	50 - 150	
IS	13C2-PFDA	76.2	60 - 150	
IS	d3-MeFOSAA	102	20 - 150	
IS	13C2-PFUnA	76.7	50 - 150	
IS	d5-EtFOSAA	115	20 - 150	
IS	13C2-PFDoA	89.2	30 - 150	
IS	13C2-PFTeDA	84.0	20 - 150	

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

DATA QUALIFIERS & ABBREVIATIONS

B	**This compound was also detected in the method blank.**
D	**Dilution**
E	**The associated compound concentration exceeded the calibration range of the instrument.**
H	**Recovery and/or RPD was outside laboratory acceptance limits.**
I	**Chemical Interference**
J	**The amount detected is below the Reporting Limit/LOQ.**
M	**Estimated Maximum Possible Concentration. (CA Region 2 projects only)**
*****	**See Cover Letter**
Conc.	**Concentration**
NA	**Not applicable**
ND	**Not Detected**
TEQ	**Toxic Equivalency**

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

CERTIFICATIONS

Accrediting Authority	Certificate Number
Arkansas Department of Environmental Quality	17-015-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-18
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2016026
Minnesota Department of Health	1175673
Nevada Division of Environmental Protection	CA004132017-1
New Hampshire Environmental Accreditation Program	207716
New Jersey Department of Environmental Protection	CA003
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-008
Pennsylvania Department of Environmental Protection	013
Texas Commission on Environmental Quality	T104704189-17-8
Virginia Department of General Services	8621
Washington Department of Ecology	C584
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	**Method**
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23

MATRIX: Biological Tissue	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	**Method**
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537

MATRIX: Non-Potable Water	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	**Method**
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope	EPA 1613B

Dilution GC/HRMS	
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

AerostarSES LLC

1007 Floyd Culler Court
Oak Ridge, TN 37830
865-481-7837

Chain of Custody Record/Analysis Request Number: 0010 1700632 -0.6°C

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

Job No.: M3010.0019.0017.05.15TM
Installation: Former Norton AFB

TAT: 10 business days

Aerostar Project Manager: Paula Bond, pbond@aerostar.net, 865-813-2759
Send Data to: Jenny Vance, jvance@aerostar.net, 865-483-7904

Sampler (s): Tim Gallen, Heidi Pfeffenbach

Laboratory Name/Address:
Vista Analytical Laboratory
1104 Windfield Way
El Dorado Hills, CA 95762

Contact: Martha Maier
Phone: 916-673-1520
email: mmaier@vista-analytical.com

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

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

Station ID	Sample ID	Date Collected	Time Collected	Sample Type	Matrix	Depth (feet)	PFAS (see list of 14 analytes below)	PFOS/PFOA					NOTES
Preservative (Trizma, HCl, HNO_3, Ice, etc.)													
NORPSB004	NORP08041	5-16-17	1345	N	SO	0.25-2	1						
NORPSB004	NORP08042	5-16-17	1345	FD	SO	0.25-2	1						
NORPSB004	NORP08043	5/16/17	1535	N	SO	15-16.5	1						
NORPSB004	NORP08044	5/16/17	1610	N	SO	28.5-30	1						
NORPSB005	NORP08045	5/16/17	1115	N	SO	0.5-2	1						
NORPSB005	NORP08046	5/16/17	1215	N	SO	0.5-2	1						
NORPSB004	NORP08047	5/16/17		EB	WQ	–	2						NORP08043 (SPT)
NORPSB005	NORP08048	5/16/17	1235	N	SO	28.5-30	1						
NORPSB006	NORP08049	5/16/17	0905	N	SO	1-2	1						
NORPSB006	NORP08050	5/16/17	1005	N	SO	15.5-16.5	1						
NORPSB00[illegible]	NORP08051	5/17/17	1015	EB	WQ	–	2						NORP07028 (SPT)
NORPSB006	NORP08052	5/16/17	1035	N	SO	30-31.5	1						
NORPSB006	NORP08053	5/16/17	1035	FD	SO	30-31.5	1						
TC													
						Total # of Containers							

RELINQUISHED BY:

Signature	Date/Time	Printed Name	Firm
	5/19/17 1715	Tim Gallen	Aerostar

RECEIVED BY:

Signature	Date/Time	Printed Name	Firm
[illegible]	05/20/17 0910	B. Benedict	VAL

ANALYTE	ERPIMS PAR CODE	CAS	Contaminant	ERPIMS PAR CODE	CAS
Perfluorooctanesulfonic acid	PFOS	1763-23-1	Perfluorobutanoic acid	PFBNA	307-24-4
Perfluorooctanoic acid	PFOA	335-67-1	Perfluorotetradecanoic acid	PFTEA	376-06-7
Perfluorononanoic acid	PFNA	375-95-1	Perfluoroheptanoic acid	PFHPA	375-85-9
Perfluorobutanesulfonic acid	PFBS	375-73-5	Perfluorodecanoic acid	PFDA	335-76-2
Perfluoroheptanesulfonic acid	PFHpS	375-92-8	Perfluorododecanoic acid	PFDoA	307-55-1
Perfluorohexanesulfonic acid	PFHxS	355-46-4	Perfluoroundecanoic acid	PFUnA	2058-94-8
Perfluorodecanesulfonic acid	PFDS	335-77-3	Perfluorohexanoic acid	PFHxA	307-24-4
N-methylperfluorooctane sulfonamidoacetic acid	NMeFOSAA	2355-31-9	N-methylperfluorooctane sulfonamidoacetic acid	NEtFOSAA	2991-50-6

Scanned by CamScanner

Vista Analytical Laboratory

Sample Log-in Checklist

Vista Work Order #: 1700632 **TAT** 14

Samples Arrival:	**Date/Time** 05/20/17 0900		**Initials:** BLB		**Location:** WR-2 **Shelf/Rack:** NA		
Logged In:	**Date/Time** 1226 05/20/17		**Initials:** BLB		**Location:** WR-2 **Shelf/Rack:** F7		
Delivered By:	FedEx	UPS	On Trac	GSO	DHL	Hand Delivered	Other
Preservation:	Ice		Blue Ice		Dry Ice		None
Temp °C: (uncorrected) 0.1	**Time:** 0910 **Probe used:** Yes☑ No☐				**Thermometer ID:** DT-3		
Temp °C: -0.6 (corrected)							

		YES	NO	NA
Adequate Sample Volume Received?		✓		
Holding Time Acceptable?		✓		
Shipping Container(s) Intact?		✓		
Shipping Custody Seals Intact?		✓		
Shipping Documentation Present?		✓		
Airbill	Trk # 7866 3180 0352	✓		
Sample Container Intact?		✓		
Sample Custody Seals Intact?				✓
Chain of Custody / Sample Documentation Present?		✓		
COC Anomaly/Sample Acceptance Form completed?			✓	✓
If Chlorinated or Drinking Water Samples, Acceptable Preservation?				✓
Preservation Documented:	$Na_2S_2O_3$ Trizma None	Yes	No	NA
Shipping Container	Vista Client Retain Return		Dispose	

Comments:

ID.: LR – SLC *Rev No.: 0* *Rev Date: 05/18/2017* *Page: 1 of 1*

June 08, 2017

Vista Work Order No. 1700633

Ms. Jenny Vance
Aerostar SES LLC
1006 Floyd Court
Oak Ridge, TN 37830

Dear Ms. Vance,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on May 20, 2017. This sample set was analyzed on a rush turn-around time, under your Project Name 'Former Norton AFB/M3010.0019.0017.05.15TM'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Karen Lopez for

Martha Maier
Laboratory Director

Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Analytical Laboratory 1104 Windfield Way El Dorado Hills, CA 95762 ph: 916-673-1520 fx: 916-673-0106 www.vista-analytical.com

Vista Work Order No. 1700633
Case Narrative

Sample Condition on Receipt:

Ten solid samples were received in good condition and within the method temperature requirements. The samples were received and stored securely in accordance with Vista standard operating procedures and EPA methodology.

Analytical Notes:

VAL-PFAS

The solid samples were extracted and analyzed for a selected list of 14 PFAS using VAL Method PFAS. Results qualified with an "E" are above the Upper Calibration Limit.

Holding Times

The samples were extracted and analyzed within the hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Method Blank and Ongoing Precision and Recovery (OPR) sample were extracted and analyzed with the preparation batch. No analytes were detected in the Method Blank above 1/2 the LOQ. The OPR recoveries were within the method acceptance criteria.

The labeled standard recoveries outside the acceptance criteria are listed in the table below.

As requested, an MS/MSD was performed on sample "NORP07031". The percent recovery for compounds PFHxA, PFHxS, PFOA, and PFOS were outside of the method criteria and results are qualified with an "H".

QC Anomalies

LabNumber	SampleName	Analysis	Analyte	Flag	%Rec
1700633-08	NORP07032	VAL - PFAS	13C3-PFBS	H	159

H = Recovery was outside laboratory acceptance criteria.

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Sample Inventory Report

Vista Sample ID	Client Sample ID		Sampled	Received	Components/Containers
1700633-01	NORP07025		17-May-17 08:25	20-May-17 09:00	HDPE Jar, 6 oz
1700633-02	NORP07026		17-May-17 08:25	20-May-17 09:00	HDPE Jar, 6 oz
1700633-03	NORP07027		17-May-17 09:05	20-May-17 09:00	HDPE Jar, 6 oz
1700633-04	NORP07028		17-May-17 10:25	20-May-17 09:00	HDPE Jar, 6 oz
1700633-05	NORP07029		17-May-17 11:15	20-May-17 09:00	HDPE Jar, 6 oz
1700633-06	NORP07030		17-May-17 12:15	20-May-17 09:00	HDPE Jar, 6 oz
1700633-07	NORP07031	MS/MSD	17-May-17 12:50	20-May-17 09:00	HDPE Jar, 6 oz
		MS/MSD			HDPE Jar, 6 oz
		MS/MSD			HDPE Jar, 6 oz
1700633-08	NORP07032		17-May-17 13:25	20-May-17 09:00	HDPE Jar, 6 oz
1700633-09	NORP07033		17-May-17 15:30	20-May-17 09:00	HDPE Jar, 6 oz
1700633-10	NORP07034		17-May-17 15:55	20-May-17 09:00	HDPE Jar, 6 oz

ANALYTICAL RESULTS

Sample ID: Method Blank — VAL - PFAS

Matrix:	Solid	QC Batch:	B7E0135	Lab Sample:	B7E0135-BLK1
Sample Size:	1.00 g	Date Extracted:	25-May-2017 16:06	Date Analyzed:	26-May-17 17:44 Column: BEH C18

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	<1.00	0.285	1.00	2.00	
PFHxA	<1.00	0.285	1.00	2.00	
PFHpA	<1.00	0.285	1.00	2.00	
PFHxS	<1.00	0.285	1.00	2.00	
PFOA	<1.00	0.285	1.00	2.00	
PFOS	<1.00	0.285	1.00	2.00	
PFNA	<1.00	0.285	1.00	2.00	
PFDA	<1.00	0.285	1.00	2.00	
MeFOSAA	<1.00	0.285	1.00	2.00	
PFUnA	<1.00	0.285	1.00	2.00	
EtFOSAA	<1.00	0.285	1.00	2.00	
PFDoA	<1.00	0.285	1.00	2.00	
PFTrDA	<1.00	0.285	1.00	2.00	
PFTeDA	<1.00	0.285	1.00	2.00	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	143	60 - 150	
IS	13C2-PFHxA	95.8	60 - 150	
IS	13C4-PFHpA	81.2	60 - 150	
IS	18O2-PFHxS	97.5	60 - 150	
IS	13C2-PFOA	88.0	60 - 150	
IS	13C8-PFOS	96.5	60 - 150	
IS	13C5-PFNA	88.1	50 - 150	
IS	13C2-PFDA	84.2	60 - 150	
IS	d3-MeFOSAA	79.0	20 - 150	
IS	13C2-PFUnA	90.0	50 - 150	
IS	d5-EtFOSAA	82.3	20 - 150	
IS	13C2-PFDoA	87.1	30 - 150	
IS	13C2-PFTeDA	81.2	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
Only the linear isomer is reported for all other analytes.

Sample ID: OPR

VAL - PFAS

Matrix:	Solid	QC Batch:	B7E0135	Lab Sample:	B7E0135-BS1
Sample Size:	1.00 g	Date Extracted:	25-May-2017 16:06	Date Analyzed:	26-May-17 17:00 Column: BEH C18

Analyte	Amt Found (ng/g)	Spike Amt	%R	Limits		Labeled Standard	%R	LCL-UCL
PFBS	9.84	10.0	98.4	60 - 130	IS	13C3-PFBS	143	60 - 150
PFHxA	9.69	10.0	96.9	70 - 130	IS	13C2-PFHxA	98.0	60 - 150
PFHpA	9.73	10.0	97.3	70 - 130	IS	13C4-PFHpA	80.2	60 - 150
PFHxS	9.75	10.0	97.5	70 - 130	IS	18O2-PFHxS	99.3	60 - 150
PFOA	10.2	10.0	102	70 - 130	IS	13C2-PFOA	90.7	60 - 150
PFOS	10.4	10.0	104	70 - 130	IS	13C8-PFOS	106	60 - 150
PFNA	10.5	10.0	105	50 - 130	IS	13C5-PFNA	86.6	50 - 150
PFDA	10.6	10.0	106	70 - 130	IS	13C2-PFDA	85.7	60 - 150
MeFOSAA	8.61	10.0	86.1	70 - 130	IS	d3-MeFOSAA	72.8	20 - 150
PFUnA	8.69	10.0	86.9	70 - 130	IS	13C2-PFUnA	86.9	50 - 150
EtFOSAA	10.2	10.0	102	70 - 130	IS	d5-EtFOSAA	76.8	20 - 150
PFDoA	8.53	10.0	85.3	70 - 130	IS	13C2-PFDoA	85.6	30 - 150
PFTrDA	9.02	10.0	90.2	20 - 130	IS	13C2-PFTeDA	72.0	20 - 150
PFTeDA	9.56	10.0	95.6	20 - 130				

LCL-UCL - Lower control limit - upper control limit

Sample ID: NORP07025

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700633-01	Date Received:	20-May-2017 9:00
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.02 g	QC Batch:	B7E0135	Date Extracted:	25-May-2017 16:06
Date Collected:	17-May-2017 8:25	% Solids:	98.0	Date Analyzed:	26-May-17 19:22 Column: BEH C18		
Location:	NORPSB001						

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	<1.00	0.285	1.00	2.00	
PFHxA	1.74	0.285	1.00	2.00	J
PFHpA	0.458	0.285	1.00	2.00	J
PFHxS	23.1	0.285	1.00	2.00	
PFOA	94.7	0.285	1.00	2.00	
PFOS	59.2	0.285	1.00	2.00	
PFNA	0.433	0.285	1.00	2.00	J
PFDA	<1.00	0.285	1.00	2.00	
MeFOSAA	<1.00	0.285	1.00	2.00	
PFUnA	<1.00	0.285	1.00	2.00	
EtFOSAA	<1.00	0.285	1.00	2.00	
PFDoA	<1.00	0.285	1.00	2.00	
PFTrDA	<1.00	0.285	1.00	2.00	
PFTeDA	<1.00	0.285	1.00	2.00	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	131	60 - 150	
IS	13C2-PFHxA	98.5	60 - 150	
IS	13C4-PFHpA	82.0	60 - 150	
IS	18O2-PFHxS	96.2	60 - 150	
IS	13C2-PFOA	88.0	60 - 150	
IS	13C8-PFOS	110	60 - 150	
IS	13C5-PFNA	90.5	50 - 150	
IS	13C2-PFDA	87.8	60 - 150	
IS	d3-MeFOSAA	70.2	20 - 150	
IS	13C2-PFUnA	75.4	50 - 150	
IS	d5-EtFOSAA	75.0	20 - 150	
IS	13C2-PFDoA	80.6	30 - 150	
IS	13C2-PFTeDA	90.8	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP07026

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700633-02	Date Received:	20-May-2017 9:00
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.02 g	QC Batch:	B7E0135	Date Extracted:	25-May-2017 16:06
Date Collected:	17-May-2017 8:25	% Solids:	98.0	Date Analyzed:	26-May-17 19:33 Column: BEH C18		
Location:	NORPSB001						

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	<1.00	0.285	1.00	2.00	
PFHxA	1.22	0.285	1.00	2.00	J
PFHpA	0.349	0.285	1.00	2.00	J
PFHxS	19.4	0.285	1.00	2.00	
PFOA	69.6	0.285	1.00	2.00	
PFOS	45.9	0.285	1.00	2.00	
PFNA	0.327	0.285	1.00	2.00	J
PFDA	<1.00	0.285	1.00	2.00	
MeFOSAA	<1.00	0.285	1.00	2.00	
PFUnA	<1.00	0.285	1.00	2.00	
EtFOSAA	<1.00	0.285	1.00	2.00	
PFDoA	<1.00	0.285	1.00	2.00	
PFTrDA	<1.00	0.285	1.00	2.00	
PFTeDA	<1.00	0.285	1.00	2.00	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	131	60 - 150	
IS	13C2-PFHxA	96.4	60 - 150	
IS	13C4-PFHpA	77.2	60 - 150	
IS	18O2-PFHxS	88.1	60 - 150	
IS	13C2-PFOA	97.7	60 - 150	
IS	13C8-PFOS	97.7	60 - 150	
IS	13C5-PFNA	99.4	50 - 150	
IS	13C2-PFDA	92.8	60 - 150	
IS	d3-MeFOSAA	67.1	20 - 150	
IS	13C2-PFUnA	75.4	50 - 150	
IS	d5-EtFOSAA	66.9	20 - 150	
IS	13C2-PFDoA	84.6	30 - 150	
IS	13C2-PFTeDA	83.4	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP07027

VAL - PFAS

Client Data

Name:	Aerostar SES LLC
Project:	Former Norton AFB/M3010.0019.0017.05.15T
Date Collected:	17-May-2017 9:05
Location:	NORPSB001

Sample Data

Matrix:	Soil
Sample Size:	1.04 g
% Solids:	96.4

Laboratory Data

Lab Sample:	1700633-03	Date Received:	20-May-2017 9:00
QC Batch:	B7E0135	Date Extracted:	25-May-2017 16:06
Date Analyzed:	26-May-17 19:44 Column: BEH C18		

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	<0.998	0.284	0.998	2.00	
PFHxA	1.23	0.284	0.998	2.00	J
PFHpA	<0.998	0.284	0.998	2.00	
PFHxS	7.52	0.284	0.998	2.00	
PFOA	10.2	0.284	0.998	2.00	
PFOS	0.796	0.284	0.998	2.00	J
PFNA	<0.998	0.284	0.998	2.00	
PFDA	<0.998	0.284	0.998	2.00	
MeFOSAA	<0.998	0.284	0.998	2.00	
PFUnA	<0.998	0.284	0.998	2.00	
EtFOSAA	<0.998	0.284	0.998	2.00	
PFDoA	<0.998	0.284	0.998	2.00	
PFTrDA	<0.998	0.284	0.998	2.00	
PFTeDA	<0.998	0.284	0.998	2.00	

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	136	60 - 150	
IS	13C2-PFHxA	95.4	60 - 150	
IS	13C4-PFHpA	79.7	60 - 150	
IS	18O2-PFHxS	97.5	60 - 150	
IS	13C2-PFOA	91.8	60 - 150	
IS	13C8-PFOS	108	60 - 150	
IS	13C5-PFNA	93.4	50 - 150	
IS	13C2-PFDA	83.2	60 - 150	
IS	d3-MeFOSAA	69.2	20 - 150	
IS	13C2-PFUnA	81.8	50 - 150	
IS	d5-EtFOSAA	77.7	20 - 150	
IS	13C2-PFDoA	82.9	30 - 150	
IS	13C2-PFTeDA	86.7	20 - 150	

MDL - Detection limit

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP07028

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700633-04	Date Received:	20-May-2017 9:00
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.03 g	QC Batch:	B7E0135	Date Extracted:	25-May-2017 16:06
Date Collected:	17-May-2017 10:25	% Solids:	97.5	Date Analyzed:	26-May-17 19:55 Column: BEH C18		
Location:	NORPSB001						

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	<0.995	0.284	0.995	1.99	
PFHxA	0.322	0.284	0.995	1.99	J
PFHpA	<0.995	0.284	0.995	1.99	
PFHxS	4.24	0.284	0.995	1.99	
PFOA	4.22	0.284	0.995	1.99	
PFOS	0.373	0.284	0.995	1.99	J
PFNA	<0.995	0.284	0.995	1.99	
PFDA	<0.995	0.284	0.995	1.99	
MeFOSAA	<0.995	0.284	0.995	1.99	
PFUnA	<0.995	0.284	0.995	1.99	
EtFOSAA	<0.995	0.284	0.995	1.99	
PFDoA	<0.995	0.284	0.995	1.99	
PFTrDA	<0.995	0.284	0.995	1.99	
PFTeDA	<0.995	0.284	0.995	1.99	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	128	60 - 150	
IS	13C2-PFHxA	94.2	60 - 150	
IS	13C4-PFHpA	79.1	60 - 150	
IS	18O2-PFHxS	95.0	60 - 150	
IS	13C2-PFOA	88.1	60 - 150	
IS	13C8-PFOS	99.3	60 - 150	
IS	13C5-PFNA	83.2	50 - 150	
IS	13C2-PFDA	78.5	60 - 150	
IS	d3-MeFOSAA	67.9	20 - 150	
IS	13C2-PFUnA	69.3	50 - 150	
IS	d5-EtFOSAA	66.4	20 - 150	
IS	13C2-PFDoA	72.9	30 - 150	
IS	13C2-PFTeDA	73.7	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP07029

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700633-05	Date Received:	20-May-2017 9:00
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.05 g	QC Batch:	B7E0135	Date Extracted:	25-May-2017 16:06
Date Collected:	17-May-2017 11:15	% Solids:	95.1	Date Analyzed:	04-Jun-17 12:35 Column: BEH C18		
Location:	NORPSB002				26-May-17 20:06 Column: BEH C18		

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	84.9	0.285	1.00	2.00	
PFHxA	305	1.43	5.01	10.0	D
PFHpA	14.8	0.285	1.00	2.00	
PFHxS	206	1.43	5.01	10.0	D
PFOA	138	1.43	5.01	10.0	D
PFOS	5990	11.4	40.1	80.1	E, D
PFNA	22.8	0.285	1.00	2.00	
PFDA	1.08	0.285	1.00	2.00	J
MeFOSAA	<1.00	0.285	1.00	2.00	
PFUnA	<1.00	0.285	1.00	2.00	
EtFOSAA	<1.00	0.285	1.00	2.00	
PFDoA	<1.00	0.285	1.00	2.00	
PFTrDA	<1.00	0.285	1.00	2.00	
PFTeDA	<1.00	0.285	1.00	2.00	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	146	60 - 150	
IS	13C2-PFHxA	97.2	60 - 150	D
IS	13C4-PFHpA	85.1	60 - 150	
IS	18O2-PFHxS	107	60 - 150	D
IS	13C2-PFOA	101	60 - 150	D
IS	13C8-PFOS	73.4	60 - 150	D
IS	13C5-PFNA	96.7	50 - 150	
IS	13C2-PFDA	84.9	60 - 150	
IS	d3-MeFOSAA	74.8	20 - 150	
IS	13C2-PFUnA	78.6	50 - 150	
IS	d5-EtFOSAA	75.2	20 - 150	
IS	13C2-PFDoA	82.5	30 - 150	
IS	13C2-PFTeDA	86.6	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP07030

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700633-06	Date Received:	20-May-2017 9:00
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.04 g	QC Batch:	B7E0135	Date Extracted:	25-May-2017 16:06
Date Collected:	17-May-2017 12:15	% Solids:	96.2	Date Analyzed:	26-May-17 20:17 Column: BEH C18		
Location:	NORPSB002						

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	0.458	0.285	0.999	2.00	J
PFHxA	3.23	0.285	0.999	2.00	
PFHpA	0.781	0.285	0.999	2.00	J
PFHxS	26.5	0.285	0.999	2.00	
PFOA	34.9	0.285	0.999	2.00	
PFOS	57.2	0.285	0.999	2.00	
PFNA	<0.999	0.285	0.999	2.00	
PFDA	<0.999	0.285	0.999	2.00	
MeFOSAA	<0.999	0.285	0.999	2.00	
PFUnA	<0.999	0.285	0.999	2.00	
EtFOSAA	<0.999	0.285	0.999	2.00	
PFDoA	<0.999	0.285	0.999	2.00	
PFTrDA	<0.999	0.285	0.999	2.00	
PFTeDA	<0.999	0.285	0.999	2.00	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	139	60 - 150	
IS	13C2-PFHxA	101	60 - 150	
IS	13C4-PFHpA	81.3	60 - 150	
IS	18O2-PFHxS	88.6	60 - 150	
IS	13C2-PFOA	94.1	60 - 150	
IS	13C8-PFOS	100	60 - 150	
IS	13C5-PFNA	94.1	50 - 150	
IS	13C2-PFDA	80.4	60 - 150	
IS	d3-MeFOSAA	55.1	20 - 150	
IS	13C2-PFUnA	66.0	50 - 150	
IS	d5-EtFOSAA	69.0	20 - 150	
IS	13C2-PFDoA	72.3	30 - 150	
IS	13C2-PFTeDA	74.8	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP07031

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700633-07	Date Received:	20-May-2017 9:00
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.08 g	QC Batch:	B7E0135	Date Extracted:	25-May-2017 16:06
Date Collected:	17-May-2017 12:50	% Solids:	92.7	Date Analyzed:	04-Jun-17 12:46 Column: BEH C18		
Location:	NORPSB002				26-May-17 21:01 Column: BEH C18		

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	7.22	0.285	0.999	2.00	
PFHxA	35.0	0.285	0.999	2.00	
PFHpA	6.67	0.285	0.999	2.00	
PFHxS	82.7	0.285	0.999	2.00	
PFOA	88.4	0.285	0.999	2.00	
PFOS	237	1.42	5.00	9.99	D
PFNA	1.12	0.285	0.999	2.00	J
PFDA	<0.999	0.285	0.999	2.00	
MeFOSAA	<0.999	0.285	0.999	2.00	
PFUnA	<0.999	0.285	0.999	2.00	
EtFOSAA	<0.999	0.285	0.999	2.00	
PFDoA	<0.999	0.285	0.999	2.00	
PFTrDA	<0.999	0.285	0.999	2.00	
PFTeDA	<0.999	0.285	0.999	2.00	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	144	60 - 150	
IS	13C2-PFHxA	104	60 - 150	
IS	13C4-PFHpA	86.3	60 - 150	
IS	18O2-PFHxS	102	60 - 150	
IS	13C2-PFOA	101	60 - 150	
IS	13C8-PFOS	114	60 - 150	D
IS	13C5-PFNA	96.6	50 - 150	
IS	13C2-PFDA	88.6	60 - 150	
IS	d3-MeFOSAA	72.8	20 - 150	
IS	13C2-PFUnA	80.5	50 - 150	
IS	d5-EtFOSAA	79.8	20 - 150	
IS	13C2-PFDoA	82.4	30 - 150	
IS	13C2-PFTeDA	87.1	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Matrix Spike Results

VAL - PFAS

Source Client ID: NORP07031
Source LabNumber: 1700633-07
Matrix: Solid
Sample Size: 1.08/1.08 g

QC Batch: B7E0135
Date Extracted: 25-May-2017 16:06

Lab Sample: B7E0135-MS1/B7E0135-MSD1
Date Analyzed: 26-May-17 19:00 Column: BEH C18
26-May-17 19:11 Column: BEH C18

Analyte	Spike-MS (ng/g)	MS %R	MS Qual.	Spike-MSD (ng/g)	MSD %R	RPD	MSD Qual.	%R Limit	%RPD Limit
PFBS	9.99	114		9.99	109	4.48		60 - 130	25
PFHxA	9.99	**175**	H	9.99	**178**	1.70	H	70 - 130	25
PFHpA	9.99	101		9.99	104	2.93		70 - 130	25
PFHxS	9.99	**28.1**	H	9.99	**374**	**172**	D, H	70 - 130	25
PFOA	9.99	**-85.0**	H	9.99	**13.4**	**275**	H	70 - 130	25
PFOS	9.99	**-242**	D, H	9.99	**2080**	**253**	D, H	70 - 130	25
PFNA	9.99	95.7		9.99	91.7	4.27		50 - 130	25
PFDA	9.99	95.6		9.99	101	5.49		70 - 130	25
MeFOSAA	9.99	84.2		9.99	81.3	3.50		70 - 130	25
PFUnA	9.99	90.4		9.99	96.7	6.73		70 - 130	25
EtFOSAA	9.99	95.9		9.99	87.4	9.27		70 - 130	25
PFDoA	9.99	95.6		9.99	85.6	11.0		70 - 130	25
PFTrDA	9.99	93.6		9.99	89.4	4.59		20 - 130	25
PFTeDA	9.99	98.3		9.99	97.4	0.920		20 - 130	25

	Labeled Standard	MS %R	MS Qualifiers	MSD %R	MS Qual.
IS	13C3-PFBS	138		143	
IS	13C2-PFHxA	97.1		96.3	
IS	13C4-PFHpA	81.9		87.5	
IS	18O2-PFHxS	107		84.9	D
IS	13C2-PFOA	98.1		97.1	
IS	13C8-PFOS	95.5	D	118	D
IS	13C5-PFNA	98.6		94.4	
IS	13C2-PFDA	89.1		87.0	
IS	d3-MeFOSAA	76.0		72.3	
IS	13C2-PFUnA	88.7		76.5	
IS	d5-EtFOSAA	77.0		72.7	
IS	13C2-PFDoA	83.7		76.5	
IS	13C2-PFTeDA	80.7		68.7	

When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
Only the linear isomer is reported for all other analytes.

Sample ID: NORP07032

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700633-08	Date Received:	20-May-2017 9:00
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.05 g	QC Batch:	B7E0135	Date Extracted:	25-May-2017 16:06
Date Collected:	17-May-2017 13:25	% Solids:	95.5	Date Analyzed:	04-Jun-17 12:58 Column: BEH C18		
Location:	NORPSB003				26-May-17 21:12 Column: BEH C18		

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	3.21	0.284	0.998	2.00	
PFHxA	225	2.84	9.98	20.0	D
PFHpA	61.2	0.284	0.998	2.00	
PFHxS	272	2.84	9.98	20.0	D
PFOA	167	2.84	9.98	20.0	D
PFOS	690	2.84	9.98	20.0	D
PFNA	2.67	0.284	0.998	2.00	
PFDA	2.80	0.284	0.998	2.00	
MeFOSAA	<0.998	0.284	0.998	2.00	
PFUnA	0.715	0.284	0.998	2.00	J
EtFOSAA	<0.998	0.284	0.998	2.00	
PFDoA	<0.998	0.284	0.998	2.00	
PFTrDA	<0.998	0.284	0.998	2.00	
PFTeDA	<0.998	0.284	0.998	2.00	

DL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	159	60 - 150	H
IS	13C2-PFHxA	102	60 - 150	D
IS	13C4-PFHpA	88.6	60 - 150	
IS	18O2-PFHxS	107	60 - 150	D
IS	13C2-PFOA	93.6	60 - 150	D
IS	13C8-PFOS	89.3	60 - 150	D
IS	13C5-PFNA	98.9	50 - 150	
IS	13C2-PFDA	89.1	60 - 150	
IS	d3-MeFOSAA	77.7	20 - 150	
IS	13C2-PFUnA	93.0	50 - 150	
IS	d5-EtFOSAA	86.4	20 - 150	
IS	13C2-PFDoA	96.9	30 - 150	
IS	13C2-PFTeDA	103	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP07033

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700633-09	Date Received:	20-May-2017 9:00
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.06 g	QC Batch:	B7E0135	Date Extracted:	25-May-2017 16:06
Date Collected:	17-May-2017 15:30	% Solids:	94.3	Date Analyzed:	26-May-17 21:23	Column: BEH C18	
Location:	NORPSB003						

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	1.28	0.285	1.00	2.00	J
PFHxA	7.46	0.285	1.00	2.00	
PFHpA	1.05	0.285	1.00	2.00	J
PFHxS	9.65	0.285	1.00	2.00	
PFOA	2.14	0.285	1.00	2.00	
PFOS	1.90	0.285	1.00	2.00	J
PFNA	<1.00	0.285	1.00	2.00	
PFDA	<1.00	0.285	1.00	2.00	
MeFOSAA	<1.00	0.285	1.00	2.00	
PFUnA	<1.00	0.285	1.00	2.00	
EtFOSAA	<1.00	0.285	1.00	2.00	
PFDoA	<1.00	0.285	1.00	2.00	
PFTrDA	<1.00	0.285	1.00	2.00	
PFTeDA	<1.00	0.285	1.00	2.00	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	134	60 - 150	
IS	13C2-PFHxA	96.2	60 - 150	
IS	13C4-PFHpA	83.0	60 - 150	
IS	18O2-PFHxS	83.7	60 - 150	
IS	13C2-PFOA	95.7	60 - 150	
IS	13C8-PFOS	89.6	60 - 150	
IS	13C5-PFNA	94.8	50 - 150	
IS	13C2-PFDA	83.5	60 - 150	
IS	d3-MeFOSAA	62.7	20 - 150	
IS	13C2-PFUnA	83.7	50 - 150	
IS	d5-EtFOSAA	78.0	20 - 150	
IS	13C2-PFDoA	80.6	30 - 150	
IS	13C2-PFTeDA	83.5	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP07034

VAL - PFAS

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Soil	Lab Sample:	1700633-10	Date Received:	20-May-2017 9:00
Project:	Former Norton AFB/M3010.0019.0017.05.15T	Sample Size:	1.02 g	QC Batch:	B7E0135	Date Extracted:	25-May-2017 16:06
Date Collected:	17-May-2017 15:55	% Solids:	97.6	Date Analyzed:	26-May-17 21:34 Column: BEH C18		
Location:	NORPSB003						

Analyte	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers
PFBS	0.624	0.286	1.00	2.01	J
PFHxA	2.13	0.286	1.00	2.01	
PFHpA	<1.00	0.286	1.00	2.01	
PFHxS	<1.00	0.286	1.00	2.01	
PFOA	<1.00	0.286	1.00	2.01	
PFOS	<1.00	0.286	1.00	2.01	
PFNA	<1.00	0.286	1.00	2.01	
PFDA	<1.00	0.286	1.00	2.01	
MeFOSAA	<1.00	0.286	1.00	2.01	
PFUnA	<1.00	0.286	1.00	2.01	
EtFOSAA	<1.00	0.286	1.00	2.01	
PFDoA	<1.00	0.286	1.00	2.01	
PFTrDA	<1.00	0.286	1.00	2.01	
PFTeDA	<1.00	0.286	1.00	2.01	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	140	60 - 150	
IS	13C2-PFHxA	101	60 - 150	
IS	13C4-PFHpA	83.7	60 - 150	
IS	18O2-PFHxS	95.6	60 - 150	
IS	13C2-PFOA	95.0	60 - 150	
IS	13C8-PFOS	100	60 - 150	
IS	13C5-PFNA	97.0	50 - 150	
IS	13C2-PFDA	93.5	60 - 150	
IS	d3-MeFOSAA	70.0	20 - 150	
IS	13C2-PFUnA	76.5	50 - 150	
IS	d5-EtFOSAA	72.4	20 - 150	
IS	13C2-PFDoA	79.3	30 - 150	
IS	13C2-PFTeDA	86.1	20 - 150	

LCL-UCL - Lower control limit - upper control limit
The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

DATA QUALIFIERS & ABBREVIATIONS

B	**This compound was also detected in the method blank.**
D	**Dilution**
E	**The associated compound concentration exceeded the calibration range of the instrument.**
H	**Recovery and/or RPD was outside laboratory acceptance limits.**
I	**Chemical Interference**
J	**The amount detected is below the Reporting Limit/LOQ.**
M	**Estimated Maximum Possible Concentration. (CA Region 2 projects only)**
*****	**See Cover Letter**
Conc.	**Concentration**
NA	**Not applicable**
ND	**Not Detected**
TEQ	**Toxic Equivalency**

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

CERTIFICATIONS

Accrediting Authority	Certificate Number
Arkansas Department of Environmental Quality	17-015-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-18
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2016026
Minnesota Department of Health	1175673
Nevada Division of Environmental Protection	CA004132017-1
New Hampshire Environmental Accreditation Program	207716
New Jersey Department of Environmental Protection	CA003
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-008
Pennsylvania Department of Environmental Protection	013
Texas Commission on Environmental Quality	T104704189-17-8
Virginia Department of General Services	8621
Washington Department of Ecology	C584
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	**Method**
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23

MATRIX: Biological Tissue	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	**Method**
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537

MATRIX: Non-Potable Water	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	**Method**
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope	EPA 1613B

Dilution GC/HRMS	
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

AerostarSES LLC

1007 Floyd Culler Court
Oak Ridge, TN 37830
865-481-7837

Chain of Custody Record/Analysis Request Number: 0010 1700633 -0.6E

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

Job No.: M3010.0019.0017.05, 15TM
Installation: Former Norton AFB

TAT: 10 business days

Aerostar Project Manager: Paula Bond, pbond@aerostar.net, 865-813-2759
Send Data to: Jenny Vance, jvance@aerostar.net, 865-483-7904

Sampler (s): Tim Culler, Heidi Pfeffenbrel

Laboratory Name/Address:
Vista Analytical Laboratory
1104 Windfield Way
El Dorado Hills, CA 95762

Contact: Martha Maier
Phone: 916-673-1520
email: mmaier@vista-analytical.com

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

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

Station ID	Sample ID	Date Collected	Time Collected	Sample Type	Matrix	Depth (feet)	PFAS (see list of 14 analytes below)	PFOS/PFOA					NOTES
						Preservative (Trizma, HCl, HNO_3, Ice, etc.)							
NORPSB001	NORP07025	5/17/17	0825	N	SO	0-1	1						
↓	NORP07026	↓	0825	FD	SO	0-1	1						
↓	NORP07027	↓	0905	N	SO	15-16	1						
NORPSB001	NORP07028	↓	1025	N	SO	28.5-30	1						
NORPSB002	NORP07029	↓	1115	N	SO	0-1	1						
NORPSB002	NORP07030	↓	1215	N	SO	15-15.5	1						
NORPSB002	NORP07031	↓	1250	N	SO	28-29.5	3						* MS/SD
NORPSB003	NORP07032	↓	1325	N	SO	0-1	1						
↓	NORP07033	↓	1530	N	SO	15-16.3	1						
↓	NORP07034	5/17/17	1555	N	SO	28.5-30	1						
						Total # of Containers							

TC

RELINQUISHED BY:		RECEIVED BY:	
Signature:	Date/Time: 5/19/17 1715	Signature:	Date/Time: 05/20/17 0909
Printed Name: Tim Culler	Firm: Aerostar	Printed Name: S Benedict	Firm: VAL
Signature:	Date/Time:	Signature:	Date/Time:
Printed Name:	Firm:	Printed Name:	Firm:

ANALYTE	ERPIMS PAR CODE	CAS	Contaminant	ERPIMS PAR CODE	CAS
Perfluorooctanesulfonic acid	PFOS	1763-23-1	Perfluorobutanoic acid	PFBA	307-24-4
Perfluorooctanoic acid	PFOA	335-67-1	Perfluorododecanoic acid	PFDoA	376-06-7
Perfluorononanoic acid	PFNA	375-95-1	Perfluoropentanoic acid	PFPeA	2706-90-3
Perfluorohexanesulfonic acid	PFHxSA	355-46-4	Perfluorotridecanoic acid	PFTrDA	72629-94-8
Perfluoroheptanoic acid	PFHpA	375-85-9	Perfluoroundecanoic acid	PFUnA	2058-94-8
Perfluorobutanesulfonic acid	PFBSA	375-73-5	Perfluorodecanoic acid	PFDcA	335-76-2
N-methyl perfluorooctane sulfonamidoacetic acid	NMEFOSAA	2355-31-9	N-ethyl perfluorooctane sulfonamidoacetic acid	NEFOSAA	2991-50-6

Scanned by CamScanner

Vista Analytical Laboratory

Sample Log-in Checklist

Vista Work Order #: 1700633 **TAT** 14

Samples Arrival:	**Date/Time** 05/20/17 0900	**Initials:** BLB	**Location:** WR-2 **Shelf/Rack:** 1VA
Logged In:	**Date/Time** 05/20/17 1248	**Initials:** BLB	**Location:** WR-2 **Shelf/Rack:** F7

Delivered By:	FedEx	UPS	On Trac	GSO	DHL	Hand Delivered	Other
Preservation:	Ice		Blue Ice		Dry Ice		None

Temp °C: (uncorrected) 0.1	**Time:** 0910 **Probe used:** Yes☑ No☐	**Thermometer ID:** DT-3
Temp °C: -0.6 (corrected)		

		YES	NO	NA
Adequate Sample Volume Received?		✓		
Holding Time Acceptable?		✓		
Shipping Container(s) Intact?		✓		
Shipping Custody Seals Intact?		✓		
Shipping Documentation Present?		✓		
Airbill	Trk # 7866 3100 0352	✓		
Sample Container Intact?		✓		
Sample Custody Seals Intact?				✓
Chain of Custody / Sample Documentation Present?		✓		
COC Anomaly/Sample Acceptance Form completed?			✓	✓
If Chlorinated or Drinking Water Samples, Acceptable Preservation?				✓
Preservation Documented:	$Na_2S_2O_3$ Trizma None	Yes	No	NA
Shipping Container	Vista Client Retain Return		Dispose	

Comments:

ID.: LR – SLC *Rev No.: 0* *Rev Date: 05/18/2017* *Page:* 1 of 1

June 05, 2017

Vista Work Order No. 1700634

Ms. Jenny Vance
Aerostar SES LLC
1006 Floyd Court
Oak Ridge, TN 37830

Dear Ms. Vance,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on May 20, 2017. This sample set was analyzed on a rush turn-around time, under your Project Name 'Former Norton AFB/M3010.0019.0017.05.15TM'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Karen Lopez for

Martha Maier
Laboratory Director

Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Analytical Laboratory 1104 Windfield Way El Dorado Hills, CA 95762 ph: 916-673-1520 fx: 916-673-0106 www.vista-analytical.com

Vista Work Order No. 1700634
Case Narrative

Sample Condition on Receipt:

Nine groundwater samples were received in good condition and within the method temperature requirements. The samples were received and stored securely in accordance with Vista standard operating procedures and EPA methodology.

Analytical Notes:

Modified EPA Method 537

The samples were extracted and analyzed for a selected list of 14 PFAS using Modified EPA Method 537.

Holding Times

The samples were extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Method Blank and Ongoing Precision and Recovery (OPR) sample were extracted and analyzed with the preparation batch. No analytes were detected in the Method Blank above 1/2 the LOQ. The OPR recoveries were within the method acceptance criteria

The labeled standard recoveries outside the acceptance criteria are listed in the table below.

As requested, an MS/MSD was performed on sample "NORPXX056".

QC Anomalies

LabNumber	SampleName	Analysis	Analyte	Flag	%Rec
1700634-09	NORPXX057	Modified EPA Method 537	13C3-PFBS	H	155
B7E0139-BLK1	B7E0139-BLK1	Modified EPA Method 537	13C3-PFBS	H	151
B7E0139-MSD1	B7E0139-MSD1	Modified EPA Method 537	13C3-PFBS	H	152

H = Recovery was outside laboratory acceptance criteria.

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Sample Inventory Report

Vista Sample ID	Client Sample ID		Sampled	Received	Components/Containers
1700634-01	NORP05016		14-May-17 16:00	20-May-17 09:00	HDPE Bottle, 125 mL
					HDPE Bottle, 125 mL
1700634-02	NORPXX058		16-May-17 19:20	20-May-17 09:00	HDPE Bottle, 125 mL
					HDPE Bottle, 125 mL
1700634-03	NORP04010		17-May-17 13:45	20-May-17 09:00	HDPE Bottle, 125 mL
					HDPE Bottle, 125 mL
1700634-04	NORP04005		17-May-17 17:45	20-May-17 09:00	HDPE Bottle, 125 mL
					HDPE Bottle, 125 mL
1700634-05	NORP07021		17-May-17 20:00	20-May-17 09:00	HDPE Bottle, 125 mL
					HDPE Bottle, 125 mL
1700634-06	NORPXX056	MS/MSD	18-May-17 11:10	20-May-17 09:00	HDPE Bottle, 125 mL
		MS/MSD			HDPE Bottle, 125 mL
		MS/MSD			HDPE Bottle, 125 mL
		MS/MSD			HDPE Bottle, 125 mL
		MS/MSD			HDPE Bottle, 125 mL
		MS/MSD			HDPE Bottle, 125 mL
1700634-07	NORP05011		18-May-17 18:30	20-May-17 09:00	HDPE Bottle, 125 mL
					HDPE Bottle, 125 mL
1700634-08	NORP05012		18-May-17 00:00	20-May-17 09:00	HDPE Bottle, 125 mL
					HDPE Bottle, 125 mL
1700634-09	NORPXX057		18-May-17 20:25	20-May-17 09:00	HDPE Bottle, 125 mL
					HDPE Bottle, 125 mL

ANALYTICAL RESULTS

Sample ID: Method Blank — Modified EPA Method 537

Matrix: Aqueous
Sample Size: 0.125 L

QC Batch: B7E0139
Date Extracted: 25-May-2017 8:08

Lab Sample: B7E0139-BLK1
Date Analyzed: 25-May-17 17:51 Column: BEH C18

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFBS	<5.00	2.18	5.00	8.00	
PFHxA	<5.00	2.18	5.00	8.00	
PFHpA	<5.00	2.18	5.00	8.00	
PFHxS	<5.00	2.18	5.00	8.00	
PFOA	<5.00	2.18	5.00	8.00	
PFOS	<5.00	2.18	5.00	8.00	
PFNA	<5.00	2.18	5.00	8.00	
PFDA	<5.00	2.18	5.00	8.00	
MeFOSAA	<5.00	2.18	5.00	8.00	
PFUnA	<5.00	2.18	5.00	8.00	
EtFOSAA	<5.00	2.18	5.00	8.00	
PFDoA	<5.00	2.18	5.00	8.00	
PFTrDA	<5.00	2.18	5.00	8.00	
PFTeDA	<5.00	2.18	5.00	8.00	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	151	60 - 150	H
IS	13C2-PFHxA	102	60 - 150	
IS	13C4-PFHpA	82.4	60 - 150	
IS	18O2-PFHxS	100	60 - 150	
IS	13C2-PFOA	93.6	60 - 150	
IS	13C8-PFOS	111	60 - 150	
IS	13C5-PFNA	94.8	50 - 150	
IS	13C2-PFDA	84.1	60 - 150	
IS	d3-MeFOSAA	80.5	20 - 150	
IS	13C2-PFUnA	73.5	50 - 150	
IS	d5-EtFOSAA	76.6	20 - 150	
IS	13C2-PFDoA	72.6	30 - 150	
IS	13C2-PFTeDA	67.8	20 - 150	

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
Only the linear isomer is reported for all other analytes.

Sample ID: OPR

Modified EPA Method 537

Matrix:	Aqueous	QC Batch:	B7E0139	Lab Sample:	B7E0139-BS1
Sample Size:	0.125 L	Date Extracted:	25-May-2017 8:08	Date Analyzed:	25-May-17 17:29 Column: BEH C18

Analyte	Amt Found (ng/L)	Spike Amt	%R	Limits		Labeled Standard	%R	LCL-UCL
PFBS	80.0	80.0	100	60 - 130	IS	13C3-PFBS	140	60 - 150
PFHxA	79.8	80.0	99.8	70 - 130	IS	13C2-PFHxA	96.3	60 - 150
PFHpA	77.9	80.0	97.4	70 - 130	IS	13C4-PFHpA	80.0	60 - 150
PFHxS	82.3	80.0	103	70 - 130	IS	18O2-PFHxS	103	60 - 150
PFOA	88.0	80.0	110	70 - 130	IS	13C2-PFOA	89.2	60 - 150
PFOS	80.9	80.0	101	70 - 130	IS	13C8-PFOS	97.1	60 - 150
PFNA	85.1	80.0	106	50 - 130	IS	13C5-PFNA	76.5	50 - 150
PFDA	80.8	80.0	101	70 - 130	IS	13C2-PFDA	82.8	60 - 150
MeFOSAA	72.9	80.0	91.1	70 - 130	IS	d3-MeFOSAA	75.2	20 - 150
PFUnA	85.1	80.0	106	70 - 130	IS	13C2-PFUnA	71.5	50 - 150
EtFOSAA	76.1	80.0	95.1	70 - 130	IS	d5-EtFOSAA	78.7	20 - 150
PFDoA	76.8	80.0	96.0	70 - 130	IS	13C2-PFDoA	70.3	30 - 150
PFTrDA	81.9	80.0	102	20 - 130	IS	13C2-PFTeDA	77.1	20 - 150
PFTeDA	87.1	80.0	109	20 - 130				

LCL-UCL - Lower control limit - upper control limit

Sample ID: NORP05016 — Modified EPA Method 537

Client Data

Name:	Aerostar SES LLC
Project:	Former Norton AFB/M3010.0019.0017.05.15T
Date Collected:	14-May-2017 16:00
Location:	NORPMW003

Sample Data

Matrix:	Groundwater
Sample Size:	0.117 L

Laboratory Data

Lab Sample:	1700634-01	Date Received:	20-May-2017 9:00
QC Batch:	B7E0139	Date Extracted:	25-May-2017 8:08
Date Analyzed:	25-May-17 18:46 Column: BEH C18		

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFBS	24.8	2.34	5.34	8.57	
PFHxA	31.1	2.34	5.34	8.57	
PFHpA	<5.34	2.34	5.34	8.57	
PFHxS	22.2	2.34	5.34	8.57	
PFOA	<5.34	2.34	5.34	8.57	
PFOS	<5.34	2.34	5.34	8.57	
PFNA	<5.34	2.34	5.34	8.57	
PFDA	<5.34	2.34	5.34	8.57	
MeFOSAA	<5.34	2.34	5.34	8.57	
PFUnA	<5.34	2.34	5.34	8.57	
EtFOSAA	<5.34	2.34	5.34	8.57	
PFDoA	<5.34	2.34	5.34	8.57	
PFTrDA	<5.34	2.34	5.34	8.57	
PFTeDA	<5.34	2.34	5.34	8.57	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	145	60 - 150	
IS	13C2-PFHxA	95.3	60 - 150	
IS	13C4-PFHpA	74.3	60 - 150	
IS	18O2-PFHxS	91.5	60 - 150	
IS	13C2-PFOA	82.0	60 - 150	
IS	13C8-PFOS	93.4	60 - 150	
IS	13C5-PFNA	85.5	50 - 150	
IS	13C2-PFDA	74.2	60 - 150	
IS	d3-MeFOSAA	90.2	20 - 150	
IS	13C2-PFUnA	76.5	50 - 150	
IS	d5-EtFOSAA	85.1	20 - 150	
IS	13C2-PFDoA	89.7	30 - 150	
IS	13C2-PFTeDA	88.6	20 - 150	

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORPXX058 — Modified EPA Method 537

Client Data

Name:	Aerostar SES LLC
Project:	Former Norton AFB/M3010.0019.0017.05.15T
Date Collected:	16-May-2017 19:20
Location:	MW-401

Sample Data

Matrix:	Groundwater
Sample Size:	0.124 L

Laboratory Data

Lab Sample:	1700634-02	Date Received:	20-May-2017 9:00
QC Batch:	B7E0139	Date Extracted:	25-May-2017 8:08
Date Analyzed:	25-May-17 18:57 Column: BEH C18		

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFBS	63.1	2.20	5.04	8.08	
PFHxA	139	2.20	5.04	8.08	
PFHpA	7.45	2.20	5.04	8.08	J
PFHxS	30.8	2.20	5.04	8.08	
PFOA	2.27	2.20	5.04	8.08	J
PFOS	<5.04	2.20	5.04	8.08	
PFNA	<5.04	2.20	5.04	8.08	
PFDA	<5.04	2.20	5.04	8.08	
MeFOSAA	<5.04	2.20	5.04	8.08	
PFUnA	<5.04	2.20	5.04	8.08	
EtFOSAA	<5.04	2.20	5.04	8.08	
PFDoA	<5.04	2.20	5.04	8.08	
PFTrDA	<5.04	2.20	5.04	8.08	
PFTeDA	<5.04	2.20	5.04	8.08	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	147	60 - 150	
IS	13C2-PFHxA	99.8	60 - 150	
IS	13C4-PFHpA	79.7	60 - 150	
IS	18O2-PFHxS	91.2	60 - 150	
IS	13C2-PFOA	97.9	60 - 150	
IS	13C8-PFOS	103	60 - 150	
IS	13C5-PFNA	86.1	50 - 150	
IS	13C2-PFDA	82.9	60 - 150	
IS	d3-MeFOSAA	94.6	20 - 150	
IS	13C2-PFUnA	77.3	50 - 150	
IS	d5-EtFOSAA	86.3	20 - 150	
IS	13C2-PFDoA	85.1	30 - 150	
IS	13C2-PFTeDA	84.6	20 - 150	

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP04010 — Modified EPA Method 537

Client Data

Name:	Aerostar SES LLC
Project:	Former Norton AFB/M3010.0019.0017.05.15T
Date Collected:	17-May-2017 13:45
Location:	NORPMW006

Sample Data

Matrix:	Groundwater
Sample Size:	0.122 L

Laboratory Data

Lab Sample:	1700634-03	Date Received:	20-May-2017 9:00
QC Batch:	B7E0139	Date Extracted:	25-May-2017 8:08
Date Analyzed:	25-May-17 19:08 Column: BEH C18		

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFBS	<5.12	2.23	5.12	8.17	
PFHxA	<5.12	2.23	5.12	8.17	
PFHpA	<5.12	2.23	5.12	8.17	
PFHxS	<5.12	2.23	5.12	8.17	
PFOA	<5.12	2.23	5.12	8.17	
PFOS	<5.12	2.23	5.12	8.17	
PFNA	<5.12	2.23	5.12	8.17	
PFDA	<5.12	2.23	5.12	8.17	
MeFOSAA	<5.12	2.23	5.12	8.17	
PFUnA	<5.12	2.23	5.12	8.17	
EtFOSAA	<5.12	2.23	5.12	8.17	
PFDoA	<5.12	2.23	5.12	8.17	
PFTrDA	<5.12	2.23	5.12	8.17	
PFTeDA	<5.12	2.23	5.12	8.17	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	142	60 - 150	
IS	13C2-PFHxA	100	60 - 150	
IS	13C4-PFHpA	74.6	60 - 150	
IS	18O2-PFHxS	109	60 - 150	
IS	13C2-PFOA	78.7	60 - 150	
IS	13C8-PFOS	97.5	60 - 150	
IS	13C5-PFNA	92.7	50 - 150	
IS	13C2-PFDA	84.2	60 - 150	
IS	d3-MeFOSAA	80.7	20 - 150	
IS	13C2-PFUnA	68.9	50 - 150	
IS	d5-EtFOSAA	79.0	20 - 150	
IS	13C2-PFDoA	68.7	30 - 150	
IS	13C2-PFTeDA	74.3	20 - 150	

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP04005

Modified EPA Method 537

Client Data

Name:	Aerostar SES LLC
Project:	Former Norton AFB/M3010.0019.0017.05.15T
Date Collected:	17-May-2017 17:45
Location:	NORPMW005

Sample Data

Matrix:	Groundwater
Sample Size:	0.122 L

Laboratory Data

Lab Sample:	1700634-04	Date Received:	20-May-2017 9:00
QC Batch:	B7E0139	Date Extracted:	25-May-2017 8:08
Date Analyzed:	25-May-17 19:19 Column: BEH C18		

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFBS	8.50	2.23	5.12	8.17	
PFHxA	17.0	2.23	5.12	8.17	
PFHpA	<5.12	2.23	5.12	8.17	
PFHxS	21.6	2.23	5.12	8.17	
PFOA	<5.12	2.23	5.12	8.17	
PFOS	<5.12	2.23	5.12	8.17	
PFNA	<5.12	2.23	5.12	8.17	
PFDA	<5.12	2.23	5.12	8.17	
MeFOSAA	<5.12	2.23	5.12	8.17	
PFUnA	<5.12	2.23	5.12	8.17	
EtFOSAA	<5.12	2.23	5.12	8.17	
PFDoA	<5.12	2.23	5.12	8.17	
PFTrDA	<5.12	2.23	5.12	8.17	
PFTeDA	<5.12	2.23	5.12	8.17	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	134	60 - 150	
IS	13C2-PFHxA	91.8	60 - 150	
IS	13C4-PFHpA	74.6	60 - 150	
IS	18O2-PFHxS	89.6	60 - 150	
IS	13C2-PFOA	89.1	60 - 150	
IS	13C8-PFOS	86.1	60 - 150	
IS	13C5-PFNA	82.0	50 - 150	
IS	13C2-PFDA	81.0	60 - 150	
IS	d3-MeFOSAA	75.1	20 - 150	
IS	13C2-PFUnA	81.8	50 - 150	
IS	d5-EtFOSAA	75.5	20 - 150	
IS	13C2-PFDoA	77.1	30 - 150	
IS	13C2-PFTeDA	81.8	20 - 150	

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP07021

Modified EPA Method 537

Client Data

Name: Aerostar SES LLC
Project: Former Norton AFB/M3010.0019.0017.05.15T
Date Collected: 17-May-2017 20:00
Location: NORPMW004

Sample Data

Matrix: Groundwater
Sample Size: 0.124 L

Laboratory Data

Lab Sample: 1700634-05 Date Received: 20-May-2017 9:00
QC Batch: B7E0139 Date Extracted: 25-May-2017 8:08
Date Analyzed: 25-May-17 19:30 Column: BEH C18

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFBS	24.3	2.19	5.04	8.04	
PFHxA	38.3	2.19	5.04	8.04	
PFHpA	4.60	2.19	5.04	8.04	J
PFHxS	107	2.19	5.04	8.04	
PFOA	21.9	2.19	5.04	8.04	
PFOS	<5.04	2.19	5.04	8.04	
PFNA	<5.04	2.19	5.04	8.04	
PFDA	<5.04	2.19	5.04	8.04	
MeFOSAA	<5.04	2.19	5.04	8.04	
PFUnA	<5.04	2.19	5.04	8.04	
EtFOSAA	<5.04	2.19	5.04	8.04	
PFDoA	<5.04	2.19	5.04	8.04	
PFTrDA	<5.04	2.19	5.04	8.04	
PFTeDA	<5.04	2.19	5.04	8.04	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	141	60 - 150	
IS	13C2-PFHxA	92.8	60 - 150	
IS	13C4-PFHpA	78.3	60 - 150	
IS	18O2-PFHxS	94.5	60 - 150	
IS	13C2-PFOA	91.4	60 - 150	
IS	13C8-PFOS	89.4	60 - 150	
IS	13C5-PFNA	89.6	50 - 150	
IS	13C2-PFDA	96.5	60 - 150	
IS	d3-MeFOSAA	94.4	20 - 150	
IS	13C2-PFUnA	81.8	50 - 150	
IS	d5-EtFOSAA	86.8	20 - 150	
IS	13C2-PFDoA	80.2	30 - 150	
IS	13C2-PFTeDA	86.2	20 - 150	

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORPXX056 — Modified EPA Method 537

Client Data

Name:	Aerostar SES LLC
Project:	Former Norton AFB/M3010.0019.0017.05.15T
Date Collected:	18-May-2017 11:10
Location:	MW-274

Sample Data

Matrix:	Groundwater
Sample Size:	0.117 L

Laboratory Data

Lab Sample:	1700634-06	Date Received:	20-May-2017 9:00
QC Batch:	B7E0139	Date Extracted:	25-May-2017 8:08
Date Analyzed:	25-May-17 19:41	Column:	BEH C18

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFBS	<5.34	2.33	5.34	8.56	
PFHxA	3.49	2.33	5.34	8.56	J
PFHpA	2.55	2.33	5.34	8.56	J
PFHxS	<5.34	2.33	5.34	8.56	
PFOA	4.68	2.33	5.34	8.56	J
PFOS	<5.34	2.33	5.34	8.56	
PFNA	<5.34	2.33	5.34	8.56	
PFDA	<5.34	2.33	5.34	8.56	
MeFOSAA	<5.34	2.33	5.34	8.56	
PFUnA	<5.34	2.33	5.34	8.56	
EtFOSAA	<5.34	2.33	5.34	8.56	
PFDoA	<5.34	2.33	5.34	8.56	
PFTrDA	<5.34	2.33	5.34	8.56	
PFTeDA	<5.34	2.33	5.34	8.56	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	138	60 - 150	
IS	13C2-PFHxA	95.1	60 - 150	
IS	13C4-PFHpA	78.3	60 - 150	
IS	18O2-PFHxS	97.2	60 - 150	
IS	13C2-PFOA	84.0	60 - 150	
IS	13C8-PFOS	102	60 - 150	
IS	13C5-PFNA	98.6	50 - 150	
IS	13C2-PFDA	88.5	60 - 150	
IS	d3-MeFOSAA	83.2	20 - 150	
IS	13C2-PFUnA	75.4	50 - 150	
IS	d5-EtFOSAA	76.5	20 - 150	
IS	13C2-PFDoA	71.8	30 - 150	
IS	13C2-PFTeDA	70.7	20 - 150	

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Matrix Spike Results

Modified EPA Method 537

Source Client ID: NORPXX056
Source LabNumber: 1700634-06
Matrix: Aqueous
Sample Size: 0.126/0.124 L

QC Batch: B7E0139
Date Extracted: 25-May-2017 8:08

Lab Sample: B7E0139-MS1/B7E0139-MSD1
Date Analyzed: 25-May-17 18:02 Column: BEH C18
25-May-17 18:13 Column: BEH C18

Analyte	Spike-MS (ng/L)	MS %R	MS Qual.	Spike-MSD (ng/L)	MSD %R	RPD	MSD Qual.	%R Limit	%RPD Limit
PFBS	79.3	99.0		80.9	105	5.88		60 - 130	25
PFHxA	79.3	94.5		80.9	103	8.61		70 - 130	25
PFHpA	79.3	99.5		80.9	94.9	4.73		70 - 130	25
PFHxS	79.3	103		80.9	109	5.66		70 - 130	25
PFOA	79.3	94.7		80.9	106	11.3		70 - 130	25
PFOS	79.3	106		80.9	98.9	6.93		70 - 130	25
PFNA	79.3	106		80.9	101	4.83		50 - 130	25
PFDA	79.3	102		80.9	111	8.45		70 - 130	25
MeFOSAA	79.3	91.0		80.9	95.1	4.41		70 - 130	25
PFUnA	79.3	117		80.9	107	8.93		70 - 130	25
EtFOSAA	79.3	94.6		80.9	98.5	4.04		70 - 130	25
PFDoA	79.3	94.2		80.9	102	7.95		70 - 130	25
PFTrDA	79.3	99.0		80.9	98.7	0.303		20 - 130	25
PFTeDA	79.3	105		80.9	107	1.89		20 - 130	25

	Labeled Standard	MS %R	MS Qualifiers	MSD %R	MS Qual.
IS	13C3-PFBS	148		152	H
IS	13C2-PFHxA	98.4		95.7	
IS	13C4-PFHpA	77.8		81.9	
IS	18O2-PFHxS	90.7		95.2	
IS	13C2-PFOA	91.9		97.9	
IS	13C8-PFOS	90.2		120	
IS	13C5-PFNA	84.8		87.5	
IS	13C2-PFDA	77.0		84.0	
IS	d3-MeFOSAA	81.1		93.3	
IS	13C2-PFUnA	73.2		82.2	
IS	d5-EtFOSAA	81.6		91.9	
IS	13C2-PFDoA	80.6		85.5	
IS	13C2-PFTeDA	83.1		87.3	

When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
Only the linear isomer is reported for all other analytes.

Sample ID: NORP05011

Modified EPA Method 537

Client Data

Name:	Aerostar SES LLC
Project:	Former Norton AFB/M3010.0019.0017.05.15T
Date Collected:	18-May-2017 18:30
Location:	NORPMW002

Sample Data

Matrix:	Groundwater
Sample Size:	0.123 L

Laboratory Data

Lab Sample:	1700634-07	Date Received:	20-May-2017 9:00
QC Batch:	B7E0139	Date Extracted:	25-May-2017 8:08
Date Analyzed:	25-May-17 19:52 Column: BEH C18		

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFBS	32.4	2.22	5.08	8.13	
PFHxA	45.4	2.22	5.08	8.13	
PFHpA	4.53	2.22	5.08	8.13	J
PFHxS	55.2	2.22	5.08	8.13	
PFOA	<5.08	2.22	5.08	8.13	
PFOS	<5.08	2.22	5.08	8.13	
PFNA	<5.08	2.22	5.08	8.13	
PFDA	<5.08	2.22	5.08	8.13	
MeFOSAA	<5.08	2.22	5.08	8.13	
PFUnA	<5.08	2.22	5.08	8.13	
EtFOSAA	<5.08	2.22	5.08	8.13	
PFDoA	<5.08	2.22	5.08	8.13	
PFTrDA	<5.08	2.22	5.08	8.13	
PFTeDA	<5.08	2.22	5.08	8.13	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	138	60 - 150	
IS	13C2-PFHxA	95.1	60 - 150	
IS	13C4-PFHpA	76.8	60 - 150	
IS	18O2-PFHxS	86.8	60 - 150	
IS	13C2-PFOA	91.5	60 - 150	
IS	13C8-PFOS	101	60 - 150	
IS	13C5-PFNA	86.9	50 - 150	
IS	13C2-PFDA	81.2	60 - 150	
IS	d3-MeFOSAA	82.1	20 - 150	
IS	13C2-PFUnA	76.4	50 - 150	
IS	d5-EtFOSAA	83.7	20 - 150	
IS	13C2-PFDoA	81.6	30 - 150	
IS	13C2-PFTeDA	84.4	20 - 150	

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP05012 — Modified EPA Method 537

Client Data

Name:	Aerostar SES LLC
Project:	Former Norton AFB/M3010.0019.0017.05.15T
Date Collected:	18-May-2017 0:00
Location:	NORPMW002

Sample Data

Matrix:	Groundwater
Sample Size:	0.120 L

Laboratory Data

Lab Sample:	1700634-08	Date Received:	20-May-2017 9:00
QC Batch:	B7E0139	Date Extracted:	25-May-2017 8:08
Date Analyzed:	25-May-17 20:03	Column:	BEH C18

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFBS	<5.21	2.26	5.21	8.31	
PFHxA	<5.21	2.26	5.21	8.31	
PFHpA	<5.21	2.26	5.21	8.31	
PFHxS	<5.21	2.26	5.21	8.31	
PFOA	<5.21	2.26	5.21	8.31	
PFOS	<5.21	2.26	5.21	8.31	
PFNA	<5.21	2.26	5.21	8.31	
PFDA	<5.21	2.26	5.21	8.31	
MeFOSAA	<5.21	2.26	5.21	8.31	
PFUnA	<5.21	2.26	5.21	8.31	
EtFOSAA	<5.21	2.26	5.21	8.31	
PFDoA	<5.21	2.26	5.21	8.31	
PFTrDA	<5.21	2.26	5.21	8.31	
PFTeDA	<5.21	2.26	5.21	8.31	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	138	60 - 150	
IS	13C2-PFHxA	93.1	60 - 150	
IS	13C4-PFHpA	73.7	60 - 150	
IS	18O2-PFHxS	89.8	60 - 150	
IS	13C2-PFOA	86.3	60 - 150	
IS	13C8-PFOS	85.8	60 - 150	
IS	13C5-PFNA	88.8	50 - 150	
IS	13C2-PFDA	79.3	60 - 150	
IS	d3-MeFOSAA	85.4	20 - 150	
IS	13C2-PFUnA	78.9	50 - 150	
IS	d5-EtFOSAA	73.7	20 - 150	
IS	13C2-PFDoA	77.3	30 - 150	
IS	13C2-PFTeDA	87.2	20 - 150	

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORPXX057 — Modified EPA Method 537

Client Data

Name:	Aerostar SES LLC
Project:	Former Norton AFB/M3010.0019.0017.05.15T
Date Collected:	18-May-2017 20:25
Location:	MW-289

Sample Data

Matrix:	Groundwater
Sample Size:	0.124 L

Laboratory Data

Lab Sample:	1700634-09	Date Received:	20-May-2017 9:00
QC Batch:	B7E0139	Date Extracted:	25-May-2017 8:08
Date Analyzed:	25-May-17 20:46 Column: BEH C18		

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFBS	48.6	2.19	5.04	8.04	
PFHxA	120	2.19	5.04	8.04	
PFHpA	7.25	2.19	5.04	8.04	J
PFHxS	41.1	2.19	5.04	8.04	
PFOA	6.22	2.19	5.04	8.04	J
PFOS	<5.04	2.19	5.04	8.04	
PFNA	<5.04	2.19	5.04	8.04	
PFDA	<5.04	2.19	5.04	8.04	
MeFOSAA	<5.04	2.19	5.04	8.04	
PFUnA	<5.04	2.19	5.04	8.04	
EtFOSAA	<5.04	2.19	5.04	8.04	
PFDoA	<5.04	2.19	5.04	8.04	
PFTrDA	<5.04	2.19	5.04	8.04	
PFTeDA	<5.04	2.19	5.04	8.04	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	155	60 - 150	H
IS	13C2-PFHxA	95.0	60 - 150	
IS	13C4-PFHpA	78.5	60 - 150	
IS	18O2-PFHxS	108	60 - 150	
IS	13C2-PFOA	96.0	60 - 150	
IS	13C8-PFOS	112	60 - 150	
IS	13C5-PFNA	94.9	50 - 150	
IS	13C2-PFDA	87.9	60 - 150	
IS	d3-MeFOSAA	79.4	20 - 150	
IS	13C2-PFUnA	85.1	50 - 150	
IS	d5-EtFOSAA	75.3	20 - 150	
IS	13C2-PFDoA	81.5	30 - 150	
IS	13C2-PFTeDA	91.5	20 - 150	

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

DATA QUALIFIERS & ABBREVIATIONS

B	**This compound was also detected in the method blank.**
D	**Dilution**
E	**The associated compound concentration exceeded the calibration range of the instrument.**
H	**Recovery and/or RPD was outside laboratory acceptance limits.**
I	**Chemical Interference**
J	**The amount detected is below the Reporting Limit/LOQ.**
M	**Estimated Maximum Possible Concentration. (CA Region 2 projects only)**
*****	**See Cover Letter**
Conc.	**Concentration**
NA	**Not applicable**
ND	**Not Detected**
TEQ	**Toxic Equivalency**

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

CERTIFICATIONS

Accrediting Authority	Certificate Number
Arkansas Department of Environmental Quality	17-015-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-18
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2016026
Minnesota Department of Health	1175673
Nevada Division of Environmental Protection	CA004132017-1
New Hampshire Environmental Accreditation Program	207716
New Jersey Department of Environmental Protection	CA003
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-008
Pennsylvania Department of Environmental Protection	013
Texas Commission on Environmental Quality	T104704189-17-8
Virginia Department of General Services	8621
Washington Department of Ecology	C584
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	**Method**
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23

MATRIX: Biological Tissue	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	**Method**
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537

MATRIX: Non-Potable Water	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	**Method**
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope	EPA 1613B

Dilution GC/HRMS	
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

AerostarSES LLC

1007 Floyd Culler Court
Oak Ridge, TN 37830
865-481-7837

Chain of Custody Record/Analysis Request Number: 0010

1700634 -0.6°C

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

Job No.: M3010.0019.0017.05 15TH
Installation: Former Norton AFB

TAT: 10 business days

Aerostar Project Manager: Paula Bond, pbond@aerostar.net, 865-813-2759
Send Data to: Jenny Vance, jvance@aerostar.net, 865-483-7904

Sampler (s): Tim Gilly, Heidi Pfeffenbach

Laboratory Name/Address:
Vista Analytical Laboratory
1104 Windfield Way
El Dorado Hills, CA 95762

Contact: Martha Maier
Phone: 916-673-1520
email: mmaier@vista-analytical.com

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

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

Station ID	Sample ID	Date Collected	Time Collected	Sample Type	Matrix	Depth (feet)	PFAS (see list of 14 analytes below)	PFOS/PFOA					NOTES
Preservative (Trizma, HCl, HNO_3, Ice, etc.)													
~~MW-403~~	~~NORPXX403~~	~~5/12/17~~	~~1110~~	~~N~~	~~WG~~	~~152-192~~	~~2~~	(FD)					
~~MW-403~~	~~NORPXX404~~	~~5/12/17~~	~~1110~~	~~FD~~	~~WG~~	~~152-192~~	~~2~~						
NORPMW003	NORP05016	5/14/17	1600	N	WG	213.2-218.25	2						
MW-401	NORPXX058	5/16/17	1920	N	WG	175-190	2						
NORPMW006	NORP04010	5/17/17	1345	N	WG	201.8-221.1	2						
NORPMW005	NORP04005	5/17/17	1745	N	WG	199.4-218.70	2						
NORPMW004	NORP07021	5/17/17	2000	N	WG	199.45-218.75	26						
MW-274	NORPXX056	5/18/17	1110	N	WG	201-221	2						*MS/SD
NORPMW002	NORP05011	5/18/17	1830	N	WG	198.9-218.2	2						
NORPMW002	NORP05012	5/18/17		EB	WQ	—	2						
MW-289	NORPXX057	5/18/17	2025	N	WG	216-236	2						
(TC)													
Total # of Containers													

RELINQUISHED BY:
Signature: Date/Time: 5/19/17 1715
Printed Name: Tim Gilly Firm: Aerostar
Signature: Date/Time:
Printed Name: Firm:

RECEIVED BY:
Signature: Date/Time: 05/20/17 0900
Printed Name: B. Benedict Firm: VAL
Signature: Date/Time:
Printed Name: Firm:

ANALYTE	ERPIMS PAR CODE	CAS	Contaminant	ERPIMS PAR CODE	CAS
Perfluorooctanesulfonic acid	PFOS	1763-23-1	Perfluorohexanoic acid	PFHXA	307-24-4
Perfluorooctanoic acid	PFOA	335-67-1	Perfluorotetradecanoic acid	PFTEA	376-06-7
Perfluorononanoic acid	PFNA	375-95-1	Perfluorododecanoic acid	PFDOA	307-55-1
Perfluorohexanesulfonic acid	PFHXSA	355-46-4	Perfluorotridecanoic acid	PFTRA	72629-94-8
Perfluoroheptanoic acid	PFHPA	375-85-9	Perfluoroundecanoic acid	PFUNA	2058-94-8
Perfluorobutanesulfonic acid	PFBSA	375-73-5	Perfluorodecanoic acid	PFDA	335-76-2
N-methylperfluorooctanesulfonamidoacetic acid	NMEFOSAA	2355-31-9	N-ethylperfluorooctanesulfonamidoacetic acid	NETFOSAA	2991-50-6

Scanned by CamScanner

Vista Analytical Laboratory

Sample Log-in Checklist

Vista Work Order #: 1700634 **TAT** 14

Samples Arrival:	**Date/Time** 05/20/17 0900	**Initials:** BLB	**Location:** WR-2 **Shelf/Rack:** NA
Logged In:	**Date/Time** 05/20/17 1446	**Initials:** BLB	**Location:** WR-2 **Shelf/Rack:** F7

Delivered By:	FedEx	UPS	On Trac	GSO	DHL	Hand Delivered	Other
Preservation:	Ice		Blue Ice		Dry Ice		None

Temp °C: (uncorrected) 0.1	**Time:** 0910 **Probe used:** Yes☑ No☐	**Thermometer ID:** DT-3
Temp °C: -0.6 (corrected)		

		YES	NO	NA
Adequate Sample Volume Received?		✓		
Holding Time Acceptable?		✓		
Shipping Container(s) Intact?		✓		
Shipping Custody Seals Intact?		✓		
Shipping Documentation Present?		✓		
Airbill	Trk # 7866 3188 0352	✓		
Sample Container Intact?		✓		
Sample Custody Seals Intact?				✓
Chain of Custody / Sample Documentation Present?		✓		
COC Anomaly/Sample Acceptance Form completed?			✓	✓
If Chlorinated or Drinking Water Samples, Acceptable Preservation?				✓
Preservation Documented:	$Na_2S_2O_3$ Trizma None	Yes	No	NA
Shipping Container	Vista Client Retain Return		Dispose	

Comments:

ID.: LR – SLC *Rev No.: 0* *Rev Date: 05/18/2017* *Page: 1 of 1*

August 16, 2017

Vista Work Order No. 1700938

Ms. Jenny Vance
Aerostar SES LLC
1006 Floyd Court
Oak Ridge, TN 37830

Dear Ms. Vance,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on July 27, 2017. This sample set was analyzed on a rush turn-around time, under your Project Name 'Former Norton AFB / M3010.0019.0017.05.15TM'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Martha Maier
Laboratory Director

Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Analytical Laboratory 1104 Windfield Way El Dorado Hills, CA 95762 ph: 916-673-1520 fx: 916-673-0106 www.vista-analytical.com

Vista Work Order No. 1700938
Case Narrative

Sample Condition on Receipt:

Three aqueous samples were received in good condition and within the method temperature requirements. The samples were received and stored securely in accordance with Vista standard operating procedures and EPA methodology.

Analytical Notes:

Modified EPA Method 537

Samples "NORP08102"contained particulate and was centrifuged prior to extraction.

The aqueous samples were extracted and analyzed for a selected list of 14 PFAS using Modified EPA Method 537.

Holding Times

The samples were initially extracted and analyzed within the method hold times. The samples were re-extracted for PFOA due to unacceptable levels of PFOA in the Method Blank. The PFOA contamination was traced to a set of samples with extremely high PFOA concentrations. The re-extractions were performed outside of the method hold times.

The original results, as well was the PFOA results from the re-extractions, are included in this report.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Method Blank and Ongoing Precision and Recovery (OPR) samples were extracted and analyzed with the preparation batches. The PFOA concentration in the MB associated with prep batch B7G0121 is greater than 1/2 the LOQ. No other analytes were detected in the Method Blanks above 1/2 the LOQ. The OPR recoveries were within the method acceptance criteria.

The labeled standard recoveries for the QC and field samples were within the acceptance criteria.

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Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
1700938-01	NORP08102	25-Jul-17 11:32	27-Jul-17 09:28	HDPE Bottle, 125 mL
				HDPE Bottle, 125 mL
1700938-02	NORP08103	25-Jul-17 11:54	27-Jul-17 09:28	HDPE Bottle, 125 mL
				HDPE Bottle, 125 mL
1700938-03	NORP08104	25-Jul-17 15:30	27-Jul-17 09:28	HDPE Bottle, 125 mL
				HDPE Bottle, 125 mL

ANALYTICAL RESULTS

Sample ID: Method Blank — Modified EPA Method 537

Matrix: Aqueous
Sample Size: 0.125 L

QC Batch: B7G0121
Date Extracted: 31-Jul-2017 12:30

Lab Sample: B7G0121-BLK1
Date Analyzed: 02-Aug-17 11:22 Column: BEH C18

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFBS	<5.00	2.18	5.00	8.00	
PFHxA	<5.00	2.18	5.00	8.00	
PFHpA	<5.00	2.18	5.00	8.00	
PFHxS	<5.00	2.18	5.00	8.00	
PFOA	4.35	2.18	5.00	8.00	J
PFOS	<5.00	2.18	5.00	8.00	
PFNA	<5.00	2.18	5.00	8.00	
PFDA	<5.00	2.18	5.00	8.00	
MeFOSAA	<5.00	2.18	5.00	8.00	
PFUnA	<5.00	2.18	5.00	8.00	
EtFOSAA	<5.00	2.18	5.00	8.00	
PFDoA	<5.00	2.18	5.00	8.00	
PFTrDA	<5.00	2.18	5.00	8.00	
PFTeDA	<5.00	2.18	5.00	8.00	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	132	50 - 150	
IS	13C2-PFHxA	99.0	50 - 150	
IS	13C4-PFHpA	78.3	50 - 150	
IS	18O2-PFHxS	104	50 - 150	
IS	13C2-PFOA	91.5	50 - 150	
IS	13C8-PFOS	105	50 - 150	
IS	13C5-PFNA	86.5	50 - 150	
IS	13C2-PFDA	84.3	50 - 150	
IS	d3-MeFOSAA	81.7	50 - 150	
IS	13C2-PFUnA	76.0	50 - 150	
IS	d5-EtFOSAA	87.9	50 - 150	
IS	13C2-PFDoA	89.7	50 - 150	
IS	13C2-PFTeDA	82.6	50 - 150	

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
Only the linear isomer is reported for all other analytes.

Sample ID: OPR

Modified EPA Method 537

Matrix:	Aqueous	QC Batch:	B7G0121	Lab Sample:	B7G0121-BS1
Sample Size:	0.125 L	Date Extracted:	31-Jul-2017 12:30	Date Analyzed:	02-Aug-17 11:01 Column: BEH C18

Analyte	Amt Found (ng/L)	Spike Amt	%R	Limits		Labeled Standard	%R	LCL-UCL
PFBS	73.8	80.0	92.3	70 - 130	IS	13C3-PFBS	133	50 - 150
PFHxA	78.0	80.0	97.5	70 - 130	IS	13C2-PFHxA	103	50 - 150
PFHpA	72.5	80.0	90.6	70 - 130	IS	13C4-PFHpA	76.8	50 - 150
PFHxS	78.2	80.0	97.7	70 - 130	IS	18O2-PFHxS	109	50 - 150
PFOA	90.2	80.0	113	70 - 130	IS	13C2-PFOA	101	50 - 150
PFOS	77.1	80.0	96.4	70 - 130	IS	13C8-PFOS	108	50 - 150
PFNA	80.9	80.0	101	70 - 130	IS	13C5-PFNA	93.0	50 - 150
PFDA	80.2	80.0	100	70 - 130	IS	13C2-PFDA	81.0	50 - 150
MeFOSAA	75.0	80.0	93.8	70 - 130	IS	d3-MeFOSAA	77.0	50 - 150
PFUnA	80.8	80.0	101	70 - 130	IS	13C2-PFUnA	81.9	50 - 150
EtFOSAA	79.2	80.0	99.0	70 - 130	IS	d5-EtFOSAA	73.5	50 - 150
PFDoA	68.3	80.0	85.4	70 - 130	IS	13C2-PFDoA	85.6	50 - 150
PFTrDA	73.0	80.0	91.3	60 - 130	IS	13C2-PFTeDA	78.6	50 - 150
PFTeDA	77.6	80.0	97.0	70 - 130				

LCL-UCL - Lower control limit - upper control limit

Sample ID: NORP08102

Modified EPA Method 537

Client Data

Name:	Aerostar SES LLC
Project:	Former Norton AFB / M3010.0019.0017.05.15
Date Collected:	25-Jul-2017 11:32
Location:	NORPMW007R

Sample Data

Matrix:	Groundwater
Sample Size:	0.118 L

Laboratory Data

Lab Sample:	1700938-01	Date Received:	27-Jul-2017 9:28
QC Batch:	B7G0121	Date Extracted:	31-Jul-2017 12:30
Date Analyzed:	03-Aug-17 17:06 Column: BEH C18		

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFBS	<5.30	2.30	5.30	8.44	
PFHxA	<5.30	2.30	5.30	8.44	
PFHpA	<5.30	2.30	5.30	8.44	
PFHxS	<5.30	2.30	5.30	8.44	
PFOA	3.32	2.30	5.30	8.44	J, B
PFOS	2.99	2.30	5.30	8.44	J
PFNA	<5.30	2.30	5.30	8.44	
PFDA	<5.30	2.30	5.30	8.44	
MeFOSAA	<5.30	2.30	5.30	8.44	
PFUnA	<5.30	2.30	5.30	8.44	
EtFOSAA	<5.30	2.30	5.30	8.44	
PFDoA	<5.30	2.30	5.30	8.44	
PFTrDA	<5.30	2.30	5.30	8.44	
PFTeDA	<5.30	2.30	5.30	8.44	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	150	50 - 150	
IS	13C2-PFHxA	99.8	50 - 150	
IS	13C4-PFHpA	77.1	50 - 150	
IS	18O2-PFHxS	109	50 - 150	
IS	13C2-PFOA	90.4	50 - 150	
IS	13C8-PFOS	101	50 - 150	
IS	13C5-PFNA	87.4	50 - 150	
IS	13C2-PFDA	73.8	50 - 150	
IS	d3-MeFOSAA	97.7	50 - 150	
IS	13C2-PFUnA	68.8	50 - 150	
IS	d5-EtFOSAA	107	50 - 150	
IS	13C2-PFDoA	85.4	50 - 150	
IS	13C2-PFTeDA	93.4	50 - 150	

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP08103

Modified EPA Method 537

Client Data

Name: Aerostar SES LLC
Project: Former Norton AFB / M3010.0019.0017.05.15
Date Collected: 25-Jul-2017 11:54
Location: FIELDQC

Sample Data

Matrix: Water
Sample Size: 0.120 L

Laboratory Data

Lab Sample: 1700938-02 Date Received: 27-Jul-2017 9:28
QC Batch: B7G0121 Date Extracted: 31-Jul-2017 12:30
Date Analyzed: 03-Aug-17 17:17 Column: BEH C18

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFBS	<5.21	2.27	5.21	8.32	
PFHxA	<5.21	2.27	5.21	8.32	
PFHpA	2.50	2.27	5.21	8.32	J
PFHxS	<5.21	2.27	5.21	8.32	
PFOA	12.7	2.27	5.21	8.32	B
PFOS	175	2.27	5.21	8.32	
PFNA	<5.21	2.27	5.21	8.32	
PFDA	<5.21	2.27	5.21	8.32	
MeFOSAA	<5.21	2.27	5.21	8.32	
PFUnA	<5.21	2.27	5.21	8.32	
EtFOSAA	<5.21	2.27	5.21	8.32	
PFDoA	<5.21	2.27	5.21	8.32	
PFTrDA	<5.21	2.27	5.21	8.32	
PFTeDA	<5.21	2.27	5.21	8.32	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	130	50 - 150	
IS	13C2-PFHxA	100	50 - 150	
IS	13C4-PFHpA	77.4	50 - 150	
IS	18O2-PFHxS	97.0	50 - 150	
IS	13C2-PFOA	101	50 - 150	
IS	13C8-PFOS	105	50 - 150	
IS	13C5-PFNA	84.7	50 - 150	
IS	13C2-PFDA	85.2	50 - 150	
IS	d3-MeFOSAA	64.4	50 - 150	
IS	13C2-PFUnA	68.8	50 - 150	
IS	d5-EtFOSAA	69.7	50 - 150	
IS	13C2-PFDoA	69.2	50 - 150	
IS	13C2-PFTeDA	64.5	50 - 150	

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP08104

Modified EPA Method 537

Client Data

Name:	Aerostar SES LLC
Project:	Former Norton AFB / M3010.0019.0017.05.15
Date Collected:	25-Jul-2017 15:30
Location:	NORPMW007R

Sample Data

Matrix:	Groundwater
Sample Size:	0.112 L

Laboratory Data

Lab Sample:	1700938-03	Date Received:	27-Jul-2017 9:28
QC Batch:	B7G0121	Date Extracted:	31-Jul-2017 12:30
Date Analyzed:	02-Aug-17 15:40 Column: BEH C18		

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFBS	<5.58	2.42	5.58	8.89	
PFHxA	<5.58	2.42	5.58	8.89	
PFHpA	<5.58	2.42	5.58	8.89	
PFHxS	2.65	2.42	5.58	8.89	J
PFOA	<5.58	2.42	5.58	8.89	
PFOS	18.8	2.42	5.58	8.89	
PFNA	<5.58	2.42	5.58	8.89	
PFDA	<5.58	2.42	5.58	8.89	
MeFOSAA	<5.58	2.42	5.58	8.89	
PFUnA	<5.58	2.42	5.58	8.89	
EtFOSAA	<5.58	2.42	5.58	8.89	
PFDoA	<5.58	2.42	5.58	8.89	
PFTrDA	<5.58	2.42	5.58	8.89	
PFTeDA	<5.58	2.42	5.58	8.89	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C3-PFBS	144	50 - 150	
IS	13C2-PFHxA	99.4	50 - 150	
IS	13C4-PFHpA	76.3	50 - 150	
IS	18O2-PFHxS	106	50 - 150	
IS	13C2-PFOA	101	50 - 150	
IS	13C8-PFOS	110	50 - 150	
IS	13C5-PFNA	84.2	50 - 150	
IS	13C2-PFDA	81.8	50 - 150	
IS	d3-MeFOSAA	93.9	50 - 150	
IS	13C2-PFUnA	92.8	50 - 150	
IS	d5-EtFOSAA	85.1	50 - 150	
IS	13C2-PFDoA	92.6	50 - 150	
IS	13C2-PFTeDA	79.1	50 - 150	

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: Method Blank — Modified EPA Method 537

Matrix:	Aqueous	QC Batch:	B7H0074	Lab Sample:	B7H0074-BLK1
Sample Size:	0.125 L	Date Extracted:	10-Aug-2017 8:51	Date Analyzed:	11-Aug-17 19:40 Column: BEH C18

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFOA	<5.00	2.18	5.00	8.00	

MDL - Detection limit

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C2-PFOA	95.8	50 - 150	

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
Only the linear isomer is reported for all other analytes.

Sample ID: OPR

Modified EPA Method 537

Matrix:	Aqueous	QC Batch:	B7H0074	Lab Sample:	B7H0074-BS1
Sample Size:	0.125 L	Date Extracted:	10-Aug-2017 8:51	Date Analyzed:	11-Aug-17 19:08 Column: BEH C18

Analyte	Amt Found (ng/L)	Spike Amt	%R	Limits		Labeled Standard	%R	LCL-UCL
PFOA	79.2	80.0	99.0	70 - 130	IS	13C2-PFOA	108	50 - 150

LCL-UCL - Lower control limit - upper control limit

Sample ID: NORP08102 — Modified EPA Method 537

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Groundwater	Lab Sample:	1700938-01	Date Received:	27-Jul-2017 9:28
Project:	Former Norton AFB / M3010.0019.0017.05.15	Sample Size:	0.113 L	QC Batch:	B7H0074	Date Extracted:	10-Aug-2017 8:51
Date Collected:	25-Jul-2017 11:32			Date Analyzed:	12-Aug-17 00:18	Column:	BEH C18
Location:	NORPMW007R						

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFOA	2.75	2.41	5.53	8.86	J

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C2-PFOA	101	50 - 150	

MDL - Detection limit

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP08103 — Modified EPA Method 537

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Water	Lab Sample:	1700938-02	Date Received:	27-Jul-2017 9:28
Project:	Former Norton AFB / M3010.0019.0017.05.15	Sample Size:	0.118 L	QC Batch:	B7H0074	Date Extracted:	10-Aug-2017 8:51
Date Collected:	25-Jul-2017 11:54			Date Analyzed:	12-Aug-17 00:28	Column:	BEH C18
Location:	FIELDQC						

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers		Labeled Standard	%R	LCL-UCL	Qualifiers
PFOA	7.69	2.30	5.30	8.46	J	IS	13C2-PFOA	96.3	50 - 150	

MDL - Detection limit

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: NORP08104 — Modified EPA Method 537

Client Data		Sample Data		Laboratory Data			
Name:	Aerostar SES LLC	Matrix:	Groundwater	Lab Sample:	1700938-03	Date Received:	27-Jul-2017 9:28
Project:	Former Norton AFB / M3010.0019.0017.05.15	Sample Size:	0.116 L	QC Batch:	B7H0074	Date Extracted:	10-Aug-2017 8:51
Date Collected:	25-Jul-2017 15:30			Date Analyzed:	12-Aug-17 00:39 Column: BEH C18		
Location:	NORPMW007R						

Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers
PFOA	2.41	2.35	5.39	8.62	J

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C2-PFOA	96.1	50 - 150	

MDL - Detection limit

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

DATA QUALIFIERS & ABBREVIATIONS

B	**This compound was also detected in the method blank.**
D	**Dilution**
E	**The associated compound concentration exceeded the calibration range of the instrument.**
H	**Recovery and/or RPD was outside laboratory acceptance limits.**
I	**Chemical Interference**
J	**The amount detected is below the Reporting Limit/LOQ.**
M	**Estimated Maximum Possible Concentration. (CA Region 2 projects only)**
*****	**See Cover Letter**
Conc.	**Concentration**
NA	**Not applicable**
ND	**Not Detected**
TEQ	**Toxic Equivalency**

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

CERTIFICATIONS

Accrediting Authority	Certificate Number
Arkansas Department of Environmental Quality	17-015-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-18
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2016026
Minnesota Department of Health	1175673
New Hampshire Environmental Accreditation Program	207716
New Jersey Department of Environmental Protection	CA003
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-008
Pennsylvania Department of Environmental Protection	013
Texas Commission on Environmental Quality	T104704189-17-8
Virginia Department of General Services	8621
Washington Department of Ecology	C584
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	**Method**
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23

MATRIX: Biological Tissue	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	**Method**
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537

MATRIX: Non-Potable Water	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	**Method**
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope	EPA 1613B

Dilution GC/HRMS	
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

1700938 3.0°C

AerostarSES LLC
1007 Floyd Culler Court
Oak Ridge, TN 37830
865-481-7837

Chain of Custody Record/Analysis Request Number: 0123

1 of 1

Project Name: Site Investigation of Perfluorinated Compound (PFC) Release Areas at Multiple BRAC Installations

Job No.: M3010.0019.0017.05.15TM
Installation: Former Norton AFB

TAT: 10 business days

Aerostar Project Manager: Paula Bond, pbond@aerostar.net, 865-813-2759
Send Data to: Jenny Vance, jvance@aerostar.net, 865-483-7904

Sampler (s): Tyler Bowling, Tom Burke

Laboratory Name/Address:
Vista Analytical Laboratory
1104 Windfield Way
El Dorado Hills, CA 95762

Contact: Martha Maier
Phone: 916-673-1520
email: mmaier@vista-analytical.com

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

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

Station ID	Sample ID	Date Collected	Time Collected	Sample Type	Matrix	Depth (feet)	PFAS (see list of 14 analytes below)	PFOS/PFOA					NOTES
						Preservative (Trizma, HCl, HNO_3, Ice, etc.)							
NORPMW007R	NORP08102	7/25/17	1132	N	WG	—	2						* Grab Sample
FIELDQC	NORP08103	7/25/17	1154	EB	WQ	—	2						Rinsate: Pump
NORPMW007R	NORP08104	7/25/17	1530	N	WG	233-293	2						
			TB										
						Total # of Containers	6						

RELINQUISHED BY:
Signature: [signature] Date/Time: 7/26/17 1110
Printed Name: Tyler Bowling Firm: Aerostar
Signature: Date/Time:
Printed Name: Firm:

RECEIVED BY:
Signature: [signature] Date/Time: 7/27/17 0938
Printed Name: Marissa Sparks Firm: Vsh
Signature: Date/Time:
Printed Name: Firm:

ANALYTE	ERPIMS PAR CODE	CAS	Contaminant	ERPIMS PAR CODE	CAS
Perfluorooctanesulfonic acid	PFOS	1763-23-1	Perfluorooctanoic acid	PFOA	335-67-1
Perfluorooctanoic acid	PFOA	335-67-1	Perfluorotetradecanoic acid	PFTEA	376-06-7
Perfluorononanoic acid	PFNA	375-95-1	Perfluoroundecanoic acid	PFUnA	2058-94-8
Perfluorohexanesulfonic acid	PFHXSA	355-46-4	Perfluorododecanoic acid	PFDOA	307-55-1
Perfluoroheptanoic acid	PFHPA	375-85-9	Perfluorotetradecanoic acid	PFTA	376-06-7
Perfluorobutanesulfonic acid	PFBSA	375-73-5	Perfluorodecanoic acid	PFDA	335-76-2
N-methyl perfluorooctane sulfonamidoacetic acid	NMEFOSAA	2355-31-9	N-ethyl perfluorooctane sulfonamidoacetic acid	NEFOSAA	2991-50-6

Vista Analytical Laboratory

Sample Log-in Checklist

Vista Work Order #: 1700938 **TAT** Std

Samples Arrival:	**Date/Time** 7/27/17 0928	**Initials:** WWS	**Location:** WR-2 **Shelf/Rack:** N/A
Logged In:	**Date/Time** 07/27/17 1059	**Initials:** JBB	**Location:** WR-2 **Shelf/Rack:** A4

Delivered By:	FedEx	UPS	On Trac	GSO	DHL	Hand Delivered	Other
Preservation:	Ice		Blue Ice		Dry Ice		None

Temp °C: 2.9 (uncorrected)	**Time:** 0938	**Thermometer ID:** IR-1
Temp °C: WWS 7/27/17 2.30 (corrected)	**Probe used:** Yes☐ No☒	

		YES	NO	NA
Adequate Sample Volume Received?		✓		
Holding Time Acceptable?		✓		
Shipping Container(s) Intact?		✓		
Shipping Custody Seals Intact?		✓		
Shipping Documentation Present?		✓		
Airbill	Trk # 7873 0605 4394	✓		
Sample Container Intact?		✓		
Sample Custody Seals Intact?				✓
Chain of Custody / Sample Documentation Present?		✓		
COC Anomaly/Sample Acceptance Form completed?			✓	✓

If Chlorinated or Drinking Water Samples, Acceptable Preservation?						✓
Preservation Documented:	$Na_2S_2O_3$	Trizma	None	Yes	No	NA
Shipping Container	Vista	Client	Retain	Return	Dispose	

Comments:

Appendix D

Data Validation Reports

The Data Validation Report will be submitted in the Draft Final version of this report.

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DATA VALIDATION REPORT

PERFLUORINATED COMPOUNDS (PFCs) RELEASE DETERMINATION AT MULTIPLE BRAC BASES

Former Norton AFB

California

Samples Collected 11 April 2017 – 25 July 2017

Prepared by Aerostar SES LLC

AFCEC Contract No. FA8903-08-D-8785

Task Order 0017

04/02/2018

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ACRONYMS AND ABBREVIATIONS

%	Percent
%D	Percent Difference
AFFF	Aqueous film forming foam
ASL	Aerostar SES LLC
B	Blank contamination
BS	Blank Spike
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
COC	Chain of Custody
CLP	Contract Laboratory Program
DL	Method Detection Limit
DoD	Department of Defense
EB	Equipment Blank
EPA	Environmental Protection Agency
FB	Field Blank
FD	Field Duplicate
FOL	Forward Operating Location
GFAA	Graphite Furnace Atomic Absorption Spectroscopy
ICB	Initial Calibration Blank
ICAL	Initial Calibration
ICV	Initial Calibration Verification
ID	Identification

IS	Internal Standard
J	Estimated Value
LC/MS/MS	Liquid Chromatography tandem Mass Spectrometry
LCS	Laboratory Control Sample
LOD	Limit of Detection
LOQ	Limit of Quantification
MB	Method Blank
MS	Matrix Spike
MSD	Matrix Spike Duplicate
N	Normal Sample
OPR	Ongoing Precision and Recovery sample
PFC	Perfluorinated Compound
QAPP	Quality Assurance Project Plan
QC	Quality control
R	Rejected
RPD	Relative Percent Difference
RRF	Relative Response Factor
RSD	Relative Standard Deviation
SDG	Sample Delivery Group
TB	Trip Blank
U	Not Detected
UJ	Not Detected; associated value is an estimate

1. INTRODUCTION

The data validation of thirty-six soil samples (thirty-two regular and four field duplicates), twelve ground-water samples (eleven regular and one field duplicate), one wastewater, six equipment blanks, two ambient blanks, and seven IDW samples from Norton AFB, California, was completed in December 2017. The samples were collected between April and July 2017 and were subsequently sent to Vista Laboratories, located in El Dorado Hills, CA or to TestAmerica, Arvada, CO for IDW samples. The samples were received by the laboratories between April 13 and July 27, 2017. The samples were assigned to the following sample delivery groups (SDG) for Vista: 1700445, 1700446, 1700509, 1700602, 1700603, 1700632, 1700633, 1700634, and 1700938. The samples were analyzed for perfluorinated compounds (PFCs) using a modified version of United States Environmental Protection Agency (EPA) Method 537. A list of these samples by field sample identification (ID), sample collection date, sample matrix, Vista sample ID and validation level are presented in Table 1a. The IDW samples were assigned to a single TestAmerica SDG: 280-97393 and were analyzed for GC/MS VOCs and SVOCs, GC pesticides and herbicides, ICP metals and mercury. A list of these samples is also presented in Table 1a.

2. PROCEDURES

Aerostar SES LLC (ASL) performed EPA Stage IV validation on 11% of the samples (seven samples validated at Level IV that included three soils, two groundwater, one ambient blank, and 1 IDW soil). EPA Stage IIb validation was performed on the remaining samples associated with this sampling event as indicated on Table 1b. The Stage IV 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 IIb 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. This data validation has been performed in accordance with:

- Aerostar, 2017. *Final Installation-Specific Uniform Federal Policy Quality Assurance Project Plan (QAPP) Addendum, Former Norton Air Force Base, Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installation*s. March 2017.

- Aerostar, 2016. *Final Quality Program Plan for Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations*. May 2016.

- Department of Defense (DoD), 2013. *DoD Quality Systems Manual for Environmental Laboratories, Version 5.0*. January 2013.

- 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*, EPA/600/R-08/092. September 2009.

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

The CLP guideline was written specifically for the CLP, and has been modified for the purposes of this data review where it differs from method-specific, QAPP-specified, and laboratory-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, 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 a relative percent difference (RPD) of analyte concentration between laboratory duplicates or MS/Matrix Spike 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 the results of all QC audits meet criteria. Adherence to QC protocols serves to increase confidence in data, but any reported value may potentially contain error.

The data validation qualifiers (Section 4.0) applied by the reviewer were recorded in a column adjacent and to the right of the target compound name. A data validation reason code, where applicable, was also added to each of the reviewer’s qualifiers to provide the user with a means to identify which results were qualified and the reason for the qualifiers (Section 5.0). The data were labeled in the validation checklist

with the appropriate stage of data validation performed according to *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use (January, 2009).*

3. 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 or ongoing precision and recovery (OPR) samples are aliquots of analyte-free matrices that are spiked with the target analytes of interest for an analytical method, or a representative subset of those analytes. The spiked analyte-free matrix is then processed through the same preparatory and analytical procedures as the samples they accompany. LCS recovery indicates the ability of a laboratory to successfully perform an analytical method in a matric free of interferences.

3.2 MATRIX SPIKE RECOVERIES

Matrix spikes (MS) and matrix spike duplicates (MSD) are prepared by adding known amounts of the target analytes for an analytical method, or a representative subset of those analytes, to an aliquot of sample. The MS and MSD are then processed through the same preparatory and analytical procedures as the accompanying unspiked samples in an analytical batch.

MS and MSD recovery and precision results indicate the ability of a laboratory to successfully recover an analyte in the matrix of a specific sample or in closely related sample matrices. It is important to apply MS results for any specific sample to other samples only when there is an empirical understanding how the sample matrices are related.

3.3 SURROGATE SPIKE RECOVERIES

Surrogate spikes are generally used to evaluate accuracy, method performance, and extraction efficiency in each individual sample. Surrogate compounds are compounds not normally found in environmental samples but are similar to target analytes in chemical composition and behavior in the preparatory and analytical process.

3.4 BLANK CONCENTRATIONS

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

Field blanks are prepared by pouring an aliquot of analyte-free water into a sample container in the field. They are subsequently analyzed for the same target analytes as the associated environmental samples specified by the project. Field blanks are used to monitor for possible sample contamination originating from ambient conditions at the sample location and to monitor subsequent sample handling, storage, preparatory, and analytical procedures.

Laboratory and field blanks are processed by the laboratory in a manner identical to those used to process associated field samples. Target analytes should not be found in laboratory blanks above one-half the limit of quantification (LOQ).

When target analytes are detected in blanks, analyte concentrations in the associated samples less than five (5) times the concentration detected in the blank will be qualified as “B”.

3.5 LABORATORY AND FIELD DUPLICATES

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

4. DEFINITIONS OF QUALIFIERS THAT MAY BE USED DURING DATA VALIDATION

Qualifier	Definition
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. These may not be used for decision making.
U	The analyte was analyzed for, but was not detected above the reported sample limit of detection (LOD).
B	The analyte was detected in the sample and an associated blank and the concentration detected in the sample was less than 5 times the concentration detected in the blank.
N	The analyte is a tentatively identified compound.
J	The analyte was positively identified, however, the quantitation is estimated because of discrepancies in meeting certain analyte-specific QC criteria; or the associated numerical value is the estimated concentration of the analyte in the sample above the method detection limit (DL) and below the LOQ.
UJ	The material was analyzed for, but was not detected. However, the result is estimated because of discrepancies in meeting certain analyte-specific QC criteria

5. QUALIFICATION REASON CODES

Reason Code	Definition
01	Sample received outside of 4+/-2 degrees Celsius
01A	Improper sample preservation
02	Holding time exceeded
02A	Extraction hold time
02B	Analysis hold time
03	Instrument performance – outside criteria
03A	4-Bromofluorobenzene Tune
03B	Decafluorotriphynylphosphine Tune
03C	Dichlorodiphenyltrichloroethane (DDT) and/or Endrin % breakdown exceeds criteria
03D	Retention time windows
03E	Resolution
04	Initial calibration results outside specified criteria
04A	Compound mean relative response factor (RRF) QC criteria not met
04B	Individual % relative standard deviation (RSD) criteria not met
04C	Regression factor or correlation coefficient >0.995
05	Continuing calibration results outside specified criteria
05A	Compound mean RRF QC criteria not met
05B	Compound % Difference (%D) QC criteria not met
06	Result qualified as a result of the 5x/10x blank correction
06A	Method or preparation blank
06B	Initial calibration blank (ICB) or continuing calibration blank (CCB)
06C	Equipment Blank (EB)
06D	Trip Blank (TB)
06E	Field Blank (FB)
07	Surrogate recoveries outside control limits
07A	Sample surrogate recoveries
07B	Associated method blank or LCS surrogate recoveries
08	MS/MSD/Duplicate results outside criteria
08A	MS and/or MSD recovery not within control limits (accuracy)
08B	% RPD outside acceptance criteria (precision)
09	Post digestion spike outside criteria graphite furnace atomic absorption (GFAA)
10	Internal standards (IS) outside specified control limits
10A	Recovery of IS
10B	Retention time of IS
11	Laboratory control sample recoveries outside specified limits
11A	Recovery

Reason Code	Definition
11B	% RPD (if run in duplicate)
12	Interference check standard
13	Serial dilution
14	Tentatively identified compounds
15	Quantification
16	Multiple results available; alternate analysis preferred
17	Field duplicate RPD criteria is exceeded
18	Percent difference between original and second column exceeds QC criteria
19	Professional judgment was used to qualify the data
20	Pesticide clean-up checks
21	Target compound identification
22	Radiological calibration
23	Radiological quantification
24	Reported result and/or lab qualifier revised to reflect validation findings

6. CHAIN OF CUSTODY AND SAMPLE RECEIPT CONDITION DOCUMENTATION

According to the laboratory case narratives and Sample Log-In Checklists, there were no anomalies noted upon receipt with the exceptions noted below:

SDG 1700445:

The case narrative noted that sample NORPWW069 contained a "gel like substance" and was centrifuged prior to extraction.

SDG 1700938:

Sample NORP08102 contained particulates and was centrifuged prior to extraction.

7. SPECIFIC DATA VALIDATION FINDINGS

Results from these samples may be considered usable with the limitations and exceptions described Sections 7.1 through 8.0.

7.1 HOLDING TIMES

All of the soil, groundwater, and water quality samples were extracted for PFCs within the maximum holding time of 14 days from sample collection for aqueous samples and 60 days from sample collection for solid samples with the exceptions noted below. The sample extracts were analyzed within the maximum hold time of 28 days from extraction.

The IDW samples were TCLP extracted within specified holding times. Preparation of the leachates for analysis was performed within holding times. Analyses were performed within specified holding times except as noted below.

SDG 1700938:

Samples NOR08102 and NORP08103 were re-extracted for PFOA beyond the stated holding time. Associated sample results for PFOA for these reanalyses were qualified "J"

SDG 280-97393:

Reanalysis associated with pesticides was made beyond the holding times. The results were excluded in favor of the original results and were qualified "X".

7.2 INITIAL CALIBRATION

The specified number of standards were used for initial calibration for organic analyses. The initial calibrations (ICALs) associated with the analyses of the soil, groundwater, water quality, and IDW samples met the QC limits requiring a correlation coefficient (r) ≥ 0.995 for linear and non-linear calibrations (coefficient of determination [r^2] ≥0.99) and each calibration point with a %D ≤ 25% (low standard %D ≤ 30%) from the true value. The types of calibration curves varied from linear, unweighted to weighted (1/x) first-order linear regression to weighted (1/x) second-order linear regression. There were also curves with the origin included or origin not included.

For metals, ICP initial calibration consisted of a single standard and blank. For mercury, calibration consisted of seven standards plus blank.

SDG 1700632:

It was noted that two samples had results reported that were above the calibration range of the instrument. Results for PFHxS for samples NORP08041 and NORP08042 were reported from dilutions that yielded concentrations that were still above the highest calibration standard. The results for this compound for these samples were qualified "J".

SDG 1700633:

It was noted that the PFOS result for sample NORP07029 was reported at a concentration that was above the level of the highest standard even after dilution. The result for this compound for this samples was qualified "J".

7.3 INITIAL CALIBRATION VERIFICATION (ICV)

The ICVs associated with the analyses of the soil, groundwater, water-quality, and IDW samples met the QC limit requiring reported compound concentrations with a %D ≤ 25% from the true value.

7.4 CONTINUING CALIBRATION VERIFICATION (CCV)

The CCVs associated with the analyses of the soil, groundwater, water-quality, and IDW samples met the QC limit requiring reported compound concentrations with a %D ≤ 25% from the true value with the exceptions noted below:

7.5 LABORATORY BLANKS

The laboratory method blanks associated with the analyses of soil, groundwater, water-quality, and IDW samples met the QC criteria requiring no analytes detected greater than one half the LOQ or greater than one tenth the amount measured in a sample with the exceptions noted below:

SDG 1700445:

PFDoA was detected at 1.67 ng/L (5x = 8.35 ng/L) in method blank B7D0064-BLK1. Results for PFDoA for samples NORP01001 and NORPWW069 were qualified "B".

SDG 280-97393:

MB-280-375578 contained acetone at 14.57 µg/kg (5x = 72.85 µg/kg). Results for acetone in samples NORPSW060, NORPSW061, NORPSW062, NORPSW063, and NORPSW064 were qualified "JB".

7.6 EXTRACTED STABLE ISOTOPE/SURROGATE RECOVERIES

For Method 537, Stable isotopes were added for each target compound (13 total) and were added to each standard, blank, and quality control sample prior to extraction. These isotopes were documented as "labeled" standards. The isotopes used included:

13C3-PFBS, 13C2-PFHxA, 13C4-PFHpA, 18O2-PFHxS, 13C2-PFOA, 13C5-PFNA, 13C8-PFOS, 13C2-PFDA, d3-N-MeFOSA, d5-N-EtFOSAA, 13C2-PFUnA, 13C2-PFDoA, and 13C2-PFTeDA.

For VOC, SVOC, pesticide, and herbicide methods used for IDW analysis, surrogates were added to each sample.

The recoveries for these extracted stable isotopes or surrogates met the QC criteria with the exceptions noted below:

SDG 1700446:

13C2-PFTeDA recovery was low for sample NORP05017 and the associated target compound, PFTeDA, was qualified "UJ".

SDG 1700632:

13C3-PFBS recovery result was elevated in samples NORP08041, NORP08042, and NORP08053. Results for PFBS were qualified "J" or "UJ", as appropriate.

18O2-PFHxS recovery result was low in sample NORP08042. The associated sample result for PFHxS was qualified “J”.

SDG 1700633:

13C3-PFBS recovery result was elevated in sample NORP07032. Results were not qualified.

SDG 1700634:

13C3-PFBS recovery result was elevated in sample NORPXX057. Results were not qualified.

SDG 280-97393:

Low dibromofluoromethane recovery was noted in IDW samples NORPSW059, NORPSW060, NORPSW063, and NORPSW064. Associated sample results were qualified “J” or “UJ”, as appropriate.

7.7 FIELD AND EQUIPMENT BLANKS

The field-submitted blanks associated with the analyses of soil, groundwater, and water quality samples met the QC criteria requiring no analytes detected greater than one half the LOQ or greater than one tenth the amount measured in a sample with the exceptions noted below:

SDG 1700445:

NORP01001 was an ambient blank in which PFOS was detected at 1.12 ng/L (5x = 5.6 ng/L), PFDoA was detected at 1.17 ng/L (5x = 5.85 ng/L), and PFTeDA was detected at 0.793 ng/L (5x = 3.956 ng/L). PFDoA and PFTeDA were not detected in associated samples. The PFOS concentration in associated samples was greater than five times the blank concentration. No qualifications were appended to the associated sample results.

SDG 1700632:

NORP08047 was an equipment blank in which PFHxA was detected at 2.35 ng/L (5x = 11.75 ng/L), PFHxS was detected at 5.68 ng/L (28.4 ng/L), and PFOS was detected at 68.8 ng/L (344 ng/L). The associated sample results for NORP08043 were greater than five times the blank result.

NORP08051 was an equipment blank in which PFHxS was detected at 3.15 ng/L (5x = 15.75 ng/L), PFOA was detected at 3.02 ng/L (5x = 15.1 ng/L), and PFOS was detected at 11.0 ng/L (5x = 55 ng/L). Associated sample results for NORP07028 were greater than 5 times the blank result.

SDG 1700938:

NORP08103 was an equipment blank in which PFOA was detected at 7.69 ng/L (5x = 38.45 ng/L) and PFOS was detected in this blank at 175 ng/L (5x = 875 ng/L). The result for PFOS for sample NORP08104 was qualified “B”.

7.8 LABORATORY CONTROL SAMPLE (LCS) ACCURACY

The LCSs associated with the analyses of soil, groundwater, water-quality, and IDW samples met the QC limit requiring reported compound concentrations with a percent recovery within ±30% of the true value.

7.9 MATRIX SPIKES/ MATRIX SPIKE DUPLICATES

The MS/MSDs associated with the analyses of the soil, groundwater, water-quality, and IDW samples met the QC limit requiring reported compound concentrations within ±30% of the true value and RPDs ≤30% with the exceptions noted below:

SDG 1700509:

NORP07022 was prepared and analyzed as an MS/MSD pair. PFOA had an elevated RPD and a low recovery in the MSD fraction. The associated parent sample result was qualified "J". In addition, PFHxA and PFOS had recovery and RPD results outside specified limits. Since the native sample concentration was greater than 5 times the spike concentration, no qualifications were appended to the associated sample results. All other recovery and RPD results were acceptable.

SDG 1700633:

NORP07031 was prepared and analyzed as an MS/MSD pair. PFHxA results in both MS and MSD fractions were elevated. The associated parent sample results were qualified "J". Additionally, PFHxS, PFOA and PFOS recovery results were outside specified limits. However, the native concentration of each was greater than 4 times the spike concentration.

SDG 280-97393:

NORPSW0061 was prepared and analyzed as an MS/MSD pair for pesticides. All compounds except 4,4'-DDE had low recovery results. The associated parent sample result was qualified "UJ". The MS recovery for Toxaphene in the MS fraction was zero (0). Apparently this compound was not spiked in the MS. MSD results for this compound were acceptable.

NORPSW059 was prepared and analyzed as an MS/MSD pair for metals. The recovery for chromium was elevated in the MS but acceptable in the MSD with an acceptable RPD. No qualifications were appended to the associated parent sample results.

7.10 INTERNAL STANDARD RECOVERIES

For Method 537, the following stable isotopes were added to each sample, blank, and standard and were noted in the package as "injected" internal standards: 13C4-PFBA, 13C5-PFHxA, 13C3-PFHxS, 13C8-PFOA, 13C4-PFOS, 13C9-PFNA, and 13C6-PFDA. All labeled stable isotope recovery results were acceptable.

Internal standard recovery results for GC/MS VOCs and SVOCs were acceptable.

7.11 DATA REPORTING AND ANALYTICAL PROCEDURES

The reported concentrations for non-detect results met project action and project quantitation limits as defined in the UFP-QAPP.

8. FIELD DUPLICATE RESULTS

Four soil samples were collected as field duplicates. For results greater than 5X the LOQ in both the parent and field duplicate sample, a maximum RPD of 30% was required for water samples and a maximum RPD of 50% was required for soil samples. If either the parent or field duplicate sample result was less than 5X the LOQ, the absolute difference was compared to the LOQ for water and 3X the LOQ for soil samples.

SDG 1700632:

The RPD was greater than 50% for PFHxS in field duplicates NORP08041 and NORP08042. The results for this compound in the associated samples were qualified "J".

Field duplicate samples with positive detections and the corresponding calculated measurement performance criteria are summarized in Table 2.

9. SUMMARY AND CONCLUSIONS

ASL evaluated a total of 2025 data records from field samples during the validation. A total of 286 results were qualified as a result of validation efforts. Compounds reported as non-detect were qualified as "U" by the data reviewer. Concentrations between the DL and LOQ had the laboratory "J" qualifier retained by the data reviewer.

Overall the data was of suitable quality for its intended purpose and met the required project measurement performance criteria related to precision, accuracy, representativeness, comparability, and completeness parameters with the exceptions noted in Section 7. Each of these measures and specific data qualifications are discussed below.

***Precision*:** Precision is a measure of the agreement between duplicate sample measurements of the same quantity and is reflected in RPD between spikes and the RPD for the field duplicate analysis.

***Accuracy*:** Accuracy is measured by the results from the recovery of known amounts of compounds or elements from laboratory control samples (LCS), matrix spikes (MS), and surrogate recoveries.

***Representativeness*:** The measures of representativeness – sample handling and analytical blank analysis were met. Designated analytical protocols were followed. Holding times were met for all analyses except as noted in section 7.1, above. Overall, no issues with representativeness were identified resulting from analytical failure.

***Comparability*:** The samples were analyzed using appropriate approved methods of analysis. All data results were reported correctly and in standard units.

***Completeness*:** Completeness is the amount of valid data compared to the planned amount and is expressed as a percent of the usable data points divided by the total number of analytes for each parameter analyzed. Out of a total of 2025 data points, no data points were rejected, resulting in a completeness of 100 percent.

10. REFERENCES

Aerostar, 2017. *Final Installation-Specific Uniform Federal Policy Quality Assurance Project Plan (QAPP) Addendum, Former Norton Air Force Base, Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations*. March 2017.

Aerostar, 2016. *Final Quality Program Plan for Site Inspection of Potential Perfluorinated Compound Release Areas at Multiple BRAC Installations*. May 2016.

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

EPA 2009. *OSWER 9200-1-85. Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use*, EPA-540/R-08-005. January 2009.

Table 1a. Field Samples Submitted to Vista Analytical Laboratory

Sample ID	Collection Date	Sample Matrix	Laboratory SDG	QC Batch Number	Laboratory Sample ID	Validation Level
NORP01001	04/11/2017	WQ	1700445	B7D0064	1700445-01	Level IV
NORPWW069	04/12/2017	WW	1700445	B7D0064	1700445-02	Level IIB
NORP01002	04/11/2017	WQ	1700446	B7D0070	1700446-01	Level IIB
NORP05017	04/11/2017	SO	1700446	B7D0079	1700446-02	Level IV
NORP05018	04/12/2017	WQ	1700446	B7D0070	1700446-03	Level IIB
NORP05019	04/12/2017	SO	1700446	B7D0079	1700446-04	Level IIB
NORP05020	04/12/2017	SO	1700446	B7D0079	1700446-05	Level IIB
NORP07022	04/15/2017	SO	1700509	B7D0138	1700509-01	Level IIB
NORP07023	04/15/2017	SO	1700509	B7D0138	1700509-02	Level IIB
NORP07024	04/15/2017	SO	1700509	B7D0138	1700509-03	Level IIB
NORP04006	04/18/2017	SO	1700509	B7D0138	1700509-04	Level IIB
NORP04007	04/18/2017	SO	1700509	B7D0138	1700509-05	Level IIB
NORP04008	04/18/2017	SO	1700509	B7D0138	1700509-06	Level IIB
NORP04009	04/18/2017	SO	1700509	B7D0138	1700509-07	Level IIB
NORP01403	05/12/2017	WG	1700602	B7E0073	1700602-01	Level IIB
NORP01404	05/12/2017	WG	1700602	B7E0073	1700602-02	Level IV
NORP05013	05/09/2017	SO	1700603	B7E0130	1700603-01	Level IIB
NORP05014	05/09/2017	SO	1700603	B7E0130	1700603-02	Level IIB
NORP05015	05/09/2017	SO	1700603	B7E0130	1700603-03	Level IIB
NORP08037	05/12/2017	SO	1700603	B7E0130	1700603-04	Level IIB
NORP08038	05/12/2017	SO	1700603	B7E0130	1700603-05	Level IIB
NORP08039	05/12/2017	WQ	1700603	B7E0073	1700603-06	Level IIB
NORP08041	05/16/2017	SO	1700632	B7E0142	1700632-01	Level IV
NORP08042	05/16/2017	SO	1700632	B7E0142	1700632-02	Level IIB
NORP08043	05/16/2017	SO	1700632	B7E0142	1700632-03	Level IIB
NORP08044	05/16/2017	SO	1700632	B7E0142	1700632-04	Level IIB

Sample ID	Collection Date	Sample Matrix	Laboratory SDG	QC Batch Number	Laboratory Sample ID	Validation Level
NORP08045	05/16/2017	SO	1700632	B7E0142	1700632-05	Level IIB
NORP08046	05/16/2017	SO	1700632	B7E0142	1700632-06	Level IIB
NORP08047	05/16/2017	WQ	1700632	B7E0139	1700632-07	Level IIB
NORP08048	05/16/2017	SO	1700632	B7E0142	1700632-08	Level IIB
NORP08049	05/16/2017	SO	1700632	B7E0142	1700632-09	Level IIB
NORP08050	05/16/2017	SO	1700632	B7E0142	1700632-10	Level IIB
NORP08051	05/17/2017	WQ	1700632	B7E0139	1700632-11	Level IIB
NORP08052	05/16/2017	SO	1700632	B7E0142	1700632-12	Level IIB
NORP08053	05/16/2017	SO	1700632	B7E0142	1700632-13	Level IIB
NORP07025	05/17/2017	SO	1700633	B7E0135	1700633-01	Level IIB
NORP07026	05/17/2017	SO	1700633	B7E0135	1700633-02	Level IV
NORP07027	05/17/2017	SO	1700633	B7E0135	1700633-03	Level IIB
NORP07028	05/17/2017	SO	1700633	B7E0135	1700633-04	Level IIB
NORP07029	05/17/2017	SO	1700633	B7E0135	1700633-05	Level IIB
NORP07030	05/17/2017	SO	1700633	B7E0135	1700633-06	Level IIB
NORP07031	05/17/2017	SO	1700633	B7E0135	1700633-07	Level IIB
NORP07032	05/17/2017	SO	1700633	B7E0135	1700633-08	Level IIB
NORP07033	05/17/2017	SO	1700633	B7E0135	1700633-09	Level IIB
NORP07034	05/17/2017	SO	1700633	B7E0135	1700633-10	Level IIB
NORP05016	05/14/2017	WG	1700634	B7E0139	1700634-01	Level IIB
NORPXX058	05/16/2017	WG	1700634	B7E0139	1700634-02	Level IIB
NORP04010	05/17/2017	WG	1700634	B7E0139	1700634-03	Level IIB
NORP04005	05/17/2017	WG	1700634	B7E0139	1700634-04	Level IIB
NORP07021	05/17/2017	WG	1700634	B7E0139	1700634-05	Level IIB
NORPXX056	05/18/2017	WG	1700634	B7E0139	1700634-06	Level IIB
NORP05011	05/18/2017	WG	1700634	B7E0139	1700634-07	Level IIB
NORP05012	05/18/2017	WQ	1700634	B7E0139	1700634-08	Level IIB

Sample ID	Collection Date	Sample Matrix	Laboratory SDG	QC Batch Number	Laboratory Sample ID	Validation Level
NORPXX057	05/18/2017	WG	1700634	B7E0139	1700634-09	Level IIB
NORP08102	07/25/2017	WG	1700938	B7G0121 B7H0074	1700938-01	Level IV
NORP08103	07/25/2017	WQ	1700938	B7G0121 B7H0074	1700938-02	Level IIB
NORP08104	07/25/2017	WG	1700938	B7G0121 B7H0074	1700938-03	Level IIB
NORPSW059	05/19/2017	ST	J97393	375578 VOC Prep 374740 SVOC Prep 374659 Pest Prep 375586 Herb Prep 374571 ICP Prep 374918 Hg Prep	280-97393-1	VOC L IIb SVOC L IV Pest L IV Herb L IV Metals L IV
NORPSW060	05/19/2017	ST	J97393	375578 VOC Prep 374740 SVOC Prep 374659 Pest Prep 375586 Herb Prep 374571 ICP Prep 374918 Hg Prep	280-97393-2	VOC L IIb SVOC L IV Pest L IIb Herb L IIb Metals L IIb
NORPSW061	05/19/2017	ST	J97393	375578 VOC Prep 374740 SVOC Prep 374659 Pest Prep 375586 Herb Prep 374571 ICP Prep 374918 Hg Prep	280-97393-3	VOC-L IV SVOC L IIb Pest L IIb Herb L IIb Metals L IIb
NORPSW062	05/19/2017	ST	J97393	375578 VOC Prep 374740 SVOC Prep 374659 Pest Prep 375586 Herb Prep 374571 ICP Prep 374918 Hg Prep	280-97393-4	VOC L IIb SVOC L IIb Pest L IIb Herb L IIb Metals L IIb
NORPSW063	05/19/2017	ST	J97393	375578 VOC Prep 374740 SVOC Prep 374659 Pest Prep 375586 Herb Prep 374571 ICP Prep 374918 Hg Prep	280-97393-5	VOC L IIb SVOC L IIb Pest L IIb Herb L IIb Metals L IIb
NORPSW064	05/19/2017	ST	J97393	375578 VOC Prep 374740 SVOC Prep 374659 Pest Prep 375586 Herb Prep 374571 ICP Prep 374918 Hg Prep	280-97393-6	VOC L IIb SVOC L IIb Pest L IIb Herb L IIb Metals L IV
NORPSW065	05/19/2017	WW	J97393	375813 VOC Leach 375578 VOC Prep 375051 SVOC Leach 375154 SVOC Prep	280-97393-7	VOC-Level IV SVOC L IIb Pest L IIb Herb L IIb

Sample ID	Collection Date	Sample Matrix	Laboratory SDG	QC Batch Number	Laboratory Sample ID	Validation Level
				375051 GC Leach 375360 Herb Prep 375382 Pest Prep 375051 Metals Leach 375069 ICP Prep 375105 Hg Prep		Metals L IIb

Table 1b. Sample Locations and Sample Descriptions

Sample Location	Field Sample ID	Lab Sample ID	Sample Description
FIELDQC	NORP01001	1700445-01	Ambient Blank
FIELDQC	NORPWW069	1700445-02	Drilling Fluid/Mud
FIELDQC	NORP01002	1700446-01	Ambient Blank
NORPMW003	NORP05017	1700446-02	Soil Sample
FIELDQC	NORP05018	1700446-03	Equipment Blank
NORPMW003	NORP05019	1700446-04	Soil Sample
NORPMW003	NORP05020	1700446-05	Soil Sample
NORPMW004	NORP07022	1700509-01	Soil Sample
NORPMW004	NORP07023	1700509-02	Soil Sample
NORPMW004	NORP07024	1700509-03	Soil Sample
NORPMW005	NORP04006	1700509-04	Soil Sample
NORPMW005	NORP04007	1700509-05	Soil Sample
NORPMW005	NORP04008	1700509-06	Field Duplicate Soil
NORPMW005	NORP04009	1700509-07	Soil Sample
MW-403	NORP01403	1700602-01	Groundwater Sample
MW-403	NORP01404	1700602-02	Groundwater Sample
NORPMW002	NORP05013	1700603-01	Soil Sample

Sample Location	Field Sample ID	Lab Sample ID	Sample Description
NORPMW002	NORP05014	1700603-02	Soil Sample
NORPMW002	NORP05015	1700603-03	Soil Sample
NORPMW007	NORP08037	1700603-04	Soil Sample
NORPMW007	NORP08038	1700603-05	Soil Sample
FIELDQC	NORP08039	1700603-06	Equipment Blank
NORPSB004	NORP08041	1700632-01	Soil Sample
NORPSB004	NORP08042	1700632-02	Field Duplicate Soil
NORPSB004	NORP08043	1700632-03	Soil Sample
NORPSB004	NORP08044	1700632-04	Soil Sample
NORPSB005	NORP08045	1700632-05	Soil Sample
NORPSB005	NORP08046	1700632-06	Soil Sample
FIELDQC	NORP08047	1700632-07	Equipment Blank
NORPSB005	NORP08048	1700632-08	Soil Sample
NORPSB006	NORP08049	1700632-09	Soil Sample
NORPSB006	NORP08050	1700632-10	Soil Sample
FIELDQC	NORP08051	1700632-11	Equipment Blank
NORPSB006	NORP08052	1700632-12	Soil Sample
NORPSB006	NORP08053	1700632-13	Field Duplicate Soil
NORPSB001	NORP07025	1700633-01	Soil Sample
NORPSB001	NORP07026	1700633-02	Field Duplicate Soil
NORPSB001	NORP07027	1700633-03	Soil Sample
NORPSB001	NORP07028	1700633-04	Soil Sample
NORPSB002	NORP07029	1700633-05	Soil Sample
NORPSB002	NORP07030	1700633-06	Soil Sample

Sample Location	Field Sample ID	Lab Sample ID	Sample Description
NORPSB002	NORP07031	1700633-07	Soil Sample
NORPSB003	NORP07032	1700633-08	Soil Sample
NORPSB003	NORP07033	1700633-09	Soil Sample
NORPSB003	NORP07034	1700633-10	Soil Sample
NORPMW003	NORP05016	1700634-01	Groundwater Sample
MW-401	NORPXX058	1700634-02	Groundwater Sample
NORPMW006	NORP04010	1700634-03	Groundwater Sample
NORPMW005	NORP04005	1700634-04	Groundwater Sample
NORPMW004	NORP07021	1700634-05	Groundwater Sample
MW-274	NORPXX056	1700634-06	Groundwater Sample
NORPMW002	NORP05011	1700634-07	Groundwater Sample
FIELDQC	NORP05012	1700634-08	Equipment Blank
MW-289	NORPXX057	1700634-09	Groundwater Sample
NORPMW007R	NORP08102	1700938-01	Groundwater Sample
FIELDQC	NORP08103	1700938-02	Equipment Blank
NORPMW007R	NORP08104	1700938-03	Groundwater Sample
NORPIDW01	NORPSW059	280-97393-1	IDW Soil
NORPIDW02	NORPSW060	280-97393-3	IDW Soil
NORPIDW03	NORPSW061	280-97393-3	IDW Soil
NORPIDW04	NORPSW062	280-97393-4	IDW Soil
NORPIDW05	NORPSW063	280-97393-5	IDW Soil
NORPIDW06	NORPSW064	280-97393-6	IDW Soil
NORPIDW07	NORPSW065	280-97393-7	Frac Tank Water

Table 2. Field Duplicate Detect

Analyte	LOQ	Primary Sample	Field Duplicate	Units	Absolute Difference or RPD (%)	Exceeds Criteria
Samples NORP04007 and NORP04008						
PFHxS	2.04/1.94	0.303	ND	ng/g	NC	
Samples NORP08041 and NORP08042						
PFBS	10.0/20.0	376	489	ng/g	26.1%	
PFHxA	50.0/100	1160	1870	ng/g	46.9%	
PFHpA	10.0/20.0	331	412	ng/g	21.8%	
PFHxS	50.0/100	4860	15300	ng/g	104%	J
PFOA	10.0/20.0	431	569	ng/g	27.6%	
PFOS	50.0/100	1600	1430	ng/g	11.2%	
PFNA	2.00/2.00	8.75	8.10	ng/g	7.72%	
PFDA	2.00/2.00	1.41	1.17	ng/g	0.24	
PFUnA	2.00/2.00	0.326	ND	ng/g	NC	
Samples NORP08052 and NORP08053						
PFBS	1.97/1.97	0.474	0.798	ng/g	0.324	
PFHxA	1.97/1.97	3.62	4.59	ng/g	0.97	
PFHpA	1.97/1.97	1.67	2.13	ng/g	0.46	
PFHxS	1.97/1.97	43.1	53.4	ng/g	21.3%	
PFOA	1.97/1.97	13.2	15.6	ng/g	16.7%	
PFOS	19.7/9.83	238	221	ng/g	7.41%	
PFNA	1.97/1.97	0.308	0.318	ng/g	0.01	
Samples NORP07025 and NORP07026						
PFHxA	2.00	1.74	1.22	ng/g	0.52	

Analyte	LOQ	Primary Sample	Field Duplicate	Units	Absolute Difference or RPD (%)	Exceeds Criteria
PFHpA	2.00	0.458	0.349	ng/g	0.109	
PFHxS	2.00	23.1	19.4	ng/g	17.4%	
PFOA	2.00	94.7	69.6	ng/g	30.6%	
PFOS	2.00	59.2	45.9	ng/g	25.3%	
PFNA	2.00	0.433	0.327	ng/g	0.106	

Table 3. Qualified Data

Delivery Group	Field Sample ID	Sample Matrix	Compound	Result	Reporting Units	Laboratory Qualifier	Data Validation Qualifier	Data Validation Reason Code
1700445	NORP01001	WQ	PFDOA	1.17	ng/L	JB	JB	6a
1700445	NORPWW069	WQ	PFDOA	1.47	ng/L	JB	JB	6a
1700446	NORP05017	SO	PFTEA	0.961	ng/g	U	UJ	7a
1700509	NORP07022	SO	PFOA	25.1	ng/g		J	8a
1700632	NORP08041	SO	PFBS	376	ng/g		J	7a
1700632	NORP08041	SO	PFHXS	4860	ng/g		J	15, 17
1700632	NORP08042	SO	PFBS	489	ng/g		J	7a
1700632	NORP08042	SO	PFHXS	15300	ng/g		J	15,7a, 17
1700632	NORP08053	SO	PFBS	0.798	ng/g	J	J	7a
1700633	NORP07029	SO	PFOS	5990	ng/g		J	15
1700633	NORP07031	SO	PFHXA	35	ng/g		J	8a
1700938	NORP08102	WG	PFOA	2.75	ng/L	J	J	02A,06E
1700938	NORP08102	WG	PFOA	3.32	ng/L	JB	X	16
1700938	NORP08103	WQ	PFOA	7.69	ng/L	J	J	02A
1700938	NORP08103	WQ	PFOA	12.7	ng/L	B	X	16
1700938	NORP08104	WG	PFOA	2.41	ng/L	J	X	16
280-97393	NORPSW059	ST	1,1,1-Trichloroethane	3.36	µg/kg	U	UJ	7a
280-97393	NORPSW059	ST	1,1-Dichloroethane	1.68	µg/kg	U	UJ	7a
280-97393	NORPSW059	ST	1,1-Dichloroethene	3.36	µg/kg	U	UJ	7a
280-97393	NORPSW059	ST	Acetone	97.8	µg/kg		J	7a
280-97393	NORPSW059	ST	Aldrin	1.25	µg/kg	U	X	15
280-97393	NORPSW059	ST	Benzoic acid	1810	µg/kg	U	UJ	8a

Delivery Group	Field Sample ID	Sample Matrix	Compound	Result	Reporting Units	Laboratory Qualifier	Data Validation Qualifier	Data Validation Reason Code
280-97393	NORPSW059	ST	Alpha-BHC	1.25	µg/kg	U	X	15
280-97393	NORPSW059	ST	Beta-BHC	3.12	µg/kg	U	X	15
280-97393	NORPSW059	ST	Delta-BHC	1.87	µg/kg	U	X	15
280-97393	NORPSW059	ST	Gamma-BHC (Lindane)	1.87	µg/kg	U	X	15
280-97393	NORPSW059	ST	Bromochloromethane	1.68	µg/kg	U	UJ	7a
280-97393	NORPSW059	ST	Bromomethane	3.36	µg/kg	U	UJ	7a
280-97393	NORPSW059	ST	Carbon disulfide	3.36	µg/kg	U	UJ	7a
280-97393	NORPSW059	ST	Chlordane	37.4	µg/kg	U	X	15
280-97393	NORPSW059	ST	Alpha-chlordane	1.25	µg/kg	U	X	15
280-97393	NORPSW059	ST	Gamma-Chlordane	1.25	µg/kg	U	X	15
280-97393	NORPSW059	ST	cis-1,2-Dichloroethene	3.36	µg/kg	U	UJ	7a
280-97393	NORPSW059	ST	Chloroethane	6.73	µg/kg	U	UJ	7a
280-97393	NORPSW059	ST	Chloromethane	3.36	µg/kg	U	UJ	7a
280-97393	NORPSW059	ST	2,2-Dichloropropane	3.36	µg/kg	U	UJ	7a
280-97393	NORPSW059	ST	4,4'-DDD	3.12	µg/kg	U	X	15
280-97393	NORPSW059	ST	4,4'-DDE	1.25	µg/kg	U	X	15
280-97393	NORPSW059	ST	4,4'-DDT	3.12	µg/kg	U	X	15
280-97393	NORPSW059	ST	Dieldrin	1.25	µg/kg	U	X	15
280-97393	NORPSW059	ST	Endosulfan I	1.25	µg/kg	U	X	15
280-97393	NORPSW059	ST	Endosulfan II	1.25	µg/kg	U	X	15
280-97393	NORPSW059	ST	Endosulfan Sulfate	1.25	µg/kg	U	X	15
280-97393	NORPSW059	ST	Endrin	1.25	µg/kg	U	X	15
280-97393	NORPSW059	ST	Endrin Aldehyde	1.25	µg/kg	U	X	15
280-97393	NORPSW059	ST	Trichlorofluoromethane	6.73	µg/kg	U	UJ	7a
280-97393	NORPSW059	ST	Dichlorodifluoromethane	3.36	µg/kg	U	UJ	7a
280-97393	NORPSW059	ST	Heptachlor	1.25	µg/kg	U	X	15
280-97393	NORPSW059	ST	Heptachlor Epoxide	1.87	µg/kg	U	X	15
280-97393	NORPSW059	ST	Methyl ethyl ketone	16.6	µg/kg	J	J	7a
280-97393	NORPSW059	ST	Methylene chloride	6.73	µg/kg	U	UJ	7a
280-97393	NORPSW059	ST	Methylene chloride	1.87	µg/kg	U	X	15
280-97393	NORPSW059	ST	Tert-Butyl Methyl Ether	1.68	µg/kg	U	UJ	7a
280-97393	NORPSW059	ST	Chloroform	1.68	µg/kg	U	UJ	7a
280-97393	NORPSW059	ST	Toxaphene	61.7	µg/kg	U	X	15
280-97393	NORPSW059	ST	trans-1,2-Dichloroethene	1.68	µg/kg	U	UJ	7a
280-97393	NORPSW059	ST	Vinyl Chloride	6.73	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	1,1,1-Trichloroethane	2.79	µg/kg	U	UJ	7a

Delivery Group	Field Sample ID	Sample Matrix	Compound	Result	Reporting Units	Laboratory Qualifier	Data Validation Qualifier	Data Validation Reason Code
280-97393	NORPSW060	ST	1,1-Dichloroethane	1.4	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	1,1-Dichloroethene	2.79	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	Acetone	23.7	µg/kg	J	JB	6a
280-97393	NORPSW060	ST	Aldrin	1.1	µg/kg	U	X	15
280-97393	NORPSW060	ST	Aldrin	1.14	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	Alpha-BHC	1.1	µg/kg	U	X	15
280-97393	NORPSW060	ST	Alpha-BHC	1.14	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	Beta-BHC	2.74	µg/kg	U	X	15
280-97393	NORPSW060	ST	Beta-BHC	2.84	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	Delta-BHC	1.64	µg/kg	U	X	15
280-97393	NORPSW060	ST	Delta-BHC	1.7	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	Gamma-BHC (Lindane)	1.64	µg/kg	U	X	15
280-97393	NORPSW060	ST	Gamma-BHC (Lindane)	1.7	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	Bromochloromethane	1.4	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	Bromomethane	2.79	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	Carbon disulfide	2.79	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	Chlordane	32.8	µg/kg	U	X	15
280-97393	NORPSW060	ST	Chlordane	34	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	Alpha-chlordane	1.1	µg/kg	U	X	15
280-97393	NORPSW060	ST	Alpha-chlordane	1.14	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	Gamma-Chlordane	1.1	µg/kg	U	X	15
280-97393	NORPSW060	ST	Gamma-Chlordane	1.14	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	cis-1,2-Dichloroethene	2.79	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	Chloroethane	5.59	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	Chloromethane	2.79	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	2,2-Dichloropropane	2.79	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	4,4'-DDD	2.74	µg/kg	U	X	15
280-97393	NORPSW060	ST	4,4'-DDD	2.84	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	4,4'-DDE	1.1	µg/kg	U	X	15
280-97393	NORPSW060	ST	4,4'-DDE	1.14	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	4,4'-DDT	2.74	µg/kg	U	X	15
280-97393	NORPSW060	ST	4,4'-DDT	2.84	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	Dieldrin	1.1	µg/kg	U	X	15
280-97393	NORPSW060	ST	Dieldrin	1.14	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	Endosulfan I	1.1	µg/kg	U	X	15
280-97393	NORPSW060	ST	Endosulfan I	1.14	µg/kg	U	UJ	7a

Delivery Group	Field Sample ID	Sample Matrix	Compound	Result	Reporting Units	Laboratory Qualifier	Data Validation Qualifier	Data Validation Reason Code
280-97393	NORPSW060	ST	Endosulfan II	1.1	µg/kg	U	X	15
280-97393	NORPSW060	ST	Endosulfan II	1.14	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	Endosulfan Sulfate	1.1	µg/kg	U	X	15
280-97393	NORPSW060	ST	Endosulfan Sulfate	1.14	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	Endrin	1.1	µg/kg	U	X	15
280-97393	NORPSW060	ST	Endrin	1.14	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	Endrin Aldehyde	1.1	µg/kg	U	X	15
280-97393	NORPSW060	ST	Endrin Aldehyde	1.14	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	Trichlorofluoromethane	5.59	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	Dichlorodifluoromethane	2.79	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	Heptachlor	1.1	µg/kg	U	X	15
280-97393	NORPSW060	ST	Heptachlor	1.14	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	Heptachlor Epoxide	1.64	µg/kg	U	X	15
280-97393	NORPSW060	ST	Heptachlor Epoxide	1.7	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	Methyl ethyl ketone	11.2	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	Methylene chloride	5.59	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	Methoxychlor	1.64	µg/kg	U	X	15
280-97393	NORPSW060	ST	Methoxychlor	1.7	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	Tert-Butyl Methyl Ether	1.4	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	Chloroform	1.4	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	Toxaphene	54.2	µg/kg	U	X	15
280-97393	NORPSW060	ST	Toxaphene	56.1	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	trans-1,2-Dichloroethene	1.4	µg/kg	U	UJ	7a
280-97393	NORPSW060	ST	Vinyl Chloride	5.59	µg/kg	U	UJ	7a
280-97393	NORPSW061	ST	Acetone	11.2	µg/kg	JB	JB	6a
280-97393	NORPSW061	ST	Aldrin	0.795	µg/kg	U	X	15
280-97393	NORPSW061	ST	Aldrin	0.803	µg/kg	U	UJ	8a
280-97393	NORPSW061	ST	Alpha-BHC	0.795	µg/kg	U	X	15
280-97393	NORPSW061	ST	Alpha-BHC	0.803	µg/kg	U	UJ	8a
280-97393	NORPSW061	ST	Beta-BHC	1.98	µg/kg	U	X	15
280-97393	NORPSW061	ST	Beta-BHC	2	µg/kg	U	UJ	8a
280-97393	NORPSW061	ST	Delta-BHC	1.19	µg/kg	U	X	15
280-97393	NORPSW061	ST	Delta-BHC	1.2	µg/kg	U	UJ	8a
280-97393	NORPSW061	ST	Gamma-BHC (Lindane)	1.19	µg/kg	U	X	15
280-97393	NORPSW061	ST	Gamma-BHC (Lindane)	1.2	µg/kg	U	UJ	8a
280-97393	NORPSW061	ST	Bromomethane	2.13	µg/kg	U	UJ	7a

Delivery Group	Field Sample ID	Sample Matrix	Compound	Result	Reporting Units	Laboratory Qualifier	Data Validation Qualifier	Data Validation Reason Code
280-97393	NORPSW061	ST	Chlordane	23.7	µg/kg	U	X	15
280-97393	NORPSW061	ST	Chlordane	24	µg/kg	U	U	8a
280-97393	NORPSW061	ST	Alpha-chlordane	0.795	µg/kg	U	X	15
280-97393	NORPSW061	ST	Alpha-chlordane	0.803	µg/kg	U	UJ	8a
280-97393	NORPSW061	ST	Gamma-Chlordane	0.795	µg/kg	U	X	15
280-97393	NORPSW061	ST	Gamma-Chlordane	0.803	µg/kg	U	UJ	8a
280-97393	NORPSW061	ST	4,4'-DDD	1.98	µg/kg	U	X	15
280-97393	NORPSW061	ST	4,4'-DDD	2	µg/kg	U	UJ	8a
280-97393	NORPSW061	ST	4,4'-DDE	0.795	µg/kg	U	X	15
280-97393	NORPSW061	ST	4,4'-DDE	0.803	µg/kg	U	U	8a
280-97393	NORPSW061	ST	4,4'-DDT	1.98	µg/kg	U	X	15
280-97393	NORPSW061	ST	4,4'-DDT	2	µg/kg	U	UJ	8a
280-97393	NORPSW061	ST	Dieldrin	0.795	µg/kg	U	X	15
280-97393	NORPSW061	ST	Dieldrin	0.803	µg/kg	U	UJ	8a
280-97393	NORPSW061	ST	Endosulfan I	0.795	µg/kg	U	X	15
280-97393	NORPSW061	ST	Endosulfan I	0.803	µg/kg	U	UJ	8a
280-97393	NORPSW061	ST	Endosulfan II	0.795	µg/kg	U	X	15
280-97393	NORPSW061	ST	Endosulfan II	0.803	µg/kg	U	UJ	8a
280-97393	NORPSW061	ST	Endosulfan Sulfate	0.795	µg/kg	U	X	15
280-97393	NORPSW061	ST	Endosulfan Sulfate	0.803	µg/kg	U	UJ	8a
280-97393	NORPSW061	ST	Endrin	0.795	µg/kg	U	X	15
280-97393	NORPSW061	ST	Endrin	0.803	µg/kg	U	UJ	8a
280-97393	NORPSW061	ST	Endrin Aldehyde	0.795	µg/kg	U	X	15
280-97393	NORPSW061	ST	Endrin Aldehyde	0.803	µg/kg	U	UJ	8a
280-97393	NORPSW061	ST	Heptachlor	0.795	µg/kg	U	X	15
280-97393	NORPSW061	ST	Heptachlor	0.803	µg/kg	U	UJ	8a
280-97393	NORPSW061	ST	Heptachlor Epoxide	1.19	µg/kg	U	X	15
280-97393	NORPSW061	ST	Heptachlor Epoxide	1.2	µg/kg	U	UJ	8a
280-97393	NORPSW061	ST	Methoxychlor	1.19	µg/kg	U	X	15
280-97393	NORPSW061	ST	Methoxychlor	1.2	µg/kg	U	UJ	8a
280-97393	NORPSW061	ST	Toxaphene	39.2	µg/kg	U	X	15
280-97393	NORPSW061	ST	Toxaphene	39.6	µg/kg	U	UJ	8a
280-97393	NORPSW062	ST	Acetone	10.2	µg/kg	JB	JB	6a
280-97393	NORPSW062	ST	Aldrin	0.895	µg/kg	U	X	15
280-97393	NORPSW062	ST	Alpha-BHC	0.895	µg/kg	U	X	15
280-97393	NORPSW062	ST	Beta-BHC	2.23	µg/kg	U	X	15

Delivery Group	Field Sample ID	Sample Matrix	Compound	Result	Reporting Units	Laboratory Qualifier	Data Validation Qualifier	Data Validation Reason Code
280-97393	NORPSW062	ST	Delta-BHC	1.34	µg/kg	U	X	15
280-97393	NORPSW062	ST	Gamma-BHC (Lindane)	1.34	µg/kg	U	X	15
280-97393	NORPSW062	ST	Bromomethane	2.5	µg/kg	U	UJ	7a
280-97393	NORPSW062	ST	Chlordane	26.7	µg/kg	U	X	15
280-97393	NORPSW062	ST	Alpha-chlordane	0.895	µg/kg	U	X	15
280-97393	NORPSW062	ST	Gamma-Chlordane	0.895	µg/kg	U	X	15
280-97393	NORPSW062	ST	4,4'-DDD	2.23	µg/kg	U	X	15
280-97393	NORPSW062	ST	4,4'-DDE	0.895	µg/kg	U	X	15
280-97393	NORPSW062	ST	4,4'-DDT	2.23	µg/kg	U	X	15
280-97393	NORPSW062	ST	Dieldrin	0.895	µg/kg	U	X	15
280-97393	NORPSW062	ST	Endosulfan I	0.895	µg/kg	U	X	15
280-97393	NORPSW062	ST	Endosulfan II	0.895	µg/kg	U	X	15
280-97393	NORPSW062	ST	Endosulfan Sulfate	0.895	µg/kg	U	X	15
280-97393	NORPSW062	ST	Endrin	0.895	µg/kg	U	X	15
280-97393	NORPSW062	ST	Endrin Aldehyde	0.895	µg/kg	U	X	15
280-97393	NORPSW062	ST	Heptachlor	0.895	µg/kg	U	X	15
280-97393	NORPSW062	ST	Heptachlor Epoxide	1.34	µg/kg	U	X	15
280-97393	NORPSW062	ST	Methoxychlor	1.34	µg/kg	U	X	15
280-97393	NORPSW062	ST	Toxaphene	44.1	µg/kg	U	X	15
280-97393	NORPSW063	ST	1,1-Dichloroethane	2.08	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	1,1-Dichloroethene	4.16	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Acetone	32	µg/kg	JB	JB	6a
280-97393	NORPSW063	ST	Aldrin	1.38	µg/kg	U	X	15
280-97393	NORPSW063	ST	Aldrin	129	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Alpha-BHC	1.38	µg/kg	U	X	15
280-97393	NORPSW063	ST	Alpha-BHC	129	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Beta-BHC	3.44	µg/kg	U	X	15
280-97393	NORPSW063	ST	Beta-BHC	321	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Delta-BHC	2.06	µg/kg	U	X	15
280-97393	NORPSW063	ST	Delta-BHC	192	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Gamma-BHC (Lindane)	2.06	µg/kg	U	X	15
280-97393	NORPSW063	ST	Gamma-BHC (Lindane)	192	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Bromochloromethane	2.08	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Bromomethane	4.16	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Carbon disulfide	4.16	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Chlordane	41.2	µg/kg	U	X	15

Delivery Group	Field Sample ID	Sample Matrix	Compound	Result	Reporting Units	Laboratory Qualifier	Data Validation Qualifier	Data Validation Reason Code
280-97393	NORPSW063	ST	Chlordane	3840	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Alpha-chlordane	1.38	µg/kg	U	X	15
280-97393	NORPSW063	ST	Alpha-chlordane	129	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Gamma-Chlordane	1.38	µg/kg	U	X	15
280-97393	NORPSW063	ST	Gamma-Chlordane	129	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	cis-1,2-Dichloroethene	4.16	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Chloroethane	8.33	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Chloromethane	4.16	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	2,2-Dichloropropane	4.16	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	4,4'-DDD	3.44	µg/kg	U	X	15
280-97393	NORPSW063	ST	4,4'-DDD	321	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	4,4'-DDE	1.38	µg/kg	U	X	15
280-97393	NORPSW063	ST	4,4'-DDE	129	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	4,4'-DDT	3.44	µg/kg	U	X	15
280-97393	NORPSW063	ST	4,4'-DDT	321	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Dieldrin	1.38	µg/kg	U	X	15
280-97393	NORPSW063	ST	Dieldrin	129	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Endosulfan I	1.38	µg/kg	U	X	15
280-97393	NORPSW063	ST	Endosulfan I	129	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Endosulfan II	1.38	µg/kg	U	X	15
280-97393	NORPSW063	ST	Endosulfan II	129	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Endosulfan Sulfate	1.38	µg/kg	U	X	15
280-97393	NORPSW063	ST	Endosulfan Sulfate	129	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Endrin	1.38	µg/kg	U	X	15
280-97393	NORPSW063	ST	Endrin	129	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Endrin Aldehyde	1.38	µg/kg	U	X	15
280-97393	NORPSW063	ST	Endrin Aldehyde	129	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Trichlorofluoromethane	8.33	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Dichlorodifluoromethane	4.16	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Heptachlor	1.38	µg/kg	U	X	15
280-97393	NORPSW063	ST	Heptachlor	129	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Heptachlor Epoxide	2.06	µg/kg	U	X	15
280-97393	NORPSW063	ST	Heptachlor Epoxide	192	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Methyl ethyl ketone	16.7	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Methylene chloride	8.33	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Methoxychlor	2.06	µg/kg	U	X	15

Delivery Group	Field Sample ID	Sample Matrix	Compound	Result	Reporting Units	Laboratory Qualifier	Data Validation Qualifier	Data Validation Reason Code
280-97393	NORPSW063	ST	Methoxychlor	192	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Tert-Butyl Methyl Ether	2.08	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	1,1,1-Trichloroethane	4.16	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Chloroform	2.08	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Toxaphene	68	µg/kg	U	X	15
280-97393	NORPSW063	ST	Toxaphene	6340	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	trans-1,2-Dichloroethene	2.08	µg/kg	U	UJ	7a
280-97393	NORPSW063	ST	Vinyl Chloride	8.33	µg/kg	U	UJ	7a
280-97393	NORPSW064	ST	1,1-Dichloroethane	1.1	µg/kg	U	UJ	7a
280-97393	NORPSW064	ST	1,1-Dichloroethene	2.19	µg/kg	U	UJ	7a
280-97393	NORPSW064	ST	Acetone	16.3	µg/kg	JB	JB	6a
280-97393	NORPSW064	ST	Aldrin	0.943	µg/kg	U	X	15
280-97393	NORPSW064	ST	Alpha-BHC	0.943	µg/kg	U	X	15
280-97393	NORPSW064	ST	Beta-BHC	2.35	µg/kg	U	X	15
280-97393	NORPSW064	ST	Delta-BHC	1.41	µg/kg	U	X	15
280-97393	NORPSW064	ST	Gamma-BHC (Lindane)	1.41	µg/kg	U	X	15
280-97393	NORPSW064	ST	Bromochloromethane	1.1	µg/kg	U	UJ	7a
280-97393	NORPSW064	ST	Bromomethane	2.19	µg/kg	U	UJ	7a
280-97393	NORPSW064	ST	Carbon disulfide	2.19	µg/kg	U	UJ	7a
280-97393	NORPSW064	ST	Chlordane	28.1	µg/kg	U	X	15
280-97393	NORPSW064	ST	Alpha-chlordane	0.943	µg/kg	U	X	15
280-97393	NORPSW064	ST	Gamma-Chlordane	0.943	µg/kg	U	X	15
280-97393	NORPSW064	ST	cis-1,2-Dichloroethene	2.19	µg/kg	U	UJ	7a
280-97393	NORPSW064	ST	Chloroethane	4.39	µg/kg	U	UJ	7a
280-97393	NORPSW064	ST	Chloromethane	2.19	µg/kg	U	UJ	7a
280-97393	NORPSW064	ST	2,2-Dichloropropane	2.19	µg/kg	U	UJ	7a
280-97393	NORPSW064	ST	4,4'-DDD	2.35	µg/kg	U	X	15
280-97393	NORPSW064	ST	4,4'-DDE	0.943	µg/kg	U	X	15
280-97393	NORPSW064	ST	4,4'-DDT	2.35	µg/kg	U	X	15
280-97393	NORPSW064	ST	Dieldrin	0.943	µg/kg	U	X	15
280-97393	NORPSW064	ST	Endosulfan I	0.943	µg/kg	U	X	15
280-97393	NORPSW064	ST	Endosulfan II	0.943	µg/kg	U	X	15
280-97393	NORPSW064	ST	Endosulfan Sulfate	0.943	µg/kg	U	X	15
280-97393	NORPSW064	ST	Endrin	0.943	µg/kg	U	X	15
280-97393	NORPSW064	ST	Endrin Aldehyde	0.943	µg/kg	U	X	15
280-97393	NORPSW064	ST	Trichlorofluoromethane	4.39	µg/kg	U	UJ	7a

Delivery Group	Field Sample ID	Sample Matrix	Compound	Result	Reporting Units	Laboratory Qualifier	Data Validation Qualifier	Data Validation Reason Code
280-97393	NORPSW064	ST	Dichlorodifluoromethane	2.19	µg/kg	U	UJ	7a
280-97393	NORPSW064	ST	Heptachlor	0.943	µg/kg	U	X	15
280-97393	NORPSW064	ST	Heptachlor Epoxide	1.41	µg/kg	U	X	15
280-97393	NORPSW064	ST	Methyl ethyl ketone	8.78	µg/kg	U	UJ	7a
280-97393	NORPSW064	ST	Methylene chloride	4.39	µg/kg	U	UJ	7a
280-97393	NORPSW064	ST	Methoxychlor	1.41	µg/kg	U	X	15
280-97393	NORPSW064	ST	Tert-Butyl Methyl Ether	1.1	µg/kg	U	UJ	7a
280-97393	NORPSW064	ST	1,1,1-Trichloroethane	2.19	µg/kg	U	UJ	7a
280-97393	NORPSW064	ST	Chloroform	1.1	µg/kg	U	UJ	7a
280-97393	NORPSW064	ST	Toxaphene	46.4	µg/kg	U	X	15
280-97393	NORPSW064	ST	trans-1,2-Dichloroethene	1.1	µg/kg	U	UJ	7a
280-97393	NORPSW064	ST	Vinyl Chloride	4.39	µg/kg	U	UJ	7a

Appendix E

Waste Manifests

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Aragonite, Utah Facility

Fact Sheet

The Aragonite incineration facility is located in the Great Salt Lake Desert approximately 75 miles west of Salt Lake City, Utah, in Tooele County. Its location is within a 100 square-mile zone established by the Tooele County Commission to be used exclusively for hazardous waste management activities. The nearest residential neighbor is approximately 45 miles southeast of the facility in Grantsville, Utah.

Within a 30-mile radius and in a southerly direction of the site, the land is used by the U.S. Army and Air Force for desert warfare training. The Federal Bureau of Land Management owns 95% of the land in the surrounding thirty miles.

Facility Description & General Information

Start-up Date: 1991

Facility Size: 35 acres

Services Provided

- Rotary Kiln Incineration Technology
- Storage prior to final Treatment and/or Disposal
- Direct Burn liquids and sludge from tankers
- Disposal of TSCA/RCRA bulk and containerized waste including labpack containers
- DEA Controlled Substance Reverse Distributor, Schedules 1-5
- Rail served by both Union Pacific and Burlington Northern Railways

Typical Customers: Refineries, R&D facilities, colleges and universities, government research facilities, pharmaceutical companies, chemical facilities, state and municipal agencies, manufacturers, medical facilities.

Typical Waste Streams: Contaminated process wastewaters, inorganic cleaning solutions, oils, spent flammable solvents, organic and inorganic laboratory chemicals, paint residues, debris from toxic or reactive chemical cleanups, off-spec commercial products, household hazardous, DEA controlled substances, infectious and medical waste.

Clean Harbors Permitted Services

- US EPA ID No. UTD981552177
- Notification of Hazardous Waste Activity UTD981552177
- Notification of PCB Activity UTD981552177
- Conditional Use and Zoning Permits (Tooele County)
- Title V Air Permit 4500048001
- CERCLA Approval
- RCRA Construction and Operation of a Hazardous Waste Facility UTD981552177
- TSCA (Transfer, Storage of PCBs) UTD981552177
- DEA Controlled Substance Registration Certificate # RC0331049
- Laboratory Certification (NELAP)
- APHIS Soil (Permit to import soils) P330-94-0036

Treatment, Storage and Disposal Capabilities

- Drum Storage Capacity (RCRA/TSCA): 550,000 gallons (10,000 drums)
- Liquid Tank Storage Capacity (RCRA/TSCA): 480,000 gallons
- Sludge Tank Storage Capacity (Non-Flammable RCRA/TSCA): 30,000 gallons
- Bulk Solid Tank Storage Capacity (Non-Flammable RCRA/TSCA): 1,200 cubic yards at Aragonite. With the neighboring Clive facility, Aragonite can receive and store rail quantities and event business.
- Wide range of permitted waste codes

Clean Harbors Aragonite, LLC • 11600 North Aptus Road • Aragonite, Utah 84029 • 435.884.8100 • www.cleanharbors.com

Clean Harbors Aragonite LLC
11600 North Aptus Road
Grantsville UT, 84029
UTD981552177
(435) 884-8100

CERTIFICATE OF DISPOSAL

Manifest Mailing Name :	Air Force Civil Engineeer Center		
Manifest Mailing Address:	3411 Olson Street McClellan, CA 95652	Job Address:	1601 E 3rd St. San Bernadino, CA 92408
Customer Contact Name:	Mr Cord Trammell	Generator Contact Name:	Mr Mike Swart
Sales Order #:	1703623146	Date Received:	7/20/2017
Generator EPA ID:	CA4570024345	Manifest #:	1703623146-1

Line #	Profile/Description		Disposal Date	Method of Disposal	Disposal Facility
1	CH1422888	Non-Hazardous Soils	7/20/2017	Incineration	Aragonite, UT Facility

Under Civil and Criminal Penalties of Law for the making or submission of false or fraudulent statements or representations (18 U.S.C. 1001 and 15 U.S.C. 2615), I certify that the information contained in or accompanying this document is true, accurate, and complete. As to the identified section(s) of this document for which I cannot personally verify truth and accuracy, I certify as the company official having supervisory responsibility for the persons who, acting under my direct instructions, made the verification that this information is true, accurate, and complete.

Name: Paul A. Wells

Title: VP Environmental Applications

Date: Tuesday, December 19, 2017

Clean Harbors Aragonite LLC
11600 North Aptus Road
Grantsville UT, 84029
UTD981552177
(435) 884-8100

CERTIFICATE OF DISPOSAL

Manifest Mailing Name :	Air Force Civil Engineeer Center		
Manifest Mailing Address:	3411 Olson Street McClellan, CA 95652	Job Address:	1601 E 3rd St. San Bernadino, CA 92408
Customer Contact Name:	Mr Cord Trammell	Generator Contact Name:	Mr Mike Swart
Sales Order #:	1703623146	Date Received:	7/20/2017
Generator EPA ID:	CA4570024345	Manifest #:	1703623146-2

Line #	Profile/Description	Disposal Date	Method of Disposal	Disposal Facility
1	CH1422888 Non-Hazardous Soils	7/20/2017	Incineration	Aragonite, UT Facility

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UTD981552177
(435) 884-8100

CERTIFICATE OF DISPOSAL

Manifest Mailing Name :	Air Force Civil Engineeer Center		
Manifest Mailing Address:	3411 Olson Street McClellan, CA 95652	Job Address:	1601 E 3rd St. San Bernadino, CA 92408
Customer Contact Name:	Mr Cord Trammell	Generator Contact Name:	Mr Mike Swart
Sales Order #:	1703623146	Date Received:	7/21/2017
Generator EPA ID:	CA4570024345	Manifest #:	1703623146-3

Line #	Profile/Description		Disposal Date	Method of Disposal	Disposal Facility
1	CH1422888	Non-Hazardous Soils	7/24/2017	Incineration	Aragonite, UT Facility

Under Civil and Criminal Penalties of Law for the making or submission of false or fraudulent statements or representations (18 U.S.C. 1001 and 15 U.S.C. 2615), I certify that the information contained in or accompanying this document is true, accurate, and complete. As to the identified section(s) of this document for which I cannot personally verify truth and accuracy, I certify as the company official having supervisory responsibility for the persons who, acting under my direct instructions, made the verification that this information is true, accurate, and complete.

Name: Paul A. Wells

Title: VP Environmental Applications

Date: Tuesday, December 19, 2017

Clean Harbors Aragonite LLC
11600 North Aptus Road
Grantsville UT, 84029
UTD981552177
(435) 884-8100

CERTIFICATE OF DISPOSAL

Manifest Mailing Name :	Air Force Civil Engineeer Center		
Manifest Mailing Address:	3411 Olson Street McClellan, CA 95652	Job Address:	1601 E 3rd St. San Bernadino, CA 92408
Customer Contact Name:	Mr Cord Trammell	Generator Contact Name:	Mr Mike Swart
Sales Order #:	1703624324	Date Received:	7/25/2017
Generator EPA ID:	CA4570024345	Manifest #:	1703624321-01

Line #	Profile/Description	Disposal Date	Method of Disposal	Disposal Facility
1	CH1422887 Non Hazardous Liquid	8/3/2017	Incineration	Aragonite, UT Facility

Under Civil and Criminal Penalties of Law for the making or submission of false or fraudulent statements or representations (18 U.S.C. 1001 and 15 U.S.C. 2615), I certify that the information contained in or accompanying this document is true, accurate, and complete. As to the identified section(s) of this document for which I cannot personally verify truth and accuracy, I certify as the company official having supervisory responsibility for the persons who, acting under my direct instructions, made the verification that this information is true, accurate, and complete.

Name: Paul A. Wells

Title: VP Environmental Applications

Date: Tuesday, December 19, 2017

Clean Harbors Aragonite LLC
11600 North Aptus Road
Grantsville UT, 84029
UTD981552177
(435) 884-8100

CERTIFICATE OF DISPOSAL

Manifest Mailing Name :	Air Force Civil Engineeer Center		
Manifest Mailing Address:	3411 Olson Street McClellan, CA 95652	Job Address:	1601 E 3rd St. San Bernadino, CA 92408
Customer Contact Name:	Mr Cord Trammell	Generator Contact Name:	Mr Mike Swart
Sales Order #:	1703624324	Date Received:	7/26/2017
Generator EPA ID:	CA4570024345	Manifest #:	1703624324-2

Line #	Profile/Description		Disposal Date	Method of Disposal	Disposal Facility
1	CH1422887	Non Hazardous Liquid	7/30/2017	Incineration	Aragonite, UT Facility

Under Civil and Criminal Penalties of Law for the making or submission of false or fraudulent statements or representations (18 U.S.C. 1001 and 15 U.S.C. 2615), I certify that the information contained in or accompanying this document is true, accurate, and complete. As to the identified section(s) of this document for which I cannot personally verify truth and accuracy, I certify as the company official having supervisory responsibility for the persons who, acting under my direct instructions, made the verification that this information is true, accurate, and complete.

Name: Paul A. Wells

Title: VP Environmental Applications

Date: Tuesday, December 19, 2017

Clean Harbors Aragonite LLC
11600 North Aptus Road
Grantsville UT, 84029
UTD981552177
(435) 884-8100

CERTIFICATE OF DISPOSAL

Manifest Mailing Name :	Air Force Civil Engineeer Center		
Manifest Mailing Address:	3411 Olson Street McClellan, CA 95652	Job Address:	1601 E 3rd St. San Bernadino, CA 92408
Customer Contact Name:	Mr Cord Trammell	Generator Contact Name:	Mr Mike Swart
Sales Order #:	1703623146	Date Received:	7/27/2017
Generator EPA ID:	CA4570024345	Manifest #:	1703623146-4

Line #	Profile/Description		Disposal Date	Method of Disposal	Disposal Facility
1	CH1422888	Non-Hazardous Soils	7/27/2017	Incineration	Aragonite, UT Facility

Under Civil and Criminal Penalties of Law for the making or submission of false or fraudulent statements or representations (18 U.S.C. 1001 and 15 U.S.C. 2615), I certify that the information contained in or accompanying this document is true, accurate, and complete. As to the identified section(s) of this document for which I cannot personally verify truth and accuracy, I certify as the company official having supervisory responsibility for the persons who, acting under my direct instructions, made the verification that this information is true, accurate, and complete.

Name: Paul A. Wells

Title: VP Environmental Applications

Date: Tuesday, December 19, 2017

Clean Harbors Aragonite LLC
11600 North Aptus Road
Grantsville UT, 84029
UTD981552177
(435) 884-8100

CERTIFICATE OF DISPOSAL

Manifest Mailing Name :	Air Force Civil Engineeer Center		
Manifest Mailing Address:	3411 Olson Street McClellan, CA 95652	Job Address:	1601 E 3rd St. San Bernadino, CA 92408
Customer Contact Name:	Mr Cord Trammell	Generator Contact Name:	Mr Mike Swart
Sales Order #:	1703623146	Date Received:	7/27/2017
Generator EPA ID:	CA4570024345	Manifest #:	1703623146-5

Line #	Profile/Description		Disposal Date	Method of Disposal	Disposal Facility
1	CH1422888	Non-Hazardous Soils	7/27/2017	Incineration	Aragonite, UT Facility

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Name: Paul A. Wells

Title: VP Environmental Applications

Date: Tuesday, December 19, 2017

Clean Harbors Aragonite LLC
11600 North Aptus Road
Grantsville UT, 84029
UTD981552177
(435) 884-8100

CERTIFICATE OF DISPOSAL

Manifest Mailing Name :	Air Force Civil Engineeer Center		
Manifest Mailing Address:	3411 Olson Street McClellan, CA 95652	Job Address:	1601 E 3rd St. San Bernadino, CA 92408
Customer Contact Name:	Mr Cord Trammell	Generator Contact Name:	Mr Mike Swart
Sales Order #:	1703623146	Date Received:	7/27/2017
Generator EPA ID:	CA4570024345	Manifest #:	1703623146-6

Line #	Profile/Description		Disposal Date	Method of Disposal	Disposal Facility
1	CH1422888	Non-Hazardous Soils	7/27/2017	Incineration	Aragonite, UT Facility

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Name: Paul A. Wells

Title: VP Environmental Applications

Date: Tuesday, December 19, 2017

Clean Harbors Aragonite LLC
11600 North Aptus Road
Grantsville UT, 84029
UTD981552177
(435) 884-8100

CERTIFICATE OF DISPOSAL

Manifest Mailing Name :	Air Force Civil Engineeer Center		
Manifest Mailing Address:	3411 Olson Street McClellan, CA 95652	Job Address:	1601 E 3rd St. San Bernadino, CA 92408
Customer Contact Name:	Mr Cord Trammell	Generator Contact Name:	Mr Mike Swart
Sales Order #:	1703624324	Date Received:	7/28/2017
Generator EPA ID:	CA4570024345	Manifest #:	4324-3

Line #	Profile/Description		Disposal Date	Method of Disposal	Disposal Facility
1	CH1422887	Non Hazardous Liquid	7/30/2017	Incineration	Aragonite, UT Facility

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Name: Paul A. Wells

Title: VP Environmental Applications

Date: Tuesday, December 19, 2017

Clean Harbors Aragonite LLC
11600 North Aptus Road
Grantsville UT, 84029
UTD981552177
(435) 884-8100

CERTIFICATE OF DISPOSAL

Manifest Mailing Name :	Air Force Civil Engineeer Center		
Manifest Mailing Address:	3411 Olson Street McClellan, CA 95652	Job Address:	1601 E 3rd St. San Bernadino, CA 92408
Customer Contact Name:	Mr Cord Trammell	Generator Contact Name:	Mr Mike Swart
Sales Order #:	1703623146	Date Received:	8/17/2017
Generator EPA ID:	CA4570024345	Manifest #:	3146-10

Line #	Profile/Description		Disposal Date	Method of Disposal	Disposal Facility
1	CH1422888	Non-Hazardous Soils	8/24/2017	Incineration	Aragonite, UT Facility

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Name: Paul A. Wells

Title: VP Environmental Applications

Date: Tuesday, December 19, 2017

Clean Harbors Aragonite LLC
11600 North Aptus Road
Grantsville UT, 84029
UTD981552177
(435) 884-8100

CERTIFICATE OF DISPOSAL

Manifest Mailing Name :	Air Force Civil Engineeer Center		
Manifest Mailing Address:	3411 Olson Street McClellan, CA 95652	Job Address:	1601 E 3rd St. San Bernadino, CA 92408
Customer Contact Name:	Mr Cord Trammell	Generator Contact Name:	Mr Mike Swart
Sales Order #:	1703624324	Date Received:	8/17/2017
Generator EPA ID:	CA4570024345	Manifest #:	4324-4

Line #	Profile/Description		Disposal Date	Method of Disposal	Disposal Facility
1	CH1422887	Non Hazardous Liquid	8/25/2017	Incineration	Aragonite, UT Facility

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Name: Paul A. Wells

Title: VP Environmental Applications

Date: Tuesday, December 19, 2017

Clean Harbors Aragonite LLC
11600 North Aptus Road
Grantsville UT, 84029
UTD981552177
(435) 884-8100

CERTIFICATE OF DISPOSAL

Manifest Mailing Name :	Air Force Civil Engineeer Center		
Manifest Mailing Address:	3411 Olson Street McClellan, CA 95652	Job Address:	1601 E 3rd St. San Bernadino, CA 92408
Customer Contact Name:	Mr Cord Trammell	Generator Contact Name:	Mr Mike Swart
Sales Order #:	1704302805	Date Received:	9/6/2017
Generator EPA ID:	CA4570024345	Manifest #:	NH3146-9

Line #	Profile/Description	Disposal Date	Method of Disposal	Disposal Facility
1	CH1486229 Non-Hazardous Poly Sheeting, Poly Tubing and PPE	9/28/2017	Incineration	Aragonite, UT Facility

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Name: Paul A. Mills

Title: VP Environmental Applications

Date: Tuesday, December 19, 2017

1703624324 17201 Truck: 16666

NON-HAZARDOUS WASTE MANIFEST

California Uniform Form

4786 01 522

DW 1703624324

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. CA4570024345

Manifest Document No. 1703624324-01

2. Page 1 of 1

3. Generator's Name and Mailing Address
Air Force Civil Engineeer Center
3411 Olson Street
McClellan CA 95652

Site Address :
1601 E 3rd St.
San Bernadino, CA 92408

4. Generator's Phone ((916) 643-0830 ATTN:Mike Swart

5. Transporter 1 Company Name: Clean Harbors Environmental Services, Inc.

6. US EPA ID Number: MAD039322250

A. State Transporter's ID

B. Transporter 1 Phone: (781) 792-5000

7. Transporter 2 Company Name

8. US EPA ID Number

C. State Transporter's ID

D. Transporter 2 Phone

9. Designated Facility Name and Site Address
Clean Harbors Aragonite LLC
11600 North Aptus Road
Grantsville, UT 84029

10. US EPA ID Number: UTD981552177

E. State Facility's ID

F. Facility's Phone: (435) 884-8100

11. WASTE DESCRIPTION

	Containers No.	Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON HAZARDOUS, NON D.O.T. REGULATED LIQUID, (WATER)	1	TT ~~truck~~	4400	Gal. TC G
b.				
c.				
d.				

G. Additional Descriptions for Materials Listed Above
11a.CH1422887

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
A: H040
TRL # 3195 101#22723551

EMERGENCY PHONE #: (800) 483-3718
GENERATOR: Air Force Civil Engineeer Center

16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name: Tim Cullen
Signature: on behalf of AFCEC/USAF
Date: Month 07 Day 24 Year 2017

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: RAYMOND WEBSTER
Signature
Date: Month 7 Day 24 Year 17

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name
Signature
Date: Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.
MOA
Printed/Typed Name: Michelle Lee
Signature: Michelle Lee
Date: Month 7 Day 25 Year 17

NON-HAZARDOUS WASTE

GENERATOR

TRANSPORTER

FACILITY

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Inspection Report by Manifests or Load

BUTTONWILLOW, CA FACILITY (BL)

Load No.: 172017

Manifest: 1703624321-01
Sales Order: 1703624324
Generator: Air Force Civil Engineeer Center (NO31019)
Generator EPA ID: CA4570024345
Manifest Doc No.:

Recorded By: _____
Dock: _____
Date _____

Tracking No.	Profile/Haz Class/Classification Code	Line #	Date	Init	Sample Time	Sample Method	Waste Charac	Physical Description	Lab Date and Init
59703570	CH1422887/N/A/A22K	1						24,000 LBS	

Total Items on Manifest 1703624321-01 : 1

Needed for pulled samples:

Waste Characterization: 1 - Inhibit Analysis, 2 - Debris, 3 - MSDS, 4 - Consumer Products & Pharmaceuticals, 5 - Controlled Substances, 6L - Samplable Liquids, 6S - Samplable Solids, 6M - Samplable Mixture, 7 - Lab PacksWaste Characterization:

Sampling Method:

S - Scoop, T - Tube

Report Printed On: 7/25/2017 9:17:28 AM
Page 2 of 3

LTLOW

Truck. Tank

DW 1703624324

Tank. 3194

NON-HAZARDOUS WASTE MANIFEST

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NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. CA4570024345

Manifest Document No. 1703624324-2

2. Page 1 of 1

Site Address: 1601 E 3rd St. San Bernadino, CA 92408

3. Generator's Name and Mailing Address
Air Force Civil Engineeer Center
3411 Olson Street
McClellan CA 95652
ATTN: Mike Swart

4. Generator's Phone ((916) 643-0830

5. Transporter 1 Company Name
Clean Harbors Environmental Services, Inc.

6. US EPA ID Number MAD039322250

A. State Transporter's ID

B. Transporter 1 Phone (781) 792-3000

C. State Transporter's ID

7. Transporter 2 Company Name

8. US EPA ID Number

D. Transporter 2 Phone

E. State Facility's ID

9. Designated Facility Name and Site Address
Clean Harbors Aragonite LLC
11600 North Aptus Road
Grantsville, UT 84029

10. US EPA ID Number UTD981552177

F. Facility's Phone (435) 884-8100

11. WASTE DESCRIPTION	Containers No.	Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON HAZARDOUS, NON D.O.T. REGULATED LIQUID. (WATER)	1	TT vac truck	4600	Gal.
b.				
c.				
d.				

G. Additional Descriptions for Materials Listed Above
11a.CH1422887

LOT# 22736182 3194

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

EMERGENCY PHONE #: (800) 483-3718

GENERATOR: Air Force Civil Engineeer Center

GENERATOR

NON-HAZARDOUS WASTE

16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name: Tim Cullen

Signature: on behalf of AFCEC/USAF

Date: Month 07 Day 25 Year 17

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: P James Bahlen

Signature: P James Bahlen

Date: Month 07 Day 25 Year 17

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name

Signature

Date: Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.

Printed/Typed Name: Mike Lazenby

Signature

Date: Month 7 Day 26 Year 17

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172056 Truck: 1668

NON-HAZARDOUS WASTE MANIFEST

DW 1703624324 522

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NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. CA4570024345

Manifest Document No. 4324-3

2. Page 1 of

3. Generator's Name and Mailing Address
Air Force Civil Engineeer Center
3411 Olson Street
McClellan CA 95652

4. Generator's Phone (916) 643-0830 ATTN: Mike Swart

Site Address:
1601 E 3rd St.
San Bernadino, CA 92408

5. Transporter 1 Company Name: Clean Harbors Environmental Services, Inc.

6. US EPA ID Number: MAD039322250

A. State Transporter's ID

B. Transporter 1 Phone (781) 792-5000

7. Transporter 2 Company Name

8. US EPA ID Number

C. State Transporter's ID

D. Transporter 2 Phone

9. Designated Facility Name and Site Address
Clean Harbors Aragonite LLC
11600 North Aptus Road
Grantsville, UT 84029

10. US EPA ID Number: UTD981552177

E. State Facility's ID

F. Facility's Phone (435) 884-8100

11. WASTE DESCRIPTION	Containers No.	Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON HAZARDOUS, NON D.O.T. REGULATED LIQUID, (WATER)	1	TT	4500	gal.
b.				
c.				
d.				

G. Additional Descriptions for Materials Listed Above
11a.CH1422887 LOT#22762861
TT 3852

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

EMERGENCY PHONE #: (800) 483-3718
GENERATOR: Air Force Civil Engineeer Center

GENERATOR

16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name: Tim Calla
Signature: on behalf of AFCEC/CIAF
Date: Month 07 Day 27 Year 17

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: C.A. Harris
Signature:
Date: Month 7 Day 27 Year 17

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name:
Signature:
Date: Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.
Printed/Typed Name: Mike Lazenby
Signature:
Date: Month 7 Day 28 Year 17

NON-HAZARDOUS WASTE

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177200 Truck: 1668

Norton AR # 576414 182 of 522

NON-HAZARDOUS WASTE MANIFEST

DW 1703624324

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. CA457 02 345

Manifest Document No. 4324-4

2. Page 1 of 1

3. Generator's Name and Mailing Address
Air Force Civil Engineeer Center
3411 Olson Street
McClellan CA 95652

4. Generator's Phone (916) 643-0830 ATTN:Mike Swart

~~Site Address~~:
1601 E 3rd St.
San Bernadino, CA 92408

5. Transporter 1 Company Name
Clean Harbors Environmental Services, Inc.

6. US EPA ID Number MAD03 32 250

A. State Transporter's ID

B. Transporter 1 Phone ~~(781) 792-5000~~

7. Transporter 2 Company Name

8. US EPA ID Number

C. State Transporter's ID

D. Transporter 2 Phone

9. Designated Facility Name and Site Address
Clean Harbors Aragonite LLC
11600 North Aptus Road
Grantsville, UT 84029

10. US EPA ID Number UTD 3 81 2177

E. State Facility's ID

F. Facility's Phone (435) 884-8100

11. WASTE DESCRIPTION	Containers No.	Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON HAZARDOUS, NON D.O.T. REGULATED LIQUID, (WATER	1	TT	23.66	gal.
b.				
c.				
d.				

G. Additional Descriptions for Materials Listed Above
11a.CH1422887

TT 3214

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

~~EMERGENCY PHONE #: (800) 483-3718~~

GENERATOR: Air Force Civil Engineeer Center

H040

16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name	Signature	Date Month	Day	Year
Tim Callon	on behalf of AFCEC/USAF	8	16	17

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date Month	Day	Year
Gil Harris		8	16	17

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date Month	Day	Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.

Printed/Typed Name	Signature	Date Month	Day	Year
Hollywood		8	17	17

NON-HAZARDOUS WASTE

GENERATOR

TRANSPORTER

FACILITY

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17144-1

Truck: 124

Norton AR # 576414

NON-HAZARDOUS WASTE MANIFEST

DW 1703623146

RO: 21115

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. CA4570024345

Manifest Document No. 1703623146-2

2. Page 1 of 1

3. Generator's Name and Mailing Address
Air Force Civil Engineeer Center
3411 Olson Street
McClellan CA 95652

Site Address:
1601 E 3rd St.
San Bernadino, CA 92408

4. Generator's Phone ((916) 643-0830 ATTN: Mike Swart

CAR000224568

5. Transporter 1 Company Name Bradley Tanks Inc. ~~Clean Harbors Environmental Services, Inc.~~

6. US EPA ID Number ~~MAD039322250~~

A. State Transporter's ID

B. Transporter 1 Phone (781) 792-5000

7. Transporter 2 Company Name

8. US EPA ID Number

C. State Transporter's ID

D. Transporter 2 Phone

9. Designated Facility Name and Site Address
Clean Harbors Aragonite LLC
11600 North Aptus Road
Grantsville, UT 84029

10. US EPA ID Number UTD981552177

E. State Facility's ID

F. Facility's Phone (435) 884-8100

GENERATOR

11. WASTE DESCRIPTION	Containers No.	Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON HAZARDOUS, NON D.O.T. REGULATED, (SOIL)	1	CM RD	10	CY, yds
b.				
c.				
d.				

G. Additional Descriptions for Materials Listed Above
11a.CH1422888

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
LOT# 22684896

EMERGENCY PHONE #: (800) 483-3718

GENERATOR: Air Force Civil Engineeer Center

16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name	Signature	Date Month	Day	Year
Tim Cullen	- on behalf of AFCEC/USAF	7	19	17

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date Month	Day	Year
David Flores		7	19	17

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date Month	Day	Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.

Printed/Typed Name	Signature	Date Month	Day	Year
Mike Lazenby		7	20	17

NON-HAZARDOUS WASTE

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NON-HAZARDOUS WASTE MANIFEST

NONHAZARD # 576414

DW 1703623146

RO: 20272

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NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. CA4570024345

Manifest Document No. 1703623146-1

2. Page 1 of 1

3. Generator's Name and Mailing Address
Air Force Civil Engineeer Center
3411 Olson Street
McClellan CA 95652

Site Address :
1601 E 3rd St.
San Bernadino, CA 92408

4. Generator's Phone ((916) 643-0830 ATTN: Mike Swart

5. Transporter 1 Company Name Bradley Tanks Inc
~~Clean Harbors Environmental Services, Inc.~~

6. US EPA ID Number CAR000224568
MAD039322250

A. State Transporter's ID

B. Transporter 1 Phone (781) 792-5000

C. State Transporter's ID

7. Transporter 2 Company Name

8. US EPA ID Number

D. Transporter 2 Phone

9. Designated Facility Name and Site Address
Clean Harbors Aragonite LLC
11600 North Aptus Road
Grantsville, UT 84029

10. US EPA ID Number UTD981552177

E. State Facility's ID

F. Facility's Phone (435) 884-8100

11. WASTE DESCRIPTION	Containers No.	Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON HAZARDOUS, NON D.O.T. REGULATED, (SOIL)	1	CM RO	10	CY, yds
b.				
c.				
d.				

G. Additional Descriptions for Materials Listed Above
11a.CH1422888

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
LOT# 22685193

EMERGENCY PHONE #: (800) 483-3718
GENERATOR: Air Force Civil Engineeer Center

GENERATOR

16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name: Tim Cullen
Signature: on behalf of AFCEC/USAF
Date: Month 7 Day 19 Year 17

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: Paulino Marin
Signature
Date: Month 7 Day 19 Year 17

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name
Signature
Date: Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.
Printed/Typed Name: Mike Lazenby
Signature
Date: Month 7 Day 20 Year 17

NON-HAZARDOUS WASTE

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Inspection Report by Manifests or Load

ARAGONITE, UT FACILITY (AG)

Load No.: 172007

Manifest: 1703623146-3
Sales Order: 1703623146
Generator: Air Force Civil Engineeer Center (NO31019)
Generator EPA ID: CA4570024345
Manifest Doc No.:

Recorded By: _____
Dock: _____
Date _____

Tracking No.	Profile/Haz Class/Classification Code	Line #	Date	Init	Sample Time	Sample Method	Waste Charac	Physical Description	Lab Date and Init
59647707	CH1422888/N/A/CCRK	1						24,000 LBS	

Total Items on Manifest 1703623146-3 : 1

Needed for pulled samples:

Waste Characterization: 1 - Inhibit Analysis, 2 - Debris, 3 - MSDS, 4 - Consumer Products & Pharmaceuticals, 5 - Controlled Substances, 6L - Samplable Liquids, 6S - Samplable Solids, 6M - Samplable Mixture, 7 - Lab PacksWaste Characterization:

Sampling Method:

S - Scoop, T - Tube

Report Printed On: 7/21/2017 10:01:58 AM
Page 1 of 3

17200 1

Truck # 121

NON-HAZARDOUS WASTE MANIFEST

DW 1703623146 CHMP

CM, RO # 20016

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NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. CA4570024345

Manifest Document No. 1703623146 3

2. Page 1 of 1

3. Generator's Name and Mailing Address
Air Force Civil Engineer Center
3411 Olson Street
McClellan CA 95652

Site Address:
1601 E 3rd St.
San Bernadino, CA 92408

4. Generator's Phone ((916) 643-0830 ATTN: Mike Swart CAR000224568

5. Transporter 1 Company Name Bradley Tanks Inc, ~~Clean Harbors Environmental Services, Inc.~~

6. US EPA ID Number ~~MAD039322250~~

A. State Transporter's ID

B. Transporter 1 Phone (781) 792-5000

7. Transporter 2 Company Name

8. US EPA ID Number

C. State Transporter's ID

D. Transporter 2 Phone

9. Designated Facility Name and Site Address
Clean Harbors Aragonite LLC
11600 North Aptus Road
Grantsville, UT 84029

10. US EPA ID Number UTD981552177

E. State Facility's ID

F. Facility's Phone (435) 884-8100

11. WASTE DESCRIPTION	Containers No.	Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON HAZARDOUS, NON D.O.T. REGULATED, (SOIL)	1	CM RO	10	CU. yds.
b.				
c.				
d.				

GENERATOR

G. Additional Descriptions for Materials Listed Above
11a.CH1422888 A: H040
lot # 226a091a

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

EMERGENCY PHONE #: (800) 483-3718

GENERATOR: Air Force Civil Engineer Center

NON-HAZARDOUS WASTE

16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name: Jim Cullen
Signature: -on behalf of AFCEC/USAF
Date: Month 7 Day 20 Year 17

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: DANIEL Hernandez
Signature:
Date: Month 7 Day 20 Year 17

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name:
Signature:
Date: Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.
Printed/Typed Name: Michelle Lee
Signature:
Date: Month 7 Day 21 Year 17

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172011

Truck: 124

NON-HAZARDOUS WASTE MANIFEST

DW 1703623146

chhp 20482

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NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. CA4570024345

Manifest Document No. 1703623146-4

2. Page 1 of 1

3. Generator's Name and Mailing Address
Air Force Civil Engineeer Center
3411 Olson Street
McClellan CA 95652

Site Address :
1601 E 3rd St.
San Bernadino,CA 92408

4. Generator's Phone ((916) 643-0830 ATTN:Mike Swart

5. Transporter 1 Company Name Bradley Tanks, Inc. BTI Environmental ~~Clean Harbors Environmental Services, Inc.~~

6. US EPA ID Number CAR000214478 ~~MAD 099322250~~

A. State Transporter's ID

B. Transporter 1 Phone (781) 792-5000

7. Transporter 2 Company Name

8. US EPA ID Number

C. State Transporter's ID

D. Transporter 2 Phone

9. Designated Facility Name and Site Address
Clean Harbors Aragonite LLC
11600 North Aptus Road
Grantsville, UT 84029

10. US EPA ID Number UTD981552177

E. State Facility's ID

F. Facility's Phone (435) 884-8100

11. WASTE DESCRIPTION	Containers No.	Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON HAZARDOUS, NON D.O.T. REGULATED, (SOIL)	1	~~RO~~ OF CM	10	CY yds (Y)
b.				
c.				
d.				

G. Additional Descriptions for Materials Listed Above
11a CH1422888
LOT#22748861

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
EMERGENCY PHONE #: (800) 483-3718
GENERATOR: Air Force Civil Engineeer Center

16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name: Tim Cullen
Signature: on behalf of AFCEC/USAF
Date: Month 07 Day 26 Year 17

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: David Fields
Signature:
Date: Month 7 Day 26 Year 17

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name: Mike Lazenby
Signature:
Date: Month 7 Day 27 Year 17

19. Discrepancy Indication Space
HU40

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.
Printed/Typed Name: Michelle Lee
Signature:
Date: Month 7 Day 27 Year 17

GENERATOR

TRANSPORTER

FACILITY

NON-HAZARDOUS WASTE

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172038

bin # CHHP21274 Truck: 121

NON-HAZARDOUS WASTE MANIFEST

DW 1703623146

Bin # 21274

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NON-HAZARDOUS WASTE MANIFEST	1. Generator's US EPA ID No. CA4570024345	Manifest Document No. 1703623146-B	2. Page 1 of 1
3. Generator's Name and Mailing Address Air Force Civil Engineeer Center 3411 Olson Street McClellan CA 95652		Site Address : 1601 E 3rd St. San Bernadino, CA 92408	
4. Generator's Phone ((916) 643-0830	ATTN: Mike Swart		
5. Transporter 1 Company Name Bradley Tanks, Inc. ~~Clean Harbors Environmental Services, Inc.~~	6. US EPA ID Number CAR000224568 ~~MAD022022250~~ D.H	A. State Transporter's ID B. Transporter 1 Phone (781) 792-5000	
7. Transporter 2 Company Name	8. US EPA ID Number	C. State Transporter's ID D. Transporter 2 Phone	
9. Designated Facility Name and Site Address Clean Harbors Aragonite LLC 11600 North Aptus Road Grantsville, UT 84029	10. US EPA ID Number UTD981552177	E. State Facility's ID F. Facility's Phone (435) 884-8100	

11. WASTE DESCRIPTION	Containers No.	Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON HAZARDOUS, NON D.O.T. REGULATED, (SOIL)	1	C.M. ~~[illegible]~~ D.H	10	CU. yds. (Y)
b.				
c.				
d.				

G. Additional Descriptions for Materials Listed Above

11a. CH1422888

LOT# 22748970

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

EMERGENCY PHONE #: (800) 483-3718

GENERATOR: Air Force Civil Engineeer Center

16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name	Signature	Date Month Day Year
Tim Cullen	on behalf of AFCEC / USAF	07 26 17

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date Month Day Year
Daniel Hernandez		7 26 17

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.

Printed/Typed Name	Signature	Date Month Day Year
Mike Lazenby		7 27 17

GENERATOR

TRANSPORTER

FACILITY

NON-HAZARDOUS WASTE

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Manifest 172031

bin # CHHP 21491

Truck: 125

NON-HAZARDOUS WASTE MANIFEST

DW 1703623146

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NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.: CA4570024345

Manifest Document No.: 1703623146-6

2. Page 1 of 1

3. Generator's Name and Mailing Address
Air Force Civil Engineeer Center
3411 Olson Street
McClellan CA 95652

4. Generator's Phone: (916)643-0830 ATTN:Mike Swart

Site Address:
1601 E 3rd St.
San Bernadino,CA 92408

5. Transporter 1 Company Name: Bulldog Trucking Inc. / Clean Harbors Environmental Services, Inc.

US EPA ID Number: CAD099224568 / MAD039322250

A. State Transporter's ID

B. Transporter 1 Phone: (781)792-5000

7. Transporter 2 Company Name

8. US EPA ID Number

C. State Transporter's ID

D. Transporter 2 Phone

9. Designated Facility Name and Site Address
Clean Harbors Aragonite LLC
11600 North Aptus Road
Grantsville, UT 84029

10. US EPA ID Number: UTD981552177

E. State Facility's ID

F. Facility's Phone: (435) 884-8100

11. WASTE DESCRIPTION	Containers No.	Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON HAZARDOUS, NON D.O.T. REGULATED, (SOIL)	1	~~RO~~ CM	10	CY/YDS.
b.				
c.				
d.				

G. Additional Descriptions for Materials Listed Above
11a.CH1422888
LOT#22749035

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
EMERGENCY PHONE #: (800) 483-3718
GENERATOR: Air Force Civil Engineeer Center

16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name: Tim Cullen
Signature: Tim Cullen - On behalf of AFCEC/USAF
Date: Month 07 Day 26 Year 17

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: Ramon Lopez
Signature
Date: Month 07 Day 26 Year 17

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name
Signature
Date: Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.
Printed/Typed Name: Mike Lazenby
Signature
Date: Month 7 Day 27 Year 17

GENERATOR

TRANSPORTER

FACILITY

NON-HAZARDOUS WASTE

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172248 Truck ST1006

Norton AR # 576414

DW 1703623146

RO: DR11706

NON-HAZARDOUS WASTE MANIFEST

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NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. CA4570024345

Manifest Document No. 3146-8

2. Page 1 of 1

3. Generator's Name and Mailing Address
Air Force Civil Engineer Center
3411 Olson Street
McClellan CA 95652

Site Address
1601 E 3rd St.
San Bernadino, CA 92408

4. Generator's Phone (916) 643-0830 ATTN: Mike Swart

5. Transporter 1 Company Name: KM Industrial

6. US EPA ID Number: CAR000075622

A. State Transporter's ID

B. Transporter 1 Phone

7. Transporter 2 Company Name

8. US EPA ID Number

C. State Transporter's ID

D. Transporter 2 Phone

9. Designated Facility Name and Site Address
Clean Harbors Aragonite LLC
11600 North Aptus Road
Grantsville, UT 84029

10. US EPA ID Number: UTD981552177

E. State Facility's ID

F. Facility's Phone (435) 884-8100

11. WASTE DESCRIPTION

	Containers No.	Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON HAZARDOUS, NON DOT REGULATED (SOIL)	1	CMS	10	cu. yds
b.				
c.				
d.				

G. Additional Descriptions for Materials Listed Above

11a. CH1422888

A: H040 lot # 22942823

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

~~EMERGENCY PHONE #: (800) 483-3711~~

GENERATOR: Air Force Civil Engineeer Center

NON-HAZARDOUS WASTE

GENERATOR

16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name: Tim Cullen | Signature: on behalf of AFCEC/USAF | Date: Month 8 Day 16 Year 17

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: SHAWN SEYMORE | Signature | Date: Month 8 Day 16 Year 17

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name | Signature | Date: Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.

Printed/Typed Name: Michelle Lee | Signature | Date: Month 8 Day 14 Year 17

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NON-HAZARDOUS WASTE MANIFEST

DW 1703623146

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NON-HAZARDOUS WASTE

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. CA4570024 45

Manifest Document No. 3146-10

2. Page 1 of 1

3. Generator's Name and Mailing Address
Air Force Civil Engineeer Center
3411 Olson Street
McClellan CA 95652

4. Generator's Phone (916) 643-0830 ATTN: Mike Swart

Site Address:
1601 E 3rd St.
San Bernadino, CA 92408

5. Transporter 1 Company Name: Clean Harbors

6. US EPA ID Num: mad03932 250

A. State Transporter's ID

B. Transporter 1 Phone: 6614402649

7. Transporter 2 Company Name

8. US EPA ID Num

C. State Transporter's ID

D. Transporter 2 Phone

9. Designated Facility Name and Site Address
Clean Harbors Aragonite LLC
11600 North Aptus Road
Grantsville, UT 84029

10. US EPA ID Num: UTD9 15 2177

E. State Facility's ID

F. Facility's Phone: (435) 884-8100

GENERATOR

11. WASTE DESCRIPTION	Containers No.	Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON-HAZARDOUS, NON-DOT REGULATED (SOIL)	1	~~RO~~ CM	10	~~CY~~ CM
b.		CM		
c.				
d.				

G. Additional Descriptions for Materials Listed Above
11a. CH142288
CHHP20033

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
HOW

EMERGENCY PHONE #: (800) 483-3718
GENERATOR: Air Force Civil Engineeer Center

16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name	Signature	Date (Month Day Year)
Tim Collen	Tim Collen on behalf of AFCEC/USAF	8 16 17

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date (Month Day Year)
Robert Frank	Robert Frank	08 16 17

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date (Month Day Year)

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest except as noted in item 19.

Printed/Typed Name	Signature	Date (Month Day Year)
Haley Inc	Haley Inc	8 17 17

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NON-HAZARDOUS WASTE MANIFEST

DW 1703623146

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Truck #: 18

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. CA4570024345

Manifest Document No. 3146-9

2. Page 1 of 1

3. Generator's Name and Mailing Address
Air Force Civil Engineeer Center
3411 Olson Street
McClellan CA 95652

Site Address:
1601 E 3rd St.
San Bernadino, CA 92408

4. Generator's Phone (916) 643-0830 ATTN: Mike Swart

5. Transporter 1 Company Name: Starlite Reclamation Environmental Services
6. US EPA ID Number: CAR000148296
A. State Transporter's ID
B. Transporter 1 Phone: 800-576-9278

7. Transporter 2 Company Name
8. US EPA ID Number
C. State Transporter's ID
D. Transporter 2 Phone

9. Designated Facility Name and Site Address
Clean Harbors Aragonite LLC
11600 North Aptus Road
Grantsville, UT 84029
10. US EPA ID Number: UTD981552177
E. State Facility's ID
F. Facility's Phone: (435) 884-8100

11. WASTE DESCRIPTION	Containers No.	Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON-HAZARDOUS, NON-DOT REGULATED (SOIL/SOLID)	12	DM	275	~~GAL~~ ~~yds~~ P (18)
b.				
c.				
d.				

G. Additional Descriptions for Materials Listed Above
11a. CH1486229

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional information
SO#1704302805

~~EMERGENCY PHONE #: (800) 483-3718~~
GENERATOR: Air Force Civil Engineeer Center

HOYO

16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name: Tim Cullen
Signature: Tim Cullen on behalf of AFCEC/MSAF
Date: Month 9 Day 18 Year 17

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: Steve Rubalcava
Signature
Date: Month 9 Day 1 Year 17

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name
Signature
Date: Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.
Printed/Typed Name: Harry Unt
Signature
Date: Month 9 Day 16 Year 17

NON-HAZARDOUS WASTE

GENERATOR TRANSPORTER FACILITY

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Appendix F

Conceptual Site Models

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Table 1. Conceptual Site Model, Former Norton Air Force Base, California

Area/Site	Facility Profile	Physical Profile	Release Profile	Land Use and Exposure Profile	Ecological Profile
Former Norton Air Force Base	**Installation History:** • Located in San Bernardino, California • Norton ~ 2,105 acres. • Installation was commissioned in 1942 during World War II to provide aircraft maintenance support. Operations were later expanded to include maintenance, storage, and logistics support for various missile programs. • Norton AFB was closed under the BRAC in 1994. • Groundwater pump and treat systems, including the Central Base Area (CBA) and Base Boundary (BB) systems previously operated at the base to remove and hydraulically control trichloroethylene (TCE) in groundwater. The CBA system commenced 24-hour operation in June 1992 and ceased in May 2002. The BB system commenced 24-hour operations in February 1995 and ceased in November 2001.	**Topography:** Norton AFB is located in the San Bernardino Valley, which slopes gradually to the southwest, and is surrounded by the San Bernardino Mountains to the north. **Vegetation:** The unpaved portions of the installation consist of bare ground, low grass vegetation and brush. Most of the installation is devoid of vegetation and is paved with asphalt or concrete. **Surface Water:** The Santa Ana River flows southwest and runs along the southern boundary of Norton and adjacent to the site. The river is dry most of the year and there are no direct or indirect surface water flows from the installation that contribute to the river. **Soils:** • Generally, surface soils over the area of the former base are classified as Tujunga gravelly loamy sand, typically highly permeable with a slow to very slow surface runoff rating. • Shallow soil is comprised of silty sands, sands, underlain by intermixed gravels, clay and silt to depths of ~40 ft bgs. • Granitic rock and boulders are encountered in subsurface soils at deeper depths. **Geology:** • The former Norton AFB is located within the Bunker Hill Basin, which is filled with more than 1,000 feet of alluvium composed of granitic and gneissic detritus. • Norton AFB is located on the San Bernardino fault block in an active seismic zone. The San Andreas Fault is located approximately 2.5 miles to the northeast and the San Jacinto Fault is located approximately 2.5 miles to the southwest. (AMEC, 2016) **Hydrogeology:** • The major hydrologic units within the former Norton AFB include the Upper Confining Member and the Upper Aquifer. The Upper Confining Member is present in the southwest portion of the base, the former Industrial Waste Treatment Plant, and the former Palm Meadows golf course area but appears to be absent across much of the eastern half of the base. In general, the confining member: consists of fine-grained clays, silty sands, and sands; contains more clay in the west portion of the base; and becomes siltier toward the east. (AMEC, 2016) • The extent of confined water beneath the confining member is variable. The confining member may locally support perched water zones that occur from depths between approximately 30 and 60 feet, but the clay layers that support perched water are not laterally continuous. Many of the perched zone wells that were installed as part of earlier investigations have gone dry and been abandoned. (AMEC, 2016) • Below the Upper Confining Member, the Upper Aquifer extends from historic depths of approximately 75 feet to depths in excess of 250 feet and is approximately 200 to 250 feet thick in the vicinity of the former Norton AFB. The results of groundwater investigations suggest that the Upper Aquifer should be considered as one hydrologic unit. Fine-grained	**Contaminants of Concern (COCs):** PFOS **Media of Potential Concern:** Soil **Release Mechanisms:** • Releases of AFFF containing PFOS, PFOA, and/or PFBS could have occurred on the installation through fire-fighting activities, fire-fighting training activities, calibration and operation of AFFF fire suppression systems, and the storage, handling and disposal of AFFF. **Confirmed Releases:** • In groundwater, analytical data indicates that PFOS, PFOA and PFBS are present above the laboratory limit of detection (LOD), which indicate a release. However, concentrations of these compounds were found at relatively low levels and no concentrations exceeded their respective health-based screening criteria. • In soil, PFOS, PFOA, and PFBS were also found at concentrations above the laboratory LOD. Three samples found concentrations of PFOS above the USAF-calculated screening criteria. These samples were collected from the upper 2 feet of soil. Therefore, impacts from PFOS to surficial soils are confirmed.	**Current Landowners:** San Bernardino International Airport Authority **Current Land Use:** Commercial (aviation, manufacturing, distribution and logistics) **Future Land Use:** Land use is not expected to change in the future. **Drinking Water Receptors:** • The potable water supply for Norton AFB is primarily from the middle and lower aquifers of the Bunker Hill groundwater basin. The approximate 110-square mile Bunker Hill groundwater basin is the primary drinking water source for San Bernardino, Redlands, and Riverside. Supply wells exist downgradient of the base (City of Riverside Public Utilities). Analytical data collected from the municipal supply wells in 2013, 2014, and 2015 did not detect PFOS or PFOS in drinking water. • No impacts from PFOS, PFOA, or PFBS were identified in groundwater (drinking water) at the former installation; therefore, the exposure pathway is incomplete.	**Ecological Receptors:** • Plants, birds, insects, soil invertebrates, and mammals that inhabit or migrate through the installation. **Threatened and Endangered Species:** • Species known to occur on or near Norton AFB include the Santa Ana River Woolly Star (Federally Endangered), San Bernardino Kangaroo Rat (Federally Endangered), the Burrowing Owl (California Species of Special Concern), the Loggerhead Shrike (California Species of Concern), and Los Angeles Pocket Mouse (California Species of Concern) (USAF, 2002). • During fieldwork, none of these species were observed.

Table 1. Conceptual Site Model, Former Norton Air Force Base, California

Area/Site	Facility Profile	Physical Profile	Release Profile	Land Use and Exposure Profile	Ecological Profile
		lenses exist within the Upper Aquifer, but they are not laterally extensive, and cannot be used to designate separate units. (AMEC, 2016) • Depth to groundwater across the installation varied from approximately 176 feet to 235 feet bgs during the AFFF Area SI fieldwork. Groundwater flow is generally to the west across the eastern portion of the installation and to the southwest in the western portion of the installation where it flows toward a number of offsite groundwater production wells downgradient of the former base. Groundwater levels in the Bunker Hill groundwater basin have fluctuated drastically over the years and have declined more than 120 feet due to agricultural pumping and low precipitation. **Meteorology:** • Average annual temperature range is 49 to 78 degrees Fahrenheit. • Average Annual Rainfall of ~16 inches (in) per year. • The rainy season occurs between November and March. (AMEC, 2016)			
Area-Specific Characteristics					
AFFF Area 1: Former IRP Site 2 Landfill	• AFFF Area 1 is a landfill that was utilized from 1958 to 1980 • In 1998, ~20,000 tons of soil from FTA AT005 was excavated, stabilized and used as foundation material for the landfill. • The landfill was closed in 1999 with an alternative vegetative cap. • The landfill was later capped with asphalt.	**Topography:** As a landfill, AFFF Area 1 has been built up (sloped areas on the south and west sides of the landfill) and graded level on the top. **Vegetation:** AFFF Area 1 is an asphalt-capped landfill, with bare ground, low grass vegetation and brush on the sloped areas. **Surface Water:** • No surface water features • Runoff is to the south and west. **Soils/Geology/Hydrogeology:** Groundwater flow is to the southwest at approximately 187 feet bgs	**COCs:** None: PFOS, PFOA, and PFBS were investigated and no impacts to groundwater were identified. **Media of Potential Concern:** None: Groundwater was investigated to determine if PFAS leached from landfill material from the fire training area. No impacts were identified. **Confirmed Releases:** • PFOS, PFOA, and PFBS were each identified in groundwater at detectable concentrations. However, none of the concentrations exceeded their respective health-based screening levels. Therefore, groundwater at AFFF Area 1 is not impacted from PFOS, PFOA, or PFBS.	**Current Landowner:** San Bernardino International Airport Authority **Current Land Use:** Commercial parking lot for semi-trailers. **Future Land Use:** No changes anticipated in the future. **Drinking Water Receptors:** Downgradient residents who obtain their drinking water from wells are potential receptors; however, since there are no impacts to drinking water from PFOS, PFOA or PFBS, the exposure pathway is incomplete.	During fieldwork, no endangered or threatened species were observed. The ecological exposure pathway cannot be evaluated at this time since there are no promulgated ecological criteria.
AFFF Area 4: Buildings 667 and 674	• Buildings 674 and 667 were constructed in 1988 • Building 674 is an aircraft maintenance hangar and Building 667 is an auxiliary pump house servicing Building 674 • Building 667 maintains two 500-gallon AFFF aboveground storage tanks	**Topography:** Level **Vegetation:** This area is devoid of vegetation and is paved. **Surface Water:** • No surface water features • Runoff flows in to nearby stormwater drains. **Soil/Geology/Hydrogeology:** The depth to groundwater at AFFF Area 4 was encountered at approximately 195 feet bgs	**COCs:** None: PFOS, PFOA, and PFBS were investigated and no impacts were identified in soil or groundwater. **Media of Potential Concern:** None: Groundwater and soil were investigated to determine if an undocumented release of AFFF occurred. No impacts to either media were identified. **Confirmed Releases:** • No releases of PFOS or PFOA were identified in groundwater or soil at AFFF Area 4 since they were not found at detectable concentrations. • PFBS was detected in one groundwater sample; however, groundwater is not impacted from PFBS since the concentration was below the health-based screening level.	**Current Landowner:** San Bernardino International Airport Authority **Current Land Use:** Commercial aircraft maintenance hangar and associated storage tank building. The entire area is paved. **Future Land Use:** No changes anticipated in the future. **Drinking Water Receptors:** Downgradient residents who obtain their drinking water from wells are potential receptors; however, since there are no impacts to drinking water from PFOS, PFOA or PFBS, the exposure pathway is incomplete.	During fieldwork, no endangered or threatened species were observed. The ecological exposure pathway cannot be evaluated at this time since there are no promulgated ecological criteria.

Table 1. Conceptual Site Model, Former Norton Air Force Base, California

Area/Site	Facility Profile	Physical Profile	Release Profile	Land Use and Exposure Profile	Ecological Profile
AFFF Area 5: Building 680	• AFFF Area 5 is Building 680 which is a fire station and associated fire tech service • Constructed in 1986 • This facility reportedly stored 88 pounds of film foam through 1989 • Emergency vehicles were washed inside Building 680 and testing/calibration of the vehicle AFFF system was conducted in front of Building 680	**Topography:** Level **Vegetation:** This entire area is devoid of vegetation and is paved. **Surface Water:** • No surface water features • Runoff flows in to nearby stormwater drains. **Soils/Geology/Hydrogeology:** The depth to groundwater near AFFF Area 5 was encountered at approximately 200 feet bgs	**COCs:** None: PFOS, PFOA, and PFBS were investigated and no impacts to groundwater or soil were identified. **Media of Potential Concern:** None: Soil and groundwater were investigated to determine if a possible undocumented release of AFFF occurred at AFFF Area 5. No impacts were identified. **Confirmed Releases:** • PFBS was identified in groundwater and PFOS and PFOA were identified in soil at detectable concentrations. However, neither the soil nor groundwater were found to be impacted from PFBS, PFOS, or PFOA since the concentrations were all below their respective health-based screening levels.	**Current Landowner:** San Bernardino International Airport Authority **Current Land Use:** Active fire station (no AFFF currently used within this facility) **Future Land Use:** No changes anticipated in the future. **Drinking Water Receptors:** Downgradient residents who obtain their drinking water from wells are potential receptors; however, since there are no impacts to drinking water from PFOS, PFOA or PFBS, the exposure pathway is incomplete.	During fieldwork, no endangered or threatened species were observed. The ecological exposure pathway cannot be evaluated at this time since there are no promulgated ecological criteria.
AFFF Area 7: Building 694	• AFFF Area 7 is Building 694 which was a crash truck station • Operational from 1943 to the early 1980s • Building and pad were demolished and paved over with concrete • Emergency vehicles were parked, washed and potentially calibrated at this location	**Topography:** Level **Vegetation:** This area is devoid of vegetation and is paved. **Surface Water:** • No surface water features • Runoff flows in to nearby stormwater drains. **Soil/Geology/Hydrogeology:** Groundwater was encountered at approximately 202 feet bgs.	**COCs:** PFOS **Media of Potential Concern:** Soil **Confirmed Releases:** • PFOS, PFOA, and PFBS were not detected in groundwater at AFFF Area 7. • PFOS, PFOA, and PFBS were each found at detectable concentrations in soil at AFFF Area 7. Neither PFOA nor PFBS were found at concentrations exceeding health-based screening levels. • PFOS was found at concentrations exceeding the USFA-calculated screening level in surficial soil.	**Current Landowner:** San Bernardino International Airport Authority **Current Land Use:** Commercial - open paved area **Future Land Use:** No changes anticipated in the future. **Drinking Water Receptors:** Downgradient residents who obtain their drinking water from wells are potential receptors; however, since there are no impacts from PFOS, PFOA or PFBS to drinking water, the exposure pathway is incomplete.	During fieldwork, no endangered or threatened species were observed. While a release of PFOS is confirmed in surficial soils, the ecological exposure pathway cannot be evaluated at this time since there are no promulgated ecological criteria.

Table 1. Conceptual Site Model, Former Norton Air Force Base, California

Area/Site	Facility Profile	Physical Profile	Release Profile	Land Use and Exposure Profile	Ecological Profile
AFFF Area 8: Building 2333	• Utilized as a Fire Training Facility from 1982 to the mid-2000s • Consisted of a fenced area with one JP-4 10,000-gallon UST and one 1,200-gallon OWS • Fire training using JP-4 was conducted within the fenced area.	**Topography:** Level **Vegetation:** This area is devoid of vegetation and is primarily bare ground. **Surface Water:** • No surface water features • Runoff would percolate into the soil. **Soil/Geology/Hydrogeology:** Groundwater was encountered at approximately 235 feet bgs.	**COCs:** • PFOS **Media of Potential Concern:** • Soil **Confirmed Releases:** • PFOA and PFBS were not detected in groundwater at AFFF Area 8. • PFOS was found at detectable concentrations in groundwater; however, the USEPA HA value was not exceeded. • PFOS, PFOA, and PFBS were each found at detectable concentrations in soil at AFFF Area 8. Neither PFOA nor PFBS were found at concentrations exceeding health-based screening levels. • PFOS was found at concentrations exceeding the USFA-calculated screening level in surficial soil.	**Current Landowner:** San Bernardino International Airport Authority **Current Land Use:** Commercial trailer storage area **Future Land Use:** No changes anticipated in the future. **Drinking Water Receptors:** Downgradient residents who obtain their drinking water from wells are potential receptors; however, since there are no impacts from PFOS, PFOA, or PFBS to drinking water, the exposure pathway is incomplete.	During fieldwork, no endangered or threatened species were observed. While a release of PFOS is confirmed in surficial soils, the ecological exposure pathway cannot be evaluated at this time since there are no promulgated ecological criteria.

~ = approximately
AFB = Air Force Base
AFFF = aqueous film forming foam
BB = base boundary
bgs = below ground surface
BRAC = base realignment and closure
CBA = Central Base Area
COCs = contaminants of concern
HA = Health Advisory
LOD = limit of detection
OWS = oil water separator
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid
RSL – Regional Screening Level
TCE = trichloroethylene
USAF = United States Air Force
USEPA = United Stat5es Environmental Protection Agency
UST = underground storage tank

Appendix G

Well Survey Results

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WCR_Number	County	Well_City	PlannedUse	Decimal_La	Decimal_Lo	Township	Range	Section
WCR1978-008467	San Bernardino		Water Supply Domestic	34.04104	-117.27004	01S	04W	35
WCR1956-001602	San Bernardino		Water Supply Domestic	34.04114	-117.28735	01S	04W	34
WCR1991-019317	San Bernardino	Colton	Water Supply Domestic	34.04114	-117.28735	01S	04W	34
WCR1984-008194	San Bernardino		Water Supply Domestic	34.04114	-117.28735	01S	04W	34
WCR1957-002167	San Bernardino		Water Supply Domestic	34.04114	-117.28735	01S	04W	34
WCR1957-002175	San Bernardino		Water Supply Domestic	34.04114	-117.28735	01S	04W	34
WCR1983-006762	San Bernardino		Water Supply Domestic	34.04114	-117.28735	01S	04W	34
WCR1959-001544	San Bernardino		Water Supply Domestic	34.04114	-117.28735	01S	04W	34
WCR1957-001702	San Bernardino		Water Supply Domestic	34.04114	-117.28735	01S	04W	34
WCR1984-008179	San Bernardino		Water Supply Domestic	34.04114	-117.28735	01S	04W	34
WCR1956-001603	San Bernardino		Water Supply Domestic	34.04114	-117.28735	01S	04W	34
WCR1957-001701	San Bernardino		Water Supply Domestic	34.04114	-117.28735	01S	04W	34
WCR1983-006761	San Bernardino		Other Not Specified	34.04114	-117.28735	01S	04W	34
WCR1958-001268	San Bernardino		Water Supply Domestic	34.04114	-117.28735	01S	04W	34
WCR1992-016758	San Bernardino	Colton	Water Supply Domestic	34.04114	-117.28735	01S	04W	34
WCR1954-002555	San Bernardino	Colton	Water Supply Domestic	34.04114	-117.28735	01S	04W	34
WCR1964-002029	San Bernardino		Water Supply Domestic	34.04114	-117.28735	01S	04W	34
WCR1957-001700	San Bernardino		Water Supply Domestic	34.04114	-117.28735	01S	04W	34
WCR1977-010353	San Bernardino		Water Supply Domestic	34.04114	-117.28735	01S	04W	34
WCR1956-001326	San Bernardino	Colton	Water Supply Domestic	34.04114	-117.28735	01S	04W	34
WCR2011-008728	San Bernardino	Colton	Water Supply Domestic	34.04114	-117.28735	01S	04W	34
WCR2015-001779	San Bernardino	Colton	Water Supply Domestic	34.04114	-117.28735	01S	04W	34
WCR2005-013544	San Bernardino	Colton	Water Supply Domestic	34.04114	-117.28735	01S	04W	34
WCR2003-014643	San Bernardino	Colton	Water Supply Domestic	34.04114	-117.28735	01S	04W	34
WCR1955-001934	San Bernardino		Water Supply Domestic	34.05586	-117.25237	01S	04W	25
WCR1984-008140	San Bernardino		Water Supply Domestic	34.05586	-117.25237	01S	04W	25
WCR1980-009193	San Bernardino	Loma Linda	Water Supply Domestic	34.05586	-117.25237	01S	04W	25
WCR2008-011472	San Bernardino	Colton	Water Supply Public	34.05593	-117.32226	01S	04W	29
WCR2008-011473	San Bernardino	Colton	Water Supply Public	34.05593	-117.32226	01S	04W	29
WCR1936-000172	San Bernardino		Water Supply Domestic	34.05596	-117.2698	01S	04W	26
WCR1951-001880	San Bernardino		Water Supply Domestic	34.05597	-117.3047	01S	04W	28
WCR1951-001881	San Bernardino		Water Supply Domestic	34.05597	-117.3047	01S	04W	28
WCR1978-008333	San Bernardino		Water Supply Domestic	34.05597	-117.3047	01S	04W	28
WCR1978-008332	San Bernardino		Water Supply Domestic	34.05597	-117.3047	01S	04W	28
WCR1984-008109	San Bernardino		Water Supply Public	34.05597	-117.3047	01S	04W	28
WCR1776-007323	San Bernardino		Water Supply Public	34.05597	-117.28725	01S	04W	27
WCR1984-008107	San Bernardino		Water Supply Public	34.05597	-117.28725	01S	04W	27

WCR_Number	County	Well_City	PlannedUse	Decimal_La	Decimal_Lo	Township	Range	Section
WCR1953-001579	San Bernardino	San Bernardino	Water Supply Domestic	34.05597	-117.28725	01S	04W	27
WCR1946-000913	San Bernardino		Water Supply Public	34.05597	-117.28725	01S	04W	27
WCR1912-000204	San Bernardino		Water Supply Public	34.05597	-117.28725	01S	04W	27
WCR1941-000428	San Bernardino		Water Supply Public	34.05597	-117.28725	01S	04W	27
WCR1994-010929	San Bernardino		Water Supply Public	34.05597	-117.28725	01S	04W	27
WCR1776-007278	San Bernardino		Water Supply Public	34.07034	-117.25239	01S	04W	24
WCR1776-007276	San Bernardino		Water Supply Public	34.07034	-117.25239	01S	04W	24
WCR1954-001892	San Bernardino		Water Supply Public	34.07034	-117.25239	01S	04W	24
WCR1993-013178	San Bernardino		Water Supply Public	34.07034	-117.25239	01S	04W	24
WCR1956-002076	San Bernardino	Colton	Water Supply Domestic	34.07034	-117.25239	01S	04W	24
WCR1987-013652	San Bernardino		Water Supply Public	34.07034	-117.25239	01S	04W	24
WCR1987-013651	San Bernardino	Loma Linda	Water Supply Public	34.07034	-117.25239	01S	04W	24
WCR1980-009184	San Bernardino	Loma Linda	Water Supply Domestic	34.07034	-117.25239	01S	04W	24
WCR1979-008232	San Bernardino		Water Supply Public	34.07034	-117.25239	01S	04W	24
WCR1964-001628	San Bernardino	Loma Linda	Water Supply Domestic	34.07034	-117.25239	01S	04W	24
WCR1993-012391	San Bernardino	Loma Linda	Water Supply Public	34.07034	-117.25239	01S	04W	24
WCR2009-010195	San Bernardino	San Bernadino	Water Supply Public	34.07034	-117.25239	01S	04W	24
WCR2009-010194	San Bernardino	San Bernadino	Water Supply Public	34.07034	-117.25239	01S	04W	24
WCR1998-009904	San Bernardino	Loma Linda	Other Not Specified	34.07034	-117.25239	01S	04W	24
WCR2008-011848	San Bernardino	San Bernardino	Water Supply Public	34.07034	-117.25239	01S	04W	24
WCR2000-009758	San Bernardino	Loma Linda	Water Supply Public	34.07034	-117.25239	01S	04W	24
WCR1999-009687	San Bernardino	Loma Linda	Water Supply Public	34.07034	-117.25239	01S	04W	24
WCR1776-011037	San Bernardino	Loma Linda	Water Supply Public	34.07034	-117.25239	01S	04W	24
WCR1999-010323	San Bernardino	Loma Linda	Water Supply Public	34.07034	-117.25239	01S	04W	24
WCR1999-010322	San Bernardino	Loma Linda	Water Supply Public	34.07034	-117.25239	01S	04W	24
WCR1776-011039	San Bernardino	Loma Linda	Water Supply Public	34.07034	-117.25239	01S	04W	24
WCR1776-011038	San Bernardino	Loma Linda	Water Supply Public	34.07034	-117.25239	01S	04W	24
WCR1776-007274	San Bernardino		Water Supply Public	34.07045	-117.26982	01S	04W	23
WCR1776-007273	San Bernardino		Water Supply Public	34.07045	-117.26982	01S	04W	23
WCR1960-001695	San Bernardino		Water Supply Domestic	34.07045	-117.26982	01S	04W	23
WCR1776-007237	San Bernardino		Water Supply Domestic	34.07045	-117.26982	01S	04W	23
WCR1966-002131	San Bernardino	San Bernardino	Other Not Specified	34.07045	-117.26982	01S	04W	23
WCR1966-002573	San Bernardino	Riverside	Other Not Specified	34.07045	-117.26982	01S	04W	23
WCR2008-011377	San Bernardino	San Bernardino	Water Supply Public	34.07045	-117.26982	01S	04W	23
WCR2007-011483	San Bernardino	San Bernardino	Water Supply Public	34.07045	-117.26982	01S	04W	23
WCR1966-002227	San Bernardino	San Bernardino	Other Not Specified	34.07045	-117.26982	01S	04W	23
WCR1996-010098	San Bernardino	San Bernardino	Water Supply Domestic	34.07045	-117.26982	01S	04W	23

WCR_Number	County	Well_City	PlannedUse	Decimal_La	Decimal_Lo	Township	Range	Section
WCR1999-009889	San Bernardino	San Bernardino	Water Supply Domestic	34.07045	-117.26982	01S	04W	23
WCR1993-013387	San Bernardino		Other Not Specified	34.07046	-117.32227	01S	04W	20
WCR1993-013383	San Bernardino		Other Not Specified	34.07046	-117.32227	01S	04W	20
WCR1993-013386	San Bernardino		Other Not Specified	34.07046	-117.32227	01S	04W	20
WCR1993-013385	San Bernardino		Other Not Specified	34.07046	-117.32227	01S	04W	20
WCR1993-013384	San Bernardino		Other Not Specified	34.07046	-117.32227	01S	04W	20
WCR1961-001782	San Bernardino	Colton	Water Supply Domestic	34.07046	-117.32227	01S	04W	20
WCR1776-007266	San Bernardino		Water Supply Domestic	34.07046	-117.30472	01S	04W	21
WCR1954-001901	San Bernardino	Colton	Water Supply Domestic	34.07046	-117.30472	01S	04W	21
WCR1955-002489	San Bernardino		Water Supply Domestic	34.07046	-117.30472	01S	04W	21
WCR1954-002108	San Bernardino	San Bernardino	Water Supply Domestic	34.07046	-117.30472	01S	04W	21
WCR1776-007267	San Bernardino		Water Supply Domestic	34.07046	-117.30472	01S	04W	21
WCR1955-001930	San Bernardino		Water Supply Domestic	34.07046	-117.30472	01S	04W	21
WCR1776-007264	San Bernardino		Water Supply Domestic	34.07046	-117.30472	01S	04W	21
WCR1969-001767	San Bernardino		Water Supply Domestic	34.07046	-117.30472	01S	04W	21
WCR1990-019881	San Bernardino		Water Supply Public	34.07046	-117.30472	01S	04W	21
WCR1961-001791	San Bernardino		Water Supply Domestic	34.07046	-117.30472	01S	04W	21
WCR1990-019880	San Bernardino		Water Supply Public	34.07046	-117.30472	01S	04W	21
WCR1935-000125	San Bernardino		Water Supply Domestic	34.07046	-117.30472	01S	04W	21
WCR1912-000054	San Bernardino		Water Supply Domestic	34.07046	-117.30472	01S	04W	21
WCR1955-001941	San Bernardino		Water Supply Domestic	34.07046	-117.30472	01S	04W	21
WCR1952-001510	San Bernardino	San Bernardino	Water Supply Domestic	34.07046	-117.30472	01S	04W	21
WCR1961-001783	San Bernardino	Colton	Water Supply Domestic	34.07046	-117.30472	01S	04W	21
WCR1990-019030	San Bernardino		Water Supply Domestic	34.07046	-117.30472	01S	04W	21
WCR1975-003968	San Bernardino		Water Supply Domestic	34.07046	-117.30472	01S	04W	21
WCR2009-009509	San Bernardino	Colton	Water Supply Public	34.07046	-117.30472	01S	04W	21
WCR1901-000009	San Bernardino		Water Supply Domestic	34.07046	-117.28728	01S	04W	22
WCR1936-000166	San Bernardino		Water Supply Domestic	34.07046	-117.28728	01S	04W	22
WCR1989-018938	San Bernardino		Water Supply Domestic	34.07046	-117.28728	01S	04W	22
WCR1966-002328	San Bernardino		Water Supply Domestic	34.07046	-117.28728	01S	04W	22
WCR1955-002490	San Bernardino		Water Supply Domestic	34.07046	-117.28728	01S	04W	22
WCR1965-001959	San Bernardino	Colton	Other Not Specified	34.07046	-117.28728	01S	04W	22
WCR1955-001926	San Bernardino		Water Supply Domestic	34.07046	-117.28728	01S	04W	22
WCR1965-001522	San Bernardino	Colton	Other Not Specified	34.07046	-117.28728	01S	04W	22
WCR1961-001779	San Bernardino	Colton	Water Supply Domestic	34.07046	-117.28728	01S	04W	22
WCR1955-001927	San Bernardino		Water Supply Domestic	34.07046	-117.28728	01S	04W	22
WCR1953-001567	San Bernardino	San Bernardino	Water Supply Domestic	34.07046	-117.28728	01S	04W	22

WCR_Number	County	Well_City	PlannedUse	Decimal_La	Decimal_Lo	Township	Range	Section
WCR1957-001644	San Bernardino		Water Supply Domestic	34.07046	-117.28728	01S	04W	22
WCR1953-001572	San Bernardino	San Bernardino	Water Supply Domestic	34.07046	-117.28728	01S	04W	22
WCR1958-001728	San Bernardino	San Bernardino	Water Supply Public	34.07046	-117.28728	01S	04W	22
WCR1974-003631	San Bernardino		Other Not Specified	34.07046	-117.28728	01S	04W	22
WCR1974-003630	San Bernardino		Other Not Specified	34.07046	-117.28728	01S	04W	22
WCR1974-003629	San Bernardino		Other Not Specified	34.07046	-117.28728	01S	04W	22
WCR1974-003628	San Bernardino		Other Not Specified	34.07046	-117.28728	01S	04W	22
WCR1958-001229	San Bernardino	San Bernardino	Water Supply Public	34.07046	-117.28728	01S	04W	22
WCR2005-016195	San Bernardino	San Bernardino	Other Not Specified	34.07046	-117.28728	01S	04W	22
WCR0069893	San Bernardino		Water Supply Public	34.0765	-117.2755	01S	04W	23
WCR0069893	San Bernardino		Water Supply Public	34.0765	-117.2755	01S	04W	23
WCR2014-008977	San Bernardino	San Bernardino	Water Supply Public	34.076667	-117.275556	01S	04W	23
WCR1776-007340	San Bernardino		Water Supply Public	34.08483	-117.25242	01S	04W	13
WCR1776-007339	San Bernardino		Water Supply Public	34.08483	-117.25242	01S	04W	13
WCR1968-001734	San Bernardino	San Bernardino	Water Supply Domestic	34.08483	-117.25242	01S	04W	13
WCR1994-012779	San Bernardino	Norton AFB	Other Not Specified	34.08483	-117.25242	01S	04W	13
WCR1994-013160	San Bernardino	Norton AFB	Other Not Specified	34.08483	-117.25242	01S	04W	13
WCR1936-000178	San Bernardino		Water Supply Domestic	34.08483	-117.25242	01S	04W	13
WCR1936-000177	San Bernardino		Water Supply Domestic	34.08483	-117.25242	01S	04W	13
WCR1776-007337	San Bernardino		Water Supply Domestic	34.08483	-117.25242	01S	04W	13
WCR1916-000018	San Bernardino		Water Supply Domestic	34.08483	-117.25242	01S	04W	13
WCR1938-000136	San Bernardino		Water Supply Domestic	34.08483	-117.25242	01S	04W	13
WCR1973-002935	San Bernardino	San Bernardino	Water Supply Domestic	34.08483	-117.25242	01S	04W	13
WCR1968-001735	San Bernardino		Water Supply Domestic	34.08483	-117.25242	01S	04W	13
WCR1956-001561	San Bernardino		Water Supply Domestic	34.08483	-117.25242	01S	04W	13
WCR1926-000086	San Bernardino		Water Supply Domestic	34.08483	-117.25242	01S	04W	13
WCR1956-001560	San Bernardino		Water Supply Domestic	34.08483	-117.25242	01S	04W	13
WCR1956-001559	San Bernardino		Water Supply Domestic	34.08483	-117.25242	01S	04W	13
WCR1994-013078	San Bernardino	Norton AFB	Other Not Specified	34.08483	-117.25242	01S	04W	13
WCR1994-013077	San Bernardino	Norton AFB	Other Not Specified	34.08483	-117.25242	01S	04W	13
WCR1993-013175	San Bernardino		Water Supply Public	34.08483	-117.25242	01S	04W	13
WCR1994-012780	San Bernardino	Norton AFB	Other Not Specified	34.08483	-117.25242	01S	04W	13
WCR1994-012778	San Bernardino	Norton AFB	Other Not Specified	34.08483	-117.25242	01S	04W	13
WCR1994-012777	San Bernardino	Norton AFB	Other Not Specified	34.08483	-117.25242	01S	04W	13
WCR1994-012776	San Bernardino	Norton AFB	Other Not Specified	34.08483	-117.25242	01S	04W	13
WCR1972-003059	San Bernardino		Water Supply Domestic	34.08483	-117.25242	01S	04W	13
WCR1966-002049	San Bernardino	San Bernardino	Other Unknown	34.08483	-117.25242	01S	04W	13

WCR_Number	County	Well_City	PlannedUse	Decimal_La	Decimal_Lo	Township	Range	Section
WCR1998-009902	San Bernardino	San Bernardino	Other Not Specified	34.08483	-117.25242	01S	04W	13
WCR2007-013069	San Bernardino	San Bernardino	Water Supply Public	34.08483	-117.25242	01S	04W	13
WCR1993-013174	San Bernardino		Water Supply Public	34.08483	-117.25242	01S	04W	13
WCR1950-001812	San Bernardino	San Bernardino	Water Supply Domestic	34.08486	-117.26986	01S	04W	14
WCR1950-001809	San Bernardino	San Bernardino	Water Supply Domestic	34.08486	-117.26986	01S	04W	14
WCR1964-001808	San Bernardino	San Bernardino	Water Supply Domestic	34.08486	-117.26986	01S	04W	14
WCR1964-001809	San Bernardino	San Bernardino	Water Supply Domestic	34.08486	-117.26986	01S	04W	14
WCR1959-001931	San Bernardino	San Bernardino	Water Supply Domestic	34.08486	-117.26986	01S	04W	14
WCR1951-002129	San Bernardino	San Bernardino	Water Supply Domestic	34.08486	-117.26986	01S	04W	14
WCR1951-002128	San Bernardino	San Bernardino	Water Supply Domestic	34.08486	-117.26986	01S	04W	14
WCR1954-002439	San Bernardino	San Bernardino	Water Supply Domestic	34.08486	-117.26986	01S	04W	14
WCR1913-000041	San Bernardino		Water Supply Domestic	34.08486	-117.26986	01S	04W	14
WCR1950-001810	San Bernardino	San Bernardino	Water Supply Domestic	34.08486	-117.26986	01S	04W	14
WCR1955-001925	San Bernardino	San Bernardino	Water Supply Domestic	34.08486	-117.26986	01S	04W	14
WCR1955-001924	San Bernardino	San Bernardino	Water Supply Domestic	34.08486	-117.26986	01S	04W	14
WCR1964-001623	San Bernardino	San Bernardino	Water Supply Domestic	34.08486	-117.26986	01S	04W	14
WCR1951-001886	San Bernardino	San Bernardino	Water Supply Domestic	34.08486	-117.26986	01S	04W	14
WCR1951-001885	San Bernardino	San Bernardino	Water Supply Domestic	34.08486	-117.26986	01S	04W	14
WCR1953-001563	San Bernardino		Water Supply Domestic	34.08486	-117.26986	01S	04W	14
WCR1952-001495	San Bernardino	San Bernardino	Water Supply Domestic	34.08486	-117.26986	01S	04W	14
WCR1951-001884	San Bernardino	San Bernardino	Water Supply Domestic	34.08486	-117.26986	01S	04W	14
WCR1776-007221	San Bernardino		Water Supply Domestic	34.08486	-117.26986	01S	04W	14
WCR1952-001494	San Bernardino		Water Supply Domestic	34.08486	-117.26986	01S	04W	14
WCR1935-000119	San Bernardino		Water Supply Domestic	34.08486	-117.26986	01S	04W	14
WCR1953-001562	San Bernardino		Water Supply Domestic	34.08486	-117.26986	01S	04W	14
WCR1954-001881	San Bernardino	San Bernardino	Water Supply Domestic	34.08486	-117.26986	01S	04W	14
WCR1952-001496	San Bernardino		Water Supply Public	34.08486	-117.26986	01S	04W	14
WCR1950-001811	San Bernardino	San Bernardino	Water Supply Domestic	34.08486	-117.26986	01S	04W	14
WCR1980-009171	San Bernardino	Riverside	Water Supply Public	34.08486	-117.26986	01S	04W	14
WCR1953-001564	San Bernardino	San Bernardino	Water Supply Domestic	34.08486	-117.26986	01S	04W	14
WCR1954-002441	San Bernardino		Water Supply Domestic	34.0849	-117.2873	01S	04W	15
WCR1957-002166	San Bernardino	San Bernardino	Water Supply Domestic	34.0849	-117.2873	01S	04W	15
WCR1951-002131	San Bernardino	San Bernardino	Water Supply Domestic	34.0849	-117.2873	01S	04W	15
WCR1950-002747	San Bernardino	San Bernardino	Water Supply Domestic	34.0849	-117.2873	01S	04W	15
WCR1959-001927	San Bernardino	San Bernardino	Water Supply Domestic	34.0849	-117.2873	01S	04W	15
WCR1957-001624	San Bernardino	San Bernardino	Water Supply Domestic	34.0849	-117.2873	01S	04W	15
WCR1951-001887	San Bernardino	San Bernardino	Water Supply Domestic	34.0849	-117.2873	01S	04W	15

WCR_Number	County	Well_City	PlannedUse	Decimal_La	Decimal_Lo	Township	Range	Section
WCR1952-001497	San Bernardino	San Bernardino	Water Supply Domestic	34.0849	-117.2873	01S	04W	15
WCR1954-001883	San Bernardino	San Bernardino	Water Supply Domestic	34.0849	-117.2873	01S	04W	15
WCR1966-002118	San Bernardino	San Bernardino	Water Supply Domestic	34.0849	-117.2873	01S	04W	15
WCR1938-000131	San Bernardino		Water Supply Domestic	34.0849	-117.2873	01S	04W	15
WCR1956-001529	San Bernardino	San Bernardino	Water Supply Domestic	34.0849	-117.2873	01S	04W	15
WCR1937-000203	San Bernardino		Water Supply Domestic	34.0849	-117.2873	01S	04W	15
WCR1992-017510	San Bernardino		Water Supply Domestic	34.0849	-117.2873	01S	04W	15
WCR1950-001823	San Bernardino		Water Supply Domestic	34.0849	-117.2873	01S	04W	15
WCR1961-001776	San Bernardino		Water Supply Domestic	34.0849	-117.2873	01S	04W	15
WCR1954-001882	San Bernardino	San Bernardino	Water Supply Domestic	34.0849	-117.2873	01S	04W	15
WCR1988-017323	San Bernardino	San Bernardino	Other Not Specified	34.08493	-117.30474	01S	04W	16
WCR1958-001240	San Bernardino		Water Supply Domestic	34.0992	-117.21752	01S	03W	8
WCR1954-002552	San Bernardino	San Bernardino	Water Supply Domestic	34.09932	-117.25243	01S	04W	12
WCR1952-001505	San Bernardino		Other Not Specified	34.09932	-117.25243	01S	04W	12

Appendix H

Regulatory Comments

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Catherine McMillen

From: Burke, NadiaHollan [mailto:Burke.NadiaHollan@epa.gov]
Sent: Monday, May 14, 2018 2:23 PM
To: WILLIS, ROY T GS-13 USAF AFMC AFCEC/CIBE <roy.willis@us.af.mil>
Cc: MOOK, PHILIP H JR GS-15 USAF AFCEC AFCEC/CIBW <philip.mook@us.af.mil>; Young, Dianna <Young.Dianna@epa.gov>; Burchette, John <Burchette.John@epa.gov>; Hannon, Patricia@Waterboards <Patricia.Hannon@waterboards.ca.gov>; Niou, Stephen@DTSC <Stephen.Niou@dtsc.ca.gov>; Eidelberg, Joseph <Eidelberg.Joseph@epa.gov>; Serda, Sophia <Serda.Sophia@epa.gov>; Levine, Herb <Levine.Herb@epa.gov>; Huang, Judy <Huang.Judy@epa.gov>
Subject: [Non-DoD Source] EPA Review of Draft Site Inspection Report for Aqueous Film Forming Foam Areas at Norton Air Force Base, April 2018

Roy,

EPA has reviewed the above referenced Draft Site Inspection Report, prepared in April 2018 by Aerostar SES LLC for the Air Force (AF) Civil Engineer Center, and has the following input:

1. Throughout the report, the AF concludes that the drinking water exposure pathway is incomplete. EPA does not concur with this conclusion as it is premature to conclude this based on the information provided in the report. In order for the drinking water exposure pathway to be fully evaluated, the AF should consider and provide the following:
    a. The AF states that domestic and public supply wells were identified within 4 miles of the AFFF areas (Executive Summary,Page ix, Groundwater, and elsewhere). It is not clear whether it is reasonable to conclude that a historic release of AFFF at Norton AFB has only migrated 4 miles. Please provide more information regarding the potential fate and transport of AFFF from the identified source areas since the time of the potential releases. Also, please provide any UNMCR (or otherwise PFOS and PFOA) data that should be available for the identified domestic and public supply wells within the 4 miles. And, should PFOA and PFOS could it have migrated beyond 4 miles, identify any wells that may be within the potential distance of that release, and associated available data.
    b. The soil and groundwater results presented throughout the report (Table ES-1, etc.) show that a confirmed AFFF release has taken place, and impacts to soil and potentially groundwater above screening levels are currently present in at least two of the source areas: Building 694 and Facility 233. However, no groundwater data for PFOS is presented for Building 694, nor for PFOA at Facility 2333. Therefore, there appears to be an incomplete data set for calculating the combined PFOS+PFOA and comparison to the EPA PHAs/screening levels. Please explain why there is no complete groundwater data set provided for comparison to the PHAs, and if needed to complete the data set, arrange for data to be collected to confirm whether the groundwater may be impacted at levels above the PHA screening level for PFOS + PFOA at both of these source areas.
    c. A pump and treatment system operated for several years at the Norton AFB, however the impact of this system's operation to fate and transport of the AFF releases as well as any effluent is not discussed in the report. More information is needed regarding whether the operation of the system impacted the potential fate and transport of AFFF releases, such as where the extraction wells were in relation to all of the potential AFFF source areas, how long they operated, how the water was treated and discharged, etc. Please add more information to the Site Conceptual Model to account for potential changes in fate and transport of AFFF due to the operation of the pump and treatment system.
2. Section 3.14 Investigation-Derived Waste, and Appendix E, Waste Manifests: It is unclear from the description in the report and the waste manifests if the waste was shipped with approval of the CERCLA Off-Site Rule Coordinator for the State of Utah. Please provide confirmation that the waste facilities receiving the wastes

were approved facilities to receive CERCLA wastes, including any correspondence with the EPA Off-Site Rule Coordinator.

Nadia Hollan Burke

Environmental Engineer/Remedial Project Manager
Superfund Division/Federal Facilities and Site Cleanup Branch
Arizona and Federal Facilities Section (SFD-8-1)
https://www.epa.gov/fedfac/fedfacts

Phone: 415-972-3187
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Cubicle: 10355

Department of Toxic Substances Control

Matthew Rodriquez
Secretary for
Environmental Protection

Barbara A. Lee, Director
5796 Corporate Avenue
Cypress, California 90630

Edmund G. Brown Jr.
Governor

June 25, 2018

Mr. Roy Willis, Program Manager
AFCEC/CIBW
2261 Hughes Ave, Suite 155
JBSA Lackland, TX 78236-9853

DRAFT SITE INSPECTION (SI) REPORT FOR AQUEOUS FILM FORMING FOAM (AFFF) AREAS, FORMER NORTON AIR FORCE BASE (NAFB)

Dear Mr. Willis:

The Department of Toxic Substances Control (DTSC) received the above-named document dated April 2018. The Air Force conducted an SI at NAFB. The objectives of this SI include:

(1) To determine if perfluorooctanoic acid (PFOA), perfluorooctanesulfonic acid (PFOS), and perfluorobutanesulfonic acid (PEBS) are present in soil and/or groundwater at NAFB.

(2) To determine if concentrations of PFOA, PFOS, or sum of both in groundwater are greater than USEPA's health advisory levels.

(3) To determine if concentrations of PFOA, PFOS, or sum of both in groundwater are greater than USEPA's regional screening levels.

(4) To determine if concentrations of PFOA and/or PFOS in soil are greater than USAF's screening levels. And,

(5) To "identify potential human health drinking water pathways and receptors." USAF will mitigate impacts to drinking water if it is caused by USAF's operations.

This report concludes that for groundwater: "no releases of PFOS, PFOA, and PFBS have occurred." However, release to soil is confirmed.

DTSC recommends that this report state whether release to soil may pose risks to human health. And if the answer is positive, please provide recommendations of mitigation.

If you have any questions regarding this letter, please either email me at <stephen.niou@dtsc.ca.gov> or call me at (714) 484-5458.

Mr. Roy Willis
June 25, 2018
Page 2

Sincerely,

Stephen Niou, P.E.
Site Mitigation and Restoration Program, Cypress

CALIFORNIA
Water Boards

EDMUND G. BROWN JR.
GOVERNOR

MATTHEW RODRIQUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

Santa Ana Regional Water Quality Control Board

June 26, 2018

Mr. Roy Willis
Remedial Project Manager
AFCEC/CIBW
2261 Hughes Avenue, Suite 155
JBSA Lackland, Texas 78236-9853

RESPONSE TO DRAFT SITE INSPECTION REPORT AQUEOUS FILM FORMING FOAM (AFFF) AREAS FOR FORMER NORTON AIR FORCE BASE, SAN BERNARDINO
GEOTRACKER ID: DOD100359200, DOD100360600, DOD100369600, 083602597T

Dear Mr. Willis:

We have completed our review of the above-referenced report dated April 2018, which we received on April 20, 2018. This document presents the results of the evaluation of eight areas at former Norton Air Force Base for potential presence of select per- and polyfluoroalkyl substances [e.g., perfluorooctanoic acid (PFOA), perfluorooctanesulfonic acid (PFOS), and perfluorobutanesulfonic acid (PFBS)] in groundwater and soil. The eight areas selected for evaluated were:

- Area 1 - Former IRP Site 2 (Landfill),
- Area 2 - Building 763 (Aircraft Maintenance Hangar and Electroplating Shop),
- Area 3 - Building 695 (Aircraft Maintenance Hangar),
- Area 4 - Buildings 674 (Aircraft Maintenance Hangar) and 667 (Pump House),
- Area 5 - Building 20 (Base Engineering Pavements, and Grounds, Building 680 and Fire Tech Service),
- Area 6 - Building 24 (Childcare Center),
- Area 7 - Building 694 (Crash Truck Station), and
- Area 8 - Facility 2333 (Fire Training Facility).

Base on the evaluation of historical records, soil samples were collected from Areas 4, 5, 7, and 8; groundwater samples were collected from Areas 1, 4, 5, 7, 8 and three existing groundwater monitoring wells (MW-274, MW-289, and MW-401) in the western portion of the former Base. Soil and groundwater samples were not collected from Areas 2, 3, and 6 as no documentation was found that indicated AFFF use at these locations by the Air Force. Groundwater samples were compared to the U. S. EPA's lifetime Health Advisory of 70 nanograms/liter (ng/L) for PFOS, PFOA individually or the

sum of the two, and the U.S. EPA's regional screening level (RSL) of 400,000 ng/L for PFBS. Results from the soil samples were compared to the Air Force's calculated screening level of 1,260 microgram/kilogram (µg/kg) for PFOS and PFOA and the RSL for PFBS of 1,300,000 ug/kg.

Groundwater
The analytical results of the groundwater samples indicated the presence of either one of the PFAS groups (PFOS, PFOA or PFBS), or a combination of all three at areas 1, 4, 5, 7, 8, and groundwater monitoring wells MW-274, MW-289, and MW-401. However, the concentrations detected are below their respective health-base screening values.

Soil
The analytical results of the soil samples indicated the presence of PFOS, PFOA and/or PFBS at Areas 5, 7, 8. The concentrations of PFOS exceeded the screening criteria, and the highest concentrations (5990 and 4490 µg/kg) were detected in soil samples from Area 7 – Building 694 and Area 8 - Facility 2333, respectively. The concentrations of PFOA and PFBS did not exceed the screening criteria.

We have the following comment:

Page 5-1 Groundwater
It is incorrect to state that no releases of PFOS, PFOA or PFBS have occurred. The analytical results of the groundwater samples indicated the presence of detectable concentrations PFOS, PFOA or PFBS in the groundwater, therefore a release to groundwater could have occurred. However, the concentrations detected were below their respective health-based screening values.

Should you have any questions regarding this letter, please contact me at (951) 782-4498, or by email at patricia.hannon@waterboards.ca.gov.

Sincerely,

Patricia A. Hannon, PG
Engineering Geologist
Land Disposal and DoD Section

cc: Addressee: roy.willis@us.af.mil
Nadia Hollan-Burke, US EPA, burke.nadiahollan@epa.gov
Stephen Niou, DTSC, Stephen.Niou@dtsc.ca.gov
Calvin Cox, SpecPro, calvin.cox@Specprosvcs.com
Andy Cramer, CH2M Hill, Andy.Cramer@CH2M.com

AIR FORCE TECHNICAL REVIEW COMMENT MATRIX					
Item	***Page***	***Section***	***Line(s)***	***Comments***	***Response to Comment (Aerostar SES)***
Reviewer: Department of Toxic Substances Control (Stephen Niou), 25 June 2018					
1.		General		This report concludes that for groundwater: "no releases of PFOS, PFOA, and PFBS have occurred." However, release to soil is confirmed. DTSC recommends that this report state whether release to soil may pose risks to human health. And if the answer is positive, please provide recommendations of mitigation.	Concur. The soil portion of Section 5.0 has been revised as follows: "Soil samples were collected at four AFFF areas during the SI field effort. The analytical results indicate that concentrations of PFOS surface soil samples at AFFF Areas 7 and 8 exceeded the USAF-calculated screening level. No other s oil samples had concentrations of PFOS, PFOA, or PFBS exceeding their respective screening values. This non-drinking water pathway is considered complete for AFFF Areas 7 and 8 since human receptors are ~~possible~~ *potentially present* in each area and ~~a release has been confirmed~~ *concentrations of PFOS may pose a risk to human health. However, in the absence of legally enforceable federal or state standards, further action is not recommended until these standards are developed and promulgated.*" Because the risks to human health from PFAS in soil are not fully understood and there are no promulgated standards, mitigation recommendations are not currently warranted.
Reviewer: Santa Ana Regional Water Quality Control Board (Patricia Hannon), 26 June 2018					
1.		5.1		It is incorrect to state that no releases of PFOS, PFOA or PFBS have occurred. The analytical results of the groundwater samples indicated the presence of detectable concentrations PFOS, PFOA or PFBS in the groundwater, therefore a release to groundwater could have occurred. However, the concentrations detected were below their respective health-based screening values.	Concur. The groundwater portion of Section 5.0 has been revised as follows: "Groundwater samples were collected from six newly installed monitoring wells and four existing monitoring wells from five AFFF areas and near the downgradient site boundary. None of the groundwater samples collected contained concentrations of PFOS, PFOA, or PFBS above their respective health-based screening values defined in Table 1-1. Therefore, no ~~releases of~~ *impacts from* PFOS, PFOA, or PFBS ~~have occurred~~ *to groundwater were identified.* Domestic and public supply wells were identified within 4 miles of the AFFF areas; however, since groundwater is not impacted with PFOS or PFOA, the drinking water exposure pathway is incomplete." In addition, the document will be revised to discuss impacts to groundwater and soil as concentrations of PFOS, PFOA or PFBS above their respective health-based screening values. The term "release" will be omitted as applicable to

AIR FORCE TECHNICAL REVIEW COMMENT MATRIX					
Item	***Page***	***Section***	***Line(s)***	***Comments***	***Response to Comment (Aerostar SES)***
					avoid confusion. These changes will be made throughout the document as necessary; however they primarily occur in Section 4 and in the Conceptual Site Model (Appendix F).
Reviewer: EPA Region IX (Nadia Hollan Burke), 14 May 2018					
1a.		General		Throughout the report, the AF concludes that the drinking water exposure pathway is incomplete. EPA does not concur with this conclusion as it is premature to conclude this based on the information provided in the report. In order for the drinking water exposure pathway to be fully evaluated, the AF should consider and provide the following: The AF states that domestic and public supply wells were identified within 4 miles of the AFFF areas (Executive Summary, Page ix, Groundwater, and elsewhere). It is not clear whether it is reasonable to conclude that a historic release of AFFF at Norton AFB has only migrated 4 miles. Please provide more information regarding the potential fate and transport of AFFF from the identified source areas since the time of the potential releases. Also, please provide any UCMR (or otherwise PFOS and PFOA) data that should be available for the identified domestic and public supply wells within the 4 miles. And, should PFOA and PFOS could it have migrated beyond 4 miles, identify any wells that may be within the	Clarification. Per the 2005 Federal Facilities Remedial Site Inspection Summary Guide (EPA, 2005), the assessment of groundwater targets during an SI should include the identification of drinking water supply wells within a four-mile radius of each source at the site. Since there is no evidence of PFOS/PFOA impacts (i.e. PFOS or PFOA at concentrations above the Health Advisory) in groundwater at the potential source areas, there is no reason to suspect a release occurred. In previous investigations at Norton, other contaminants (i.e., TCE plume at the Central Base Area [CBA]) did migrate downgradient. However, they were also identified at the source locations. Further, in our experience conducting PFAS investigations at 40+ installations across the US, we have never identified downgradient PFAS contamination without also detecting contamination (typically at higher concentrations) within the source areas. UCMR data for the cities of San Bernardino and Riverside were reviewed as part of the SI. As stated on page 4-2, neither city reported any detections of PFAS within their systems during the 2013–2015 UCMR period. For clarity, Figure 4-1 will be added to the document showing the result of the 4-mile well survey. This figure is included as Attachment A to these RTCs. Section 4.4.1.3 will also be revised as follows to detail why the drinking water pathway is incomplete. "4.4.1.3 Incomplete Pathways "The drinking water pathways at Norton AFB are considered incomplete. ~~since no releases were identified~~ *Since there were no concentrations of PFOS or PFOA above the HA within potential source areas, there is no source of contamination. Further, analytical data from the City of San Bernardino and the City of Riverside, both of which have drinking water production wells downgradient of the potential source areas, did not detect PFOS or PFOA in*

AIR FORCE TECHNICAL REVIEW COMMENT MATRIX					
Item	***Page***	***Section***	***Line(s)***	***Comments***	***Response to Comment (Aerostar SES)***
				potential distance of that release, and associated available data.	*their drinking water systems. Therefore, the drinking water pathway is considered incomplete."*
1b.				The soil and groundwater results presented throughout the report (Table ES-1, etc.) show that a confirmed AFFF release has taken place, and impacts to soil and potentially groundwater above screening levels are currently present in at least two of the source areas: Building 694 and Facility 2333. However, no groundwater data for PFOS is presented for Building 694, nor for PFOA at Facility 2333. Therefore, there appears to be an incomplete data set for calculating the combined PFOS+PFOA and comparison to the EPA PHAs/screening levels. Please explain why there is no complete groundwater data set provided for comparison to the PHAs, and if needed to complete the data set, arrange for data to be collected to confirm whether the groundwater may be impacted at levels above the PHA screening level for PFOS + PFOA at both of these source areas.	Clarification. Groundwater data for AFFF Areas 7 (Building 694) and 8 (Facility 2333) are summarized in Tables 3-9 and 3-10, respectively. Please note that when an analyte was not detected, a "--" symbol was used in the summary tables. Groundwater was analyzed for PFOS from NORPMW004 but not detected at Building 694 (AFFF Area 7). Groundwater was analyzed for PFOA from NORPMW007R but not detected at Facility 2333 (AFFF Area 8). Groundwater analytical data for these areas is illustrated in Figures 3-5 and 3-6 and shown in tabular form on Exhibit 1.
1c.				A pump and treatment system operated for several years at the Norton AFB, however the impact of this system's operation to fate and transport of the AFFF releases as well as any effluent is not discussed in the report. More information is needed regarding whether the operation of the system impacted the potential fate and transport of AFFF releases, such as where the extraction wells were in relation to all	Concur. Text will be added to the document to discuss the previous pump and treat systems and municipal wellhead and facility treatments. The CBA and BB treatment systems were located downgradient of potential AFFF source areas. The approximate location of the CBA and BB treatment systems is provided as Attachment B for reference. At each system, the groundwater extracted with reinjected relatively nearby and within the same aquifer as the extraction wells. The area of influence of the systems localized and hydraulic impacts would have been minimal.

AIR FORCE TECHNICAL REVIEW COMMENT MATRIX					
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				of the potential AFFF source areas, how long they operated, how the water was treated and discharged, etc. Please add more information to the Site Conceptual Model to account for potential changes in fate and transport of AFFF due to the operation of the pump and treatment system.	As discussed in the response to comment 1a, we are not aware of any situations where PFAS was found downgradient of a source but not at the source itself. As concentrations of PFOS, PFOA, and PFBS did not exceed screening levels in groundwater at the former Norton AFB potential source areas, there is no reason to suspect any impacts or distribution of PFAS from the treatment systems. However, two wells downgradient of the AFFF Areas, MW-289 and MW-401, were sampled and were not found to have PFOS, PFOA or PFBS impacts. The following text will be added to the CSM under the general Norton Installation, Installation History: • *"Groundwater pump and treat systems, including the Central Base Area (CBA) and Base Boundary (BB) systems previously operated at the base to remove and hydraulically control trichloroethylene (TCE) in groundwater. The CBA system commenced 24-hour operation in June 1992 and ceased in May 2002. The BB system commenced 24-hour operations in February 1995 and ceased in November 2001."* The following paragraph will be added to the end of Section 4.1.2 (Hydrogeology): "*Previously, groundwater in parts of the base were influenced by pump and treat remediation systems used to control base to remove and hydraulically control trichloroethylene (TCE) in groundwater. The Central Base Area (CBA) system was located on the northwest portion of the base, near well BP-3 (Figure 2-2). This system commenced 24-hour operation in June 1992 and ceased in May 2002. The CBA system included liquid-phase granular activated carbon (GAC) treatment, which not only was effective in reducing TCE concentrations, would also have been effective in removing any PFOS or PFOA from the groundwater. The Base Boundary (BB) system was located in the southwest corner of the installation, near the intersection of Tippecanoe Avenue and Mill Street. This system commenced 24-hour operations in February 1995 and ceased in November 2001. Liquid-phase GAC treatment*

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					was not included in this system. Currently, no pump and treat system operate at the former installation." The following paragraph will be added to the end of Section 4.4.1 (Drinking Water Pathways): "*Municipal drinking water wells downgradient of Norton AFB have been impacted by various contaminants in the past. TCE contamination was found in Raub Well #5 (Figure 4-1), resulting in the installation of a wellhead treatment system including liquid phase GAC treatment. Lockheed-Martin has installed liquid-phase granular-activated carbon at three City of Riverside Regional Treatment Facilities (RTFs). Tippecanoe RTF treats Gage 29-2, Gage 29-3, Gage 92-1, and Tippecanoe; Sunnyside RTF treats Gage 26-1, Gage 27-1, and Gage 51-1; Raub RTF treats Raub #4, Raub #5, and Raub #7 (Tetra Tech, 2008). While groundwater was not observed to be impacted by PFOS or PFOA during this SI, these treatment systems have historically provided further protection to drinking water from PFOS and PFOA."* Section 3.13.3 will be revised to include the following text: "*Wells MW-289 and MW-401 are hydraulically downgradient of AFFF Area 7 and 8, both of which were found to have PFOS impacts in surficial soils. Since PFOS was not detected in wells MW-289 and MW-401, this suggests that the PFOS in soil is not leaching into groundwater and is not migrating downgradient at the former Norton AFB."* *Finally, the following sentence will be added to the Executive Summary and Section 5 (Conclusions):* "*While surficial soils were impacted with PFOS in two AFFF Areas, analytical samples from groundwater in and downgradient of these areas show very low to no levels of PFOS, suggesting that PFOS has not significantly leached from soil."*

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2.		3.14 and Appendix E		Section 3.14 Investigation-Derived Waste, and Appendix E, Waste Manifests: It is unclear from the description in the report and the waste manifests if the waste was shipped with approval of the CERCLA Off-Site Rule Coordinator for the State of Utah. Please provide confirmation that the waste facilities receiving the wastes were approved facilities to receive CERCLA wastes, including any correspondence with the EPA Off-Site Rule Coordinator.	Concur. The text in Section 3.14 has been revised as follows: "*The SI field effort at the former Norton AFB generated approximately 83 cubic yards of soil and 13,524 gallons of wastewater. The soil and water were both characterized as nonhazardous. The waste was then transported to and disposed of via incineration at Clean Harbors Aragonite landfill in Utah. This facility is permitted to receive CERCLA waste under EPA Permit #UTD981552177. The final waste manifests, certificates of disposal, and additional information on the Clean Harbors Aragonite facility are included in Appendix E."* A copy of the Fact Sheet on the Clean Harbors Aragonite Facility and the Disposal Certificates for the IDW are also included as Attachment C to these RTCs for your convenience.

From: Burke, NadiaHollan
To: Catherine McMillen; WILLIS, ROY T GS-13 USAF AFMC AFCEC/CIBE
Cc: Calvin Cox (Calvin.Cox@SpecProSvcs.com); Niou, Stephen@DTSC; Hannon, Patricia@Waterboards; Serda, Sophia
Subject: RE: Revised Responses to Comments on the Draft SI Report_Norton
Date: Friday, August 10, 2018 6:03:21 PM

Hi, I don't have anything further, these revised RTCs address our comments. Based on the results of the Report, we believe a Remedial Investigation is needed to delineate the extent of soil contamination and to develop a risk assessment. The AF should also consider putting in place land use restrictions in the areas that exceed the soil RSLs to prevent residential uses or use as a day care (unless these uses are already prohibited) in the meantime. Hopefully this is something we can discuss in our upcoming scoping meeting.

Nadia Hollan Burke

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