



Naval Facilities Engineering Systems Command Washington
Washington, D.C.

Final

**Basewide Site Inspection Report
Per- and Polyfluoroalkyl Substances
Site 14 – Old Fire Fighting Burn Pad
Air Show Fire Fighting Demonstration Area
Site 41 – Fire Fighting Burn Pad
Crash Trucks Daily Equipment Functioning Inspection Area**

Naval Air Station Patuxent River
St. Mary's County, Maryland

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December 2021

Prepared for NAVFAC Washington
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Herndon, Virginia
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Executive Summary

Historical use of aqueous film-forming foam (AFFF) during fire and emergency response, testing, and training activities at Naval Air Station (NAS) Patuxent River has prompted the Department of the Navy (Navy) to conduct a per- and polyfluoroalkyl substances (PFAS) Site Inspection (SI) at the installation. PFAS are considered “emerging chemicals of environmental concern” by the U.S. Environmental Protection Agency (USEPA) and the Department of Defense (DoD).¹ There are currently no legally enforceable federal or Maryland standards for PFAS.

The following objectives of the PFAS SI at NAS Patuxent River were identified in the Final *Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan (SAP)*, Naval Air Station Patuxent River, St. Mary’s County, Maryland (CH2M HILL, Inc. [CH2M], 2020), hereinafter referred to as the SAP:

- Determine whether PFAS (if present) were detected at concentrations that exceed the project action limits (PALs)² for soil, groundwater, surface water, and sediment at the confirmed or suspected release areas.
- Determine the potential for PFAS (if present) to migrate offsite.

Historical research and interviews with fire department and installation personnel completed for the Preliminary Assessment (PA) report for PFAS at NAS Patuxent River (CH2M, 2018) identified 16 areas of interest (AOIs) at the installation requiring additional investigation for PFAS. This PFAS SI report is focused on four of these AOIs: Site 14 – Old Fire Fighting Burn Pad (Site 14); Air Show Fire Fighting Demonstration Area (FFDA); Site 41 – Fire Fighting Burn Pad (Site 41); and Crash Trucks Daily Equipment Functioning Inspection Area (CTIA). Based on the PA and subsequent SAP, the field investigation for the SI at these four AOIs was conducted in August and September 2020. This effort consisted of the installation of shallow temporary piezometers and co-located soil borings at locations where AFFF may have been used or released, collection of soil (surface and subsurface) and grab groundwater samples to determine whether PFAS releases occurred, and collection of depth to water measurements at the newly installed temporary piezometers to estimate the direction of groundwater flow in the surficial aquifer. The field investigation for the SI was performed in general accordance with the SAP (CH2M, 2020).

Laboratory analysis of soil samples collected at Site 14 indicated that perfluorooctanoic acid (PFOA) and/or perfluorooctanesulfonic acid (PFOS) were present in samples from four soil borings. PFOA was detected at one surface soil sample location but no subsurface soil sample locations. PFOS was detected at four surface soil sample locations but no subsurface soil sample locations. None of the detected PFOA and PFOS concentrations exceeded the corresponding PALs. Perfluorobutanesulfonic acid (PFBS) was not detected in soil samples at Site 14. Laboratory analysis of grab groundwater samples collected at Site 14 indicated that PFOA, PFOS, and PFBS were each present in samples from six temporary piezometers, with detected PFOA concentrations exceeding the corresponding PAL at all six grab groundwater sample locations and detected PFOS concentrations exceeding the corresponding PAL at five grab groundwater sample locations. None of the detected PFBS concentrations exceeded the corresponding PAL at Site 14.

Laboratory analysis of soil samples collected at FFDA indicated that PFOA and/or PFOS were present in samples from five soil borings. PFOA was detected at one surface soil sample location but no subsurface soil sample locations. PFOS was detected at five surface soil sample locations but no subsurface soil sample locations. None of the detected PFOA and PFOS concentrations exceeded the corresponding PALs. PFBS was not detected in soil samples at FFDA. Laboratory analysis of grab groundwater samples collected at FFDA indicated that PFOA, PFOS,

¹ The most current version of DoD Instruction 4715.18 (DoD, 2019a) defines emerging chemicals of environmental concern as “Chemicals relevant to the DoD that are characterized by a perceived or real threat to human health or the environment and that have new or changing toxicity values or new or changing human health or environmental regulatory standards. Changes may be due to new science discoveries, detection capabilities, or exposure pathways.”

² The PALs for PFOA and PFOS for this investigation align with screening values for moving a site from the SI phase to the RI phase included in the Assistant Secretary of Defense Memorandum issued on October 15, 2019 (DoD, 2019b). For PFBS, the PALs are based on the May 2021 USEPA Regional Screening Levels (USEPA, 2021).

and PFBS were each present in samples from five temporary piezometers, with detected PFOA concentrations exceeding the corresponding PAL at one grab groundwater sample location and detected PFOS concentrations exceeding the corresponding PAL at two grab groundwater sample locations. None of the detected PFBS concentrations exceeded the corresponding PAL at FFDA.

Laboratory analysis of soil samples collected at Site 41 indicated that PFOA and/or PFOS were present in samples from four soil borings. PFOA was detected at four surface soil sample locations and two subsurface soil sample locations, although none of the detected PFOA concentrations exceeded the corresponding PAL. PFOS was detected at four surface soil sample locations and two subsurface soil sample locations, with detected PFOS concentrations exceeding the corresponding PAL at one surface soil sample location. PFBS was not detected in soil samples at Site 41. Laboratory analysis of grab groundwater samples collected at Site 41 indicated that PFOA, PFOS, and/or PFBS were present in samples from seven temporary piezometers. PFOA and PFOS were each detected at all seven grab groundwater sample locations, with detected PFOA concentrations exceeding the corresponding PAL at five locations and detected PFOS concentrations exceeding the corresponding PAL at six locations. PFBS was detected at six grab groundwater sample locations, although none of the detected PFBS concentrations exceeded the corresponding PAL at Site 41.

Laboratory analysis of soil samples collected at CTIA indicated that PFOA and/or PFOS were present in samples from four soil borings. PFOA was detected at two surface soil sample locations and two subsurface soil sample locations, although none of the detected PFOA concentrations exceeded the corresponding PAL. PFOS was detected at four surface soil sample locations and four subsurface soil sample locations, with detected PFOS concentrations exceeding the corresponding PAL at one surface soil sample location and one subsurface soil sample location. PFBS was not detected in soil samples at CTIA. Laboratory analysis of grab groundwater samples collected at CTIA indicated that PFOA, PFOS, and PFBS were each present in samples from six temporary piezometers, with detected PFOA concentrations exceeding the corresponding PAL at four grab groundwater sample locations and detected PFOS concentrations exceeding the corresponding PAL at four grab groundwater sample locations. None of the detected PFBS concentrations exceeded the corresponding PAL at CTIA.

Groundwater flow is predominantly to the north-northeast at Site 14 in the direction of Harper's Creek, to the north at FFDA and Site 41 in the direction of the Patuxent River, and to the east-southeast at CTIA in the direction of Pine Hill Run. At each site, there is the potential for migration of PFAS in the direction of groundwater flow. However, because all the sites included in this report are not located in proximity to the installation boundaries, migration off-installation in groundwater is not of concern at this time. There is no potential drinking water exposure because groundwater flow is not toward off-installation wells, the surficial aquifer at the installation is not used for drinking water on- or off-installation, and there are confining units isolating the aquifers used for drinking water.

This investigation demonstrated that PFAS are present in environmental media at levels exceeding screening values at the four identified AOIs where AFFF was reportedly released. It is recommended that Remedial Investigations (RIs) are conducted at Site 14, FFDA, Site 41, and CTIA to fully delineate the nature and extent of PFAS releases and assess potential human health and ecological risks. The RIs should include the collection and analysis of representative environmental media at each AOI, including the installation and sampling of permanent monitoring wells. Based on the resulting data, conceptual site models should be developed, including discussions of the fate and transport of PFAS at the AOIs. Further, quantitative human health risk assessments should be performed to evaluate risks to human health associated with potential exposure to PFAS detected in environmental media at the AOIs, and an ecological risk screening should be performed. Potential risks associated with PFAS should be evaluated within the applicable DoD, Navy, and/or USEPA policy, guidance, or directives using the state-of-the-science toxicological information available and current at the time the RI report is prepared.

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Acronyms and Abbreviations

°C	degree(s) Celsius
°F	degree(s) Fahrenheit
µg/kg	microgram(s) per kilogram
AFFF	aqueous film-forming foam
AOI	area of interest
bgs	below ground surface
CH2M	CH2M HILL, Inc.
CSM	conceptual site model
CTIA	Crash Trucks Daily Equipment Functioning Inspection Area
DoD	Department of Defense
DPT	direct-push technology
ER	Environmental Restoration
ERS	ecological risk screening
FFDA	Air Show Fire Fighting Demonstration Area
HHRA	human health risk assessment
IDW	investigation-derived waste
LC-MS/MS	Liquid Chromatography Tandem Mass Spectrometry
MDE	Maryland Department of the Environment
mg/L	milligram(s) per liter
mS/cm	millisiemen(s) per centimeter
msl	mean sea level
mV	millivolt(s)
NAS	Naval Air Station
NAVFAC	Naval Facilities Engineering Systems Command
Navy	Department of the Navy
ng/L	nanogram(s) per liter
NTU	nephelometric turbidity unit(s)
ORP	oxidation-reduction potential
PA	Preliminary Assessment
PAL	project action limit
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
QSM	Quality Systems Manual
RI	Remedial Investigation
SAP	Sampling and Analysis Plan
SI	Site Inspection

Site 14	Site 14 – Old Fire Fighting Burn Pad
Site 41	Site 41 – Fire Fighting Burn Pad
SOP	standard operating procedure
UCMR3	Third Unregulated Contaminant Monitoring Rule
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UST	underground storage tank

Introduction

This report presents the data and findings obtained from a per- and polyfluoroalkyl substances (PFAS) Site Inspection (SI) conducted at Naval Air Station (NAS) Patuxent River (also referred to as installation). PFAS are considered “emerging chemicals of environmental concern” by the U.S. Environmental Protection Agency (USEPA) and the Department of Defense (DoD).¹

The following objectives of the PFAS SI at NAS Patuxent River were identified in the *Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan (SAP), Naval Air Station Patuxent River, St. Mary’s County, Maryland* (CH2M HILL, Inc. [CH2M], 2020), hereinafter referred to as the SAP:

- Determine whether PFAS (if present) were detected at concentrations that exceed the project action limits (PALs)² for soil, groundwater, surface water, and sediment at the confirmed or suspected release areas.
- Determine the potential for PFAS (if present) to migrate offsite.

This report outlines the approach taken to achieve the listed objectives, provides conclusions based on data collected, and makes recommendations for further study. This report was prepared in accordance with Comprehensive Environmental Response, Compensation, and Liability Act requirements for the Department of the Navy (Navy), Naval Facilities Engineering Systems Command (NAVFAC) Washington, under the Comprehensive Long-term Environmental Action—Navy 9000 Program, Contract N62470-16-D-9000, Contract Task Order 4256, for submittal to the Navy (NAVFAC Washington), USEPA, and the Maryland Department of the Environment (MDE). The Navy, USEPA, and MDE work jointly as the NAS Patuxent River Tier 1 Partnering Team.

This report is organized as follows, with tables and figures provided at the end of each respective section and support information appended to the report as shown:

- **Section 1** – Introduction
- **Section 2** – Site Background and Physical Setting
- **Section 3** – Investigation Methodology
- **Section 4** – Investigation Results
- **Section 5** – Conclusions and Recommendations
- **Section 6** – References
- **Appendix A** – Survey Data
- **Appendix B** – Investigation-Derived Waste Analytical Data, Waste Profiles, and Disposal Manifests
- **Appendix C** – Data Quality Assessment
- **Appendix D** – Laboratory Analytical Data

¹ The most current version of DoD Instruction 4715.18 (DoD, 2019a) defines emerging chemicals of environmental concern as “Chemicals relevant to the DoD that are characterized by a perceived or real threat to human health or the environment and that have new or changing toxicity values or new or changing human health or environmental regulatory standards. Changes may be due to new science discoveries, detection capabilities, or exposure pathways.”

² The PALs for PFOA and PFOS for this investigation align with screening values for moving a site from the SI phase to the RI phase included in the Assistant Secretary of Defense Memorandum issued on October 15, 2019 (DoD, 2019b). For PFBS, the PALs are based on the May 2021 USEPA Regional Screening Levels (USEPA, 2021).

Site Background and Physical Setting

This section presents background information on NAS Patuxent River including applicable history and confirmed or suspected releases of PFAS, along with relevant information on the physical and hydrogeologic setting at the installation.

2.1 Site Background

NAS Patuxent River is located in St. Mary's County, Maryland, approximately 65 miles southeast of Washington, D.C. (**Figure 2-1**). NAS Patuxent River was listed on the National Priorities List on June 30, 1994, and USEPA assigned NAS Patuxent River with USEPA Identification No. MD7170024536.

NAS Patuxent River encompasses approximately 7,900 acres, including both the primary installation parcel at the confluence of the Patuxent River and the Chesapeake Bay, and Webster Outlying Field annex, an outlying parcel located in St. Ingoes, Maryland, approximately 9 miles south of NAS Patuxent River. NAS Patuxent River contains buildings, runways, and infrastructure to support the NAS Patuxent River military mission, provide office space for Navy and civilian personnel, and provide housing for personnel posted to the installation. Several areas are used for recreational activities.

Interviews with fire department and installation personnel completed for the Preliminary Assessment (PA) report for PFAS at NAS Patuxent River (CH2M, 2018) identified 16 areas of interest (AOIs) requiring investigation as part of an SI due to confirmed or suspected releases of aqueous film-forming foam (AFFF). This PFAS SI report summarizes the outcome of SI activities at four of these AOIs (**Figure 2-2**): Site 14 – Old Fire Fighting Burn Pad (Site 14); Air Show Fire Fighting Demonstration Area (FFDA); Site 41 – Fire Fighting Burn Pad (Site 41); and Crash Trucks Daily Equipment Functioning Inspection Area (CTIA). PFAS AOIs recommended for an SI in the PA but not included in this report are the subject of separate SI reports, which are being submitted in phases as per Partnering Team agreement for ease of review.

2.1.1 Site 14 Background

Site 14 is located in the middle of the airfield immediately adjacent to Taxiway Echo in the east-central portion of the installation (**Figures 2-2 and 2-3**). The site sits at approximately 15 feet above mean sea level (msl), with little topographic relief. The ground surface is largely paved with asphalt, though the pavement is worn and cracked in places. Unpaved portions of the site are covered with coarse sand, gravel, and cobble. There are several mounds of debris and soil, and there are pits in the ground surface. Sparse, scrubby vegetation partially covers the ground surface, including the pavement (CH2M, 2018).

Site 14 was in use from the late 1950s through the early 1980s (AFFF use from 1970 to early 1980s). Fires were ignited on the concrete “burn pad” or in shallow pits using gasoline, diesel oil, or waste oil. AFFF was used to extinguish the fires and then allowed to infiltrate into the ground and discharge to surrounding stormwater ditches and drains. An unknown amount of AFFF was released. The site was closed under the MDE Oil Control Program and removed from the Environmental Restoration (ER) Program in 2006, but the potential presence of PFAS was not investigated (CH2M, 2018).

2.1.2 FFDA Background

FFDA is located on the western side of the airfield, southeast of the intersection of Taxiway Charlie and Runway 2-20 (**Figures 2-2 and 2-4**). The approximate location of the site is based on historical accounts from retired installation personnel and a photograph from a 1969 Tester newspaper article describing a fire-fighting demonstration. The site is largely flat, with an elevation of approximately 25 feet above msl (CH2M, 2018).

FFDA was used for fire-fighting demonstrations during air shows starting in the early 1960s and ending in the early 1970s. Protein foam was used prior to 1970 followed by AFFF from approximately 1970 to 1973. Fires were

ignited by dumping fuel around a fuselage to simulate an actual crash scene. AFFF on crash trucks was used to extinguish the fires and then allowed to infiltrate into the ground and discharge to surrounding stormwater ditches and drains. An unknown amount of AFFF was released (CH2M, 2018).

2.1.3 Site 41 Background

Site 41 is located in the north-central portion of the installation, directly north of the intersection between Taxiway Bravo and Runway 14-32 (**Figures 2-2 and 2-5**). The core of the site is in a flat area sitting at approximately 30 feet above msl, surrounded on the north and east sides by a hill encompassing approximately 10 feet of vertical relief. The site is partially paved, and the ground surface is mainly characterized by broken pavement, loose pebbles and cobbles, scrubby vegetation, and a grassy area. Toward the north end of the site, scraps of metal are on the ground surface, but neither the metal nor the surrounding landscape appear to have been burned. No visible impacts related to past activities are observed at the site, possibly because the location where most of the burning probably occurred has since been paved over with asphalt (CH2M, 2018).

Site 41 was used for training from 1952 to 1991. Pipes carried expired jet fuel or waste oil from two nearby underground storage tanks (USTs) to the burn area set in a 200-foot by 200-foot pit on a concrete pad where fires were ignited. Protein foam was used prior to 1970 followed by AFFF to 1991. AFFF was used to extinguish the fires and then was allowed to infiltrate into the ground and discharge to surrounding stormwater ditches and drains. An unknown amount of AFFF was released. The site was closed under the MDE Oil Control Program and removed from the ER Program in 2005, but the potential presence of PFAS was not investigated (CH2M, 2018).

2.1.4 CTIA Background

CTIA is located on the south side of the airfield, between the intersections of Taxiway Alpha with Taxiway Bravo and Taxiway Alpha with Runway 02-20 (**Figures 2-2 and 2-6**). The site consists of a flat area adjacent to the taxiway, which is bordered on the south by a hill (CH2M, 2018).

CTIA was used for daily checks of AFFF spray equipment and consistency of foam, although the time period over which equipment functioning testing was conducted is unknown. AFFF was reportedly sprayed in the direction of the hill to the south during daily routine equipment checks on the fire and rescue crash trucks. AFFF was allowed to infiltrate into the ground and discharge to surrounding stormwater ditches and drains. An unknown amount of AFFF was released (CH2M, 2018).

2.2 Physical Setting

This section describes the physical setting of NAS Patuxent River, including geologic features relevant to this investigation.

2.2.1 Climate

The climate of St. Mary's County is moderated by its proximity to the Chesapeake Bay and the Atlantic Ocean. The climate is predominantly continental and is characterized by seasonal and daily fluctuations. According to the Maryland State Office of Climatology, the average winter temperature is 36.6 degrees Fahrenheit (°F), whereas the average summer temperature is 74.9°F. In St. Mary's County, the warmest and coldest months of the year are July (mean temperature of 77°F) and January (mean temperature of 35.5°F), respectively.

Annual precipitation averages 42 inches. July is typically the wettest month of the year, averaging 4.8 inches of precipitation. October is the driest month of the year, averaging 2.7 inches of precipitation. In general, precipitation is distributed evenly throughout the year.

2.2.2 Topography and Surface Drainage Features

Most of NAS Patuxent River is a flat plain that protrudes into the Chesapeake Bay at the mouth of the Patuxent River. Elevations in the lowland areas may be as high as 40 feet above msl but are typically less than 20 feet above

msl. In the southwestern part of the installation, the land rises to an upland plateau, where elevations range from 40 to 120 feet above msl.

NAS Patuxent River is located in the Patuxent River basin. As shown on **Figure 2-2**, the majority of the streams that drain NAS Patuxent River are intermittent and originate northwest of State Highway 235. Streams that originate on the installation remain within the property boundaries and discharge into manmade ponds, the Patuxent River, or the Chesapeake Bay. A few small intermittent streams discharge primarily to Harper's Creek, Pearson Creek, or Goose Creek. Harper's Creek and Pearson Creek discharge into the Patuxent River, which is estuarine, in the vicinity of the installation. Goose Creek and Pine Hill Run discharge directly into the Chesapeake Bay. Manmade structures, such as aircraft runways and the stormwater drainage system, affect surface water flow. The stormwater drainage system consists of concrete storm sewers that receive surface water and groundwater seepage from a network of shallow roadside ditches, culverts, sub-drains, storm drains, associated laterals, and natural streams. Discharge points for the stormwater drainage system include onsite ponds, the Patuxent River, and the Chesapeake Bay.

Several broad wetland cover types have been identified at the installation. These include forested wetlands, scrub/shrub wetlands, saline marshes, freshwater tidal marshes, nontidal marshes, and open water/emergent wetlands. Five types of forests have been identified and include upland hardwoods, upland pine, bottomland pine, bottomland hardwood, and mixed forest. Approximately 37 percent of NAS Patuxent River is forested, with mature upland hardwoods and mixed pine/hardwood stands being the most common. Shrubs and young trees cover approximately 14 percent of NAS Patuxent River. Freshwater and saltwater marshes and open water habitats cover a little less than 9 percent of NAS Patuxent River.

Surface water drainage features are shown on the site layouts for Site 14, FFDA, Site 41, and CTIA. As shown on **Figures 2-3** through **2-6**, the approximate surface water flow is generally to the northeast and east at Site 14, toward the low-lying area immediately south and east of FFDA, to the south and southeast at Site 41, and generally toward the area to the southwest of CTIA.

2.2.3 Land Use

NAS Patuxent River contains buildings, runways, and infrastructure to support the military mission, provide office space for Navy and civilian personnel, and provide housing for personnel posted to the installation. Several areas are used for recreational activities. Creeks, ponds, forests, and beaches provide the opportunity for fishing, swimming, camping, and hunting at the installation. Although construction and other activities have disturbed approximately 3,000 acres since establishment of NAS Patuxent River in 1943, many of the disturbed areas have since been left fallow and are now covered with trees, shrubs, or tall grasses.

2.2.4 Geologic Setting

NAS Patuxent River is in the Coastal Plain physiographic province, approximately 50 miles southeast of the Piedmont physiographic province. The Coastal Plain sediments consist of a thick sequence of unconsolidated sand, clay, and gravel that dips gently (less than 1 degree) to the east and southeast (Fred C. Hart Associates, Inc., 1984). The thickness of the sedimentary units varies from approximately 2,000 feet in the northwestern part of St. Mary's County to 3,000 feet in the southeastern area of the county. Near NAS Patuxent River, the unconsolidated Coastal Plain sediments overlie crystalline rocks.

The Coastal Plain sediments range in age from Cretaceous to Recent. During the latter part of the Late Cretaceous and through Tertiary time, the sediments deposited were of estuarine and marine origin (Fred C. Hart Associates, Inc., 1984). The upper few hundred feet of sediments at NAS Patuxent River were deposited during the Tertiary (2 to 65 million years old) and Quaternary (up to 2 million years old) periods.

The major regional geologic units for St. Mary's County are present near NAS Patuxent River. These units include some of the major water supply aquifers in the area. The uppermost geologic units are discussed as follows in order of increasing age (Chappelle and Drummond, 1983; McCartan, 1989):

- The Lowland deposits consist of tan, gray, or greenish-gray stratified sand and gravel, clay, and silt. The thickness of the unit ranges from 0 to 150 feet and averages 20 to 30 feet. Soil borings completed during Remedial Investigation (RI) activities conducted for the Sites 1 and 12 Fishing Point Landfill (CH2M, 1998) and the Site 4 Hermanville Landfill (CH2M, 2014) revealed 45 to 80 feet of sediments believed to correlate with the Lowland deposits.

The Lowland deposits in southern St. Mary's County are reported to consist of three general units: (1) a thick basal sand and gravelly sand; (2) a middle unit of thick clay that becomes silty and sandy in some areas; and (3) a surficial unit of fine to medium sand. This stratification is consistent with stratigraphy found at NAS Patuxent River, but the middle unit is a silty or clayey sand rather than a clay throughout most of the installation.

- The Upland deposits consist of tan to orange clay, silt, and sand. Included in the Upland deposits are the Chickamuxen Church Formation (tan to yellow-orange gravel and sand), the Park Hall Formation (silty sand and clay, interbedded with pebbles, cobbles, and boulders), and the Upland gravel unit (muddy sand grading to medium gravel, overlying well-sorted gravel and clean coarse sand). The thickness of the Upland deposits ranges from 10 to 60 feet near NAS Patuxent River (McCartan, 1989).
- Beneath the Upland and Lowland deposits is the Tertiary Chesapeake Group, which consists of three formations: the St. Mary's Formation, the Choptank Formation, and the Calvert Formation. The uppermost is the St. Mary's Formation, which consists of greenish-blue to yellowish-gray sandy clay and fine-grained clayey sand. The thickness of this unit ranges from 0 to 80 feet (Chappelle and Drummond, 1983). The predominant feature of the St. Mary's Formation is the presence of abundant oyster shells and shell hash.

The Choptank Formation underlies the St. Mary's Formation and consists of olive-gray to yellow sand, fine sandy silt, or silt and clay with prominent shell beds. The thickness of this unit ranges from 35 to 150 feet.

The Calvert Formation underlies the Choptank Formation. It consists of fossiliferous, slightly sandy greenish-gray silty clay. At the base of the Calvert Formation is the Fairhaven Member, a greenish-blue diatomaceous clay. The total thickness of the Calvert Formation ranges from 85 to 190 feet (McCartan, 1989).

- Beneath the Chesapeake Group is the Piney Point Formation, a gray to brownish-yellow, slightly glauconitic, medium- to coarse-grained sand. Near NAS Patuxent River, the top of the Piney Point Formation is approximately 240 to 250 feet below msl, and the unit ranges in thickness from 20 to 60 feet.
- Below the Piney Point Formation is the Nanjemoy Formation, a dark-green to gray, fine- to medium-grained glauconitic sand containing layers of shell fragments. Near NAS Patuxent River, the thickness ranges from 130 to 170 feet. The top of the Nanjemoy Formation is found at approximately 270 feet below msl. The lower part of the Nanjemoy is olive-green silty clay.
- Between the Nanjemoy Formation and the deeper Aquia Formation lies the Marlboro Clay Formation, described as pink to silver-gray and plastic. The thickness of the Marlboro Clay ranges from 5 to 35 feet, thinning to the southeast.
- The Aquia Formation is located beneath the Nanjemoy Formation. It is described as a greenish- to yellow-brown, well-sorted glauconitic quartz sand containing localized carbonate shell beds. In the area of NAS Patuxent River, the Aquia Formation is approximately 125 to 150 feet thick. The top of the Aquia Formation is approximately 425 to 450 feet below msl near NAS Patuxent River (Chappelle and Drummond, 1983).

2.2.5 Hydrogeologic Setting

From shallowest to deepest, the aquifers of primary interest with respect to NAS Patuxent River are the surficial aquifer, the Piney Point-Nanjemoy aquifer, the Aquia aquifer, and the Patapsco aquifer.

The surficial (water table) aquifer, the shallowest aquifer beneath NAS Patuxent River, occurs in the Lowland deposits (i.e., clay, silt, sand, and gravel), is unconfined, and ranges in thickness from 10 to 100 feet (U.S. Geological Survey [USGS], 2007). The St. Mary's Formation, as one formation of the low-permeability Chesapeake

Group, functions primarily as a confining unit underlying the surficial aquifer. This confining unit is approximately 210 to 250 feet thick (USGS, 2007). The Piney Point-Nanjemoy, Aquia, and Upper Patapsco aquifers are deeper, confined aquifers below the St. Mary's Formation (Fred C. Hart Associates, Inc., 1984).

2.2.6 Groundwater Flow

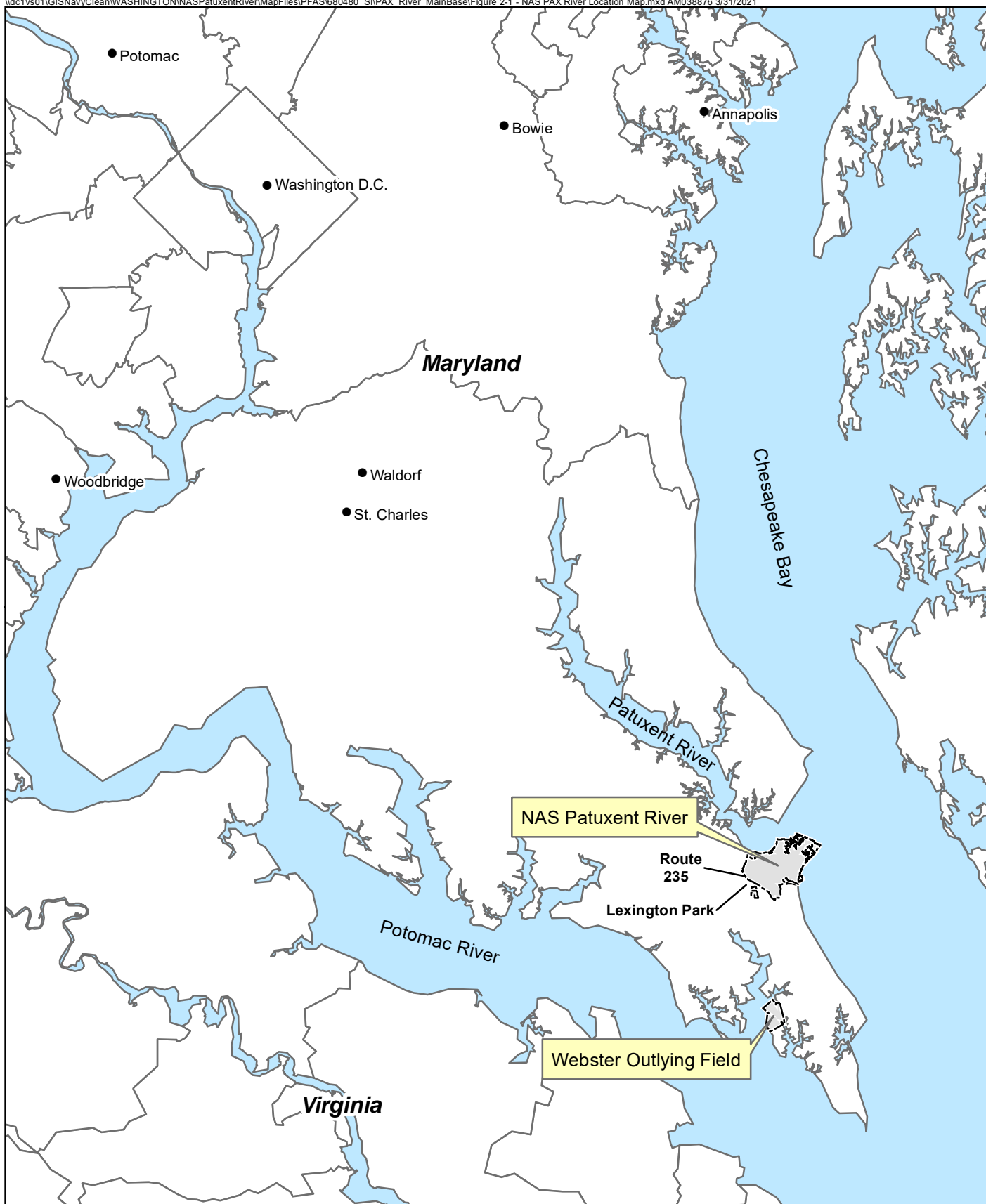
Groundwater from the surficial aquifer discharges to surface water bodies at NAS Patuxent River, including ponds, streams, the Patuxent River, and the Chesapeake Bay. The groundwater flow direction for the surficial aquifer across the installation is predominately to the northeast and southeast toward the Patuxent River and the Chesapeake Bay. The surficial aquifer is recharged by precipitation and infiltration. The groundwater flow direction for the Piney Point-Nanjemoy and Aquia aquifers is predominately toward the northeast and east at NAS Patuxent River (USGS, 2001). Site-specific groundwater flow data collected as part of this investigation are discussed in more detail in **Section 3**.

2.2.7 Drinking Water

Water for drinking and industrial use at NAS Patuxent River is obtained from groundwater withdrawals from 24 production wells across the installation; however, no water production wells are installed in the surficial aquifer at the installation because such wells are not permitted by the St. Mary's County Health Department.¹ All known properties with private drinking water wells are located off-installation and upgradient of confirmed or suspected PFAS release areas at the installation. Based on the PA report for PFAS at NAS Patuxent River (CH2M, 2018), there is no drinking water exposure from shallow groundwater at or within 1 mile of the installation.

Nineteen of the 24 production wells within the installation boundary are installed in the Aquia aquifer, with intake depths greater than 500 feet. Four of the wells are in the shallower Piney Point-Nanjemoy aquifer, with intake depths between 284 and 357 feet. Finally, one production well is installed in the Upper Patapsco aquifer at a depth greater than 900 feet. The production wells are used by the installation as either independent supply or community supply. Independent supply wells only provide water to one or two buildings at or adjacent to the production well location. Community supply wells are separated into three zones (Zones A, B, and C) and are all connected to the main water supply for the installation. Wells in the three zones can all be connected or isolated by valves to supply water. The installation has 18 community supply wells and 6 independent supply wells. In December 2014 and June 2015, 15 of the 24 production wells used in the public water system network at NAS Patuxent River were sampled at the well heads and before any combining into the main water supply system under the Third Unregulated Contaminant Monitoring Rule (UCMR3) (USEPA, 2012); none of the six PFAS analyzed for (perfluorooctanoic acid [PFOA], perfluorooctanesulfonic acid [PFOS], perfluorobutanesulfonic acid [PFBS], perfluorononanoic acid, perfluorohexanesulfonic acid, and perfluoroheptanoic acid) were detected during the sampling effort, as indicated in the PA report for PFAS at NAS Patuxent River (CH2M, 2018). According to installation personnel, the other nine production wells do not meet the criteria as public water supply wells, and therefore were not sampled as part of UCMR3. In addition, three public water supply wells in adjacent Lexington Park were sampled as part of UCMR3 in 2015. The same six PFAS were analyzed for and none of them were detected in the Lexington Park samples, as indicated in the PA report for PFAS at NAS Patuxent River (CH2M, 2018). The same 15 production wells at NAS Patuxent River were sampled again in December 2020 per DoD policy (DoD, 2020), and the samples were analyzed for 18 PFAS (including PFOA, PFOS, and PFBS) by USEPA Drinking Water Method 537.1; none of the 18 PFAS were detected.

¹ As stated in a letter from the St. Mary's County Health Department, "...With the exception of Amish and Mennonite properties, the construction of shallow surface wells for drinking water has not been permitted in St. Mary's County since 1976" (correspondence dated December 1, 1998, from A. Rose, St. Mary's County Health Department to R. Tarr, NAS Patuxent River). There are no Amish or Mennonite properties with wells within one mile of the boundary of NAS Patuxent River.



Legend

- Cities
- [] Installation Boundary



0 22,500 45,000
Feet

Figure 2-1
Naval Air Station Patuxent River Location Map
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland



Legend

- Confirmed PFAS Release Area
- 1-mile Zone
- Stream
- Stormwater
- Installation Boundary
- Water Body

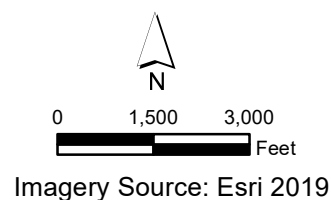
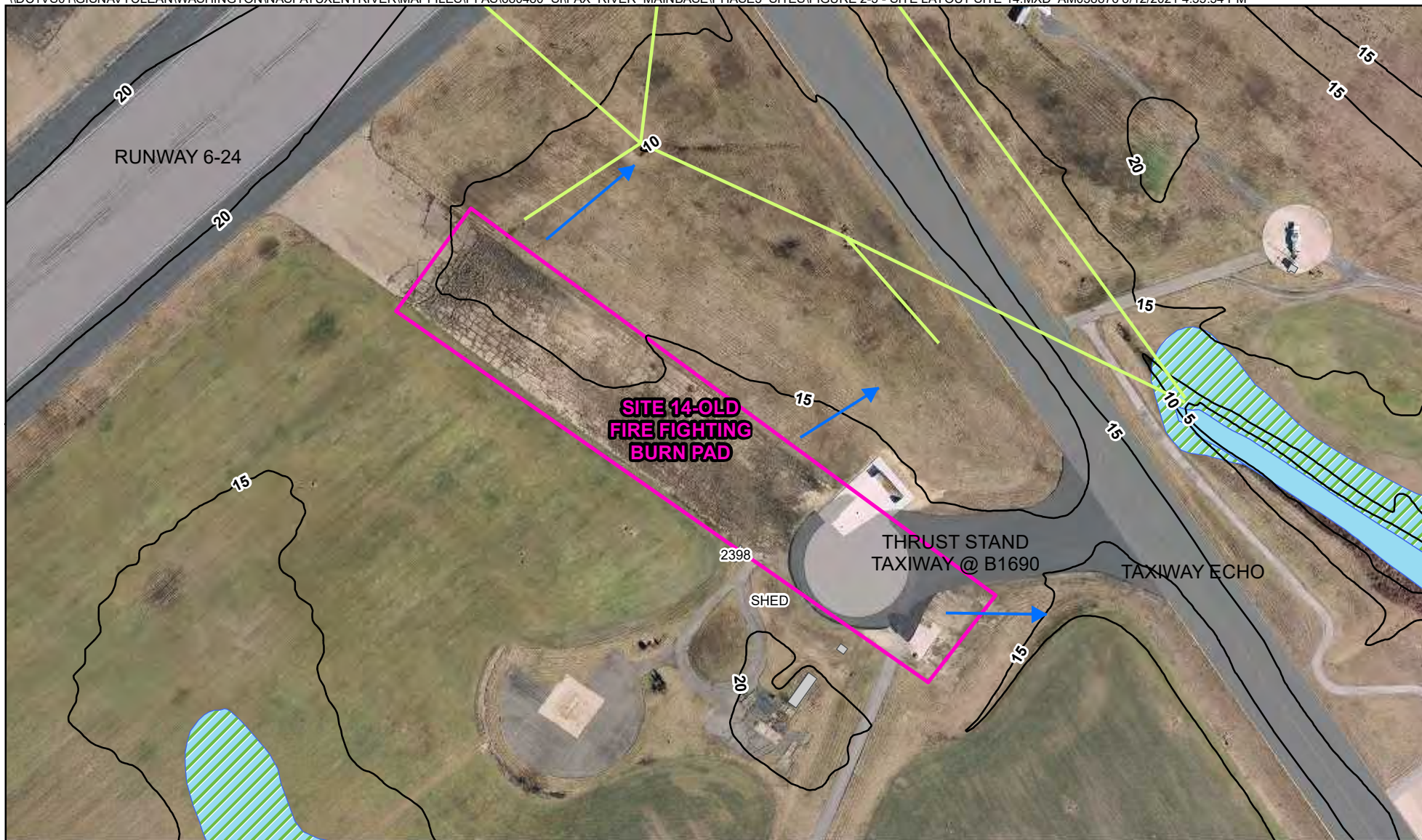


Figure 2-2
Confirmed or Suspected PFAS Release Areas
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland





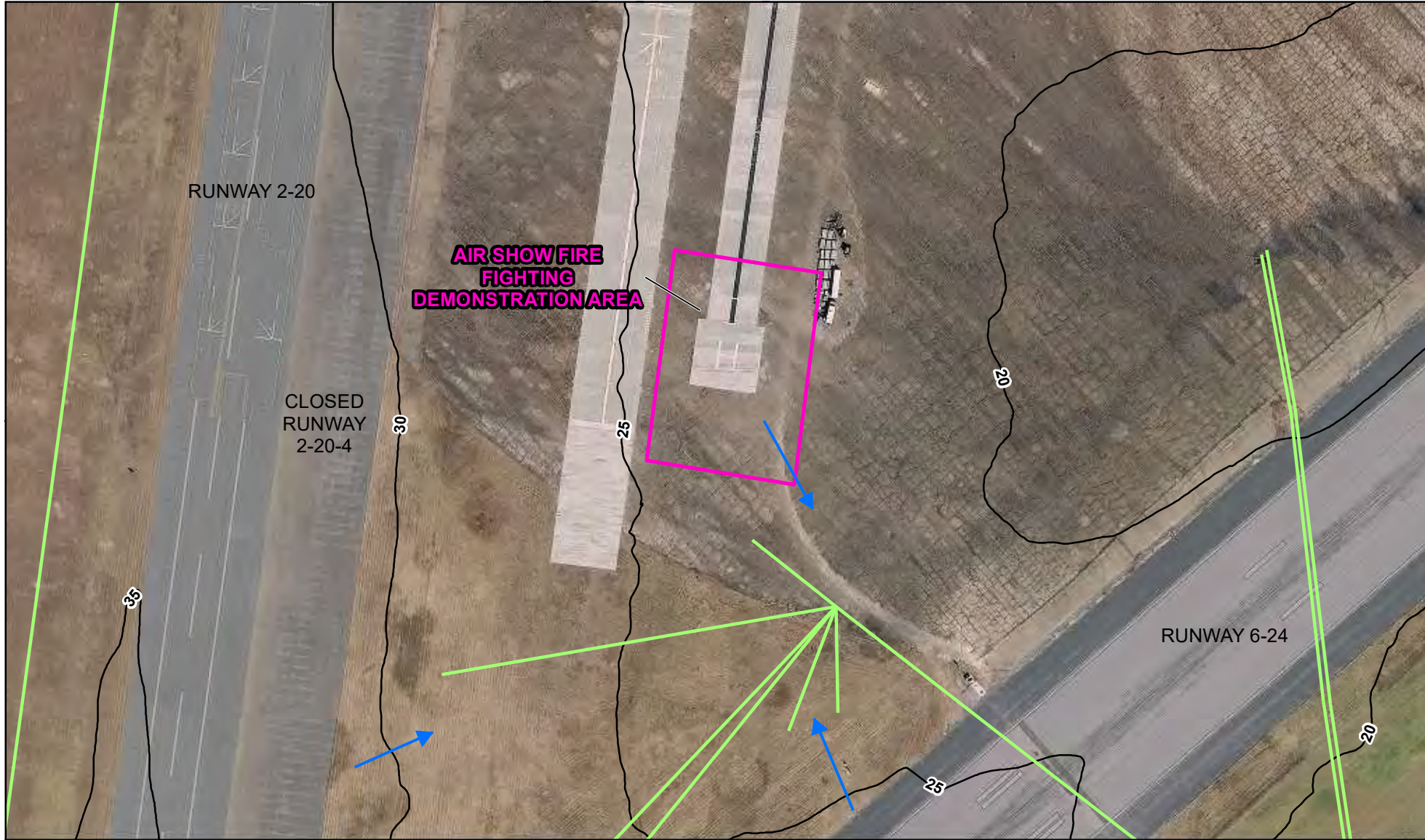
Legend

- Confirmed PFAS Release Area
- ➔ Approximate Surface Water Flow Direction
- Stormwater
- Elevation Contour 5 ft
- Wetland Area



0 100 200
Feet

Figure 2-3
Site Layout for Site 14 - Old Fire Fighting Burn Pad
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland



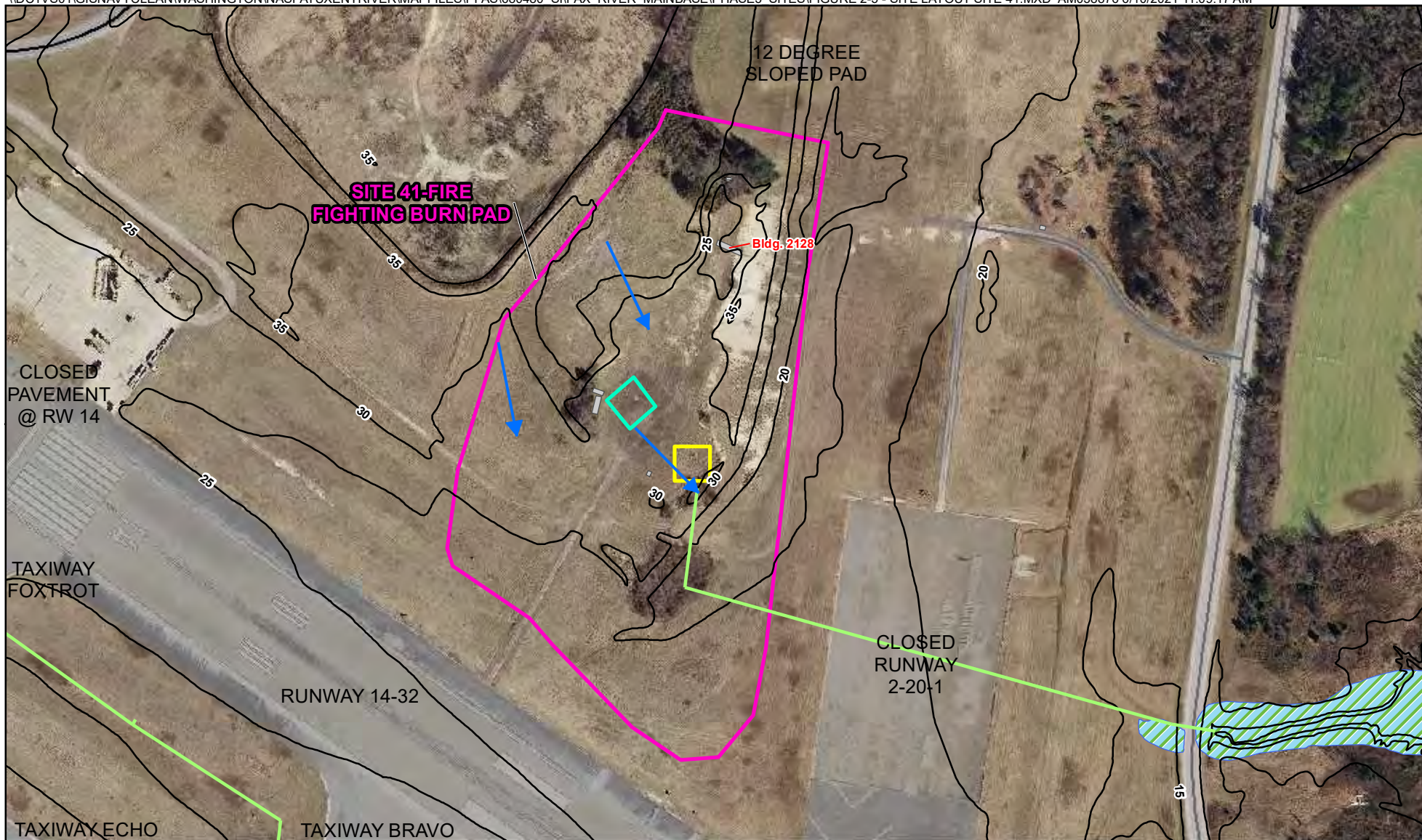
Legend

- Confirmed PFAS Release Area
- ➔ Approximate Surface Water Flow Direction
- Stormwater
- Elevation Contour 5 ft



0 100 200
Feet

Figure 2-4
Site Layout for Air Show Fire Fighting Demonstration Area
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland



Legend

- Confirmed PFAS Release Area
- ➔ Approximate Surface Water Flow Direction
- Stormwater
- Elevation Contour 5 ft
- Approximate Location of Former Burn Pad
- Approximate Location of Former USTs
- Wetland Area



0 125 250
Feet

Figure 2-5
Site Layout for Site 41 - Fire Fighting Burn Pad
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland



Legend

- Confirmed PFAS Release Area
- ➔ Approximate Surface Water Flow Direction
- Stormwater
- Elevation Contour 5 ft
- Building



0 100 200
Feet

Figure 2-6
Site Layout for Crash Trucks Daily Equipment Functioning Inspection Area
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Investigation Methodology

3.1 Objectives and Approach

The field activities discussed in this report were performed in general accordance with the SAP (CH2M, 2020). These activities were conducted in August and September 2020 at Site 14, FFDA, Site 41, and CTIA. The field investigation included the following activities:

- Installation of shallow temporary piezometers and co-located soil borings
- Co-located soil sampling (surface and subsurface)
- Grab groundwater sampling from temporary piezometers
- Water level surveys at the newly installed temporary piezometers

A summary of the technical approach for the SI field effort is provided below.

3.2 Site Preparation and Utility Location

Mobilization for the field efforts included procurement of necessary field equipment and initial transport to the site. Prior to the advancement of borings and installation of new temporary piezometers at each site, utilities within 10 feet of the proposed locations were marked by Inframap Corp. (Halethorpe, Maryland), a Maryland-licensed utility locator.

3.3 Soil Boring Advancement

For the purpose of collecting co-located surface and subsurface soil samples in addition to installing temporary piezometers for grab groundwater sampling, five borings were advanced at Site 14 on September 12, 2020, five borings were advanced at FFDA on September 12, 2020, four borings were advanced at Site 41 on August 19, 2020, and four borings were advanced at CTIA on September 13, 2020. For the purpose of only collecting co-located surface and subsurface soil samples, two additional borings were advanced at FFDA on September 12, 2020, and two additional borings were advanced at Site 41 on August 19, 2020. For the purpose of only installing temporary piezometers for grab groundwater sampling, two additional borings were advanced at Site 14 on September 12, 2020, three additional borings were advanced at Site 41 on August 19, 2020, and two additional borings were advanced at CTIA on September 13, 2020. Soil boring locations at Site 14, FFDA, Site 41, and CTIA are shown on **Figures 3-1 through 3-4**, respectively.

A-Zone Environmental Services (Charles Town, West Virginia), a Maryland-licensed driller, provided direct-push technology (DPT) drilling services to advance the soil borings in all identified locations in accordance with the standard operating procedures (SOPs) included in the SAP (CH2M, 2020).

3.4 Soil Sampling

In August and September 2020, surface and subsurface soil samples were collected from five borings at Site 14, seven borings at FFDA, six borings at Site 41, and four borings at CTIA. All soil samples were collected in accordance with the SOPs included in the SAP (CH2M, 2020). For the investigation, surface soil samples were defined as 0 to 6 inches below ground surface (bgs) and subsurface soil samples were defined as 3 to 4 feet bgs. After collection in sampling containers, and at the end of each day, the samples were packed on ice and shipped via overnight service to the laboratory for analysis. Soil samples were analyzed for the 18 PFAS listed in USEPA Drinking Water Method 537.1 using Liquid Chromatography Tandem Mass Spectrometry (LC-MS/MS) compliant with the DoD Quality Systems Manual (QSM) Version 5.3 Table B-15. Soil analytical results are discussed in detail in **Section 4**.

3.5 Temporary Piezometer Installation

For the purposes of grab groundwater sampling and groundwater elevation monitoring, seven temporary piezometers were installed to a depth of 15 feet bgs at Site 14, five temporary piezometers were installed to a depth of 15 feet bgs at FFDA, one temporary piezometer was installed to a depth of 15 feet bgs and six temporary piezometers were installed to a depth of 20 feet bgs at Site 41, and six temporary piezometers were installed to a depth of 15 feet bgs at CTIA. Each temporary piezometer was constructed with a 10-foot screened interval to the total depth. Grab groundwater sample locations at Site 14, FFDA, Site 41, and CTIA are shown on **Figures 3-1** through **3-4**, respectively.

A-Zone Environmental Services (Charles Town, West Virginia), a Maryland-licensed driller, provided DPT drilling services to install the temporary piezometers, which were constructed of 1.5-inch-diameter polyvinyl chloride (PVC) and installed across the water table in all identified locations in accordance with the SOPs included in the SAP (CH2M, 2020) and State of Maryland construction standards. Temporary piezometer construction details are summarized in **Table 3-1**. After the completion of grab groundwater sampling and groundwater elevation monitoring efforts, the temporary piezometers were abandoned at Site 14 (September 28, 2020), FFDA (September 28, 2020), Site 41 (September 11, 2020), and CTIA (October 21, 2020).

3.6 Groundwater Elevation Measurement

Groundwater elevation measurements were taken in August and September 2020 at five temporary piezometers prior to grab groundwater sampling at Site 14 (not measured at PX-S14-WT06 and PX-S14-WT07), four temporary piezometers prior to grab groundwater sampling at FFDA (not measured at PX-FFDA-WT02), six temporary piezometers prior to grab groundwater sampling at Site 41 (not measured at PX-S41-WT01), and six temporary piezometers prior to grab groundwater sampling at CTIA, as listed in **Table 3-1**. An electronic water-level indicator was used to measure the depth to water from the surveyed marking on the top of each PVC casing to the nearest 0.01 foot. Based on the measured groundwater elevations, groundwater contour maps were prepared for Site 14, FFDA, Site 41, and CTIA, as presented on **Figures 3-1** through **3-4**. As shown, groundwater flow at Site 14 is predominantly to the north-northeast in the direction of Harper's Creek with localized flow to the northwest, groundwater flow at FFDA is predominantly to the north in the direction of the Patuxent River, groundwater flow at Site 41 is predominantly to the north in the direction of the Patuxent River, and groundwater flow at CTIA is predominantly to the east-southeast in the direction of Pine Hill Run.

3.7 Groundwater Sampling

In August and September 2020, grab groundwater samples were collected from all temporary piezometers at Site 14, FFDA, Site 41, and CTIA. It should be noted that analytical results for grab groundwater samples collected from temporary piezometers exhibit uncertainty and variability as compared to analytical results for groundwater samples collected from permanent monitoring wells. Prior to sample collection, the temporary piezometers were purged to remove any stagnant water and to collect a representative sample from the aquifer using a peristaltic pump and disposable tubing. Water quality parameters, including pH in standard units, oxidation-reduction potential (ORP) in millivolts (mV), temperature in degrees Celsius (°C), specific conductance in millisiemens per centimeter (mS/cm), turbidity in nephelometric turbidity units (NTU), and dissolved oxygen in milligrams per liter (mg/L), were measured during the purging of each temporary piezometer using a YSI water quality meter and flow-through cell to prevent the purged groundwater from contacting the atmosphere during parameter measurement. Purging continued for approximately 20 minutes with two sets of water quality readings collected 5 minutes apart, after which grab groundwater samples were collected directly into laboratory-provided sample bottles. The final set of water quality parameters recorded before sample collection at each temporary piezometer is presented in **Table 3-2**. Grab groundwater samples were collected in accordance with the SOPs included in the SAP (CH2M, 2020) and analyzed for the 18 PFAS listed in USEPA Drinking Water Method 537.1

using LC-MS/MS compliant with the DoD QSM Version 5.3 Table B-15. Groundwater analytical results are discussed in detail in **Section 4**.

3.8 Surveying

Thoth Land Surveying Professionals (Walkersville, Maryland), a Maryland-licensed and registered surveyor, conducted a survey of the temporary piezometers installed during the SI field effort. The survey achieved vertical and horizontal control to an accuracy of ± 0.01 foot and ± 0.1 foot, respectively (**Appendix A**). Each temporary piezometer was surveyed at the top of the PVC casing (where marked) and at the ground surface. Vertical elevations were referenced to North American Vertical Datum of 1988 to remain consistent with the coordinate system and datum currently in use at NAS Patuxent River. Horizontal coordinates were referenced to the Maryland State Plane Coordinate System, North American Datum of 1983.

For soil borings advanced for the purpose of only collecting co-located surface and subsurface soil samples (FFDA and Site 41), horizontal coordinates were obtained using a Trimble® R1 global positioning system receiver and connected tablet.

3.9 Quality Assurance and Quality Control

Field quality assurance/quality control (QA/QC) samples were collected during the sampling program. These samples were obtained to:

- Ensure that disposable and reusable sampling equipment were free of analytes in question
- Evaluate field methodology
- Establish ambient field background conditions
- Evaluate whether cross-contamination occurred during sampling and/or shipping

Several types of field QA/QC samples that were collected and analyzed are defined as follows:

- **Equipment Rinsate Blank (decontaminated equipment):** Equipment blanks were collected at the frequency of one per site per day of sampling. These samples were obtained by running certified PFAS-free laboratory-grade deionized water over or through sample collection equipment after the decontamination procedures had been conducted. These samples, which were collected during soil and groundwater sampling, were used to determine whether decontamination procedures for reusable equipment were adequate.
- **Equipment Rinsate Blank (disposable equipment):** Equipment blanks were collected at the frequency of one per lot. These samples were obtained by running certified PFAS-free laboratory-grade deionized water over or through unused sample collection equipment. These samples, which were collected during groundwater sampling only, were used to determine whether disposable, one-time-use equipment was free of the analytes in question prior to use.
- **Field Blank:** Field blanks were collected at the frequency of one per area. These samples were obtained by pouring the certified PFAS-free laboratory-provided blank water into unpreserved blank containers. These samples, which were collected during soil and groundwater sampling, were used to assess the potential for field contamination.
- **Field Duplicate Sample:** Field duplicate samples were collected at the same time and under identical conditions as their respective associated field sample at the frequency of one per 10 field samples of similar matrix. These samples, which were collected during soil and groundwater sampling, were used to evaluate the field and laboratory reproducibility of sample results and are one way to evaluate field methodology.

In addition to samples collected to monitor field QC, samples were also collected to monitor quality within the laboratory. These included the following:

- **Matrix Spike:** An aliquot of a matrix (e.g., groundwater) was spiked with known quantities of analytes of interest and subjected to the entire analytical procedure. By measuring the recovery of these spiked quantities, the appropriateness of the method for the matrix was demonstrated.
- **Matrix Spike Duplicate:** These samples were collected as second aliquots of the same matrix as the matrix spike to determine the precision of the method.

One matrix spike sample and one matrix spike duplicate sample were collected for every 20 environmental samples collected per site (or greater than or equal to 5 percent of the samples collected per site) per medium including field duplicates.

3.10 Decontamination Procedures

All decontamination activities were conducted in accordance with the SOPs included in the SAP (CH2M, 2020), and cross-contamination of PFAS was considered during decontamination between sites.

Non-disposable sampling equipment was decontaminated using the following solutions in this order:

1. Distilled water (laboratory-certified PFAS-free) and Liquinox solution
2. Distilled water (laboratory-certified PFAS-free) rinse 10 percent isopropanol and distilled water solution (laboratory-certified PFAS-free) and air-dried
3. Laboratory-grade deionized water (laboratory-certified PFAS-free)

Water generated during decontamination of non-disposable sampling equipment was collected and transferred to approved 55-gallon drums to await characterization and disposal.

Disposable sampling equipment and personal protective equipment, such as Masterflex tubing and nitrile gloves, were not decontaminated after use and instead were disposed as nonhazardous solid waste. After use, disposable equipment was placed in plastic contractor bags and disposed in an onsite trash dumpster.

Reusable heavy drilling equipment was decontaminated before and in between each borehole via thorough truck-side cleaning. Decontamination fluids were containerized into approved 55-gallon drums to await characterization and disposal. All heavy drilling equipment decontamination procedures were conducted in accordance with the SOPs included in the SAP (CH2M, 2020).

3.11 Investigation-Derived Waste Management

During the SI field effort, generated investigation-derived waste (IDW) included soil cuttings, groundwater sampling purge-water, and decontamination rinse-water from all non-disposable sampling equipment and heavy drilling equipment. The IDW was containerized in approved 55-gallon drums that were properly labeled and stored at NAS Patuxent River. A total of two drums of solid IDW and four drums of aqueous IDW were generated during the field activities at NAS Patuxent River for all 16 PFAS AOIs requiring investigation.

Prior to disposal, CH2M field staff collected one composite sample from the aqueous IDW drums and one composite sample from the solid IDW drums. The IDW samples were analyzed for full Toxicity Characteristic Leaching Procedure analyses (volatile organic compounds, semivolatile organic compounds, pesticides, and inorganic constituents), ignitability, reactive cyanide, reactive sulfide, corrosivity, and PFAS. For the aqueous sample, PFAS analytical results for PFOA and PFOS were greater than the USEPA lifetime health advisory of 70 nanograms per liter (ng/L). Based on the overall analytical results, all IDW was characterized as nonhazardous, PFAS-containing, with notification of the PFAS results to the receiving facility. As such, solid IDW was disposed of as nonhazardous; aqueous IDW was first solidified and then disposed of with the solid IDW by Clearfield MMG at the Navy's approved disposal facility in Chesapeake, Virginia.

All IDW-management activities were conducted in accordance with the SOPs included in the SAP (CH2M, 2020). **Appendix B** provides an analytical summary for the IDW samples and includes all IDW handling and disposal information.

3.12 Data Quality Assessment

The data quality assessment (data validation procedure and review) was a multi-tiered approach. The process began with an internal laboratory review, continued with an independent review by a third-party validator, and ended with an overall review by the CH2M project chemistry team. A technical memorandum summarizing the data quality assessment is included as **Appendix C**.

As shown in **Appendix C**, the data set was deemed to be 99.94 percent complete based on one rejected result, although the rejected result had no impact on the project objectives because it was for a parameter without PALs. Therefore, the validation review demonstrated PFOA, PFOS, and PFBS data are suitable for use in the project decision-making process.

Table 3-1. Temporary Piezometer Construction Details and Groundwater Elevations (August/September 2020)

Basewide PFAS Site Inspection Report

NAS Patuxent River, St. Mary's County, Maryland

Piezometer	Date Installed	Total Depth ^a	Ground Surface Elevation ^b	Top of Screen Depth ^a	Bottom of Screen Depth ^a	Top of Casing Elevation ^b	Depth to Water ^c	Groundwater Elevation ^b
Site 14 – Old Fire Fighting Burn Pad								
PX-S14-WT01	9/12/2020	15	14.38	5	15	14.73	4.11 ^e	10.62
PX-S14-WT02	9/12/2020	15	13.14	5	15	13.49	2.89 ^e	10.60
PX-S14-WT03	9/12/2020	15	13.21	5	15	13.51	3.88 ^e	9.63
PX-S14-WT04	9/12/2020	15	13.73	5	15	14.03	2.89 ^e	11.14
PX-S14-WT05	9/12/2020	15	17.20	5	15	17.55	6.65 ^e	10.90
PX-S14-WT06	9/12/2020	15	15.68	5	15	15.98	no measurement taken	
PX-S14-WT07	9/12/2020	15	17.77	5	15	18.17	no measurement taken	
Air Show Fire Fighting Demonstration Area								
PX-FFDA-WT01	9/12/2020	15	25.24	5	15	25.49	10.31 ^e	15.18
PX-FFDA-WT02	9/12/2020	15	21.86	5	15	22.21	no measurement taken	
PX-FFDA-WT03	9/12/2020	15	21.48	5	15	21.83	7.78 ^e	14.05
PX-FFDA-WT04	9/12/2020	15	25.77	5	15	26.12	9.08 ^e	17.04
PX-FFDA-WT05	9/12/2020	15	21.67	5	15	21.92	4.47 ^e	17.45
Site 41 – Fire Fighting Burn Pad								
PX-S41-WT01	8/19/2020	15	20.11	5	15	20.51	no measurement taken	
PX-S41-WT02	8/19/2020	20	23.70	10	20	24.00	12.17 ^d	11.83
PX-S41-WT03	8/19/2020	20	27.16	10	20	27.46	15.55 ^d	11.91
PX-S41-WT04	8/19/2020	20	18.89	10	20	19.09	6.65 ^d	12.44
PX-S41-WT05	8/19/2020	20	26.21	10	20	27.06	13.66 ^d	13.40
PX-S41-WT06	8/19/2020	20	26.31	10	20	26.71	13.25 ^d	13.46
PX-S41-WT07	8/19/2020	20	23.97	10	20	24.32	9.22 ^d	15.10
Crash Trucks Daily Equipment Functioning Inspection Area								
PX-CTIA-WT01	9/13/2020	15	44.44	5	15	44.79	11.08 ^f	33.71
PX-CTIA-WT02	9/13/2020	15	41.18	5	15	41.53	8.92 ^f	32.61
PX-CTIA-WT03	9/13/2020	15	40.70	5	15	41.10	9.08 ^f	32.02
PX-CTIA-WT04	9/13/2020	15	36.42	5	15	36.57	5.32 ^f	31.25
PX-CTIA-WT05	9/13/2020	15	42.40	5	15	42.60	9.08 ^f	33.52
PX-CTIA-WT06	9/13/2020	15	36.09	5	15	36.49	4.63 ^f	31.86

Notes:

^a feet below ground surface

^b feet above North American Vertical Datum of 1988

^c feet below top of casing elevation

^d depth to water measurement collected on August 19, 2020

^e depth to water measurement collected on September 12, 2020

^f depth to water measurement collected on September 13, 2020

Table 3-2. Water Quality Parameters (August/September 2020)

Basewide PFAS Site Inspection Report

NAS Patuxent River, St. Mary's County, Maryland

Piezometer	Date Sampled	Temperature (°C)	pH (standard units)	Specific Conductance (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)
Site 14 – Old Fire Fighting Burn Pad							
PX-S14-WT01	9/12/2020	24.3	5.92	0.137	above range	3.90	34.2
PX-S14-WT02	9/12/2020	21.6	5.51	0.078	above range	3.60	71.9
PX-S14-WT03	9/12/2020	18.9	5.64	0.026	67.9	7.20	90.9
PX-S14-WT04	9/12/2020	21.6	5.66	0.057	129	4.00	46.0
PX-S14-WT05	9/12/2020	23.0	5.78	0.201	above range	5.00	55.4
PX-S14-WT06	9/12/2020	27.1	5.88	0.062	290	3.90	19.1
PX-S14-WT07	9/12/2020	24.6	6.07	0.133	above range	3.90	-20.2
Air Show Fire Fighting Demonstration Area							
PX-FFDA-WT01	9/12/2020	24.4	8.20	0.081	above range	5.60	47.0
PX-FFDA-WT02	9/12/2020	25.9	5.34	0.064	731	4.40	77.6
PX-FFDA-WT03	9/12/2020	26.2	5.35	0.076	above range	3.70	69.8
PX-FFDA-WT04	9/12/2020	21.9	5.85	0.058	95.6	6.50	152.2
PX-FFDA-WT05	9/12/2020	23.4	5.10	0.049	20.6	6.00	159.8
Site 41 – Fire Fighting Burn Pad							
PX-S41-WT01	8/19/2020	23.6	5.71	0.007	above range	6.40	135.6
PX-S41-WT02	8/19/2020	24.4	5.91	0.001	above range	7.50	137.8
PX-S41-WT03	8/19/2020	20.8	6.22	0.149	471	4.80	66.3
PX-S41-WT04	8/19/2020	26.7	6.12	0.020	above range	7.50	82.2
PX-S41-WT05	8/19/2020	21.3	5.91	0.215	709	5.90	67.9
PX-S41-WT06	8/19/2020	19.2	5.53	0.228	639	5.10	98.0
PX-S41-WT07	8/19/2020	24.1	5.29	0.192	111	4.70	61.8
Crash Trucks Daily Equipment Functioning Inspection Area							
PX-CTIA-WT01	9/13/2020	22.5	6.07	0.104	above range	5.00	13.0
PX-CTIA-WT02	9/13/2020	22.5	6.64	0.174	above range	6.40	63.3
PX-CTIA-WT03	9/13/2020	22.5	6.89	0.130	101	5.40	25.0
PX-CTIA-WT04	9/13/2020	24.0	6.22	0.123	above range	6.10	78.2
PX-CTIA-WT05	9/13/2020	22.0	5.78	0.058	above range	7.30	78.5
PX-CTIA-WT06	9/13/2020	24.4	6.27	0.030	above range	6.20	39.4

Notes:

°C = degree(s) Celsius

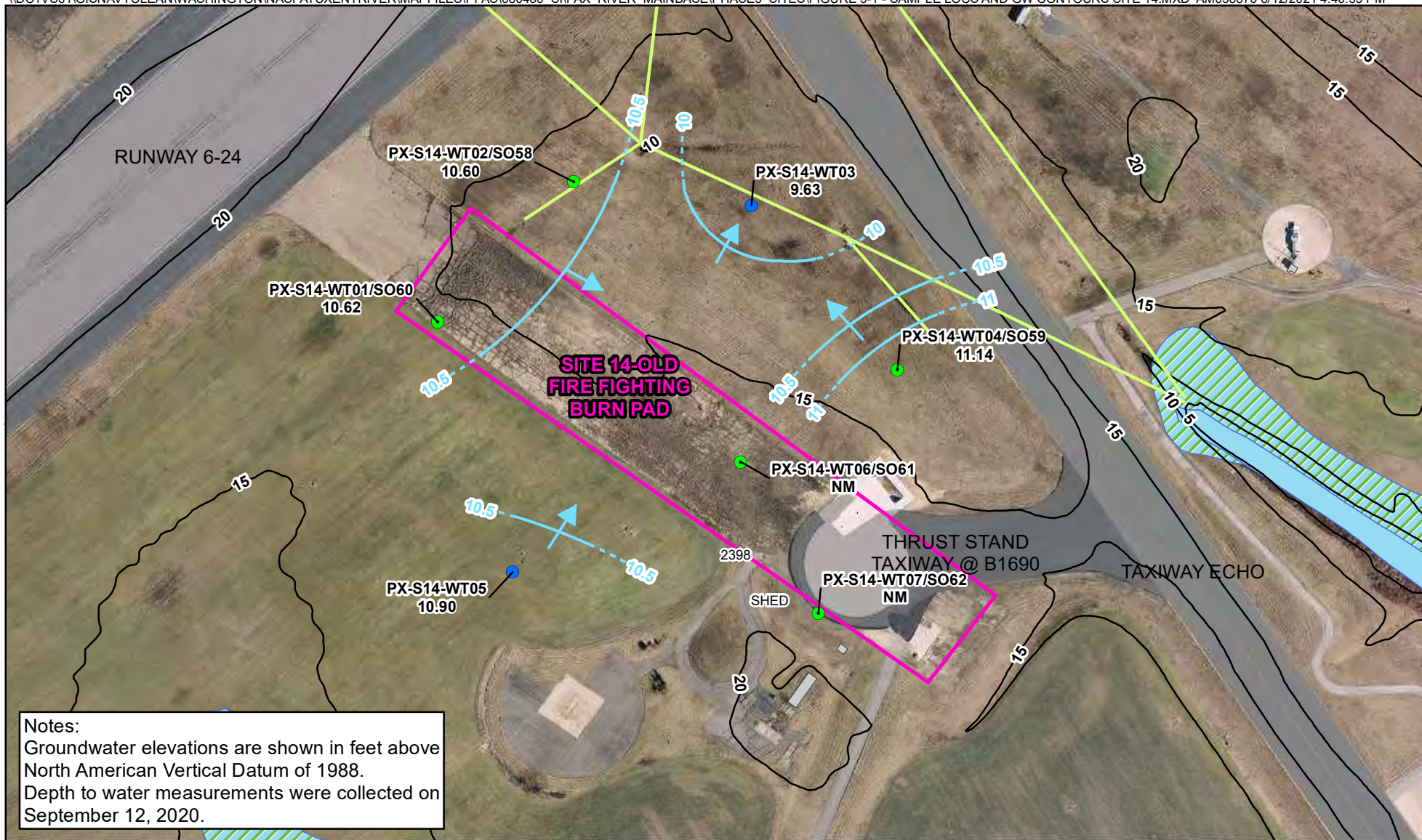
mg/L = milligram(s) per liter

mS/cm = millisiemen(s) per centimeter

mV = millivolt(s)

NTU = nephelometric turbidity unit(s)

ORP = oxidation-reduction potential



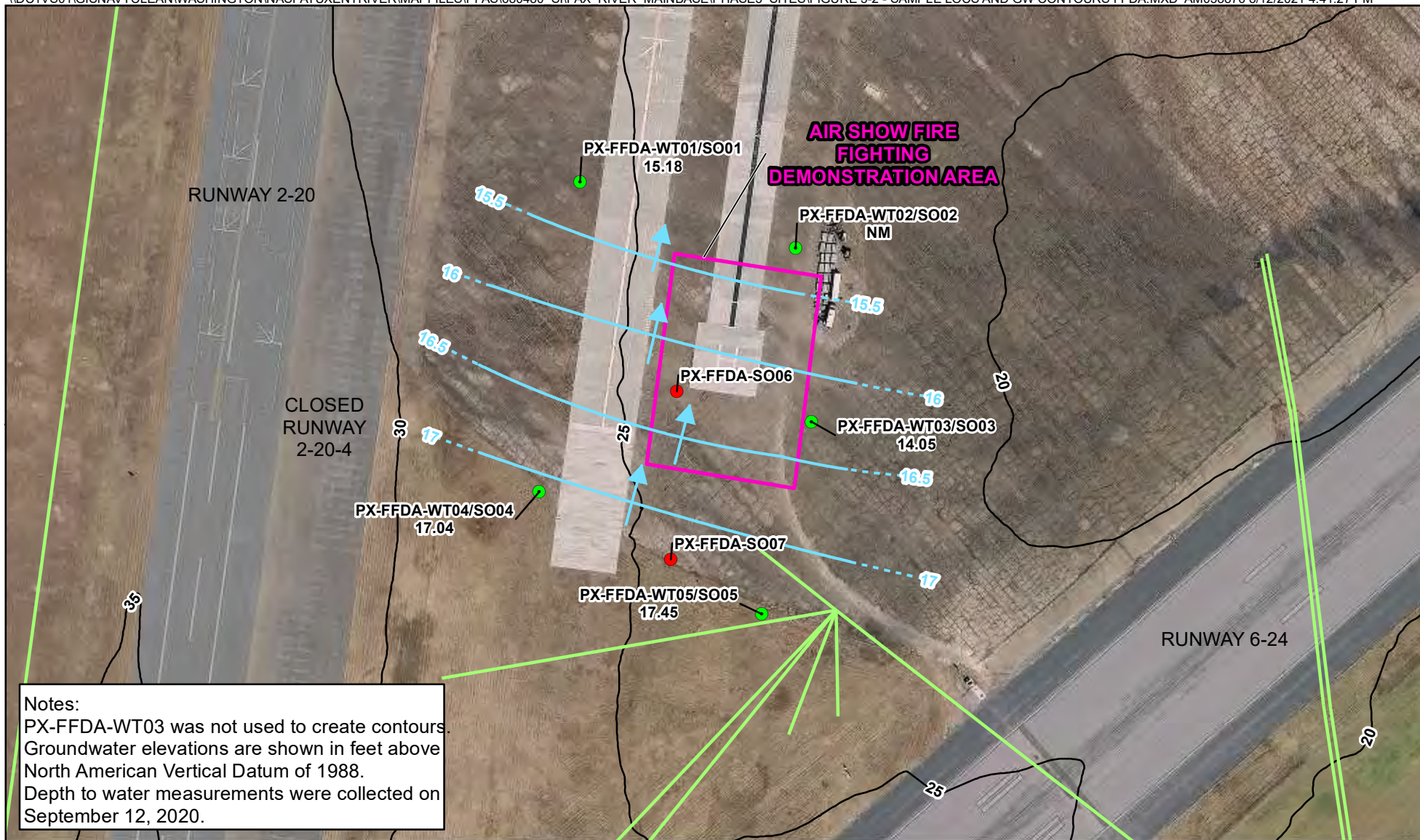
Legend

- Co-located Groundwater and Soil Sample Location
- Groundwater Sample Location
- Confirmed PFAS Release Area
- Stormwater
- Elevation Contour 5 ft
- Groundwater Contour (dashed where inferred)
- Groundwater Flow Direction
- ▨ Wetland Area



0 100 200
Feet

Figure 3-1
Sample Locations and Groundwater Contours for
Site 14 – Old Fire Fighting Burn Pad
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland



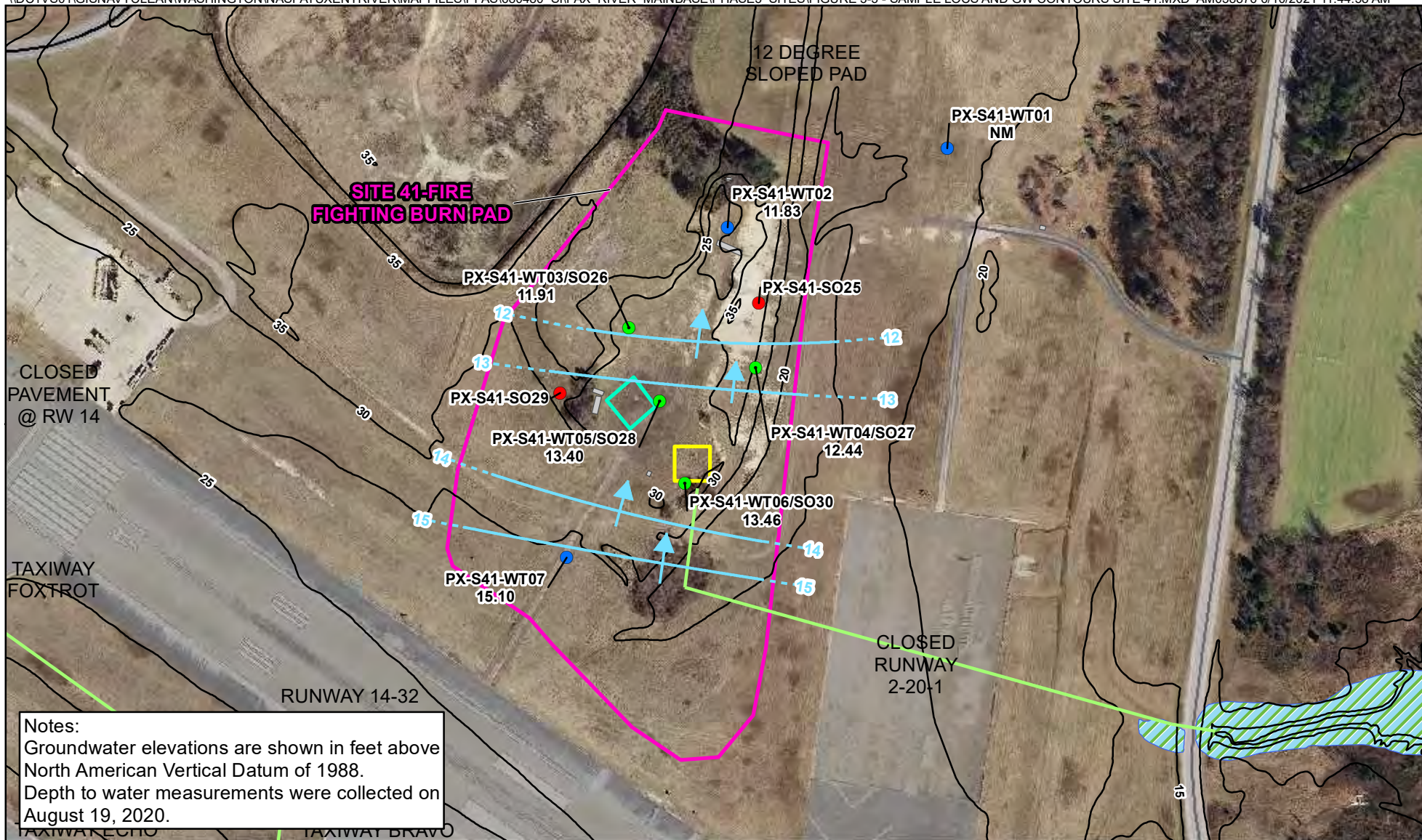
Legend

- Co-located Groundwater and Soil Sample Location
- Surface/Subsurface Soil Sample Location
- Confirmed PFAS Release Area
- Stormwater
- Elevation Contour 5 ft
- Groundwater Contour (dashed where inferred)
- ➔ Groundwater Flow Direction



0 100 200
Feet

Figure 3-2
 Sample Locations and Groundwater Contours for
 Air Show Fire Fighting Demonstration Area
 Basewide PFAS Site Inspection Report
 NAS Patuxent River
 St. Mary's County, Maryland



Notes:
Groundwater elevations are shown in feet above North American Vertical Datum of 1988.
Depth to water measurements were collected on August 19, 2020.

Legend

- Co-located Groundwater and Soil Sample Location
- Groundwater Sample Location
- Surface/Subsurface Soil Sample Location
- Confirmed PFAS Release Area
- Stormwater
- Elevation Contour 5 ft
- Wetland Area
- Approximate Location of Former Burn Pad
- Approximate Location of Former USTs
- Groundwater Contour (dashed where inferred)
- Groundwater Flow Direction

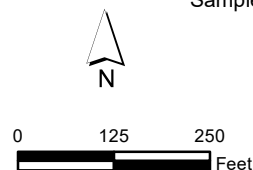
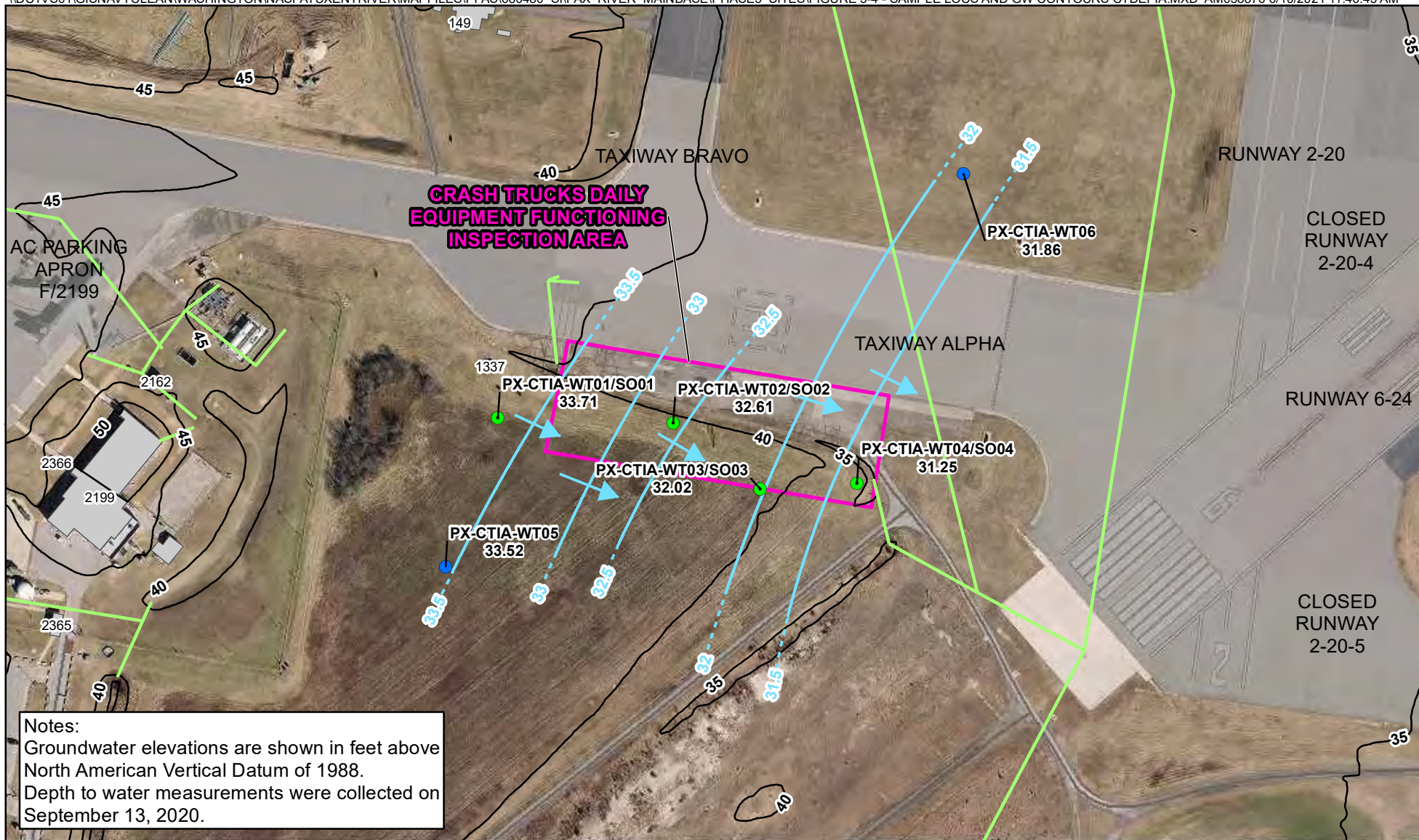


Figure 3-3
Sample Locations and Groundwater Contours for
Site 41 - Fire Fighting Burn Pad
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland



Legend

- Confirmed PFAS Release Area
- Co-located Groundwater and Soil Sample Location
- Groundwater Sample Location
- Stormwater
- Elevation Contour 5 ft
- Building
- Groundwater Contour (dashed where inferred)
- Groundwater Flow Direction

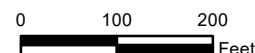


Figure 3-4
Sample Locations and Groundwater Contours for
Crash Trucks Daily Equipment Functioning Inspection Area
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Investigation Results

This section presents the results of the investigation described in **Section 3**.

Soil analytical data for PFOA and PFOS were screened against the PAL of 130 micrograms per kilogram ($\mu\text{g}/\text{kg}$) for each compound, and soil analytical data for PFBS were screened against the PAL of 1,900 $\mu\text{g}/\text{kg}$. Groundwater analytical data for PFOA and PFOS were screened against the PAL of 40 ng/L for each compound, and groundwater analytical data for PFBS were screened against the PAL of 600 ng/L. The PALs for PFOA and PFOS for this investigation align with screening values for moving a site from the SI phase to the RI phase included in the Assistant Secretary of Defense Memorandum issued on October 15, 2019 (DoD, 2019b). For PFBS, the PALs are based on the May 2021 USEPA Regional Screening Levels (USEPA, 2021). Where present, exceedances were identified for PFAS with PALs only (PFOA, PFOS, and PFBS). Soil and groundwater analytical data were also obtained for 15 other PFAS that do not have screening criteria, and these results may be screened in the future if criteria are established.

Laboratory analytical results for soil and grab groundwater samples collected at Site 14, FFDA, Site 41, and CTIA are summarized in **Tables 4-1** and **4-2**, respectively. **Tables 4-1** and **4-2** present data screened against the PALs for PFOA, PFOS, and PFBS; **Appendix D** presents data for all 18 PFAS analyzed, including PFOA, PFOS, and PFBS. **Figures 4-1** through **4-4** show PFOA, PFOS, and PFBS concentrations for each of the soil and grab groundwater sample locations at Site 14, FFDA, Site 41, and CTIA.

4.1 Soil

4.1.1 Soil Analytical Results for Site 14

Results of surface and subsurface soil samples collected from the five soil borings at Site 14 are presented on **Figure 4-1** and in **Table 4-1**. Analysis indicated the following:

- PFOA and PFOS were detected in site soil. PFBS was not detected in site soil.
- PFOA was detected at one surface soil sample location (PX-S14-SS58) at an estimated concentration of 0.89 J $\mu\text{g}/\text{kg}$; there were no PFOA detections in subsurface soil. The lone PFOA detection did not exceed the PAL of 130 $\mu\text{g}/\text{kg}$.
- PFOS was detected at four surface soil sample locations, with concentrations ranging from 1.43 J $\mu\text{g}/\text{kg}$ (estimated) at PX-S14-SS61 to 11.14 $\mu\text{g}/\text{kg}$ at PX-S14-SS58; there were no PFOS detections in subsurface soil. None of the PFOS detections exceeded the PAL of 130 $\mu\text{g}/\text{kg}$.

4.1.2 Soil Analytical Results for FFDA

Results of surface and subsurface soil samples collected from the seven soil borings at FFDA are presented on **Figure 4-2** and in **Table 4-1**. Analysis indicated the following:

- PFOA and PFOS were detected in site soil. PFBS was not detected in site soil.
- PFOA was detected at one surface soil sample location (PX-FFDA-SS04) at an estimated concentration of 1.04 J $\mu\text{g}/\text{kg}$; there were no PFOA detections in subsurface soil. The lone PFOA detection did not exceed the PAL of 130 $\mu\text{g}/\text{kg}$.
- PFOS was detected at five surface soil sample locations, with estimated concentrations ranging from 1.07 J $\mu\text{g}/\text{kg}$ at PX-FFDA-SS05 to 3.81 J $\mu\text{g}/\text{kg}$ at PX-FFDA-SS02; there were no PFOS detections in subsurface soil. None of the PFOS detections exceeded the PAL of 130 $\mu\text{g}/\text{kg}$.

4.1.3 Soil Analytical Results for Site 41

Results of surface and subsurface soil samples collected from the six soil borings at Site 41 are presented on **Figure 4-3** and in **Table 4-1**. Analysis indicated the following:

- PFOA and PFOS were detected in site soil. PFBS was not detected in site soil.
- PFOA was detected at four surface soil sample locations, with estimated concentrations ranging from 0.79 J µg/kg at PX-S41-SS26 to 3.36 J µg/kg at PX-S41-SS30. PFOA was detected at two subsurface soil sample locations, with estimated concentrations ranging from 1.3 J µg/kg at PX-S41-SB26 to 1.76 J µg/kg at PX-S41-SB30. None of the PFOA detections exceeded the PAL of 130 µg/kg.
- PFOS was detected at four surface soil sample locations, with concentrations ranging from 30.02 µg/kg at PX-S41-SS30 to 172.54 µg/kg at PX-S41-SS28. PFOS was detected at two subsurface soil sample locations, with concentrations ranging from 56.26 µg/kg at PX-S41-SB30 to 111.98 µg/kg at PX-S41-SB26. The surface soil PFOS detection at PX-S41-SS28 exceeded the PAL of 130 µg/kg; there were no exceedances in subsurface soil.

4.1.4 Soil Analytical Results for CTIA

Results of surface and subsurface soil samples collected from the four soil borings at CTIA are presented on **Figure 4-4** and in **Table 4-1**. Analysis indicated the following:

- PFOA and PFOS were detected in site soil. PFBS was not detected in site soil.
- PFOA was detected at two surface soil sample locations, with estimated concentrations ranging from 0.88 J µg/kg at PX-CTIA-SS02 to 1.86 J µg/kg at PX-CTIA-SS03. PFOA was detected at two subsurface soil sample locations, with estimated concentrations ranging from 1.03 J µg/kg at PX-CTIA-SB02 to 1.95 J µg/kg at PX-CTIA-SB03. None of the PFOA detections exceeded the PAL of 130 µg/kg.
- PFOS was detected at all four surface soil sample locations, with concentrations ranging from 4.9 J µg/kg (estimated) at PX-CTIA-SS01 to 471.93 µg/kg at PX-CTIA-SS03. PFOS was detected at all four subsurface soil sample locations, with concentrations ranging from 2.29 J µg/kg (estimated) at PX-CTIA-SB01 to 376.4 µg/kg at PX-CTIA-SB02. The surface soil PFOS detection at PX-CTIA-SS03 and subsurface soil PFOS detection at PX-CTIA-SB02 exceeded the PAL of 130 µg/kg.

4.2 Groundwater

4.2.1 Water Quality Parameters

Measurements of pH, ORP, temperature, specific conductance, turbidity, and dissolved oxygen were collected at each temporary piezometer following purging and immediately prior to sampling. The final water quality parameters recorded before sample collection at all four AOIs (Site 14, FFDA, Site 41, and CTIA) are presented in **Table 3-2**.

Measured pH values were generally acidic at these four sites, ranging between 5.10 (PX-FFDA-WT05) and 8.20 (PX-FFDA-WT01). Measured ORP values, which provide an indication of the potential for redox conditions in groundwater, ranged between -20.2 mV (PX-S14-WT07) and 159.8 mV (PX-FFDA-WT05); overall, these values are indicative of primarily oxidizing conditions. Temperature readings ranged between 18.9°C (PX-S14-WT03) and 27.1°C (PX-S14-WT06). Specific conductance values, which provide an indication of the concentration of total dissolved solids within groundwater, ranged between 0.001 mS/cm (PX-S41-WT02) and 0.228 mS/cm (PX-S41-WT06); these values are indicative of freshwater conditions. Turbidity measurements, which provide an indication of the presence of suspended colloidal matter in groundwater, were wide-ranging from 20.6 NTU (PX-FFDA-WT05) to above the range of the instrument (greater than 1,000 NTU) at multiple sample locations at the four sites. Measured dissolved oxygen values, which provide an indication of the oxidative state of the subsurface

environment, ranged between 3.60 mg/L (PX-S14-WT02) and 7.50 mg/L (PX-S41-WT02 and PX-S41-WT04); these values are indicative of aerobic conditions.

4.2.2 Groundwater Analytical Results for Site 14

Results of groundwater samples collected from six temporary piezometers at Site 14 are presented on **Figure 4-1** and in **Table 4-2**. Analysis indicated the following:

- PFOA, PFOS, and PFBS were detected in site groundwater.
- PFOA was detected at all six grab groundwater sample locations, with concentrations ranging from 63.77 ng/L at PX-S14-WT07 to 745.57 ng/L at PX-S14-WT06. PFOA detections exceeded the PAL of 40 ng/L at all six grab groundwater sample locations.
- PFOS was detected at all six grab groundwater sample locations, with concentrations ranging from 15.46 ng/L at PX-S14-WT04 to 6,489.84 ng/L at PX-S14-WT05. PFOS detections exceeded the PAL of 40 ng/L at five of the six grab groundwater sample locations.
- PFBS was detected at all six grab groundwater sample locations, with concentrations ranging from 2.46 J ng/L (estimated) at PX-S14-WT04 to 177.98 ng/L at PX-S14-WT05. None of the PFBS detections exceeded the PAL of 600 ng/L.

4.2.3 Groundwater Analytical Results for FFDA

Results of groundwater samples collected from the five temporary piezometers at FFDA are presented on **Figure 4-2** and in **Table 4-2**. Analysis indicated the following:

- PFOA, PFOS, and PFBS were detected in site groundwater.
- PFOA was detected at all five grab groundwater sample locations, with concentrations ranging from 10.54 ng/L at PX-FFDA-WT05 to 55 ng/L at PX-FFDA-WT03. PFOA detections exceeded the PAL of 40 ng/L at one of the five grab groundwater sample locations (PX-FFDA-WT03).
- PFOS was detected at all five grab groundwater sample locations, with concentrations ranging from 3.51 J ng/L (estimated) at PX-FFDA-WT05 to 104.52 ng/L at PX-FFDA-WT01. PFOS detections exceeded the PAL of 40 ng/L at two of the five grab groundwater sample locations (PX-FFDA-WT01 and PX-FFDA-WT02).
- PFBS was detected at all five grab groundwater sample locations, with concentrations ranging from 1.97 J ng/L (estimated) at PX-FFDA-WT05 to 17.2 ng/L at PX-FFDA-WT03. None of the PFBS detections exceeded the PAL of 600 ng/L.

4.2.4 Groundwater Analytical Results for Site 41

Results of groundwater samples collected from the seven temporary piezometers at Site 41 are presented on **Figure 4-3** and in **Table 4-2**. Analysis indicated the following:

- PFOA, PFOS, and PFBS were detected in site groundwater.
- PFOA was detected at all seven grab groundwater sample locations, with concentrations ranging from 7.79 ng/L at PX-S41-WT07 to 1,169.18 ng/L at PX-S41-WT05. PFOA detections exceeded the PAL of 40 ng/L at five of the seven grab groundwater sample locations.
- PFOS was detected at all seven grab groundwater sample locations, with concentrations ranging from 33.94 ng/L at PX-S41-WT01 to 23,765.25 ng/L at PX-S41-WT05. PFOS detections exceeded the PAL of 40 ng/L at six of the seven grab groundwater sample locations.
- PFBS was detected at six grab groundwater sample locations, with concentrations ranging from 1.29 J ng/L (estimated) at PX-S41-WT07 to 220.04 ng/L at PX-S41-WT05. None of the PFBS detections exceeded the PAL of 600 ng/L.

4.2.5 Groundwater Analytical Results for CTIA

Results of groundwater samples collected from the six temporary piezometers at CTIA are presented on **Figure 4-4** and in **Table 4-2**. Analysis indicated the following:

- PFOA, PFOS, and PFBS were detected in site groundwater.
- PFOA was detected at all six grab groundwater sample locations, with concentrations ranging from 5.09 ng/L at PX-CTIA-WT05 to 1,348.08 ng/L at PX-CTIA-WT03. PFOA detections exceeded the PAL of 40 ng/L at four of the six grab groundwater sample locations.
- PFOS was detected at all six grab groundwater sample locations, with concentrations ranging from 13.13 ng/L at PX-CTIA-WT05 to 35,787.16 ng/L at PX-CTIA-WT03. PFOS detections exceeded the PAL of 40 ng/L at four of the six grab groundwater sample locations.
- PFBS was detected at all six grab groundwater sample locations, with concentrations ranging from 0.89 J ng/L (estimated) at PX-CTIA-WT05 to 127.2 ng/L at PX-CTIA-WT03. None of the PFBS detections exceeded the PAL of 600 ng/L.

Table 4-1. Soil Analytical Data for PFOA, PFOS, and PFBS (August/September 2020)

Basewide PFAS Site Inspection Report

NAS Patuxent River, St. Mary's County, Maryland

Sample Location	Date Sampled	PFOA (µg/kg)	PFOS (µg/kg)	PFBS (µg/kg)
Project Action Limits (PALs) :		130 ^a	130 ^a	1,900 ^a
Site 14 – Old Fire Fighting Burn Pad				
SURFACE SOIL				
PX-S14-SS58	9/12/2020	0.89 J	11.14	1.18 U
PX-S14-SS59	9/12/2020	2.55 U	1.52 J	1.27 U
PX-S14-SS60	9/12/2020	2.14 U	2.14 U	1.07 U
PX-S14-SS61	9/12/2020	2.41 U	1.43 J	1.2 U
PX-S14-SS62	9/12/2020	2.17 U	1.9 J ^b	1.09 U
SUBSURFACE SOIL				
PX-S14-SB58	9/12/2020	2.19 U	2.19 U	1.09 U
PX-S14-SB59	9/12/2020	2.3 U	2.3 U	1.15 U
PX-S14-SB60	9/12/2020	2.27 U	2.27 U	1.14 U
PX-S14-SB61	9/12/2020	2.02 U	2.02 U	1.01 U
PX-S14-SB62	9/12/2020	2.13 U	2.13 U	1.06 U
Air Show Fire Fighting Demonstration Area				
SURFACE SOIL				
PX-FFDA-SS01	9/12/2020	2.37 U	1.38 J	1.18 U
PX-FFDA-SS02	9/12/2020	2.26 U	3.81 J	1.13 U
PX-FFDA-SS03	9/12/2020	2.26 U	2.26 U	1.13 U
PX-FFDA-SS04	9/12/2020	1.04 J	2.18 J	1.32 U
PX-FFDA-SS05	9/12/2020	2.56 U	1.07 J	1.28 U
PX-FFDA-SS06	9/12/2020	2.35 U	2.35 U	1.18 U
PX-FFDA-SS07	9/12/2020	2.33 U	3.14 J	1.16 U
SUBSURFACE SOIL				
PX-FFDA-SB01	9/12/2020	2.78 U	2.78 U	1.39 U
PX-FFDA-SB02	9/12/2020	2.37 U	2.37 U	1.18 U
PX-FFDA-SB03	9/12/2020	2.11 U	2.11 U	1.05 U
PX-FFDA-SB04	9/12/2020	2.2 U	2.2 U	1.1 U
PX-FFDA-SB05	9/12/2020	2.16 U	2.16 U	1.08 U
PX-FFDA-SB06	9/12/2020	1.96 U	1.96 U	0.98 U
PX-FFDA-SB07	9/12/2020	2.15 U	2.15 U	1.08 U
Site 41 – Fire Fighting Burn Pad				
SURFACE SOIL				
PX-S41-SS25	8/19/2020	2.05 U	2.53 U	1.03 U
PX-S41-SS26	8/19/2020	0.79 J	50.45	1.1 U
PX-S41-SS27	8/19/2020	2.14 U	3.18 U	1.07 U
PX-S41-SS28	8/19/2020	1.14 J	172.54	1.12 U
PX-S41-SS29	8/19/2020	1.42 J ^b	84.67 ^b	1.28 U
PX-S41-SS30	8/19/2020	3.36 J	30.02	1.03 U

Table 4-1. Soil Analytical Data for PFOA, PFOS, and PFBS (August/September 2020)

Basewide PFAS Site Inspection Report

NAS Patuxent River, St. Mary's County, Maryland

Sample Location	Date Sampled	PFOA (µg/kg)	PFOS (µg/kg)	PFBS (µg/kg)
Project Action Limits (PALs) :		130 ^a	130 ^a	1,900 ^a
Site 41 – Fire Fighting Burn Pad (continued)				
SUBSURFACE SOIL				
PX-S41-SB25	8/19/2020	2.14 U	2.14 U	1.07 U
PX-S41-SB26	8/19/2020	1.3 J	111.98	1.06 U
PX-S41-SB27	8/19/2020	2.06 U	2.06 U	1.03 U
PX-S41-SB28	8/19/2020	2.37 U	2.37 U	1.18 U
PX-S41-SB29	8/19/2020	2.06 U	4.86 U	1.03 U
PX-S41-SB30	8/19/2020	1.76 J	56.26	1.12 U
Crash Trucks Daily Equipment Functioning Inspection Area				
SURFACE SOIL				
PX-CTIA-SS01	9/13/2020	2.61 U	4.9 J	1.31 U
PX-CTIA-SS02	9/13/2020	0.88 J	58.51	1.23 U
PX-CTIA-SS03	9/13/2020	1.86 J	471.93	1.16 U
PX-CTIA-SS04	9/13/2020	2.4 U ^b	64.68 J	1.2 U ^b
SUBSURFACE SOIL				
PX-CTIA-SB01	9/13/2020	2.58 U ^b	2.29 J ^b	1.29 U ^b
PX-CTIA-SB02	9/13/2020	1.03 J	376.4	1.2 U
PX-CTIA-SB03	9/13/2020	1.95 J	88.06	1.14 U
PX-CTIA-SB04	9/13/2020	2.3 U	17.8	1.15 U

Notes:

^a The PALs for PFOA and PFOS for this investigation align with screening values for moving a site from the SI phase to the RI phase included in the Assistant Secretary of Defense Memorandum issued on October 15, 2019 (DoD, 2019b). For PFBS, the PALs are based on the May 2021 USEPA Regional Screening Levels (USEPA, 2021).

^b Result from a field duplicate sample.

Bolding indicates detection.

Shading and bolding indicate exceedance of screening value.

J = Analyte present. Reported value may or may not be accurate or precise.

U = Analyte not detected.

RI = Remedial Investigation

SI = Site Inspection

µg/kg = microgram(s) per kilogram

Table 4-2. Groundwater Analytical Data for PFOA, PFOS, and PFBS (August/September 2020)

Basewide PFAS Site Inspection Report

NAS Patuxent River, St. Mary's County, Maryland

Sample Location	Date Sampled	PFOA (ng/L)	PFOS (ng/L)	PFBS (ng/L)
Project Action Limits (PALs) :		40 ^a	40 ^a	600 ^a
Site 14 – Old Fire Fighting Burn Pad				
GRAB GROUNDWATER				
PX-S14-WT01	9/12/2020	groundwater sample was lost by laboratory; therefore, was not analyzed		
PX-S14-WT02	9/12/2020	570.91 J	752.11	163.86 ^b
PX-S14-WT03	9/12/2020	129.41	181.64	17.49
PX-S14-WT04	9/12/2020	66.8	15.46	2.46 J
PX-S14-WT05	9/12/2020	287.43	6,489.84	177.98
PX-S14-WT06	9/12/2020	745.57	1,350.45	58.49
PX-S14-WT07	9/12/2020	63.77	65.77	8.97
Air Show Fire Fighting Demonstration Area				
GRAB GROUNDWATER				
PX-FFDA-WT01	9/12/2020	18.09	104.52	2 J
PX-FFDA-WT02	9/12/2020	21.2	88.9 ^b	6.09
PX-FFDA-WT03	9/12/2020	55	9.8	17.2
PX-FFDA-WT04	9/12/2020	11.17	3.62 J	12.15
PX-FFDA-WT05	9/12/2020	10.54	3.51 J	1.97 J
Site 41 – Fire Fighting Burn Pad				
GRAB GROUNDWATER				
PX-S41-WT01	8/19/2020	10.83	33.94	0.86 U
PX-S41-WT02	8/19/2020	51.44	926.81	3.77 J
PX-S41-WT03	8/19/2020	98.57	2,127.67	13.04
PX-S41-WT04	8/19/2020	74.6	630.54	1.43 J
PX-S41-WT05	8/19/2020	1,169.18	23,765.25	220.04
PX-S41-WT06	8/19/2020	768.09	9,473.12	73.76
PX-S41-WT07	8/19/2020	7.79	556.52	1.29 J
Crash Trucks Daily Equipment Functioning Inspection Area				
GRAB GROUNDWATER				
PX-CTIA-WT01	9/13/2020	8.69	33.91	2.81 J
PX-CTIA-WT02	9/13/2020	135.59	3,205.21	35.94
PX-CTIA-WT03	9/13/2020	1,348.08	35,787.16	127.2
PX-CTIA-WT04	9/13/2020	234.78	3,865.7	40.28
PX-CTIA-WT05	9/13/2020	5.09	13.13	0.89 J
PX-CTIA-WT06	9/13/2020	73.35	1,831.53	5.94

Notes:

^a The PALs for PFOA and PFOS for this investigation align with screening values for moving a site from the SI phase to the RI phase included in the Assistant Secretary of Defense Memorandum issued on October 15, 2019 (DoD, 2019b). For PFBS, the PALs are based on the May 2021 USEPA Regional Screening Levels (USEPA, 2021).

^b Result from a field duplicate sample.

Bolding indicates detection.

Shading and bolding indicate exceedance of screening value.

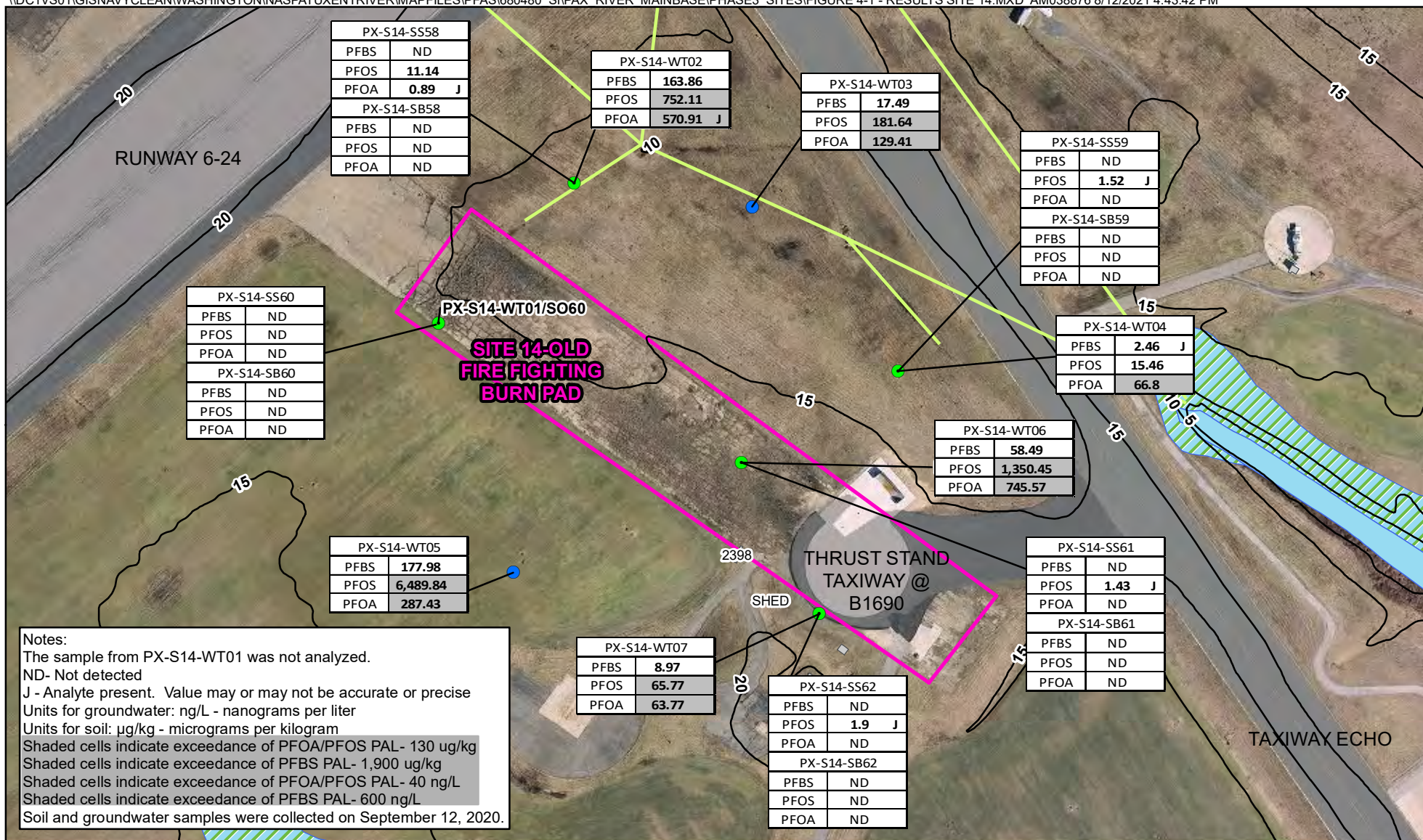
J = Analyte present. Reported value may or may not be accurate or precise.

RI = Remedial Investigation

SI = Site Inspection

U = Analyte not detected.

ng/L = nanogram(s) per liter or parts per trillion



Notes:
 The sample from PX-S14-WT01 was not analyzed.
 ND- Not detected
 J - Analyte present. Value may or may not be accurate or precise
 Units for groundwater: ng/L - nanograms per liter
 Units for soil: ug/kg - micrograms per kilogram
 Shaded cells indicate exceedance of PFOA/PFOS PAL- 130 ug/kg
 Shaded cells indicate exceedance of PFBS PAL- 1,900 ug/kg
 Shaded cells indicate exceedance of PFOA/PFOS PAL- 40 ng/L
 Shaded cells indicate exceedance of PFBS PAL- 600 ng/L
 Soil and groundwater samples were collected on September 12, 2020.

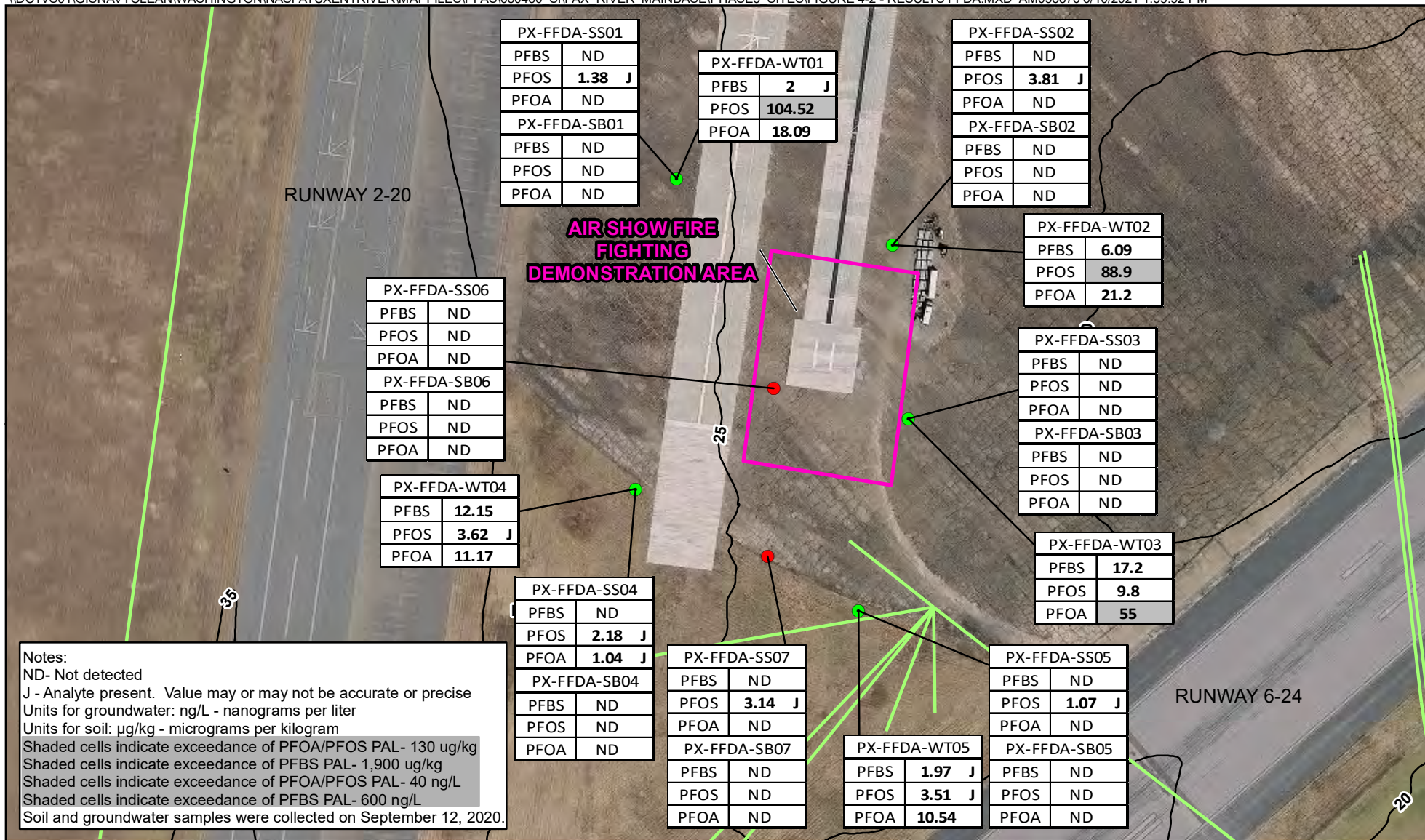
Legend

- Co-located Groundwater and Soil Sample Location
- Groundwater Sample Location
- Confirmed PFAS Release Area
- Stormwater
- Elevation Contour 5 ft
- ▨ Wetland Area



0 100 200
Feet

Figure 4-1
 PFOA, PFOS, and PFBS Concentrations for Site 14 – Old Fire Fighting Burn Pad
 Basewide PFAS Site Inspection Report
 NAS Patuxent River
 St. Mary's County, Maryland



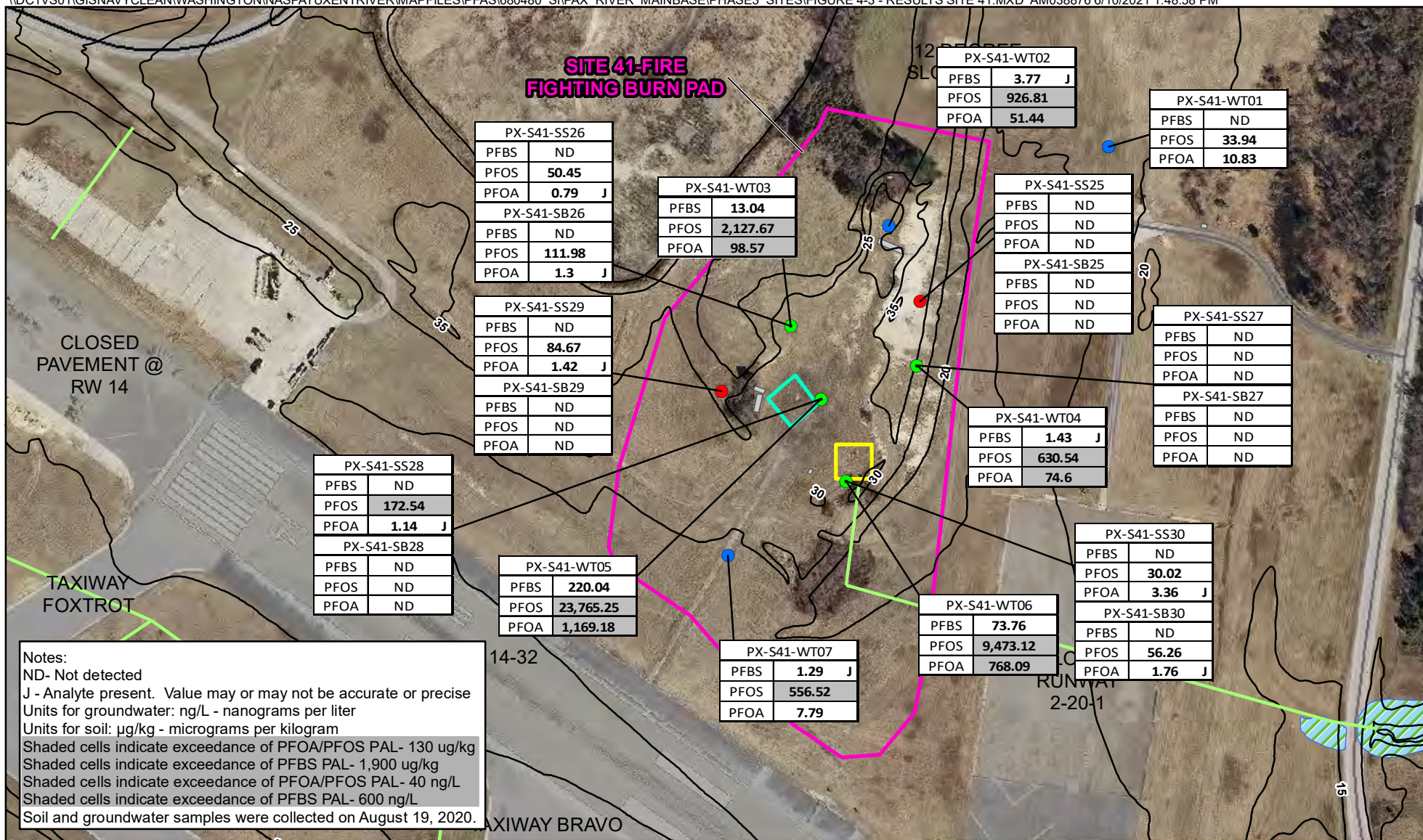
Legend

- Co-located Groundwater and Soil Sample Location
- Surface/Subsurface Soil Sample Location
- Confirmed PFAS Release Area
- Stormwater
- Elevation Contour 5 ft



0 100 200
Feet

Figure 4-2
 PFOA, PFOS, and PFBS Concentrations for Air Show Fire Fighting Demonstration Area
 Basewide PFAS Site Inspection Report
 NAS Patuxent River
 St. Mary's County, Maryland



Legend

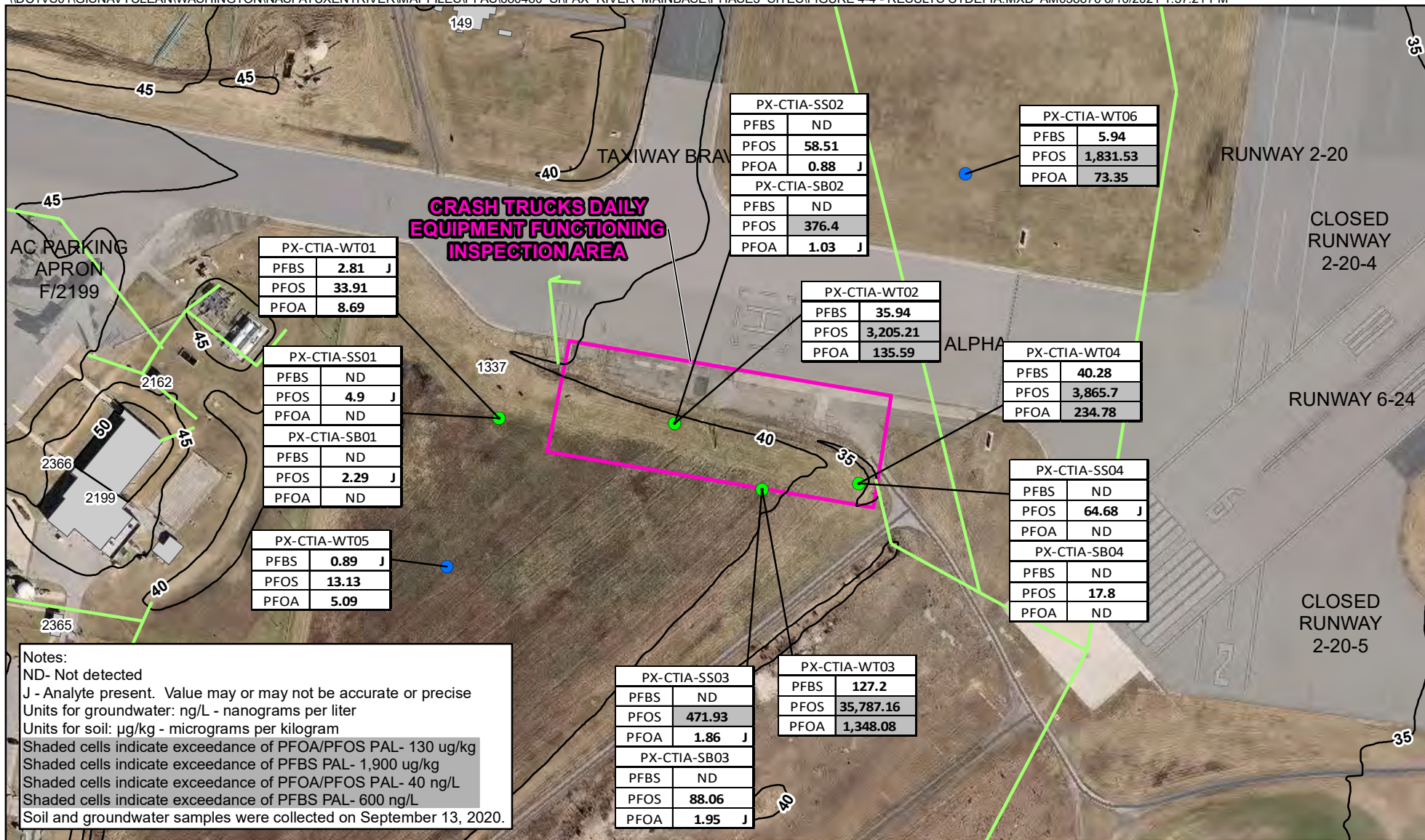
- Co-located Groundwater and Soil Sample Location
- Groundwater Sample Location
- Surface/Subsurface Soil Sample Location
- Confirmed PFAS Release Area
- Stormwater
- Elevation Contour 5 ft
- Approximate Location of Former Burn Pad
- Approximate Location of Former USTs
- ▨ Wetland Area



0 125 250
Feet

Figure 4-3
 PFOA, PFOS, and PFBS Concentrations for
 Site 41 – Fire Fighting Burn Pad
 Basewide PFAS Site Inspection Report
 NAS Patuxent River
 St. Mary's County, Maryland

ch2m



Legend

- Confirmed PFAS Release Area
- Co-located Groundwater and Soil Sample Location
- Groundwater Sample Location
- Stormwater
- Elevation Contour 5 ft
- Building

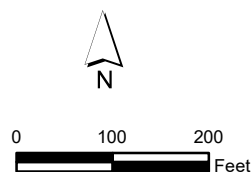


Figure 4-4
PFOA, PFOS, and PFBS Concentrations for Crash Trucks Daily
Equipment Functioning Inspection Area
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Conclusions and Recommendations

Table 5-1 summarizes the results of the PFAS SI conducted for Site 14, FFDA, Site 41, and CTIA at NAS Patuxent River.

Table 5-1. Conclusions of PFAS SI

Basewide PFAS Site Inspection Report

NAS Patuxent River, St. Mary's County, Maryland

Objective	Results
Determine whether PFAS (if present) were detected at concentrations that exceed the PALs for soil and groundwater.	<p>Site 14:</p> <ul style="list-style-type: none"> PFOA and PFOS were detected in site soil; none of the detected concentrations exceeded the corresponding PALs. PFBS was not detected in site soil. PFOA, PFOS, and PFBS were detected in site groundwater; detected concentrations of PFOA and PFOS exceeded the corresponding PALs. Groundwater analytical results were for grab groundwater samples collected from temporary piezometers. <p>FFDA:</p> <ul style="list-style-type: none"> PFOA and PFOS were detected in site soil; none of the detected concentrations exceeded the corresponding PALs. PFBS was not detected in site soil. PFOA, PFOS, and PFBS were detected in site groundwater; detected concentrations of PFOA and PFOS exceeded the corresponding PALs. Groundwater analytical results were for grab groundwater samples collected from temporary piezometers. <p>Site 41:</p> <ul style="list-style-type: none"> PFOA and PFOS were detected in site soil; detected concentrations of PFOS exceeded the corresponding PAL. PFBS was not detected in site soil. PFOA, PFOS, and PFBS were detected in site groundwater; detected concentrations of PFOA and PFOS exceeded the corresponding PALs. Groundwater analytical results were for grab groundwater samples collected from temporary piezometers. <p>CTIA:</p> <ul style="list-style-type: none"> PFOA and PFOS were detected in site soil; detected concentrations of PFOS exceeded the corresponding PAL. PFBS was not detected in site soil. PFOA, PFOS, and PFBS were detected in site groundwater; detected concentrations of PFOA and PFOS exceeded the corresponding PALs. Groundwater analytical results were for grab groundwater samples collected from temporary piezometers.
Determine the potential for PFAS (if present) to migrate offsite.	<p>Site 14:</p> <ul style="list-style-type: none"> Groundwater flow is predominantly to the north-northeast in the direction of Harper's Creek, and there is the potential for migration of PFAS in that direction. There is no potential drinking water exposure because groundwater flow is not toward off-installation wells, the surficial aquifer at the installation is not used for drinking water on- or off-installation, and there are confining units isolating the aquifers used for drinking water. <p>FFDA:</p> <ul style="list-style-type: none"> Groundwater flow is predominantly to the north in the direction of the Patuxent River, and there is the potential for migration of PFAS in that direction. There is no potential drinking water exposure because groundwater flow is not toward off-installation wells, the surficial aquifer at the installation is not used for drinking water on- or off-installation, and there are confining units isolating the aquifers used for drinking water.

Table 5-1. Conclusions of PFAS SI

Basewide PFAS Site Inspection Report

NAS Patuxent River, St. Mary's County, Maryland

Objective	Results
	<p>Site 41:</p> <ul style="list-style-type: none"> Groundwater flow is predominantly to the north in the direction of the Patuxent River, and there is the potential for migration of PFAS in that direction. There is no potential drinking water exposure because groundwater flow is not toward off-installation wells, the surficial aquifer at the installation is not used for drinking water on- or off-installation, and there are confining units isolating the aquifers used for drinking water. <p>CTIA:</p> <ul style="list-style-type: none"> Groundwater flow is predominantly to the east-southeast in the direction of Pine Hill Run, and there is the potential for migration of PFAS in that direction, in addition to ponds south of the site. There is no potential drinking water exposure because groundwater flow is not toward off-installation wells, the surficial aquifer at the installation is not used for drinking water on- or off-installation, and there are confining units isolating the aquifers used for drinking water.

The following actions are proposed as part of the recommended RIs at Site 14, FFDA, Site 41, and CTIA:

1. Collect additional soil samples at each site to better define the extent of PFOA, PFOS, and PFBS in soil.
2. Install permanent monitoring wells at each site to better define the extent of PFOA, PFOS, and PFBS in groundwater. New monitoring wells will also provide additional groundwater elevation data, which will help to refine the groundwater flow direction estimates developed in the SI field investigation.
3. Soil and groundwater samples will be analyzed for PFAS in accordance with Navy guidance, which will be updated as new USEPA and DoD guidance and directives are issued.
4. After the collection of additional soil data, consider performing lysimeter testing to evaluate the potential for soil to leach to groundwater above unacceptable risk levels at each site.
5. Based on data collected during the RIs, develop the conceptual site model (CSM) for each site. Each CSM will incorporate information to fully define the fate and transport of PFAS at NAS Patuxent River.
6. Perform a quantitative human health risk assessment (HHRA) at each site. Each HHRA will evaluate potential risks to human health associated with exposure to PFAS detected in soil and groundwater.
7. Perform an ecological risk screening (ERS) at each site. Each ERS will be conducted within the applicable DoD, Navy, and/or USEPA policy, guidance, or directives using the state-of-the-science toxicological information available and current at the time the RI report is prepared.

References

- Chappelle, F.H. and D.D. Drummond. 1983. *Hydrogeology, Digital Simulation, and Geochemistry of the Aquia and Piney-Point-Nanjemoy Aquifer System in Southern Maryland*. Maryland Geological Survey, Report of Investigations No. 38.
- CH2M HILL, Inc. (CH2M). 1998. *Remedial Investigation, Naval Air Station Patuxent River, Site 1, Fishing Point Landfill and Site 12, Rifle Range Landfill, NAS Patuxent River, Patuxent River, Maryland*. Final. July.
- CH2M HILL, Inc. (CH2M). 2014. *Remedial Investigation at Sites 4 and 5, Volume 3 of 10—Operable Unit 1 (Area 4A) Soil and Sediment, Naval Air Station Patuxent River, St. Mary's County, Maryland*. Final. September.
- CH2M HILL, Inc. (CH2M). 2018. *Preliminary Assessment Report for Per- and Polyfluoroalkyl Substances (PFAS), Naval Air Station Patuxent River, St. Mary's County, Maryland*. Final. July.
- CH2M HILL, Inc. (CH2M). 2020. *Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, Naval Air Station Patuxent River, St. Mary's County, Maryland*. Final. April.
- Department of Defense (DoD). 2019a. *DoD Instruction 4715.18, Emerging Chemicals (ECs) of Environmental Concern*. September.
- Department of Defense (DoD). 2019b. *Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program*. October.
- Department of Defense (DoD). 2020. *Per- and Polyfluoroalkyl Substances Sampling of Department of Defense Drinking Water Systems*. March.
- Fred C. Hart Associates, Inc. 1984. *Initial Assessment Study, Naval Air Station, Patuxent River, Maryland*.
- McCartan, L. 1989. *Geologic Map of St. Mary's County*. Maryland Department of Natural Resources. Baltimore, Maryland.
- Rose, A., St. Mary's County Health Department. 1998. Personal communication (letter) to R. Tarr, NAS Patuxent River. December 1.
- U.S. Environmental Protection Agency (USEPA). 2012. *Third Unregulated Contaminant Monitoring Rule*. 77-FR 26071. May.
- U.S. Environmental Protection Agency (USEPA). 2021. *Regional Screening Level Summary Table*. May.
- U.S. Geological Survey (USGS). 2001. "Hydrogeology and Ground-Water Quality of the Piney Point-Nanjemoy and Aquia Aquifers, Naval Air Station Patuxent River and Webster Outlying Field, St. Mary's County, Maryland." Water Resources Investigation Report 2001-4029.
- U.S. Geological Survey (USGS). 2007. "Hydrogeology of the Piney Point-Nanjemoy, Aquia, and Upper Patapsco Aquifers, Naval Air Station Patuxent River and Webster Outlying Field, St. Mary's County, Maryland, 2000-06." Scientific Investigation Report 2006-5266.

Appendix A

Survey Data

PROJECT: Survey Services
Contract: CLEAN 9000 CTO-4304
NAVAL AIR STATION PATUXENT
CALIFORNIA, MARYLAND
Date: Sept 9, 2020, 2020

DATUM:
Horizontal: NAD83(2007) Maryland State Plane (U.S. Feet)
Vertical: NAVD88 (U.S. Feet)

POINT NAME	NORTH	EAST	GR. ELEV.	PVC ELEV.	DESC.
PXBRACSWT01	228760.5693	1479716.811	16.75	17.05	MW
PXBRACSWT02	228688.9942	1479918.085	16.69	16.99	MW
PXBRACSWT03	228937.9769	1480170.841	16.66	17.01	MW
PXBRACSWT04	228759.0199	1480019.328	15.30	15.55	MW
PXBRACSWT05	228652.2495	1479917.609	13.62	14.02	MW
PXBRACSWT06	228521.6126	1480034.423	14.21	14.56	MW
PXBRACSWT07	228657.7925	1480181.605	14.99	15.39	MW
PXH2133WT01	221971.4946	1483439.978	15.56	15.91	MW
PXH2133WT02	222119.3609	1483773.366	16.66	16.91	MW
PXH2133WT03	221955.1899	1484077.886	15.26	16.11	MW
PXH2133WT04	221647.3468	1484176.903	15.67	16.12	MW
PXH2133WT05	221374.4666	1484034.463	15.69	16.04	MW
PXH2133WT06	221432.2786	1483743.124	13.03	13.63	MW
PXH2835WT01	224094.8216	1474608.405	45.28	45.68	MW
PXH2835WT02	223535.212	1473920.634	42.33	42.78	MW
PXH2835WT03	223481.212	1474040.594	40.65	40.95	MW
PXH2835WT04	223696.0789	1474182.024	40.67	41.17	MW
PXH2835WT05	223877.2208	1474473.981	44.50	44.85	MW
PXH2835WT06	223306.4742	1473568.89	47.28	47.48	MW
PXS41WT01	229629.736	1479508.871	20.11	20.51	MW
PXS41WT02	229488.4921	1479115.97	23.70	24.00	MW
PXS41WT03	229308.0289	1478939.466	27.16	27.46	MW
PXS41WT04	229237.6139	1479165.878	18.89	19.09	MW
PXS41WT05	229177.8764	1478994.294	26.21	27.06	MW
PXS41WT06	229030.4429	1479039.139	26.31	26.71	MW
PXS41WT07	228896.5128	1478827.331	23.97	24.32	MW

NUMBER	NORTH	EAST	ELEV	DESC.
SHOOP	229798.701	1477979.174	32.97	Brass Disk Monument
BEACH	232642.289	1481735.738	15.57	Brass Disk Monument

GENERAL NOTES

- DATUM:
 - Horizontal: Quantico Base Datum NAD83/91
 - Vertical: Quantico Base Datum NAVD88 (U.S. Feet)
- Monitoring Wells were located RTK GPS for both horizontal and vertical locations per the NAVFAC liaison based on accuracy requirements restricted access to sites.

I hereby Certify that this survey was conducted under my direct supervision and meets the accuracies required under this contract.

Thomas S. Pendleton

Thomas Gregory Pendleton
Maryland Professional Land Surveyor 21925



P) 202-652-0184 ♦ F) 202-330-5311
http://www.thothsurveying.com



Scale: As Shown SHEET 2 of 4

Bronson Road, Site 41, Hanger 2133 and Hanger 2835

Survey Services for Location of Piezometer
CLEAN 9000 CTO-JU40

Naval Air Station Patuxent
California, Maryland

FILENAME
NSA_UXO-02.dwg

DATE: September 09, 2020

PROJECT: Survey Services
Contract: CLEAN 9000 CTO-4304
NAVAL AIR STATION PATUXENT
CALIFORNIA, MARYLAND
Date: Sept 9, 2020, 2020

DATUM:
Horizontal: NAD83(2007) Maryland State Plane (U.S. Feet)
Vertical: NAVD88 (U.S. Feet)

POINT NAME	NORTH	EAST	GR. ELEV.	PVC ELEV.	DESC.
PX_CTIA_WT01	223042.2483	1477514.887	44.44	44.79	MW
PX_CTIA_WT02	223034.9603	1477766.26	41.18	41.53	MW
PX_CTIA_WT03	222940.7483	1477891.272	40.70	41.10	MW
PX_CTIA_WT04	222948.7298	1478029.365	36.42	36.57	MW
PX_CTIA_WT05	222829.8365	1477440.078	42.40	42.60	MW
PX_CTIA_WT06	223392.5068	1478182.462	36.09	36.49	MW

PX_FFDA_WT01	225072.7126	1479344.808	25.24345	25.49	MW
PX_FFDA_WT02	224977.8769	1479653.866	21.88027	22.21	MW
PX_FFDA_WT03	224728.7554	1479676.363	21.47939	21.83	MW
PX_FFDA_WT04	224628.5738	1479285.981	25.77476	26.12	MW
PX_FFDA_WT05	224453.7713	1479605.081	21.67026	21.92	MW

PX_S14_WT01	224856.049	1481418.911	14.38403	14.73	MW
PX_S14_WT02	225057.3517	1481613.293	13.13754	13.49	MW
PX_S14_WT03	225023.8232	1481868.355	13.20903	13.51	MW
PX_S14_WT04	224787.3672	1482077.493	13.72516	14.03	MW
PX_S14_WT05	224498.1753	1481525.785	17.19836	17.55	MW
PX_S14_WT06	224656.2476	1481852.613	15.68145	15.98	MW
PX_S14_WT07	224438.8128	1481963.983	17.76509	18.17	MW

BASE CONTROL FOUND					
NUMBER	NORTH	EAST	ELEV		DESC.
SHOOP	229798.701	1477979.174	32.97		Brass Disk Monument
BEACH	232642.289	1481735.738	15.57		Brass Disk Monument

GENERAL NOTES

- DATUM:
 - Horizontal: Quantico Base Datum NAD83/91
 - Vertical: Quantico Base Datum NAVD88 (U.S. Feet)
- Monitoring Wells were located RTK GPS for both horizontal and vertical locations per the NAVFAC liaison based on accuracy requirements restricted access to sites.

I hereby Certify that this survey was conducted under my direct supervision and meets the accuracies required under this contract.

Thomas G Pendleton

Thomas Gregory Pendleton
Maryland Professional Land Surveyor 21925



P) 202-652-0184 ♦ F) 202-330-5311
http://www.thothsurveying.com



Scale: As Shown	SHEET 3 of 4
Air Demo Site, CTIA Washrack Site and Site 14	
Survey Services for Location of Piezometer CLEAN 9000 CTO-JU40	
Naval Air Station Patuxant California, Maryland	
FILENAME NSA_UKO-02.dwg	DATE: September 28, 2020

Appendix B
Investigation-Derived Waste Analytical
Data, Waste Profiles, and
Disposal Manifests



LELAP CERTIFICATE NUMBER: 01955
DOD-ELAP ACCREDITATION NUMBER: 74960

ANALYTICAL RESULTS

PERFORMED BY

Pace Analytical Gulf Coast
7979 Innovation Park Dr.
Baton Rouge, LA 70820
(225) 769-4900

Report Date 11/25/2020

Report # 220102866



Project PAX Basewide - CTO-4256

Deliver To

Juan Acaron
CH2M Hill
3011 SW Williston Rd
Gainesville, FL 32608
352-384-7002

Additional Recipients

NONE





Report#: 220102866

Project ID: PAX Basewide - CTO-4256

Report Date: 11/25/2020

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with Pace Gulf Coast's Standard Operating Procedures.

Common Abbreviations that may be Utilized in this Report

ND	Indicates the result was Not Detected at the specified reporting limit
NO	Indicates the sample did not ignite when preliminary test performed for EPA Method 1030
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
DL	Detection Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
RE	Re-analysis
CF	HPLC or GC Confirmation
00:01	Reported as a time equivalent to 12:00 AM

Reporting Flags that may be Utilized in this Report

J or I	Indicates the result is between the MDL and LOQ
J	DOD flag on analyte in the parent sample for MS/MSD outside acceptance criteria
U	Indicates the compound was analyzed for but not detected
B or V	Indicates the analyte was detected in the associated Method Blank
Q	Indicates a non-compliant QC Result (See Q Flag Application Report)
*	Indicates a non-compliant or not applicable QC recovery or RPD – see narrative
E	Organics - The result is estimated because it exceeded the instrument calibration range
E	Metals - % difference for the serial dilution is > 10%
L	Reporting Limits adjusted to meet risk-based limit.
P	RPD between primary and confirmation result is greater than 40
DL	Diluted analysis – when appended to Client Sample ID

Sample receipt at Pace Gulf Coast is documented through the attached chain of custody. In accordance with NELAC, this report shall be reproduced only in full and with the written permission of Pace Gulf Coast. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with The NELAC Institute (TNI) Standard 2009 and terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.

Estimated uncertainty of measurement is available upon request. This report is in compliance with the DOD QSM as specified in the contract if applicable.

Authorized Signature
Pace Gulf Coast Report 220102866



Report#: 220102866

Project ID: PAX Basewide - CTO-4256

Report Date: 11/25/2020

Sample Results

PAX-IDW01-102420-AQ

Collect Date 10/24/2020 13:25

LAB ID 22010286601

Receive Date 10/28/2020 09:47

Matrix Water

EPA 1311/8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
10/31/2020 10:00	696144	EPA 1311(TCLP)	100	11/05/2020 06:53	SMS	696531

CAS#	Parameter	Result	DL	LOD	LOQ	Units
75-35-4	1,1-Dichloroethene	0.050U	0.020	0.050	0.500	mg/L
107-06-2	1,2-Dichloroethane	0.050U	0.020	0.050	0.250	mg/L
78-93-3	2-Butanone	0.050U	0.020	0.050	0.500	mg/L
71-43-2	Benzene	0.050U	0.020	0.050	0.250	mg/L
56-23-5	Carbon tetrachloride	0.050U	0.025	0.050	0.250	mg/L
108-90-7	Chlorobenzene	0.050U	0.020	0.050	0.500	mg/L
67-66-3	Chloroform	0.050U	0.020	0.050	0.500	mg/L
127-18-4	Tetrachloroethene	0.050U	0.020	0.050	0.500	mg/L
79-01-6	Trichloroethene	0.050U	0.020	0.050	0.250	mg/L
75-01-4	Vinyl chloride	0.050U	0.020	0.050	0.100	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	5	5.09	mg/L	102	62 - 130
1868-53-7	Dibromofluoromethane	5	5.43	mg/L	109	65 - 127
2037-26-5	Toluene d8	5	5.2	mg/L	104	71 - 134
17060-07-0	1,2-Dichloroethane-d4	5	5.25	mg/L	105	62 - 127

EPA 1311/8270D

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/04/2020 06:45	696434	EPA 3510C	10	11/08/2020 13:24	DLB	696802

CAS#	Parameter	Result	DL	LOD	LOQ	Units
106-46-7	1,4-Dichlorobenzene	0.0500U	0.0250	0.0500	0.5000	mg/L
95-95-4	2,4,5-Trichlorophenol	0.0500U	0.0250	0.0500	0.5000	mg/L
88-06-2	2,4,6-Trichlorophenol	0.0500U	0.0250	0.0500	0.5000	mg/L
121-14-2	2,4-Dinitrotoluene	0.0500U	0.0250	0.0500	0.1000	mg/L
1319-77-3	Cresols	0.1000U	0.0500	0.1000	1.00	mg/L
118-74-1	Hexachlorobenzene	0.0500U	0.0250	0.0500	0.1000	mg/L
87-68-3	Hexachlorobutadiene	0.0500U	0.0250	0.0500	0.5000	mg/L
67-72-1	Hexachloroethane	0.0500U	0.0250	0.0500	0.5000	mg/L
1319-77-3MP	m,p-Cresol	0.0500U	0.0250	0.0500	0.5000	mg/L
98-95-3	Nitrobenzene	0.0500U	0.0250	0.0500	0.5000	mg/L
95-48-7	o-Cresol	0.0500U	0.0250	0.0500	0.5000	mg/L
87-86-5	Pentachlorophenol	0.0500U	0.0250	0.0500	0.5000	mg/L



Report#: 220102866

Project ID: PAX Basewide - CTO-4256

Report Date: 11/25/2020

Sample Results

PAX-IDW01-102420-AQ

Collect Date 10/24/2020 13:25

LAB ID 22010286601

Receive Date 10/28/2020 09:47

Matrix Water

EPA 1311/8270D (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/04/2020 06:45	696434	EPA 3510C	10	11/08/2020 13:24	DLB	696802

CAS#	Parameter	Result	DL	LOD	LOQ	Units
110-86-1	Pyridine	0.2500U	0.0750	0.2500	0.5000	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
4165-60-0	Nitrobenzene-d5	0.1250	Diluted Out	mg/L	0*	44 - 120
321-60-8	2-Fluorobiphenyl	0.1250	Diluted Out	mg/L	0*	44 - 119
1718-51-0	Terphenyl-d14	0.1250	Diluted Out	mg/L	0*	50 - 134
4165-62-2	Phenol-d5	0.25	Diluted Out	mg/L	0*	10 - 123
367-12-4	2-Fluorophenol	0.25	Diluted Out	mg/L	0*	19 - 119
118-79-6	2,4,6-Tribromophenol	0.25	Diluted Out	mg/L	0*	43 - 140

EPA 1311/8081B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/06/2020 13:00	696723	EPA 3510C	1	11/07/2020 07:24	MFS	696912

CAS#	Parameter	Result	DL	LOD	LOQ	Units
57-74-9	Chlordane (Technical)	0.000500U	0.000250	0.000500	0.00250	mg/L
72-20-8	Endrin	0.0000400U	0.0000200	0.0000400	0.00100	mg/L
58-89-9	gamma-BHC (Lindane)	0.0000400U	0.0000100	0.0000400	0.000500	mg/L
76-44-8	Heptachlor	0.0000800U	0.0000400	0.0000800	0.000500	mg/L
1024-57-3	Heptachlor epoxide	0.0000400U	0.0000200	0.0000400	0.000500	mg/L
72-43-5	Methoxychlor	0.000100U	0.0000500	0.000100	0.000500	mg/L
8001-35-2	Toxaphene	0.000500U	0.000250	0.000500	0.00250	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
877-09-8	Tetrachloro-m-xylene	0.0050	.0018	mg/L	36*	44 - 124
2051-24-3	Decachlorobiphenyl	0.0050	.0007	mg/L	13*	30 - 139

EPA 1311/8151A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/02/2020 09:30	696203	EPA 1311/8151A	1	11/09/2020 14:19	MFS	696856

CAS#	Parameter	Result	DL	LOD	LOQ	Units
93-72-1	2,4,5-TP (Silvex)	0.00250U	0.00100	0.00250	0.00500	mg/L



Report#: 220102866

Project ID: PAX Basewide - CTO-4256

Report Date: 11/25/2020

Sample Results

PAX-IDW01-102420-AQ

Collect Date 10/24/2020 13:25

LAB ID 22010286601

Receive Date 10/28/2020 09:47

Matrix Water

EPA 1311/8151A (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/02/2020 09:30	696203	EPA 1311/8151A (Continued)	1	11/09/2020 14:19	MFS	696856

CAS#	Parameter	Result	DL	LOD	LOQ	Units
94-75-7	2,4'-D	0.00250U	0.00100	0.00250	0.00500	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
19719-28-9	DCAA	0.02	.0184	mg/L	92	18 - 136

EPA 1311/6020B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/02/2020 07:45	696199	EPA 3010A	10	11/02/2020 15:56	LWZ	696271

CAS#	Parameter	Result	DL	LOD	LOQ	Units
7440-38-2	Arsenic	0.050U	0.025	0.050	0.10	mg/L
7440-39-3	Barium	0.11	0.025	0.050	0.10	mg/L
7440-43-9	Cadmium	0.050U	0.025	0.050	0.10	mg/L
7440-47-3	Chromium	0.050U	0.025	0.050	0.10	mg/L
7439-92-1	Lead	0.050U	0.025	0.050	0.10	mg/L
7782-49-2	Selenium	0.050U	0.025	0.050	0.10	mg/L
7440-22-4	Silver	0.050U	0.025	0.050	0.10	mg/L

EPA 1311/7470A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/04/2020 13:00	696492	EPA 7470A	1	11/05/2020 14:55	LWZ	696635

CAS#	Parameter	Result	DL	LOD	LOQ	Units
7439-97-6	Mercury	0.0020U	0.00043	0.0020	0.020	mg/L

EPA 1010A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	11/11/2020 11:49	MOS	697083

CAS#	Parameter	Result	DL	LOD	LOQ	Units
000000-01-3	Flash point	>200	50	50	50	Deg F



Report#: 220102866

Project ID: PAX Basewide - CTO-4256

Report Date: 11/25/2020

Sample Results

PAX-IDW01-102420-AQ

Collect Date 10/24/2020 13:25

LAB ID 22010286601

Receive Date 10/28/2020 09:47

Matrix Water

EPA 9012B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
10/29/2020 09:00	695802	EPA 7.3.3.2 (1997)	1	10/30/2020 13:18	MOS	695999

CAS#	Parameter	Result	DL	LOD	LOQ	Units
57-12-5R	Reactivity Cyanide	250U	250	250	250	mg/L

EPA 9034

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
10/29/2020 09:00	695803	EPA 7.3.4.2 (1997)	1	10/30/2020 13:38	RYC	696047

CAS#	Parameter	Result	DL	LOD	LOQ	Units
18496-25-8R	Reactivity Sulfide	250U	250	250	250	mg/L

SM 4500-H+ B/EPA 9040C

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	10/29/2020 13:11	SLL2	695930

CAS#	Parameter	Result	DL	LOD	LOQ	Units
pH	pH	7.73	1.00	1.00	1.00	pH unit

PAX-IDW01-102420-SO

Collect Date 10/24/2020 13:30

LAB ID 22010286602

Receive Date 10/28/2020 09:47

Matrix Solid

EPA 1311/8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
10/29/2020 15:00	695926	EPA 1311(TCLP)	100	11/05/2020 01:34	SMS	696531

CAS#	Parameter	Result	DL	LOD	LOQ	Units
75-35-4	1,1-Dichloroethene	0.050U	0.020	0.050	0.500	mg/L
107-06-2	1,2-Dichloroethane	0.050U	0.020	0.050	0.250	mg/L
78-93-3	2-Butanone	0.050U	0.020	0.050	0.500	mg/L
71-43-2	Benzene	0.050U	0.020	0.050	0.250	mg/L
56-23-5	Carbon tetrachloride	0.050U	0.025	0.050	0.250	mg/L
108-90-7	Chlorobenzene	0.050U	0.020	0.050	0.500	mg/L
67-66-3	Chloroform	0.050U	0.020	0.050	0.500	mg/L
127-18-4	Tetrachloroethene	0.050U	0.020	0.050	0.500	mg/L
79-01-6	Trichloroethene	0.050U	0.020	0.050	0.250	mg/L



Report#: 220102866

Project ID: PAX Basewide - CTO-4256

Report Date: 11/25/2020

Sample Results

PAX-IDW01-102420-SO

Collect Date 10/24/2020 13:30

LAB ID 22010286602

Receive Date 10/28/2020 09:47

Matrix Solid

EPA 1311/8260B (Continued)

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
10/29/2020 15:00	695926	EPA 1311(TCLP)	100	11/05/2020 01:34	SMS	696531

CAS#	Parameter	Result	DL	LOD	LOQ	Units
75-01-4	Vinyl chloride	0.050U	0.020	0.050	0.100	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	5	4.72	mg/L	94	62 - 130
1868-53-7	Dibromofluoromethane	5	5.31	mg/L	106	65 - 127
2037-26-5	Toluene d8	5	5.1	mg/L	102	71 - 134
17060-07-0	1,2-Dichloroethane-d4	5	5.11	mg/L	102	62 - 127

EPA 1311/8270D

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/04/2020 06:45	696434	EPA 3510C	1	11/05/2020 10:37	DLB	696571

CAS#	Parameter	Result	DL	LOD	LOQ	Units
106-46-7	1,4-Dichlorobenzene	0.0050U	0.0025	0.0050	0.0500	mg/L
95-95-4	2,4,5-Trichlorophenol	0.0050U	0.0025	0.0050	0.0500	mg/L
88-06-2	2,4,6-Trichlorophenol	0.0050U	0.0025	0.0050	0.0500	mg/L
121-14-2	2,4-Dinitrotoluene	0.0050U	0.0025	0.0050	0.0100	mg/L
1319-77-3	Cresols	0.0100U	0.0050	0.0100	0.1000	mg/L
118-74-1	Hexachlorobenzene	0.0050U	0.0025	0.0050	0.0100	mg/L
87-68-3	Hexachlorobutadiene	0.0050U	0.0025	0.0050	0.0500	mg/L
67-72-1	Hexachloroethane	0.0050U	0.0025	0.0050	0.0500	mg/L
1319-77-3MP	m,p-Cresol	0.0050U	0.0025	0.0050	0.0500	mg/L
98-95-3	Nitrobenzene	0.0050U	0.0025	0.0050	0.0500	mg/L
95-48-7	o-Cresol	0.0050U	0.0025	0.0050	0.0500	mg/L
87-86-5	Pentachlorophenol	0.0050U	0.0025	0.0050	0.0500	mg/L
110-86-1	Pyridine	0.0250U	0.0075	0.0250	0.0500	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
4165-60-0	Nitrobenzene-d5	0.25	.196	mg/L	78	44 - 120
321-60-8	2-Fluorobiphenyl	0.25	.194	mg/L	78	44 - 119
1718-51-0	Terphenyl-d14	0.25	.177	mg/L	71	50 - 134
4165-62-2	Phenol-d5	0.50	.106	mg/L	21	10 - 123
367-12-4	2-Fluorophenol	0.50	.185	mg/L	37	19 - 119
118-79-6	2,4,6-Tribromophenol	0.50	.459	mg/L	92	43 - 140



Report#: 220102866

Project ID: PAX Basewide - CTO-4256

Report Date: 11/25/2020

Sample Results

PAX-IDW01-102420-SO

Collect Date 10/24/2020 13:30

LAB ID 22010286602

Receive Date 10/28/2020 09:47

Matrix Solid

EPA 1311/8081B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/02/2020 06:30	696194	EPA 3510C	1	11/02/2020 17:28	MFS	696349

CAS#	Parameter	Result	DL	LOD	LOQ	Units
57-74-9	Chlordane (Technical)	0.000500U	0.000250	0.000500	0.00250	mg/L
72-20-8	Endrin	0.0000400U	0.0000200	0.0000400	0.00100	mg/L
58-89-9	gamma-BHC (Lindane)	0.0000400U	0.0000100	0.0000400	0.000500	mg/L
76-44-8	Heptachlor	0.0000800U	0.0000400	0.0000800	0.000500	mg/L
1024-57-3	Heptachlor epoxide	0.0000400U	0.0000200	0.0000400	0.000500	mg/L
72-43-5	Methoxychlor	0.000100U	0.0000500	0.000100	0.000500	mg/L
8001-35-2	Toxaphene	0.000500U	0.000250	0.000500	0.00250	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
877-09-8	Tetrachloro-m-xylene	0.0050	.004	mg/L	79	44 - 124
2051-24-3	Decachlorobiphenyl	0.0050	.0034	mg/L	68	30 - 139

EPA 1311/8151A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
11/02/2020 09:30	696203	EPA 1311/8151A	1	11/09/2020 14:40	MFS	696856

CAS#	Parameter	Result	DL	LOD	LOQ	Units
93-72-1	2,4,5-TP (Silvex)	0.00250U	0.00100	0.00250	0.00500	mg/L
94-75-7	2,4'-D	0.00250U	0.00100	0.00250	0.00500	mg/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
19719-28-9	DCAA	0.02	.0228	mg/L	114	18 - 136

EPA 1311/6020B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
10/30/2020 14:45	696093	EPA 3010A	10	11/03/2020 15:44	LWZ	696405

CAS#	Parameter	Result	DL	LOD	LOQ	Units
7440-38-2	Arsenic	0.050U	0.025	0.050	0.10	mg/L
7440-39-3	Barium	0.28	0.025	0.050	0.10	mg/L
7440-43-9	Cadmium	0.050U	0.025	0.050	0.10	mg/L
7440-47-3	Chromium	0.040J	0.025	0.050	0.10	mg/L
7439-92-1	Lead	0.050U	0.025	0.050	0.10	mg/L
7782-49-2	Selenium	0.050U	0.025	0.050	0.10	mg/L
7440-22-4	Silver	0.050U	0.025	0.050	0.10	mg/L



Report#: 220102866

Project ID: PAX Basewide - CTO-4256

Report Date: 11/25/2020

Sample Results

PAX-IDW01-102420-SO

Collect Date 10/24/2020 13:30

LAB ID 22010286602

Receive Date 10/28/2020 09:47

Matrix Solid

EPA 1311/7470A

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
10/30/2020 15:15	696094	EPA 7470A	1	11/04/2020 12:47	BDP	696390

CAS#	Parameter	Result	DL	LOD	LOQ	Units
7439-97-6	Mercury	0.00010J	0.000070	0.00020	0.0020	mg/L

EPA 1030

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	11/12/2020 17:55	AJE	697206

CAS#	Parameter	Result	DL	LOD	LOQ	Units
000000-01-7	Ignitable	NO	2	2	2	mm/sec

EPA 9012B

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
10/29/2020 09:00	695800	EPA 7.3.3.2 (1997)	1	10/30/2020 12:59	MOS	695998

CAS#	Parameter	Result	DL	LOD	LOQ	Units
57-12-5R	Reactivity Cyanide	250U	250	250	250	mg/kg

EPA 9034

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
10/29/2020 09:00	695801	EPA 7.3.4.2 (1997)	1	10/30/2020 10:15	RYC	696046

CAS#	Parameter	Result	DL	LOD	LOQ	Units
18496-25-8R	Reactivity Sulfide	250U	250	250	250	mg/kg

EPA 9045D

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	10/29/2020 14:06	SLL2	695929

CAS#	Parameter	Result	DL	LOD	LOQ	Units
pH	pH	12.2	1.00	1.00	1.00	pH unit

CHAIN-OF-CUSTODY Analytical Request Document										LAB USE ONLY - Affix Work Order														
Company: <u>CH2M/Jacobs</u>					Billing Information:					<div style="background-color: yellow; padding: 5px; border: 1px solid black;"> Client ID: 4380 - CH2M Hill Constructors SDG: 220102866 PM: EPM </div>														
Address:					Report To: <u>Juan Acaron</u>															Email To: <u>juan.acaron@jacobs.com</u>				
Copy To:					Site Collection Info/Address: <u>PAX River, MD</u>															** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other _____				
Customer Project Name/Number: <u>CTO-4256</u>					State: <u>MD</u> County/City: <u>Pax River</u> Time Zone Collected: <u>ET</u>					Analyses														
Phone: <u>352-214-2814</u> Site/Facility ID #: <u>PAX Basewide PFAS</u>					Compliance Monitoring? <input type="checkbox"/> Yes <input type="checkbox"/> No					Lab Profile/Line:														
Collected By (print): <u>Hannah Moore</u>					Purchase Order #:					Lab Sample Receipt Checklist:														
Collected By (signature): <u>[Signature]</u>					Quote #:					Custody Seals Present/Intact Y N NA Custody Signatures Present Y N NA Collector Signature Present Y N NA Bottles Intact Y N NA Correct Bottles Y N NA Sufficient Volume Y N NA Samples Received on Ice Y N NA VOA - Headspace Acceptable Y N NA USDA Regulated Soils Y N NA Samples in Holding Time Y N NA Residual Chlorine Present Y N NA Cl Strips: _____ Sample pH Acceptable Y N NA pH Strips: _____ Sulfide Present Y N NA Lead Acetate Strips: _____														
Sample Disposal: <input type="checkbox"/> Dispose as appropriate <input type="checkbox"/> Return <input type="checkbox"/> Archive: _____ <input type="checkbox"/> Hold: _____					Turnaround Date Required: <u>normal</u>					Immediately Packed on Ice: <input type="checkbox"/> Yes <input type="checkbox"/> No														
Rush: <input type="checkbox"/> Same Day <input type="checkbox"/> Next Day <input type="checkbox"/> 2 Day <input type="checkbox"/> 3 Day <input type="checkbox"/> 4 Day <input type="checkbox"/> 5 Day (Expedite Charges Apply)					Field Filtered (if applicable): <input type="checkbox"/> Yes <input type="checkbox"/> No					LAB USE ONLY: Lab Sample # / Comments:														
* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)																								
Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start)		Composite End		Res Cl	# of Ctns																
			Date	Time	Date	Time																		
PAX-IDW01-107420-PA	GW	Comp	10/24/20	1325	10/24/20	1325		4	X															
PAX-IDW01-107420-XO	SD	Comp	10/24/20	1330	10/24/20	1330		2	X															
Customer Remarks / Special Conditions / Possible Hazards:			Type of Ice Used: Wet Blue Dry None				SHORT HOLDS PRESENT (<72 hours): Y N N/A				Lab Sample Temperature Info: Temp Blank Received: Y N NA Therm ID#: <u>E34</u> Cooler 1 Temp Upon Receipt: <u>1.3</u> oC Cooler 1 Therm Corr. Factor: _____ oC Cooler 1 Corrected Temp: _____ oC Comments: <u>771894038300</u>													
			Packing Material Used:				Lab Tracking #: <u>2595065</u>																	
			Radchem sample(s) screened (<500 cpm): Y N NA				Samples received via: FEDEX UPS Client Courier Pace Courier																	
Relinquished by/Company: (Signature) <u>Kurt Jacobs</u>			Date/Time: <u>10/26/2020 1030</u>		Received by/Company: (Signature) <u>Fed Ex</u>			Date/Time:		MTJL LAB USE ONLY Table #: Acctnum: Template: Prelogin: PM: PB:														
Relinquished by/Company: (Signature) <u>Fed EX</u>			Date/Time: <u>10/26/20 0947</u>		Received by/Company: (Signature) <u>J. R. PACE</u>			Date/Time: <u>10/26/20 0947</u>																
Relinquished by/Company: (Signature)			Date/Time:		Received by/Company: (Signature)			Date/Time:																
Non Conformance(s): YES / NO										Page: _____ of: _____														

CTO-4256: PAX Basewide PFAS
Project No 100142032
PFAS by DoD QSM 5.3 Table B-15
SD, SO
Batch 20-1355
Package DP-20-1225

Submitted to:
CH2M
5701 Cleveland Street
Virginia Beach, VA 23462 USA

Submitted by:
Battelle Norwell Operations
141 Longwater Drive Suite 202
Norwell, MA 02061




CTO-4256: PAX Basewide PFAS
Project No 100142032
PFAS by DoD QSM 5.3 Table B-15
SD, SO
Batch 20-1355
Package DP-20-1225

Submitted to:
CH2M
5701 Cleveland Street
Virginia Beach, VA 23462 USA


NELAP Accreditation Number: E87856 (Florida Department of Health)
DoD-ELAP Accreditation Number: 91667

Submitted by:
Battelle Norwell Operations
141 Longwater Drive Suite 202
Norwell, MA 02061

Analyst Approval:

 Digitally signed
by Lauren Griffith
Date: 2020.11.19
10:04:22 -05'00'

QC Chemist Approval:



Digitally signed by Elyn M. Fitch
Date: 2020.11.24 12:17:06 -05'00'

Project Manager Approval:



Digitally signed by Jonathan Thorn
Date: 2020.11.24 13:03:50 -05'00'

BATTELLE
It can be done



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PAX-IDW01-102420-SO

Battelle ID G1996-FS
 Sample Type SA
 Collection Date 10/24/2020
 Extraction Date 11/04/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 7.55
 Matrix SO
 Sample Size 1.80
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.22 U	G1996-FS(3)	10.000	11/18/2020	0.79	2.22	5.56
PFHpA	375-85-9	1.67 U	G1996-FS(3)	10.000	11/18/2020	0.57	1.67	5.56
PFOA	335-67-1	2.22 U	G1996-FS(3)	10.000	11/18/2020	0.68	2.22	5.56
PFNA	375-95-1	1.11 U	G1996-FS(3)	10.000	11/18/2020	0.54	1.11	5.56
PFDA	335-76-2	1.11 U	G1996-FS(3)	10.000	11/18/2020	0.51	1.11	5.56
PFUnA	2058-94-8	1.11 U	G1996-FS(3)	10.000	11/18/2020	0.51	1.11	5.56
PFDoA	307-55-1	2.22 U	G1996-FS(3)	10.000	11/18/2020	0.68	2.22	5.56
PFTTrDA	72629-94-8	1.11 U	G1996-FS(3)	10.000	11/18/2020	0.31	1.11	5.56
PFTeDA	376-06-7	2.78 U	G1996-FS(3)	10.000	11/18/2020	1.20	2.78	5.56
NMeFOSAA	2355-31-9	2.78 U	G1996-FS(3)	10.000	11/18/2020	1.13	2.78	5.56
NEtFOSAA	2991-50-6	2.22 U	G1996-FS(3)	10.000	11/18/2020	0.83	2.22	5.56
PFBS	375-73-5	1.11 U	G1996-FS(3)	10.000	11/18/2020	0.39	1.11	5.56
PFHxS	355-46-4	1.73 J	G1996-FS(3)	10.000	11/18/2020	0.90	2.22	5.56
PFOS	1763-23-1	40.43	G1996-FS(3)	10.000	11/18/2020	0.77	2.22	5.56
HFPO-DA	13252-13-6	2.22 U	G1996-FS(3)	10.000	11/18/2020	0.71	2.22	5.56
Adona	919005-14-4	2.22 U	G1996-FS(3)	10.000	11/18/2020	0.92	2.22	5.56
11CI-PF3OUdS	763051-92-9	1.67 U	G1996-FS(3)	10.000	11/18/2020	0.58	1.67	5.56
9CI-PF3ONS	756426-58-1	1.11 U	G1996-FS(3)	10.000	11/18/2020	0.53	1.11	5.56

PINK = CLIENT

CTO-4256: PAX Basewide PFAS
Project No 100142032
PFAS by DoD QSM 5.3 Table B-15
AQ, GW, SW
Batch 20-1357
Package DP-20-1227

Submitted to:
CH2M
5701 Cleveland Street
Virginia Beach, VA 23462 USA

Submitted by:
Battelle Norwell Operations
141 Longwater Drive Suite 202
Norwell, MA 02061



CTO-4256: PAX Basewide PFAS
Project No 100142032
PFAS by DoD QSM 5.3 Table B-15
AQ, GW, SW
Batch 20-1357
Package DP-20-1227

Submitted to:
CH2M
5701 Cleveland Street
Virginia Beach, VA 23462 USA

NELAP Accreditation Number: E87856 (Florida Department of Health)
DoD-ELAP Accreditation Number: 91667

Submitted by:
Battelle Norwell Operations
141 Longwater Drive Suite 202
Norwell, MA 02061

Analyst Approval:		Digitally signed by Denise Schumitz Date: 2020.11.20 16:09:11 -05'00'
QC Chemist Approval:		Digitally signed by Carla Devine Date: 2020.11.24 11:28:51 -05'00'
Project Manager Approval:		Digitally signed by Jonathan Thorn Date: 2020.11.24 11:49:09 -05'00'

BATTELLE
It can be done



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PAX-IDW01-102420-AQ

Battelle ID G1995-FS
 Sample Type SA
 Collection Date 10/24/2020
 Extraction Date 11/02/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix GW
 Sample Size 0.255
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	234.87 D	G1995-FS-D(3)	5.000	11/20/2020	2.60	7.35	24.51
PFHpA	375-85-9	0.98 U	G1995-FS(0)	1.000	11/20/2020	0.25	0.98	4.90
PFOA	335-67-1	154.18 D	G1995-FS-D(3)	5.000	11/20/2020	2.50	7.35	24.51
PFNA	375-95-1	32.76 D	G1995-FS-D(3)	5.000	11/20/2020	1.52	4.90	24.51
PFDA	335-76-2	0.49 U	G1995-FS(0)	1.000	11/20/2020	0.14	0.49	4.90
PFUnA	2058-94-8	0.49 U	G1995-FS(0)	1.000	11/20/2020	0.22	0.49	4.90
PFDoA	307-55-1	0.49 U	G1995-FS(0)	1.000	11/20/2020	0.19	0.49	4.90
PFTTrDA	72629-94-8	0.49 U	G1995-FS(0)	1.000	11/20/2020	0.15	0.49	4.90
PFTeDA	376-06-7	1.96 U	G1995-FS(0)	1.000	11/20/2020	0.72	1.96	4.90
NMeFOSAA	2355-31-9	0.98 U	G1995-FS(0)	1.000	11/20/2020	0.34	0.98	4.90
NEtFOSAA	2991-50-6	0.98 U	G1995-FS(0)	1.000	11/20/2020	0.49	0.98	4.90
PFBS	375-73-5	0.49 U	G1995-FS(0)	1.000	11/20/2020	0.14	0.49	4.90
PFHxS	355-46-4	672.94 D	G1995-FS-D(3)	5.000	11/20/2020	0.54	1.96	24.51
PFOS	1763-23-1	1692.50 D	G1995-FS-D(5)	25.000	11/20/2020	10.78	24.51	122.55
HFPO-DA	13252-13-6	0.49 U	G1995-FS(0)	1.000	11/20/2020	0.25	0.49	4.90
Adona	919005-14-4	0.98 U	G1995-FS(0)	1.000	11/20/2020	0.26	0.98	4.90
11CI-PF3OUdS	763051-92-9	0.49 U	G1995-FS(0)	1.000	11/20/2020	0.23	0.49	4.90
9CI-PF3ONS	756426-58-1	0.98 U	G1995-FS(0)	1.000	11/20/2020	0.26	0.98	4.90

PINK = CLIENT

Applicant / Agent Information

Company Name: _____
Address: _____
City / State / Zip: _____
Contact: _____
Phone: _____
e-mail: _____

Generator Information

Company Name: _____
Address: _____
City / State / Zip: _____
Contact: _____
Phone: _____
e-mail: _____

Project Description

Site Name: _____
Site Address: _____
Source of Contamination: ☐ UST ☐ AST ☐ Spill ☐ Historical / Other: _____
Waste Generating Activity: _____

Waste Characterization

Applicant must complete the following information and attach all supporting laboratory analyses and / or SDS utilized to characterize the material as non-hazardous and acceptable for receipt by Clearfield MMG.

Common Waste Name: _____
Type of Waste: ☐ Soil ☐ Sludge ☐ Liquid ☐ Absorbents ☐ Other: _____
Type of Contamination: ☐ Unused Petroleum ☐ Used Petroleum ☐ No Petroleum ☐ Other
(list all contaminants & include type of petroleum, if any): _____

Flash Point Range: _____ pH Range: _____ Reactive: ☐ YES ☐ NO
Quantity: _____ Units: _____ Lab Analysis / SDS Attached: ☐ YES ☐ NO

Generator Certification

I hereby certify, based upon my diligent inquiry into the activities and processes generating the waste described on this form, that these materials are not classified as listed or characteristic hazardous waste as regulated by the Commonwealth of Virginia or the state of origin of this waste; that the materials do not contain 50.0 parts per million or more of polychlorinated biphenyls (PCB's); that the analytical results, completed *Waste Profile Form* and attached documentation are a representative, true, and accurate description of these materials; that no deliberate or willful omissions have been made in the preparation of this form; and that all known or suspect hazards have been disclosed herein. I further acknowledge that I am aware it is the duty of all persons to dispose of their solid waste in a legal manner (Va.Code ' 10.1-1418.1.A).

Generator or Agent Signature / Date

Generator or Agent Printed Name

If I am an agent signing on behalf of the generator, I have confirmed with the generator that the information contained in this profile is accurate and complete.

For Facility Use Only

Approved By: _____ Approval Code: _____
Approval Date: _____ Comments: _____



POST OFFICE BOX 1444 • CHESAPEAKE, VA 23327
PHONE: (757) 549-8448 • WWW.CLEARFIELDMMG.COM

NON-HAZARDOUS
SHIPPING MANIFEST

MANIFEST NO. _____

GENERATOR

NAME	NAVFAC Environmental	TELEPHONE	301-757-4897
ADDRESS	22445 Peary Road, Bldg. 504	CITY/STATE	Patuxent River, MD
SHIPMENT ORIGIN	NAS Patuxent River & Webster Field Annex	CITY/STATE	Patuxent River, MD
AUTHORIZED AGENT	c/o Jacobs / CH2M Hill	FIRM	
OTHER	PO # 148015204		

WASTE CHARACTERIZATION

WASTE NAME AND DESCRIPTION

PHYSICAL STATE

1. IDW Groundwater (Contains PFAS > 70 ppt)	SOLID _____	LIQUID / SLUDGE X
BULK LOAD WEIGHT / TONS _____	CONTAINERS TYPE 55 Gallon Drum	QUANTITY 6
2. IDW Soil Cuttings	SOLID X	LIQUID / SLUDGE _____
BULK LOAD WEIGHT / TONS _____	CONTAINERS TYPE 55 Gallon Drum	QUANTITY 3

ADDITIONAL INFORMATION

IDW generated from Monitoring Well & Soil Sampling Activities. Groundwater Must be Solidified & Landfilled

GENERATOR'S CERTIFICATION

I hereby certify, to the best of my knowledge, that the materials characterized above are not classified as listed or characteristic hazardous waste as regulated by the Commonwealth of Virginia, the state of origin, or Federal Regulations. All containers have been properly marked / labeled and are in proper condition for transport according to all DOT and government regulations.

Heidi A Morgan
Generator / Agent's Printed Name

Heidi A Morgan
Signature

12/15/20
Date

TRANSPORTER

TRANSPORTER NAME **Clearfield MMG, Inc.** TELEPHONE **757-549-8448** TRUCK NO. **22**

I certify that the materials described above were received by me for shipment and delivered to the designated facility.

Rob Steke
Transporter's Signature

12-15-20
Date

FACILITY

I certify that the materials described above were delivered to the facility and received by me.

DESIGNATED FACILITY: **Chesapeake Facility, 3900 Shannon Street**

John Lallier
Printed Name

John Lallier
Signature

12-15-20
Date

FACILITY

Appendix C

Data Quality Assessment

Data Quality Assessment for Per- and Polyfluoroalkyl Substances Site Inspection at Sites 14 and 41, Air Show Fire Fighting Demonstration Area (FFDA), and Crash Trucks Daily Equipment Functioning Inspection Area (CTIA), Naval Air Station Patuxent River, St. Mary's County, Maryland

DATE: June 28, 2021

1.0 Introduction

Historical use of aqueous film-forming foam during fire and emergency response, testing, and training activities at Naval Air Station (NAS) Patuxent River has prompted the Department of the Navy (Navy) to conduct a per- and polyfluoroalkyl substances (PFAS) Site Inspection (SI) at the installation. The purpose of this technical memorandum is to present the results of the data validation process for the soil and water samples collected in August and September 2020 during the PFAS SI at Sites 14 and 41, FFDA, and CTIA.

Soil and water samples were submitted to Battelle Laboratories for PFAS analysis by analytical method Liquid Chromatography Tandem Mass Spectrometry (LC-MS/MS) compliant with Department of Defense (DoD) Quality Systems Manual (QSM) Version 5.3 Table B-15 (DoD, 2020). The sample results were validated by Environmental Data Services, Inc. (EDS) for compliance with the analytical method requirements. Data validation reports for the following sample delivery groups (SDGs) were reviewed and summarized:

SDG
20-0985
20-0986
20-0988
20-0989
20-1118
20-1133
20-1134
20-1135
20-1136
20-1137
20-1138
20-1139
20-1140
20-1281

The process for conducting this data quality assessment included a review of the data to assess the accuracy, precision, and completeness based on procedures described in the DoD guidance document *Data Validation Guidelines Module 3: Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories Table B-15* (DoD, 2020), the project-specific sampling and analysis plan (SAP) for the PFAS SI (CH2M HILL, Inc. [CH2M], 2020), and professional judgment. The quality assurance

(QA)/quality control (QC) summary forms and data reports were reviewed, and the resulting findings are documented within each subsection that follows.

During the data validation by EDS, if QA/QC parameters were not within the acceptance limits, associated sample results were appended with a primary qualifying flag that indicated a possible anomaly with these data. The qualifying flags were applied during the data review and validation processes. This qualification also included the use of secondary qualifier flags. The secondary qualifiers provide the reasoning behind the assignment of a qualifier to these data. The definitions of the primary qualifiers are presented below. The secondary qualifiers are listed in **Attachment 1**.

2.0 Validation Flag Definitions

The following primary qualifiers were used to qualify the data:

- [NULL]: **Detected.** The analyte was analyzed for and detected at the concentration shown.
- [J]: **Estimated.** The reported result was an estimated value with an unknown bias.
- [U]: **Undetected.** The analyte was not detected and was reported as less than the limit of detection (LOD) or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
- [UJ]: **Detection limit estimated.** The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
- [R]: **Rejected.** The data are not useable.
- [Exclude]: **Excluded.** Data were not used due to another value being more appropriate.

3.0 Quality Control Measures

The following list represents the QA/QC measures that were reviewed during the data quality evaluation procedure:

- **Holding Times:** The holding times are evaluated to verify that samples were extracted and analyzed within holding times.
- **Blank samples:** Method blank, equipment blank, and trip blank samples were provided for this project. Blank samples enable the reviewer to determine if an analyte may be attributed to sampling or laboratory procedures, rather than environmental contamination from site activities.
- **Surrogate Recoveries:** Surrogate compounds are added to each sample and the recoveries are used to monitor lab performance and possible matrix interference.
- **Lab Control Sample (LCS)/Lab Control Sample Duplicate (LCSD):** These samples are a "controlled matrix", laboratory reagent water, in which target compounds have been added prior to extraction/analysis. The recoveries serve as a monitor of the overall performance of each step during the analysis, including sample preparation.
- **Matrix Spike/Matrix Spike Duplicate (MS/MSD) Samples:** Spike recovery is used to evaluate potential matrix interferences, as well as accuracy. Precision information is also determined by calculating the reproducibility between the recoveries of each spiked parameter.
- **Field Duplicate/Triplicate Samples:** These samples are collected to determine precision between a native and its duplicates. This information can only be determined when target compounds are detected.
- **Internal Standards:** These are compounds added to the sample extracts prior to analysis. Their retention times and response are evaluated for method compliance. The internal standards are used in quantification of the target parameters and to monitor the instrument sensitivity and response for stability during analysis.

- **Initial Calibration:** The initial calibration ensures the instrument is capable of producing acceptable qualitative and quantitative data for the compounds of interest. Multiple standard solutions are analyzed to determine the response and linearity of the instrument over a varying concentration range.
- **Continuing Calibration:** The continuing calibration checks satisfactory performance of the instrument and its predicted response to the target compounds by analysis of a standard solution(s) at known concentrations.

4.0 Quality Control Review

The QA/QC parameters for all samples were within acceptable control limits with the exceptions listed below. A brief overview of the data evaluation follows:

4.1 Holding Time

All holding time requirements were met.

4.2 Recoveries – Surrogate, MS/MSD and LCS/LCSD

Surrogates, MS/MSD, and LCS/LCSD recoveries all met acceptance criteria with the exception of those listed below:

- **MS/MSD:**
 - Spiked sample PX-CTIA-SS03-000H exhibited low recoveries in the MS/MSD for perfluorohexanesulfonic acid (PFHxS).
- **Surrogates:**
 - Various samples exhibited low and high recoveries in the surrogates over several SDGs.
 - Sample PX-CTIA-WT03-0920 exhibited high recoveries in the surrogates.
 - Sample PX-S14-WT02-0920 exhibited recoveries less than 10% in the surrogates. Data were rejected.

Associated results were qualified as estimated unless otherwise noted. Affected data are summarized in **Attachment 2**.

4.3 Field Duplicate Precision

- Native sample PX-CTIA-SS04-000H and field duplicate PX-CTIA-SS04P-000H did not meet field duplicate precision criteria for perfluorooctane sulfonate (PFOS).
- Native sample PX-S14-WT02-0920 and field duplicate PX-S14-WT02P-0920 did not meet field duplicate precision criteria for perfluorooctanoic acid (PFOA).
- Native sample PX-S41-WT02-0820 and field duplicate PX-S41-WT02P-0820 did not meet field duplicate precision criteria for PFHxS.

Associated results were qualified as estimated and are summarized in **Attachment 2**.

4.4 Analytical Blanks

- Perfluorobutanesulfonic acid (PFBS) and PFHxS were detected in the method blank for SDG 20-0985.
- PFBS was detected in the method blank for SDG 20-0986.
- Several target analytes were detected in various equipment blanks in SDGs 20-1136, 20-1135, and 20-0985.
- PFBS and PFHxS were detected in field blank PX-S41-FB01-081920.

Associated data were qualified as non-detect (U) due to blank contamination. Affected data are summarized in **Attachment 2**.

4.5 Calibration

All calibration acceptance criteria were met.

4.6 Serial Dilution

All serial dilution acceptance criteria were met.

4.7 Quantitation

Several compounds for various samples were outside of QC criteria for ion ratio in SDG 20-0988. Associated results were qualified as estimated (J-OT) and are summarized in **Attachment 2**.

4.8 Reporting Limits Evaluation

Laboratory detection limits (DLs), LODs, and limits of quantitation (LOQs) were evaluated and compared to the project limits and were found to be within an acceptable range.

5.0 PARCC

Precision is defined as the agreement between duplicate results and was estimated by comparing duplicate MS recoveries and field duplicate sample results. The precision between the native and field duplicate sample results was mostly within acceptable criteria indicating that the sample matrix did not significantly interfere with the overall analytical process.

Accuracy is a measure of the agreement between an experimental determination and the true value of the parameter being measured. For organic analyses, each sample was spiked with surrogate compounds. Additionally, an MS/MSD and LCS were spiked with a known parameter concentration before preparation. Internal standards also provide a measure of accuracy. Internal standards, surrogates, and MS/MSD provide a measure of the matrix effects on the analytical accuracy. The LCS demonstrates accuracy of the method and the laboratory's ability to meet the method criteria. Accuracy is also assessed by calibration responses. Potential biases and trends were evaluated by first determining whether a QA/QC exceedance may indicate a potential bias or trend. If so, then the exceedance was examined to determine whether the bias or trend was significant enough to warrant rejection of data. Spike recoveries were mostly within the method acceptance limits, except where noted, indicating matrix interference. One data point was rejected for failing surrogate recoveries, as noted.

Representativeness is a qualitative measure of the degree to which sample data accurately and precisely represent a characteristic environmental condition (e.g., nature and extent of contamination). Representativeness is a subjective parameter and is used to evaluate the efficacy of the sample planning design. In terms of data quality, representativeness was assured because the sampling team followed approved standard operating procedures (SOPs) for sample collection and handling, and the laboratory followed approved SOPs for sample handling, preparation, and analysis. All field samples were collected and analyzed as proposed in the SAP.

Completeness is defined as the percentage of measurements that are judged to be valid; validity being defined by the data quality objectives (DQOs). Therefore, completeness is calculated as the number of analytically sound results that are available for use compared to the total number of measurements made. The National Functional Guidelines data validation guidance designates all results except those R-qualified as "rejected" to be available for use as analytically sound results. The R-qualifier is the only qualifier that negatively affects a data point's availability. The data set is 99.94% complete and the completeness goal of 95% was exceeded. Additionally, the rejected results have no impact on project objectives because they are for a parameter without project action limits (PALs).

Comparability is another qualitative measure designed to express the confidence with which one data set may be compared to another. Factors that affect comparability are sample collection and handling techniques, sample matrix, and analytical methods. In this case, because approved SOPs were used for sample collection and handling, common sample matrices were evaluated, and EPA SW-846 methods were utilized, the data user may express confidence in that fact that this data set is comparable to others of acceptable data quality. Comparability

is controlled by the other PARCC parameters, because data sets can be compared with confidence only when precision and accuracy are known. Precision and accuracy were demonstrated to be acceptable, and the data user may be confident that this data set is comparable to others of high data quality.

The recalculation of the laboratory quantitation was performed at a 10% frequency as per the statement of work with no anomalies found. The assumptions made about the PARCC were proper and correct. No error in judgment was found during this review of the data validation reports, which are included in **Attachment 3**.

6.0 Conclusion

A review of the analytical data submitted for the August and September 2020 PFAS SI sampling events for Sites 14 and 41, FFDA, and CTIA has been completed. The validation review demonstrated that the analytical systems were generally in control and most of the data results can be used in the project decision making process.

7.0 References

CH2M HILL. 2020. *Basewide Per- and Polyfluoroalkyl Substances Site Inspection Sampling and Analysis Plan, St. Mary's County, Naval Air Station Patuxent River, Maryland*. April.

Department of Defense (DoD). 2020. *Data Validation Guidelines Module 3: Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories Table B-15*. May.

Attachment 1

Secondary Data Qualifier Codes

Attachment 1. Secondary Data Qualifier, or Validation Reason, Codes

Secondary Data Qualifier	Description
%SOL	High Moisture content
2C	Second Column – Poor Dual Column Reproducibility
2S	Second Source – Bad reproducibility between tandem detectors
BD	Blank Spike/Blank Spike Duplicate(LCS/LCSD) Precision
BRL	Below Reporting Limit
BSH	Blank Spike/LCS – High Recovery
BSL	Blank Spike/LCS – Low Recovery
CC	Continuing Calibration
CCBL	Continuing Calibration Blank Contamination
CCH	Continuing Calibration Verification – High Recovery
CCL	Continuing Calibration Verification – Low Recovery
DL	Redundant Result – due to Dilution
EBL	Equipment Blank Contamination
EMPC	Estimated Possible Maximum Concentration
ESH	Extraction Standard - High Recovery
ESL	Extraction Standard - Low Recovery
FBL	Field Blank Contamination
FD	Field Duplicate
GBL	Grinding Blank Contamination
GBSH	Ground Blank Spike/LCS – High Recovery
GBSL	Ground Blank Spike/LCS – Low Recovery
HT	Holding Time
ICB	Initial Calibration – Bad Linearity or Curve Function
ICH	Initial Calibration – High Relative Response Factors
ICL	Initial Calibration – Low Relative Response Factors
IR15	Ion ratio exceeds +/- 15% difference
ISH	Internal Standard – High Recovery
ISL	Internal Standard – Low Recovery
LD	Lab Duplicate Reproducibility
LR	Concentration Exceeds Linear Range
MBL	Method Blank Contamination
MDP	Matrix Spike/Matrix Spike Duplicate Precision
MI	Matrix interference obscuring the raw data
MSH	Matrix Spike and/or Matrix Spike Duplicate – High Recovery

Attachment 1. Secondary Data Qualifier, or Validation Reason, Codes

Secondary Data Qualifier	Description
MSL	Matrix Spike and/or Matrix Spike Duplicate – Low Recovery
OT	Other
PD	Pesticide Degradation
RE	Redundant Result - due to Reanalysis or Re-extraction
SD	Serial Dilution Reproducibility
SSH	Spiked Surrogate – High Recovery
SSL	Spiked Surrogate – Low Recovery
TBL	Trip Blank Contamination
TN	Tune

Attachment 2

Assigned Qualifiers

Attachment 2. Assigned Qualifiers.

Sample ID	Sample Type	Analytical Method	Parameter	Lab Result	Lab Qual	Final Result	Primary Qualifier	Units	Secondary Qualifier
PX-CTIA-SS03-000H	REG	PFAS_QSM5.3	Perfluorohexanesulfonic acid (PFHxS)	30.12		30.12	J	NG_G	MSL
PX-CTIA-SS04-000H	REG	PFAS_QSM5.3	Perfluorooctane Sulfonate (PFOS)	64.68		64.68	J	NG_G	FD
PX-CTIA-SS04P-000H	FD	PFAS_QSM5.3	Perfluorooctane Sulfonate (PFOS)	37.85		37.85	J	NG_G	FD
PX-CTIA-WT01-0920	REG	PFAS_QSM5.3	Perfluorohexanoic Acid (PFHxA)	7.79		7.79	J	NG_L	SSL
PX-CTIA-WT01-0920	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	1.92	U	1.92	UJ	NG_L	SSL
PX-CTIA-WT02P-0920	FD	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	1.92	U	1.92	UJ	NG_L	SSL
PX-CTIA-WT03-0920	REG	PFAS_QSM5.3	Perfluoroundecanoic Acid (PFUnA)	4.34	J	4.34	J	NG_L	SSH
PX-CTIA-WT04-0920	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	2	U	2	UJ	NG_L	SSL
PX-CTIA-WT05-0920	REG	PFAS_QSM5.3	Perfluorohexanoic Acid (PFHxA)	7.51		7.51	J	NG_L	SSL
PX-CTIA-WT05-0920	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	1.92	U	1.92	UJ	NG_L	SSL
PX-CTIA-WT06-0920	REG	PFAS_QSM5.3	Perfluorohexanoic Acid (PFHxA)	49.25		49.25	J	NG_L	SSL
PX-CTIA-WT06-0920	REG	PFAS_QSM5.3	Perfluoroheptanoic acid (PFHpA)	48.89		48.89	J	NG_L	SSL
PX-CTIA-WT06-0920	REG	PFAS_QSM5.3	Perfluorononanoic acid (PFNA)	55.13		55.13	J	NG_L	SSL
PX-CTIA-WT06-0920	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	1.92	U	1.92	UJ	NG_L	SSL
PX-FFDA-WT01-0920	REG	PFAS_QSM5.3	Perfluorohexanoic Acid (PFHxA)	16.74		16.74	J	NG_L	SSL
PX-FFDA-WT01-0920	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	1.85	U	1.85	UJ	NG_L	SSL
PX-FFDA-WT02-0920	REG	PFAS_QSM5.3	Perfluorohexanoic Acid (PFHxA)	13.77		13.77	J	NG_L	SSL
PX-FFDA-WT03-0920	REG	PFAS_QSM5.3	Perfluorohexanoic Acid (PFHxA)	30.1		30.1	J	NG_L	SSL
PX-FFDA-WT03-0920	REG	PFAS_QSM5.3	Perfluorododecanoic Acid (PFDoA)	0.48	U	0.48	UJ	NG_L	SSL
PX-FFDA-WT03-0920	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	1.92	U	1.92	UJ	NG_L	SSL
PX-FFDA-WT03-0920	REG	PFAS_QSM5.3	N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA)	0.96	U	0.96	UJ	NG_L	SSL
PX-FFDA-WT03-0920	REG	PFAS_QSM5.3	N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	0.96	U	0.96	UJ	NG_L	SSL
PX-FFDA-WT05-0920	REG	PFAS_QSM5.3	Perfluorohexanoic Acid (PFHxA)	3.33	J	3.33	J	NG_L	SSL
PX-FFDA-WT05-0920	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	1.89	U	1.89	UJ	NG_L	SSL
PX-S14-SS60-000H	REG	PFAS_QSM5.3	Perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA)	2.14	U	2.14	UJ	NG_G	SSL
PX-S14-WT02-0920	REG	PFAS_QSM5.3	Perfluorooctanoic acid (PFOA)	570.91	D	570.91	J	NG_L	FD

Attachment 2. Assigned Qualifiers.

Sample ID	Sample Type	Analytical Method	Parameter	Lab Result	Lab Qual	Final Result	Primary Qualifier	Units	Secondary Qualifier
PX-S14-WT02-0920	REG	PFAS_QSM5.3	Perfluorododecanoic Acid (PFDoA)	0.47	U	0.47	UJ	NG_L	SSL
PX-S14-WT02-0920	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	1.89	U	1.89	R	NG_L	SSL
PX-S14-WT02P-0920	FD	PFAS_QSM5.3	Perfluorooctanoic acid (PFOA)	398.02	D	398.02	J	NG_L	FD
PX-S14-WT02P-0920	FD	PFAS_QSM5.3	Perfluorododecanoic Acid (PFDoA)	0.47	U	0.47	UJ	NG_L	SSL
PX-S14-WT02P-0920	FD	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	1.89	U	1.89	UJ	NG_L	SSL
PX-S14-WT04-0920	REG	PFAS_QSM5.3	Perfluorohexanoic Acid (PFHxA)	13.04		13.04	J	NG_L	SSL
PX-S14-WT05-0920	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	1.92	U	1.92	UJ	NG_L	SSL
PX-S14-WT06-0920	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	1.96	U	1.96	UJ	NG_L	SSL
PX-S41-EB01-081920-GW	EB	PFAS_QSM5.3	Perfluorobutanesulfonic acid (PFBS)	0.19	J	0.49	U	NG_L	MBL
PX-S41-EB01-081920-GW	EB	PFAS_QSM5.3	Perfluorohexanesulfonic acid (PFHxS)	0.17	J	0.39	U	NG_L	MBL
PX-S41-EB01-081920-SO	EB	PFAS_QSM5.3	Perfluorobutanesulfonic acid (PFBS)	0.19	J	0.50	U	NG_L	MBL
PX-S41-EB01-081920-SO	EB	PFAS_QSM5.3	Perfluorohexanesulfonic acid (PFHxS)	0.68	J	0.68	U	NG_L	MBL
PX-S41-FB01-081920	FB	PFAS_QSM5.3	Perfluorobutanesulfonic acid (PFBS)	0.19	J	0.49	U	NG_L	MBL
PX-S41-FB01-081920	FB	PFAS_QSM5.3	Perfluorohexanesulfonic acid (PFHxS)	0.19	J	0.39	U	NG_L	MBL
PX-S41-SB29-0304	REG	PFAS_QSM5.3	Perfluorooctane Sulfonate (PFOS)	4.86	J	4.86	U	NG_G	EBL
PX-S41-SB30-0304	REG	PFAS_QSM5.3	Perfluorotridecanoic Acid (PFTTrDA)	3.87	J	3.87	J	NG_G	OT
PX-S41-SB30-0304	REG	PFAS_QSM5.3	N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA)	6.07		6.07	J	NG_G	OT
PX-S41-SS25-000H	REG	PFAS_QSM5.3	Perfluorooctane Sulfonate (PFOS)	2.53	J	2.53	U	NG_G	EBL
PX-S41-SS26-000H	REG	PFAS_QSM5.3	Perfluorooctanoic acid (PFOA)	0.79	J	0.79	J	NG_G	OT
PX-S41-SS27-000H	REG	PFAS_QSM5.3	Perfluorooctane Sulfonate (PFOS)	3.18	J	3.18	U	NG_G	EBL
PX-S41-SS30-000H	REG	PFAS_QSM5.3	Perfluorotridecanoic Acid (PFTTrDA)	7.58		7.58	J	NG_G	OT
PX-S41-WT01-0820	REG	PFAS_QSM5.3	Perfluorobutanesulfonic acid (PFBS)	0.86	J	0.86	U	NG_L	MBL
PX-S41-WT02-0820	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	2.13	U	2.13	UJ	NG_L	SSL
PX-S41-WT02-0820	REG	PFAS_QSM5.3	Perfluorohexanesulfonic acid (PFHxS)	534.53	D	534.53	J	NG_L	FD
PX-S41-WT02P-0820	FD	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	2	U	2	UJ	NG_L	SSL
PX-S41-WT02P-0820	FD	PFAS_QSM5.3	Perfluorohexanesulfonic acid (PFHxS)	399.74	D	399.74	J	NG_L	FD
PX-S41-WT03-0820	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	2	U	2	UJ	NG_L	SSL

Attachment 3

Data Validation Reports

**DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND**

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-0985
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: October 28, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-BR-ACS-WT06-0820	H8662-FS	Water
2	PX-S41-WT06-0820	H8665-FS	Water
3	PX-S41-WT07-0820	H8669-FS	Water
4	PX-S41-WT05-0820	H8674-FS	Water
5	PX-S41-FB01-081920	H8675-FS	Water
6	PX-S41-EB01-081920-GW	H8676-FS	Water
7	PX-S41-EB01-081920-SO	H8677-FS	Water
8	PX-S41-WT03-0820	H8678-FS	Water
9	PX-S41-WT04-0820	H8683-FS	Water
9MS	PX-S41-WT04-0820MS	H8684-FSMS	Water
9MSD	PX-S41-WT04-0820MSD	H8685-FSMSD	Water

A Stage 2B/4 data validation was performed on the analytical data for six water samples, two aqueous equipment blank samples, and one aqueous field blank sample collected on August 19, 2020 by CH2M HILL at the NAS Patuxent River site in Maryland. The samples were analyzed under the Analysis of Poly and Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-08

The data have been validated according to the protocols and quality control (QC) requirements of the analytical methods, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, Webster Field Annex, Naval Air Station Patuxent River, Maryland, April 2020, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, St. Mary's County, Naval Air Station Patuxent River, Maryland, April 2020, and the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

Organics

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A full (Stage 2B/4) data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

Per- and Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks exhibited the following contamination.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PB 08/31/20	PFBS	0.20	U	5, 6, 7
	PFHxS	0.17	U	5, 6, 7

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-S41-FB01-081920	None - ND	-	-	-
PX-S41-EB01-081920-GW	None - ND	-	-	-
PX-S41-EB01-081920-SO	PFOS	3.51	None	Applies to other packages

Surrogate Spike Recoveries

- EDS Sample 8 exhibited a low surrogate percent recovery (%R) for PFTeDA of 35%. PFTeDA was qualified as estimated (UJ) in this sample.

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values except for the following.

EDS Sample ID	Compound	MS %R/MSD %R/RDP	Qualifier
9	PFOS	260%/0%/200	None - 4X Rule Applies

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

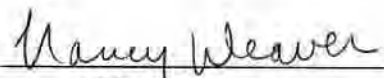
- The samples were analyzed at various dilutions due to high concentrations of target compounds. The reporting limits were adjusted accordingly. No action was required.
- EDS Sample 8 was re-extracted outside of holding times in SDG 20-1118 to confirm surrogate deficiencies. Use the original analysis results for reporting purposes.

Field Duplicate Sample Precision

- Field duplicate samples were not collected.

Please contact the undersigned at (757) 564-0090 if you have any questions or need further information.

Signed:


Nancy Weaver
Senior Chemist

Dated: 10/31/20

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-BR-ACS-WT06-0820

Battelle ID H8662-FS
 Sample Type SA
 Collection Date 08/19/2020
 Extraction Date 08/31/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.250
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	72.29	H8662-FS(0)	1.000	9/13/2020	0.53	1.50	5.00
PFHpA	375-85-9	11.46	H8662-FS(0)	1.000	9/13/2020	0.26	1.00	5.00
PFOA	335-67-1	28.32	H8662-FS(0)	1.000	9/13/2020	0.51	1.50	5.00
PFNA	375-95-1	0.47 J	H8662-FS(0)	1.000	9/13/2020	0.31	1.00	5.00
PFDA	335-76-2	0.23 J	H8662-FS(0)	1.000	9/13/2020	0.14	0.50	5.00
PFUnA	2058-94-8	0.50 U	H8662-FS(0)	1.000	9/13/2020	0.22	0.50	5.00
PFDoA	307-55-1	0.50 U	H8662-FS(0)	1.000	9/13/2020	0.19	0.50	5.00
PFTTrDA	72629-94-8	0.50 U	H8662-FS(0)	1.000	9/13/2020	0.15	0.50	5.00
PFTeDA	376-06-7	2.00 U	H8662-FS(0)	1.000	9/13/2020	0.73	2.00	5.00
NMeFOSAA	2355-31-9	1.00 U	H8662-FS(0)	1.000	9/13/2020	0.35	1.00	5.00
NEtFOSAA	2991-50-6	1.00 U	H8662-FS(0)	1.000	9/13/2020	0.50	1.00	5.00
PFBS	375-73-5	12.83	H8662-FS(0)	1.000	9/13/2020	0.14	0.50	5.00
PFHxS	355-46-4	195.08	H8662-FS-D(3)	5.000	9/13/2020	0.55	2.00	25.00
PFOS	1763-23-1	78.92	H8662-FS(0)	1.000	9/13/2020	0.44	1.00	5.00
HFPO-DA	13252-13-6	0.50 U	H8662-FS(0)	1.000	9/13/2020	0.25	0.50	5.00
Adona	919005-14-4	1.00 U	H8662-FS(0)	1.000	9/13/2020	0.27	1.00	5.00
11CI-PF3OUdS	763051-92-9	0.50 U	H8662-FS(0)	1.000	9/13/2020	0.23	0.50	5.00
9CI-PF3ONS	756426-58-1	1.00 U	H8662-FS(0)	1.000	9/13/2020	0.27	1.00	5.00

nw 10/28/20
 Analyzed by: Griffith, Lauren
 Printed: 9/17/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-S41-WT06-0820

Battelle ID H8665-FS
 Sample Type SA
 Collection Date 08/19/2020
 Extraction Date 08/31/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.250
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1631.66 D	H8665-FS-D(7)	31.250	9/13/2020	16.56	46.88	156.25
PFHpA	375-85-9	661.40 D	H8665-FS-D(5)	12.500	9/13/2020	3.25	12.50	62.50
PFOA	335-67-1	768.09 D	H8665-FS-D(7)	31.250	9/13/2020	15.94	46.88	156.25
PFNA	375-95-1	92.03	H8665-FS(0)	1.000	9/13/2020	0.31	1.00	5.00
PFDA	335-76-2	27.11	H8665-FS(0)	1.000	9/13/2020	0.14	0.50	5.00
PFUnA	2058-94-8	112.75 D	H8665-FS-D(3)	5.000	9/13/2020	1.10	2.50	25.00
PFDoA	307-55-1	4.41 J	H8665-FS(0)	1.000	9/13/2020	0.19	0.50	5.00
PFTTrDA	72629-94-8	8.62	H8665-FS(0)	1.000	9/13/2020	0.15	0.50	5.00
PFTeDA	376-06-7	2.00 U	H8665-FS(0)	1.000	9/13/2020	0.73	2.00	5.00
NMeFOSAA	2355-31-9	1.00 U	H8665-FS(0)	1.000	9/13/2020	0.35	1.00	5.00
NEtFOSAA	2991-50-6	6.73	H8665-FS(0)	1.000	9/13/2020	0.50	1.00	5.00
PFBS	375-73-5	73.76	H8665-FS(0)	1.000	9/13/2020	0.14	0.50	5.00
PFHxS	355-46-4	3812.33 D	H8665-FS-D(9)	156.250	9/13/2020	17.19	62.50	781.25
PFOS	1763-23-1	9473.12 D	H8665-FS-D(9)	156.250	9/13/2020	68.75	156.25	781.25
HFPO-DA	13252-13-6	0.50 U	H8665-FS(0)	1.000	9/13/2020	0.25	0.50	5.00
Adona	919005-14-4	1.00 U	H8665-FS(0)	1.000	9/13/2020	0.27	1.00	5.00
11CI-PF3OUdS	763051-92-9	0.50 U	H8665-FS(0)	1.000	9/13/2020	0.23	0.50	5.00
9CI-PF3ONS	756426-58-1	1.00 U	H8665-FS(0)	1.000	9/13/2020	0.27	1.00	5.00

mw 10/28/20
 Analyzed by: Griffith, Lauren
 Printed: 9/17/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-S41-WT07-0820

Battelle ID H8669-FS
 Sample Type SA
 Collection Date 08/19/2020
 Extraction Date 08/31/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.260
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	6.31	H8669-FS(0)	1.000	9/13/2020	0.51	1.44	4.81
PFHpA	375-85-9	5.18	H8669-FS(0)	1.000	9/13/2020	0.25	0.96	4.81
PFOA	335-67-1	7.79	H8669-FS(0)	1.000	9/13/2020	0.49	1.44	4.81
PFNA	375-95-1	10.22	H8669-FS(0)	1.000	9/13/2020	0.30	0.96	4.81
PFDA	335-76-2	1.38 J	H8669-FS(0)	1.000	9/13/2020	0.13	0.48	4.81
PFUnA	2058-94-8	0.48 U	H8669-FS(0)	1.000	9/13/2020	0.21	0.48	4.81
PFDoA	307-55-1	0.48 U	H8669-FS(0)	1.000	9/13/2020	0.18	0.48	4.81
PFTTrDA	72629-94-8	0.48 U	H8669-FS(0)	1.000	9/13/2020	0.14	0.48	4.81
PFTeDA	376-06-7	1.92 U	H8669-FS(0)	1.000	9/13/2020	0.70	1.92	4.81
NMeFOSAA	2355-31-9	0.96 U	H8669-FS(0)	1.000	9/13/2020	0.34	0.96	4.81
NEtFOSAA	2991-50-6	0.96 U	H8669-FS(0)	1.000	9/13/2020	0.48	0.96	4.81
PFBS	375-73-5	1.29 J	H8669-FS(0)	1.000	9/13/2020	0.13	0.48	4.81
PFHxS	355-46-4	46.99	H8669-FS(0)	1.000	9/13/2020	0.11	0.38	4.81
PFOS	1763-23-1	556.52	H8669-FS-D(5)	25.000	9/14/2020	10.58	24.04	120.19
HFPO-DA	13252-13-6	0.48 U	H8669-FS(0)	1.000	9/13/2020	0.24	0.48	4.81
Adona	919005-14-4	0.96 U	H8669-FS(0)	1.000	9/13/2020	0.26	0.96	4.81
11CI-PF3OUdS	763051-92-9	0.48 U	H8669-FS(0)	1.000	9/13/2020	0.22	0.48	4.81
9CI-PF3ONS	756426-58-1	0.96 U	H8669-FS(0)	1.000	9/13/2020	0.26	0.96	4.81

9/10/28/20
 Analyzed by: Griffith, Lauren
 Printed: 9/17/2020

BATTELLE

It can be done

Project Client: CH2M

Project Name: CTO-4256: PAX Basewide PFAS

Project No.: 100142032

Client ID PX-S41-WT05-0820

Battelle ID H8674-FS

Sample Type SA

Collection Date 08/19/2020

Extraction Date 08/31/2020

Analytical Instrument Sciex 5500 LC/MS/MS

% Moisture NA

Matrix WATER

Sample Size 0.250

Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2944.68 D	H8674-FS-D(7)	62.500	9/13/2020	33.13	93.75	312.50
PFHpA	375-85-9	680.75 D	H8674-FS-D(5)	12.500	9/13/2020	3.25	12.50	62.50
PFOA	335-67-1	1169.18 D	H8674-FS-D(7)	62.500	9/13/2020	31.88	93.75	312.50
PFNA	375-95-1	114.11	H8674-FS(0)	1.000	9/13/2020	0.31	1.00	5.00
PFDA	335-76-2	17.62	H8674-FS(0)	1.000	9/13/2020	0.14	0.50	5.00
PFUnA	2058-94-8	8.79	H8674-FS(0)	1.000	9/13/2020	0.22	0.50	5.00
PFDoA	307-55-1	0.50 U	H8674-FS(0)	1.000	9/13/2020	0.19	0.50	5.00
PFTTrDA	72629-94-8	0.27 J	H8674-FS(0)	1.000	9/13/2020	0.15	0.50	5.00
PFTeDA	376-06-7	2.00 U	H8674-FS(0)	1.000	9/13/2020	0.73	2.00	5.00
NMeFOSAA	2355-31-9	1.00 U	H8674-FS(0)	1.000	9/13/2020	0.35	1.00	5.00
NEtFOSAA	2991-50-6	0.97 J	H8674-FS(0)	1.000	9/13/2020	0.50	1.00	5.00
PFBS	375-73-5	220.04 D	H8674-FS-D(3)	5.000	9/13/2020	0.70	2.50	25.00
PFHxS	355-46-4	6024.88 D	H8674-FS-D(9)	781.250	9/13/2020	85.94	312.50	3906.25
PFOS	1763-23-1	23765.25 D	H8674-FS-D(9)	781.250	9/13/2020	343.75	781.25	3906.25
HFPO-DA	13252-13-6	0.50 U	H8674-FS(0)	1.000	9/13/2020	0.25	0.50	5.00
Adona	919005-14-4	1.00 U	H8674-FS(0)	1.000	9/13/2020	0.27	1.00	5.00
11CI-PF3OUdS	763051-92-9	0.50 U	H8674-FS(0)	1.000	9/13/2020	0.23	0.50	5.00
9CI-PF3ONS	756426-58-1	1.00 U	H8674-FS(0)	1.000	9/13/2020	0.27	1.00	5.00

NW 10/28/20
 Analyzed by: Griffith, Lauren
 Printed: 9/17/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-S41-FB01-081920

Battelle ID H8675-FS
 Sample Type SA
 Collection Date 08/19/2020
 Extraction Date 08/31/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.255
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.47 U	H8675-FS(0)	1.000	9/13/2020	0.52	1.47	4.90
PFHpA	375-85-9	0.98 U	H8675-FS(0)	1.000	9/13/2020	0.25	0.98	4.90
PFOA	335-67-1	1.47 U	H8675-FS(0)	1.000	9/13/2020	0.50	1.47	4.90
PFNA	375-95-1	0.98 U	H8675-FS(0)	1.000	9/13/2020	0.30	0.98	4.90
PFDA	335-76-2	0.49 U	H8675-FS(0)	1.000	9/13/2020	0.14	0.49	4.90
PFUnA	2058-94-8	0.49 U	H8675-FS(0)	1.000	9/13/2020	0.22	0.49	4.90
PFDoA	307-55-1	0.49 U	H8675-FS(0)	1.000	9/13/2020	0.19	0.49	4.90
PFTTrDA	72629-94-8	0.49 U	H8675-FS(0)	1.000	9/13/2020	0.15	0.49	4.90
PFTeDA	376-06-7	1.96 U	H8675-FS(0)	1.000	9/13/2020	0.72	1.96	4.90
NMeFOSAA	2355-31-9	0.98 U	H8675-FS(0)	1.000	9/13/2020	0.34	0.98	4.90
NEtFOSAA	2991-50-6	0.98 U	H8675-FS(0)	1.000	9/13/2020	0.49	0.98	4.90
PFBS	375-73-5	0.49 U	H8675-FS(0)	1.000	9/13/2020	0.14	0.49	4.90
PFHxS	355-46-4	0.39 U	H8675-FS(0)	1.000	9/13/2020	0.11	0.39	4.90
PFOS	1763-23-1	0.98 U	H8675-FS(0)	1.000	9/13/2020	0.43	0.98	4.90
HFPO-DA	13252-13-6	0.49 U	H8675-FS(0)	1.000	9/13/2020	0.25	0.49	4.90
Adona	919005-14-4	0.98 U	H8675-FS(0)	1.000	9/13/2020	0.26	0.98	4.90
11CI-PF3OUdS	763051-92-9	0.49 U	H8675-FS(0)	1.000	9/13/2020	0.23	0.49	4.90
9CI-PF3ONS	756426-58-1	0.98 U	H8675-FS(0)	1.000	9/13/2020	0.26	0.98	4.90

0.49
0.39

MBL
MBL

AN 10/28/20
 Analyzed by: Griffith, Lauren
 Printed: 9/17/2020



6

Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-S41-EB01-081920-GW

Battelle ID H8676-FS
 Sample Type SA
 Collection Date 08/19/2020
 Extraction Date 08/31/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.255
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.47 U	H8676-FS(0)	1.000	9/13/2020	0.52	1.47	4.90
PFHpA	375-85-9	0.98 U	H8676-FS(0)	1.000	9/13/2020	0.25	0.98	4.90
PFOA	335-67-1	1.47 U	H8676-FS(0)	1.000	9/13/2020	0.50	1.47	4.90
PFNA	375-95-1	0.98 U	H8676-FS(0)	1.000	9/13/2020	0.30	0.98	4.90
PFDA	335-76-2	0.49 U	H8676-FS(0)	1.000	9/13/2020	0.14	0.49	4.90
PFUnA	2058-94-8	0.49 U	H8676-FS(0)	1.000	9/13/2020	0.22	0.49	4.90
PFDoA	307-55-1	0.49 U	H8676-FS(0)	1.000	9/13/2020	0.19	0.49	4.90
PFTeDA	72629-94-8	0.49 U	H8676-FS(0)	1.000	9/13/2020	0.15	0.49	4.90
PFTeDA	376-06-7	1.96 U	H8676-FS(0)	1.000	9/13/2020	0.72	1.96	4.90
NMeFOSAA	2355-31-9	0.98 U	H8676-FS(0)	1.000	9/13/2020	0.34	0.98	4.90
NEtFOSAA	2991-50-6	0.98 U	H8676-FS(0)	1.000	9/13/2020	0.49	0.98	4.90
PFBS	375-73-5	0.49 U	H8676-FS(0)	1.000	9/13/2020	0.14	0.49	4.90
PFHxS	355-46-4	0.39 U	H8676-FS(0)	1.000	9/13/2020	0.11	0.39	4.90
PFOS	1763-23-1	0.98 U	H8676-FS(0)	1.000	9/13/2020	0.43	0.98	4.90
HFPO-DA	13252-13-6	0.49 U	H8676-FS(0)	1.000	9/13/2020	0.25	0.49	4.90
Adona	919005-14-4	0.98 U	H8676-FS(0)	1.000	9/13/2020	0.26	0.98	4.90
11Cl-PF3OUdS	763051-92-9	0.49 U	H8676-FS(0)	1.000	9/13/2020	0.23	0.49	4.90
9Cl-PF3ONS	756426-58-1	0.98 U	H8676-FS(0)	1.000	9/13/2020	0.26	0.98	4.90

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Analyzed by: Griffith, Lauren
 Printed: 9/17/2020



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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-S41-EB01-081920-SO

Battelle ID H8677-FS
 Sample Type SA
 Collection Date 08/19/2020
 Extraction Date 08/31/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.250
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.50 U	H8677-FS(0)	1.000	9/13/2020	0.53	1.50	5.00
PFHpA	375-85-9	1.00 U	H8677-FS(0)	1.000	9/13/2020	0.26	1.00	5.00
PFOA	335-67-1	1.50 U	H8677-FS(0)	1.000	9/13/2020	0.51	1.50	5.00
PFNA	375-95-1	1.00 U	H8677-FS(0)	1.000	9/13/2020	0.31	1.00	5.00
PFDA	335-76-2	0.50 U	H8677-FS(0)	1.000	9/13/2020	0.14	0.50	5.00
PFUnA	2058-94-8	0.50 U	H8677-FS(0)	1.000	9/13/2020	0.22	0.50	5.00
PFDoA	307-55-1	0.50 U	H8677-FS(0)	1.000	9/13/2020	0.19	0.50	5.00
PFTTrDA	72629-94-8	0.50 U	H8677-FS(0)	1.000	9/13/2020	0.15	0.50	5.00
PFTeDA	376-06-7	2.00 U	H8677-FS(0)	1.000	9/13/2020	0.73	2.00	5.00
NMeFOSAA	2355-31-9	1.00 U	H8677-FS(0)	1.000	9/13/2020	0.35	1.00	5.00
NEtFOSAA	2991-50-6	1.00 U	H8677-FS(0)	1.000	9/13/2020	0.50	1.00	5.00
PFBS	375-73-5	0.50 0.19 U	H8677-FS(0)	1.000	9/13/2020	0.14	0.50	5.00
PFHxS	355-46-4	0.68 0.19 U	H8677-FS(0)	1.000	9/13/2020	0.11	0.40	5.00
PFOS	1763-23-1	3.51 J	H8677-FS(0)	1.000	9/13/2020	0.44	1.00	5.00
HFPO-DA	13252-13-6	0.50 U	H8677-FS(0)	1.000	9/13/2020	0.25	0.50	5.00
Adona	919005-14-4	1.00 U	H8677-FS(0)	1.000	9/13/2020	0.27	1.00	5.00
11CI-PF3OUdS	763051-92-9	0.50 U	H8677-FS(0)	1.000	9/13/2020	0.23	0.50	5.00
9CI-PF3ONS	756426-58-1	1.00 U	H8677-FS(0)	1.000	9/13/2020	0.27	1.00	5.00

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9/10/2020
 Analyzed by: Griffith, Lauren
 Printed: 9/17/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-S41-WT03-0820

Battelle ID H8678-FS
 Sample Type SA
 Collection Date 08/19/2020
 Extraction Date 08/31/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.250
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	77.15	H8678-FS(0)	1.000	9/13/2020	0.53	1.50	5.00
PFHpA	375-85-9	35.68	H8678-FS(0)	1.000	9/13/2020	0.26	1.00	5.00
PFOA	335-67-1	98.57	H8678-FS(0)	1.000	9/13/2020	0.51	1.50	5.00
PFNA	375-95-1	47.16	H8678-FS(0)	1.000	9/13/2020	0.31	1.00	5.00
PFDA	335-76-2	0.27 J	H8678-FS(0)	1.000	9/13/2020	0.14	0.50	5.00
PFUnA	2058-94-8	0.50 U	H8678-FS(0)	1.000	9/13/2020	0.22	0.50	5.00
PFDoA	307-55-1	0.50 U	H8678-FS(0)	1.000	9/13/2020	0.19	0.50	5.00
PFTrDA	72629-94-8	0.50 U	H8678-FS(0)	1.000	9/13/2020	0.15	0.50	5.00
PFTeDA	376-06-7	2.00 U	H8678-FS(0)	1.000	9/13/2020	0.73	2.00	5.00
NMeFOSAA	2355-31-9	1.00 U	H8678-FS(0)	1.000	9/13/2020	0.35	1.00	5.00
NEtFOSAA	2991-50-6	1.00 U	H8678-FS(0)	1.000	9/13/2020	0.50	1.00	5.00
PFBS	375-73-5	13.04	H8678-FS(0)	1.000	9/13/2020	0.14	0.50	5.00
PFHxS	355-46-4	874.55 P	H8678-FS-D(5)	12.500	9/13/2020	1.38	5.00	62.50
PFOS	1763-23-1	2127.67 P	H8678-FS-D(7)	31.250	9/13/2020	13.75	31.25	156.25
HFPO-DA	13252-13-6	0.50 U	H8678-FS(0)	1.000	9/13/2020	0.25	0.50	5.00
Adona	919005-14-4	1.00 U	H8678-FS(0)	1.000	9/13/2020	0.27	1.00	5.00
11CI-PF3OUdS	763051-92-9	0.50 U	H8678-FS(0)	1.000	9/13/2020	0.23	0.50	5.00
9CI-PF3ONS	756426-58-1	1.00 U	H8678-FS(0)	1.000	9/13/2020	0.27	1.00	5.00

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MW 10/28/20
 Analyzed by: Griffith, Lauren
 Printed: 9/17/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

8

Client ID PX-S41-WT03-0820

Battelle ID H8678-FS
 Sample Type SA
 Collection Date 08/19/2020
 Extraction Date 08/31/2020
 Analytical Instrument Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	79	H8678-FS(0)	9/13/2020
13C4-PFHpA	74	H8678-FS(0)	9/13/2020
13C8-PFOA	79	H8678-FS(0)	9/13/2020
13C9-PFNA	58	H8678-FS(0)	9/13/2020
13C6-PFDA	74	H8678-FS(0)	9/13/2020
13C7-PFUnA	74	H8678-FS(0)	9/13/2020
13C2-PFDoA	54	H8678-FS(0)	9/13/2020
13C2-PFTeDA	35	H8678-FS(0)	9/13/2020
d3-MeFOSAA	89	H8678-FS-D(7)	9/13/2020
d5-EtFOSAA	98	H8678-FS-D(7)	9/13/2020
13C3-PFBS	93	H8678-FS-D(7)	9/13/2020
13C3-PFHxS	96	H8678-FS-D(7)	9/13/2020
13C8-PFOS	93	H8678-FS-D(7)	9/13/2020
13C3-HFPO-DA	74	H8678-FS(0)	9/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-S41-WT04-0820

Battelle ID H8683-FS
 Sample Type SA
 Collection Date 08/19/2020
 Extraction Date 08/31/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.265
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	14.20	H8683-FS(0)	1.000	9/13/2020	0.50	1.42	4.72
PFHpA	375-85-9	36.70	H8683-FS(0)	1.000	9/13/2020	0.25	0.94	4.72
PFOA	335-67-1	74.60	H8683-FS(0)	1.000	9/13/2020	0.48	1.42	4.72
PFNA	375-95-1	31.30	H8683-FS(0)	1.000	9/13/2020	0.29	0.94	4.72
PFDA	335-76-2	9.11	H8683-FS(0)	1.000	9/13/2020	0.13	0.47	4.72
PFUnA	2058-94-8	0.47 U	H8683-FS(0)	1.000	9/13/2020	0.21	0.47	4.72
PFDoA	307-55-1	0.47 U	H8683-FS(0)	1.000	9/13/2020	0.18	0.47	4.72
PFTTrDA	72629-94-8	0.47 U	H8683-FS(0)	1.000	9/13/2020	0.14	0.47	4.72
PFTeDA	376-06-7	1.89 U	H8683-FS(0)	1.000	9/13/2020	0.69	1.89	4.72
NMeFOSAA	2355-31-9	0.94 U	H8683-FS(0)	1.000	9/13/2020	0.33	0.94	4.72
NEtFOSAA	2991-50-6	0.94 U	H8683-FS(0)	1.000	9/13/2020	0.47	0.94	4.72
PFBS	375-73-5	1.43 J	H8683-FS(0)	1.000	9/13/2020	0.13	0.47	4.72
PFHxS	355-46-4	104.14 D	H8683-FS-D(3)	5.000	9/13/2020	0.52	1.89	23.58
PFOS	1763-23-1	630.54 D	H8683-FS-D(5)	12.500	9/13/2020	5.19	11.79	58.96
HFPO-DA	13252-13-6	0.47 U	H8683-FS(0)	1.000	9/13/2020	0.24	0.47	4.72
Adona	919005-14-4	0.94 U	H8683-FS(0)	1.000	9/13/2020	0.25	0.94	4.72
11CI-PF3OUdS	763051-92-9	0.47 U	H8683-FS(0)	1.000	9/13/2020	0.22	0.47	4.72
9CI-PF3ONS	756426-58-1	0.94 U	H8683-FS(0)	1.000	9/13/2020	0.25	0.94	4.72

mw10/28/20
 Analyzed by: Griffith, Lauren
 Printed: 9/17/2020

**DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND**

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-0986
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: October 28, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-S41-WT02-0820	H8686-FS	Water
2	PX-S41-WT02P-0820	H8687-FS	Water
3	PX-S41-WT01-0820	H8691-FS	Water
4	PX-H2133-WT03-0820	H8698-FS	Water
5	PX-H2133-WT04-0820	H8701-FS	Water
5MS	PX-H2133-WT04-0820MS	H8702-FSMS	Water
5MSD	PX-H2133-WT04-0820MSD	H8703-FSMSD	Water
6	PX-H2133-SW01-0820	H8712-FS	Water
7	PX-H2133-SW01P-0820	H8713-FS	Water
8	PX-H2133-WT02-0820	H8714-FS	Water
9	PX-H2133-WT06-0820	H8720-FS	Water
10	PX-H2133-WT06P-0820	H8721-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for ten water samples collected on August 19-20, 2020 by CH2M HILL at the NAS Patuxent River site in Maryland. The samples were analyzed under the Analysis of Poly and Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-08

The data have been validated according to the protocols and quality control (QC) requirements of the analytical methods, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, Webster Field Annex, Naval Air Station Patuxent River, Maryland, April 2020, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, St. Mary's County, Naval Air Station Patuxent River, Maryland, April 2020, and the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

Organics

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A full (Stage 2B/4) data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

Per- and Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks exhibited the following contamination.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PB 08/31/20	PFBS	0.19	U	3
	PFHxS	0.18	None	Associated Samples >5X

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-S41-FB01-081920	None - ND	-	-	-
PX-S41-EB01-081920-GW	None - ND	-	-	-
PX-H2133-FB01-082020	None - ND	-	-	-
PX-H2133-EB01-082020-GW	None - ND	-	-	-

Surrogate Spike Recoveries

- Several samples exhibited low surrogate percent recoveries (%R) for several surrogate compounds. These compounds were qualified as estimated (J/UJ) in each sample. Please refer to the Form Is for specific recoveries and qualifications.

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values except for the following.

EDS Sample ID	Compound	MS %R/MSD %R/RDP	Qualifier
5	PFHxA	0%/0%/NC	None - 4X Rule Applies
	PFHpA	0%/22%/200.0	None - 4X Rule Applies
	PFOA	0%/40%/200.0	None - 4X Rule Applies
	PFHxS	40%/OK/94.0	J
	PFOS	35%/OK/107.9	J

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- The samples were analyzed at various dilutions due to high concentrations of target compounds. The reporting limits were adjusted accordingly. No action was required.
- Several samples were re-extracted outside of holding times in SDG 20-1118 to verify surrogate deficiencies. Use the original analysis results for reporting purposes.

Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was unacceptable for PFHxS in one field duplicate pair. These results were qualified as estimated (J).

Compound	PX-S41-WT02-0820 ng/L	PX-S41-WT02P-0820 ng/L	RPD	Qualifier
PFHxA	35.50	33.02	7%	None
PFHpA	7.66	6.97	9%	
PFOA	51.44	42.43	19%	
PFNA	14.12	13.42	5%	
PFDA	2.77	2.90	5%	
PFUnA	0.31	0.69	76%	None - <5X LOQ

Compound	PX-S41-WT02-0820 ng/L	PX-S41-WT02P-0820 ng/L	RPD	Qualifier
PFBS	3.77	3.63	4%	None
PFHxS	534.53	399.74	29%	J
PFOS	926.81	874.37	6%	None

Compound	PX-H2133-SW01-0820 ng/L	PX-H2133-SW01P-0820 ng/L	RPD	Qualifier
PFHxA	58.40	50.39	15%	None
PFHpA	46.68	41.23	12%	
PFOA	41.19	36.62	12%	
PFNA	11.48	9.99	14%	
PFDA	3.32	2.74	19%	
PFUnA	0.89	0.84	6%	
PFDoA	0.19	0.22	15%	
PFTriDA	0.47U	0.17	NC	
PFBS	4.59	3.97	14%	
PFHxS	3.96	4.19	6%	
PFOS	7.53	6.56	14%	

Compound	PX-H2133-WT06-0820 ng/L	PX-H2133-WT06P-0820 ng/L	RPD	Qualifier
PFHxA	578.25	550.92	5%	None
PFHpA	545.81	521.54	5%	
PFOA	187.61	201.81	7%	
PFNA	68.57	68.52	0%	
PFDA	30.01	29.03	3%	
PFUnA	4.04	4.22	4%	
PFDoA	0.70	0.64	9%	
PFBS	3.72	4.00	7%	
PFHxS	4.25	4.27	0%	
PFOS	12.45	12.80	3%	
HFPO-DA	0.53	0.48	10%	

Please contact the undersigned at (757) 564-0090 if you have any questions or need further information.

Signed:

Nancy Weaver
Nancy Weaver
Senior Chemist

Dated: 11/21/20

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-S41-WT02-0820

Battelle ID H8686-FS
 Sample Type SA
 Collection Date 08/19/2020
 Extraction Date 08/31/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.235
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	35.50	H8686-FS(0)	1.000	9/13/2020	0.56	1.60	5.32
PFHpA	375-85-9	7.66	H8686-FS(0)	1.000	9/13/2020	0.28	1.06	5.32
PFOA	335-67-1	51.44	H8686-FS(0)	1.000	9/13/2020	0.54	1.60	5.32
PFNA	375-95-1	14.12	H8686-FS(0)	1.000	9/13/2020	0.33	1.06	5.32
PFDA	335-76-2	2.77 J	H8686-FS(0)	1.000	9/13/2020	0.15	0.53	5.32
PFUnA	2058-94-8	0.31 J	H8686-FS(0)	1.000	9/13/2020	0.23	0.53	5.32
PFDoA	307-55-1	0.53 U	H8686-FS(0)	1.000	9/13/2020	0.20	0.53	5.32
PFTTrDA	72629-94-8	0.53 U	H8686-FS(0)	1.000	9/13/2020	0.16	0.53	5.32
PFTeDA	376-06-7	2.13 Y U J	H8686-FS(0)	1.000	9/13/2020	0.78	2.13	5.32
NMeFOSAA	2355-31-9	1.06 U	H8686-FS(0)	1.000	9/13/2020	0.37	1.06	5.32
NEtFOSAA	2991-50-6	1.06 U	H8686-FS(0)	1.000	9/13/2020	0.53	1.06	5.32
PFBS	375-73-5	3.77 J	H8686-FS(0)	1.000	9/13/2020	0.15	0.53	5.32
PFHxS	355-46-4	534.53 J	H8686-FS-D(5)	12.500	9/13/2020	1.46	5.32	66.49
PFOS	1763-23-1	926.81 J	H8686-FS-D(5)	12.500	9/13/2020	5.85	13.30	66.49
HFPO-DA	13252-13-6	0.53 U	H8686-FS(0)	1.000	9/13/2020	0.27	0.53	5.32
Adona	919005-14-4	1.06 U	H8686-FS(0)	1.000	9/13/2020	0.29	1.06	5.32
11CI-PF3OUdS	763051-92-9	0.53 U	H8686-FS(0)	1.000	9/13/2020	0.24	0.53	5.32
9CI-PF3ONS	756426-58-1	1.06 U	H8686-FS(0)	1.000	9/13/2020	0.29	1.06	5.32

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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-S41-WT02-0820

Battelle ID H8686-FS
 Sample Type SA
 Collection Date 08/19/2020
 Extraction Date 08/31/2020
 Analytical Instrument Sciex 5500 LC/MS/MS

<i>Surrogate Recoveries (%)</i>	<i>Recovery</i>	<i>Extract ID</i>	<i>Analysis Date</i>
13C5-PFHxA	85	H8686-FS(0)	9/13/2020
13C4-PFHpA	82	H8686-FS(0)	9/13/2020
13C8-PFOA	81	H8686-FS(0)	9/13/2020
13C9-PFNA	67	H8686-FS(0)	9/13/2020
13C6-PFDA	83	H8686-FS(0)	9/13/2020
13C7-PFUnA	89	H8686-FS(0)	9/13/2020
13C2-PFDoA	76	H8686-FS(0)	9/13/2020
13C2-PFTeDA	36	H8686-FS(0)	9/13/2020
d3-MeFOSAA	91	H8686-FS-D(5)	9/13/2020
d5-EtFOSAA	105	H8686-FS-D(5)	9/13/2020
13C3-PFBS	100	H8686-FS-D(5)	9/13/2020
13C3-PFHxS	99	H8686-FS-D(5)	9/13/2020
13C8-PFOS	90	H8686-FS-D(5)	9/13/2020
13C3-HFPO-DA	82	H8686-FS(0)	9/13/2020

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 Analyzed by: Griffith, Lauren
 Printed: 9/17/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-S41-WT02P-0820

Battelle ID H8687-FS
 Sample Type SA
 Collection Date 08/19/2020
 Extraction Date 08/31/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.250
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	33.02	H8687-FS(0)	1.000	9/13/2020	0.53	1.50	5.00
PFHpA	375-85-9	6.97	H8687-FS(0)	1.000	9/13/2020	0.26	1.00	5.00
PFOA	335-67-1	42.43	H8687-FS(0)	1.000	9/13/2020	0.51	1.50	5.00
PFNA	375-95-1	13.42	H8687-FS(0)	1.000	9/13/2020	0.31	1.00	5.00
PFDA	335-76-2	2.90 J	H8687-FS(0)	1.000	9/13/2020	0.14	0.50	5.00
PFUnA	2058-94-8	0.69 J	H8687-FS(0)	1.000	9/13/2020	0.22	0.50	5.00
PFDoA	307-55-1	0.50 U	H8687-FS(0)	1.000	9/13/2020	0.19	0.50	5.00
PFTTrDA	72629-94-8	0.50 U	H8687-FS(0)	1.000	9/13/2020	0.15	0.50	5.00
PFTeDA	376-06-7	2.00 U J	H8687-FS(0)	1.000	9/13/2020	0.73	2.00	5.00
NMeFOSAA	2355-31-9	1.00 U	H8687-FS(0)	1.000	9/13/2020	0.35	1.00	5.00
NEtFOSAA	2991-50-6	1.00 U	H8687-FS(0)	1.000	9/13/2020	0.50	1.00	5.00
PFBS	375-73-5	3.63 J	H8687-FS(0)	1.000	9/13/2020	0.14	0.50	5.00
PFHxS	355-46-4	399.74 J	H8687-FS-D(5)	12.500	9/13/2020	1.38	5.00	62.50
PFOS	1763-23-1	874.37 J	H8687-FS-D(5)	12.500	9/13/2020	5.50	12.50	62.50
HFPO-DA	13252-13-6	0.50 U	H8687-FS(0)	1.000	9/13/2020	0.25	0.50	5.00
Adona	919005-14-4	1.00 U	H8687-FS(0)	1.000	9/13/2020	0.27	1.00	5.00
11CI-PF3OUdS	763051-92-9	0.50 U	H8687-FS(0)	1.000	9/13/2020	0.23	0.50	5.00
9CI-PF3ONS	756426-58-1	1.00 U	H8687-FS(0)	1.000	9/13/2020	0.27	1.00	5.00

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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

2

Client ID PX-S41-WT02P-0820

Battelle ID H8687-FS

Sample Type SA

Collection Date 08/19/2020

Extraction Date 08/31/2020

Analytical Instrument Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	76	H8687-FS(0)	9/13/2020
13C4-PFHxA	80	H8687-FS(0)	9/13/2020
13C8-PFOA	78	H8687-FS(0)	9/13/2020
13C9-PFNA	62	H8687-FS(0)	9/13/2020
13C6-PFDA	72	H8687-FS(0)	9/13/2020
13C7-PFUnA	76	H8687-FS(0)	9/13/2020
13C2-PFDoA	63	H8687-FS(0)	9/13/2020
13C2-PFTeDA	27	H8687-FS(0)	9/13/2020
d3-MeFOSAA	98 D	H8687-FS-D(5)	9/13/2020
d5-EtFOSAA	108	H8687-FS-D(5)	9/13/2020
13C3-PFBS	102 D	H8687-FS-D(5)	9/13/2020
13C3-PFHxS	104	H8687-FS-D(5)	9/13/2020
13C8-PFOS	90 D	H8687-FS-D(5)	9/13/2020
13C3-HFPQ-DA	74	H8687-FS(0)	9/13/2020

9/10/28/20
 Analyzed by: Griffith, Lauren
 Printed: 9/17/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

3

Client ID PX-S41-WT01-0820

Battelle ID H8691-FS
 Sample Type SA
 Collection Date 08/19/2020
 Extraction Date 08/31/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.260
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.39 J	H8691-FS(0)	1.000	9/13/2020	0.51	1.44	4.81
PFHpA	375-85-9	3.04 J	H8691-FS(0)	1.000	9/13/2020	0.25	0.96	4.81
PFOA	335-67-1	10.83	H8691-FS(0)	1.000	9/13/2020	0.49	1.44	4.81
PFNA	375-95-1	2.32 J	H8691-FS(0)	1.000	9/13/2020	0.30	0.96	4.81
PFDA	335-76-2	0.20 J	H8691-FS(0)	1.000	9/13/2020	0.13	0.48	4.81
PFUnA	2058-94-8	0.48 U	H8691-FS(0)	1.000	9/13/2020	0.21	0.48	4.81
PFDoA	307-55-1	0.48 U	H8691-FS(0)	1.000	9/13/2020	0.18	0.48	4.81
PFTTrDA	72629-94-8	0.48 U	H8691-FS(0)	1.000	9/13/2020	0.14	0.48	4.81
PFTeDA	376-06-7	1.92 U	H8691-FS(0)	1.000	9/13/2020	0.70	1.92	4.81
NMeFOSAA	2355-31-9	0.96 U	H8691-FS(0)	1.000	9/13/2020	0.34	0.96	4.81
NEtFOSAA	2991-50-6	0.96 U	H8691-FS(0)	1.000	9/13/2020	0.48	0.96	4.81
PFBS	375-73-5	0.86 J U	H8691-FS(0)	1.000	9/13/2020	0.13	0.48	4.81
PFHxS	355-46-4	9.25	H8691-FS(0)	1.000	9/13/2020	0.11	0.38	4.81
PFOS	1763-23-1	33.94	H8691-FS(0)	1.000	9/13/2020	0.42	0.96	4.81
HFPO-DA	13252-13-6	0.48 U	H8691-FS(0)	1.000	9/13/2020	0.24	0.48	4.81
Adona	919005-14-4	0.96 U	H8691-FS(0)	1.000	9/13/2020	0.26	0.96	4.81
11CI-PF3OUdS	763051-92-9	0.48 U	H8691-FS(0)	1.000	9/13/2020	0.22	0.48	4.81
9CI-PF3ONS	756426-58-1	0.96 U	H8691-FS(0)	1.000	9/13/2020	0.26	0.96	4.81

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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

4

Client ID PX-H2133-WT03-0820

Battelle ID H8698-FS
 Sample Type SA
 Collection Date 08/20/2020
 Extraction Date 08/31/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.240
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.68 J	H8698-FS(0)	1.000	9/13/2020	0.55	1.56	5.21
PFHpA	375-85-9	2.53 J	H8698-FS(0)	1.000	9/13/2020	0.27	1.04	5.21
PFOA	335-67-1	3.47 J	H8698-FS(0)	1.000	9/13/2020	0.53	1.56	5.21
PFNA	375-95-1	1.13 J	H8698-FS(0)	1.000	9/13/2020	0.32	1.04	5.21
PFDA	335-76-2	0.26 J	H8698-FS(0)	1.000	9/13/2020	0.15	0.52	5.21
PFUnA	2058-94-8	0.52 U	H8698-FS(0)	1.000	9/13/2020	0.23	0.52	5.21
PFDoA	307-55-1	0.52 U	H8698-FS(0)	1.000	9/13/2020	0.20	0.52	5.21
PFTTrDA	72629-94-8	0.52 U	H8698-FS(0)	1.000	9/13/2020	0.16	0.52	5.21
PFTeDA	376-06-7	2.08 ✓ wj	H8698-FS(0)	1.000	9/13/2020	0.76	2.08	5.21
NMeFOSAA	2355-31-9	1.04 U	H8698-FS(0)	1.000	9/13/2020	0.36	1.04	5.21
NEtFOSAA	2991-50-6	1.04 U	H8698-FS(0)	1.000	9/13/2020	0.52	1.04	5.21
PFBS	375-73-5	1.12 J	H8698-FS(0)	1.000	9/13/2020	0.15	0.52	5.21
PFHxS	355-46-4	7.43	H8698-FS(0)	1.000	9/13/2020	0.11	0.42	5.21
PFOS	1763-23-1	6.63	H8698-FS(0)	1.000	9/13/2020	0.46	1.04	5.21
HFPO-DA	13252-13-6	0.52 U	H8698-FS(0)	1.000	9/13/2020	0.26	0.52	5.21
Adona	919005-14-4	1.04 U	H8698-FS(0)	1.000	9/13/2020	0.28	1.04	5.21
11CI-PF3OUdS	763051-92-9	0.52 U	H8698-FS(0)	1.000	9/13/2020	0.24	0.52	5.21
9CI-PF3ONS	756426-58-1	1.04 U	H8698-FS(0)	1.000	9/13/2020	0.28	1.04	5.21

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 Printed: 9/17/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-H2133-WT03-0820

Battelle ID H8698-FS
 Sample Type SA
 Collection Date 08/20/2020
 Extraction Date 08/31/2020
 Analytical Instrument Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	85	H8698-FS(0)	9/13/2020
13C4-PFHpA	88	H8698-FS(0)	9/13/2020
13C8-PFOA	81	H8698-FS(0)	9/13/2020
13C9-PFNA	84	H8698-FS(0)	9/13/2020
13C6-PFDA	89	H8698-FS(0)	9/13/2020
13C7-PFUnA	85	H8698-FS(0)	9/13/2020
13C2-PFDoA	71	H8698-FS(0)	9/13/2020
13C1-PFTeDA	29	H8698-FS(0)	9/13/2020
d3-MeFOSAA	78	H8698-FS(0)	9/13/2020
d5-EtFOSAA	94	H8698-FS(0)	9/13/2020
13C3-PFBS	83	H8698-FS(0)	9/13/2020
13C3-PFHxS	80	H8698-FS(0)	9/13/2020
13C8-PFOS	77	H8698-FS(0)	9/13/2020
13C3-HFPO-DA	75	H8698-FS(0)	9/13/2020



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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-H2133-WT04-0820

Battelle ID H8701-FS
 Sample Type SA
 Collection Date 08/20/2020
 Extraction Date 08/31/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.255
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	513.23 Q	H8701-FS-D(5)	25.000	9/15/2020	12.99	36.76	122.55
PFHpA	375-85-9	382.41 Q	H8701-FS-D(5)	25.000	9/15/2020	6.37	24.51	122.55
PFOA	335-67-1	205.56 Q	H8701-FS-D(5)	25.000	9/15/2020	12.50	36.76	122.55
PFNA	375-95-1	26.73	H8701-FS(0)	1.000	9/13/2020	0.30	0.98	4.90
PFDA	335-76-2	9.43	H8701-FS(0)	1.000	9/13/2020	0.14	0.49	4.90
PFUnA	2058-94-8	3.99 J	H8701-FS(0)	1.000	9/13/2020	0.22	0.49	4.90
PFDoA	307-55-1	1.97 J	H8701-FS(0)	1.000	9/13/2020	0.19	0.49	4.90
PFTTrDA	72629-94-8	0.66 J	H8701-FS(0)	1.000	9/13/2020	0.15	0.49	4.90
PFTeDA	376-06-7	1.96 U	H8701-FS(0)	1.000	9/13/2020	0.72	1.96	4.90
NMeFOSAA	2355-31-9	0.98 U	H8701-FS(0)	1.000	9/13/2020	0.34	0.98	4.90
NeFOSAA	2991-50-6	0.98 U	H8701-FS(0)	1.000	9/13/2020	0.49	0.98	4.90
PFBS	375-73-5	17.67	H8701-FS(0)	1.000	9/13/2020	0.14	0.49	4.90
PFHxS	355-46-4	179.57 Q	H8701-FS-D(3)	5.000	9/13/2020	0.54	1.96	24.51
PFOS	1763-23-1	135.83 Q	H8701-FS-D(3)	5.000	9/13/2020	2.16	4.90	24.51
HFPO-DA	13252-13-6	0.39 J	H8701-FS(0)	1.000	9/13/2020	0.25	0.49	4.90
Adona	919005-14-4	0.98 U	H8701-FS(0)	1.000	9/13/2020	0.26	0.98	4.90
11CI-PF3OUdS	763051-92-9	0.49 U	H8701-FS(0)	1.000	9/13/2020	0.23	0.49	4.90
9CI-PF3ONS	756426-58-1	0.98 U	H8701-FS(0)	1.000	9/13/2020	0.26	0.98	4.90

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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-H2133-SW01-0820

Battelle ID H8712-FS
 Sample Type SA
 Collection Date 08/20/2020
 Extraction Date 08/31/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.265
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	58.40	H8712-FS(0)	1.000	9/13/2020	0.50	1.42	4.72
PFHpA	375-85-9	46.68	H8712-FS(0)	1.000	9/13/2020	0.25	0.94	4.72
PFOA	335-67-1	41.19	H8712-FS(0)	1.000	9/13/2020	0.48	1.42	4.72
PFNA	375-95-1	11.48	H8712-FS(0)	1.000	9/13/2020	0.29	0.94	4.72
PFDA	335-76-2	3.32 J	H8712-FS(0)	1.000	9/13/2020	0.13	0.47	4.72
PFUnA	2058-94-8	0.89 J	H8712-FS(0)	1.000	9/13/2020	0.21	0.47	4.72
PFDoA	307-55-1	0.19 J	H8712-FS(0)	1.000	9/13/2020	0.18	0.47	4.72
PFTTrDA	72629-94-8	0.47 U	H8712-FS(0)	1.000	9/13/2020	0.14	0.47	4.72
PFTeDA	376-06-7	1.89 <i>YUJ</i>	H8712-FS(0)	1.000	9/13/2020	0.69	1.89	4.72
NMeFOSAA	2355-31-9	0.94 U	H8712-FS(0)	1.000	9/13/2020	0.33	0.94	4.72
NEtFOSAA	2991-50-6	0.94 U	H8712-FS(0)	1.000	9/13/2020	0.47	0.94	4.72
PFBS	375-73-5	4.59 J	H8712-FS(0)	1.000	9/13/2020	0.13	0.47	4.72
PFHxS	355-46-4	3.96 J	H8712-FS(0)	1.000	9/13/2020	0.10	0.38	4.72
PFOS	1763-23-1	7.53	H8712-FS(0)	1.000	9/13/2020	0.42	0.94	4.72
HFPO-DA	13252-13-6	0.47 U	H8712-FS(0)	1.000	9/13/2020	0.24	0.47	4.72
Adona	919005-14-4	0.94 U	H8712-FS(0)	1.000	9/13/2020	0.25	0.94	4.72
11CI-PF3OUdS	763051-92-9	0.47 U	H8712-FS(0)	1.000	9/13/2020	0.22	0.47	4.72
9CI-PF3ONS	756426-58-1	0.94 U	H8712-FS(0)	1.000	9/13/2020	0.25	0.94	4.72

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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-H2133-SW01-0820

Battelle ID H8712-FS
 Sample Type SA
 Collection Date 08/20/2020
 Extraction Date 08/31/2020
 Analytical Instrument Sciex 5500 LC/MS/MS

<i>Surrogate Recoveries (%)</i>	<i>Recovery</i>	<i>Extract ID</i>	<i>Analysis Date</i>
13C5-PFHxA	67	H8712-FS(0)	9/13/2020
13C4-PFHpA	84	H8712-FS(0)	9/13/2020
13C8-PFOA	82	H8712-FS(0)	9/13/2020
13C9-PFNA	87	H8712-FS(0)	9/13/2020
13C6-PFDA	72	H8712-FS(0)	9/13/2020
13C7-PFUnA	70	H8712-FS(0)	9/13/2020
13C2-PFDoA	57	H8712-FS(0)	9/13/2020
13C2-PFTeDA	39	H8712-FS(0)	9/13/2020
d3-MeFOSAA	72	H8712-FS(0)	9/13/2020
d5-EtFOSAA	88	H8712-FS(0)	9/13/2020
13C3-PFBS	55	H8712-FS(0)	9/13/2020
13C3-PFHxS	88	H8712-FS(0)	9/13/2020
13C8-PFOS	69	H8712-FS(0)	9/13/2020
13C3-HFPO-DA	69	H8712-FS(0)	9/13/2020



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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-H2133-SW01P-0820

Battelle ID H8713-FS
 Sample Type SA
 Collection Date 08/20/2020
 Extraction Date 08/31/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.255
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	50.39	H8713-FS(0)	1.000	9/13/2020	0.52	1.47	4.90
PFHpA	375-85-9	41.23	H8713-FS(0)	1.000	9/13/2020	0.25	0.98	4.90
PFOA	335-67-1	36.62	H8713-FS(0)	1.000	9/13/2020	0.50	1.47	4.90
PFNA	375-95-1	9.99	H8713-FS(0)	1.000	9/13/2020	0.30	0.98	4.90
PFDA	335-76-2	2.74 J	H8713-FS(0)	1.000	9/13/2020	0.14	0.49	4.90
PFUnA	2058-94-8	0.84 J	H8713-FS(0)	1.000	9/13/2020	0.22	0.49	4.90
PFDoA	307-55-1	0.22 J	H8713-FS(0)	1.000	9/13/2020	0.19	0.49	4.90
PFTTrDA	72629-94-8	0.17 J	H8713-FS(0)	1.000	9/13/2020	0.15	0.49	4.90
PFTeDA	376-06-7	1.96 J	H8713-FS(0)	1.000	9/13/2020	0.72	1.96	4.90
NMeFOSAA	2355-31-9	0.98 U	H8713-FS(0)	1.000	9/13/2020	0.34	0.98	4.90
NEtFOSAA	2991-50-6	0.98 U	H8713-FS(0)	1.000	9/13/2020	0.49	0.98	4.90
PFBS	375-73-5	3.97 J	H8713-FS(0)	1.000	9/13/2020	0.14	0.49	4.90
PFHxS	355-46-4	4.19 J	H8713-FS(0)	1.000	9/13/2020	0.11	0.39	4.90
PFOS	1763-23-1	6.56	H8713-FS(0)	1.000	9/13/2020	0.43	0.98	4.90
HFPO-DA	13252-13-6	0.49 U	H8713-FS(0)	1.000	9/13/2020	0.25	0.49	4.90
Adona	919005-14-4	0.98 U	H8713-FS(0)	1.000	9/13/2020	0.26	0.98	4.90
11CI-PF3OUdS	763051-92-9	0.49 U	H8713-FS(0)	1.000	9/13/2020	0.23	0.49	4.90
9CI-PF3ONS	756426-58-1	0.98 U	H8713-FS(0)	1.000	9/13/2020	0.26	0.98	4.90

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MW 10/28/20
 Analyzed by: Griffith, Lauren
 Printed: 9/17/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-H2133-SW01P-0820

Battelle ID H8713-FS
 Sample Type SA
 Collection Date 08/20/2020
 Extraction Date 08/31/2020
 Analytical Instrument Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	58	H8713-FS(0)	9/13/2020
13C4-PFHpA	72	H8713-FS(0)	9/13/2020
13C8-PFOA	71	H8713-FS(0)	9/13/2020
13C9-PFNA	69	H8713-FS(0)	9/13/2020
13C6-PFDA	60	H8713-FS(0)	9/13/2020
13C7-PFUnA	55	H8713-FS(0)	9/13/2020
13C2-PFDoA	43	H8713-FS(0)	9/13/2020
13C2-PFTeDA	27	H8713-FS(0)	9/13/2020
d3-MeFOSAA	64	H8713-FS(0)	9/13/2020
d5-EtFOSAA	76	H8713-FS(0)	9/13/2020
13C3-PFBS	59	H8713-FS(0)	9/13/2020
13C3-PFHxS	77	H8713-FS(0)	9/13/2020
13C8-PFOS	64	H8713-FS(0)	9/13/2020
13C3-HFPODA	57	H8713-FS(0)	9/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-H2133-WT02-0820

Battelle ID H8714-FS
 Sample Type SA
 Collection Date 08/20/2020
 Extraction Date 08/31/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.250
 Size Unit-Basis L

Analysis Date	DL	LOD	LOQ	DF	Extract ID	Result (ng/L)	CAS No.	Analyte
9/15/2020	2.65	7.50	25.00	5.000	H8714-FS-D(3)	119.11 <i>β</i>	307-24-4	PFHxA
9/13/2020	0.26	1.00	5.00	1.000	H8714-FS(0)	43.07	375-85-9	PFHpA
9/13/2020	0.51	1.50	5.00	1.000	H8714-FS(0)	7.94	335-67-1	PFOA
9/13/2020	0.31	1.00	5.00	1.000	H8714-FS(0)	1.17 <i>J</i>	375-95-1	PFNA
9/13/2020	0.14	0.50	5.00	1.000	H8714-FS(0)	0.16 <i>J</i>	335-76-2	PFDA
9/13/2020	0.22	0.50	5.00	1.000	H8714-FS(0)	0.50 <i>U</i>	2058-94-8	PFUnA
9/13/2020	0.19	0.50	5.00	1.000	H8714-FS(0)	0.50 <i>U</i>	307-55-1	PFDoA
9/13/2020	0.15	0.50	5.00	1.000	H8714-FS(0)	0.50 <i>U</i>	72629-94-8	PFTTrDA
9/13/2020	0.73	2.00	5.00	1.000	H8714-FS(0)	2.00 <i>U</i>	376-06-7	PFTeDA
9/13/2020	0.35	1.00	5.00	1.000	H8714-FS(0)	1.00 <i>U</i>	2355-31-9	NMeFOSAA
9/13/2020	0.50	1.00	5.00	1.000	H8714-FS(0)	1.00 <i>U</i>	2991-50-6	NEtFOSAA
9/13/2020	0.14	0.50	5.00	1.000	H8714-FS(0)	30.32	375-73-5	PFBS
9/13/2020	0.11	0.40	5.00	1.000	H8714-FS(0)	16.24	355-46-4	PFHxS
9/13/2020	0.44	1.00	5.00	1.000	H8714-FS(0)	6.48	1763-23-1	PFOS
9/13/2020	0.25	0.50	5.00	1.000	H8714-FS(0)	0.50 <i>U</i>	13252-13-6	HFPO-DA
9/13/2020	0.27	1.00	5.00	1.000	H8714-FS(0)	1.00 <i>U</i>	919005-14-4	Adona
9/13/2020	0.23	0.50	5.00	1.000	H8714-FS(0)	0.50 <i>U</i>	763051-92-9	11CI-PF3OUdS
9/13/2020	0.27	1.00	5.00	1.000	H8714-FS(0)	1.00 <i>U</i>	756426-58-1	9CI-PF3ONS

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9/10/28/20
 Analyzed by: Griffith, Lauren
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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-H2133-WT02-0820

Battelle ID H8714-FS
 Sample Type SA
 Collection Date 08/20/2020
 Extraction Date 08/31/2020
 Analytical Instrument Sciex 5500 LC/MS/MS

<u>Surrogate Recoveries (%)</u>	<u>Recovery</u>	<u>Extract ID</u>	<u>Analysis Date</u>
13C5-PFHxA	100	H8714-FS-D(3)	9/15/2020
13C4-PFHpA	75	H8714-FS(0)	9/13/2020
13C8-PFOA	74	H8714-FS(0)	9/13/2020
13C9-PFNA	74	H8714-FS(0)	9/13/2020
13C6-PFDA	71	H8714-FS(0)	9/13/2020
13C7-PFUnA	73	H8714-FS(0)	9/13/2020
13C2-PFDoA	55	H8714-FS(0)	9/13/2020
13C2-PFToDA	46	H8714-FS(0)	9/13/2020
d3-MeFOSAA	63	H8714-FS(0)	9/13/2020
d5-EtFOSAA	71	H8714-FS(0)	9/13/2020
13C3-PFBS	71	H8714-FS(0)	9/13/2020
13C3-PFHxS	80	H8714-FS(0)	9/13/2020
13C8-PFOS	71	H8714-FS(0)	9/13/2020
13C3-HFPO-DA	64	H8714-FS(0)	9/13/2020



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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-H2133-WT06-0820

Battelle ID H8720-FS
 Sample Type SA
 Collection Date 08/20/2020
 Extraction Date 08/31/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.265
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	578.25 D	H8720-FS-D(5)	12.500	9/15/2020	6.25	17.69	58.96
PFHpA	375-85-9	545.81 D	H8720-FS-D(5)	12.500	9/15/2020	3.07	11.79	58.96
PFOA	335-67-1	187.61 D	H8720-FS-D(5)	12.500	9/15/2020	6.01	17.69	58.96
PFNA	375-95-1	68.57	H8720-FS(0)	1.000	9/15/2020	0.29	0.94	4.72
PFDA	335-76-2	30.01	H8720-FS(0)	1.000	9/15/2020	0.13	0.47	4.72
PFUnA	2058-94-8	4.04 J	H8720-FS(0)	1.000	9/15/2020	0.21	0.47	4.72
PFDoA	307-55-1	0.70 J	H8720-FS(0)	1.000	9/15/2020	0.18	0.47	4.72
PFTTrDA	72629-94-8	0.47 U	H8720-FS(0)	1.000	9/15/2020	0.14	0.47	4.72
PFTeDA	376-06-7	1.89 U	H8720-FS(0)	1.000	9/15/2020	0.69	1.89	4.72
NMeFOSAA	2355-31-9	0.94 U	H8720-FS(0)	1.000	9/15/2020	0.33	0.94	4.72
NEtFOSAA	2991-50-6	0.94 U	H8720-FS(0)	1.000	9/15/2020	0.47	0.94	4.72
PFBS	375-73-5	3.72 J	H8720-FS(0)	1.000	9/15/2020	0.13	0.47	4.72
PFHxS	355-46-4	4.25 J	H8720-FS(0)	1.000	9/15/2020	0.10	0.38	4.72
PFOS	1763-23-1	12.45	H8720-FS(0)	1.000	9/15/2020	0.42	0.94	4.72
HFPO-DA	13252-13-6	0.53 J	H8720-FS(0)	1.000	9/15/2020	0.24	0.47	4.72
Adona	919005-14-4	0.94 U	H8720-FS(0)	1.000	9/15/2020	0.25	0.94	4.72
11CI-PF3OUdS	763051-92-9	0.47 U	H8720-FS(0)	1.000	9/15/2020	0.22	0.47	4.72
9CI-PF3ONS	756426-58-1	0.94 U	H8720-FS(0)	1.000	9/15/2020	0.25	0.94	4.72

ANALYZED BY
 Analyzed by: Griffith, Lauren
 Printed: 9/17/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-H2133-WT06P-0820

Battelle ID H8721-FS
 Sample Type SA
 Collection Date 08/20/2020
 Extraction Date 08/31/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.265
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	550.92 D	H8721-FS-D(5)	12.500	9/13/2020	6.25	17.69	58.96
PFHpA	375-85-9	521.54 D	H8721-FS-D(5)	12.500	9/13/2020	3.07	11.79	58.96
PFOA	335-67-1	201.81 D	H8721-FS-D(5)	12.500	9/13/2020	6.01	17.69	58.96
PFNA	375-95-1	68.52	H8721-FS(0)	1.000	9/13/2020	0.29	0.94	4.72
PFDA	335-76-2	29.03	H8721-FS(0)	1.000	9/13/2020	0.13	0.47	4.72
PFUnA	2058-94-8	4.22 J	H8721-FS(0)	1.000	9/13/2020	0.21	0.47	4.72
PFDoA	307-55-1	0.64 J	H8721-FS(0)	1.000	9/13/2020	0.18	0.47	4.72
PFTTrDA	72629-94-8	0.47 U	H8721-FS(0)	1.000	9/13/2020	0.14	0.47	4.72
PFTeDA	376-06-7	1.89 U	H8721-FS(0)	1.000	9/13/2020	0.69	1.89	4.72
NMeFOSAA	2355-31-9	0.94 U	H8721-FS(0)	1.000	9/13/2020	0.33	0.94	4.72
NEtFOSAA	2991-50-6	0.94 U	H8721-FS(0)	1.000	9/13/2020	0.47	0.94	4.72
PFBS	375-73-5	4.00 J	H8721-FS(0)	1.000	9/13/2020	0.13	0.47	4.72
PFHxS	355-46-4	4.27 J	H8721-FS(0)	1.000	9/13/2020	0.10	0.38	4.72
PFOS	1763-23-1	12.80	H8721-FS(0)	1.000	9/13/2020	0.42	0.94	4.72
HFPO-DA	13252-13-6	0.48 J	H8721-FS(0)	1.000	9/13/2020	0.24	0.47	4.72
Adona	919005-14-4	0.94 U	H8721-FS(0)	1.000	9/13/2020	0.25	0.94	4.72
11CI-PF3OUdS	763051-92-9	0.47 U	H8721-FS(0)	1.000	9/13/2020	0.22	0.47	4.72
9CI-PF3ONS	756426-58-1	0.94 U	H8721-FS(0)	1.000	9/13/2020	0.25	0.94	4.72

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ANALYZED 9/28/20
 Analyzed by: Griffith, Lauren
 Printed: 9/17/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-H2133-WT06P-0820

Battelle ID H8721-FS
 Sample Type SA
 Collection Date 08/20/2020
 Extraction Date 08/31/2020
 Analytical Instrument Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	86 D	H8721-FS-D(5)	9/13/2020
13C4-PFHpA	91 D	H8721-FS-D(5)	9/13/2020
13C8-PFOA	83 D	H8721-FS-D(5)	9/13/2020
13C9-PFNA	89 D	H8721-FS-D(5)	9/13/2020
13C6-PFDA	82	H8721-FS(0)	9/13/2020
13C7-PFUnA	86	H8721-FS(0)	9/13/2020
13C2-PFDoA	73	H8721-FS(0)	9/13/2020
13C2-PFTeDA	46 D	H8721-FS(0)	9/13/2020
d3-MeFOSAA	83	H8721-FS(0)	9/13/2020
d5-EtFOSAA	99	H8721-FS(0)	9/13/2020
13C3-PFBS	76	H8721-FS(0)	9/13/2020
13C3-PFHxS	76	H8721-FS(0)	9/13/2020
13C8-PFOS	75	H8721-FS(0)	9/13/2020
13C3-HFPQ-DA	85 D	H8721-FS-D(5)	9/13/2020

**DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND**

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-0988
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: October 28, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-S41-SS30-000H	H8663-FS	Soil
2	PX-S41-SB30-0304	H8664-FS	Soil
3	PX-S41-SS29-000H	H8666-FS	Soil
4	PX-S41-SS29P-000H	H8667-FS	Soil
5	PX-S41-SB29-0304	H8668-FS	Soil
6	PX-S41-SS28-000H	H8670-FS	Soil
7	PX-S41-SB28-0304	H8671-FS	Soil
8	PX-S41-SS26-000H	H8672-FS	Soil
9	PX-S41-SB26-0304	H8673-FS	Soil
10	PX-S41-SS27-000H	H8679-FS	Soil
10MS	PX-S41-SS27-000HMS	H8680-FSMS	Soil
10MSD	PX-S41-SS27-000HMMSD	H8681-FSMSD	Soil

A Stage 2B/4 data validation was performed on the analytical data for ten soil samples collected on August 19, 2020 by CH2M HILL at the NAS Patuxent River site in Maryland. The samples were analyzed under the Analysis of Poly and Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-08

The data have been validated according to the protocols and quality control (QC) requirements of the analytical methods, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, Webster Field Annex, Naval Air Station Patuxent River, Maryland, April 2020, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, St. Mary's County, Naval Air Station Patuxent River, Maryland, April 2020, and the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

Organics

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A full (Stage 2B/4) data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

Per- and Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for soil samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-S41-FB01-081920	None - ND	-	-	-
PX-S41-EB01-081920-SO	PFOS	3.51	U	5, 10

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- The samples were analyzed at various dilutions due to high concentrations of target compounds. The reporting limits were adjusted accordingly. No action was required.
- Several compounds were flagged (Q) indicating the ion ratio is outside of QC criteria. The reviewer further qualified these compounds as estimated (J).

Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

Compound	PX-S41-SS29-000H ng/g	PX-S41-SS29P-000H ng/g	RPD	Qualifier
PFHxA	1.15	1.31	13%	None
PFHpA	0.75	0.79	5%	
PFOA	1.32	1.42	7%	
PFNA	1.69	1.85	9%	
PFDA	0.96	1.06	10%	
PFUnA	0.76	0.82	8%	
PFHxS	2.38	2.54	7%	
PFOS	74.30	84.67	13%	

Please contact the undersigned at (757) 564-0090 if you have any questions or need further information.

Signed: Nancy Weaver
Nancy Weaver
Senior Chemist

Dated: 10/31/20

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-S41-SS30-000H

Battelle ID H8663-FS
 Sample Type SA
 Collection Date 08/19/2020
 Extraction Date 08/27/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture 3.71
 Matrix SOIL
 Sample Size 1.94
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.98 J	H8663-FS(3)	10.000	9/10/2020	0.73	2.06	5.15
PFHpA	375-85-9	1.79 J	H8663-FS(3)	10.000	9/10/2020	0.53	1.55	5.15
PFOA	335-67-1	3.36 J	H8663-FS(3)	10.000	9/10/2020	0.63	2.06	5.15
PFNA	375-95-1	1.01 J	H8663-FS(3)	10.000	9/10/2020	0.51	1.03	5.15
PFDA	335-76-2	1.72 J	H8663-FS(3)	10.000	9/10/2020	0.47	1.03	5.15
PFUnA	2058-94-8	1.46 J	H8663-FS(3)	10.000	9/10/2020	0.47	1.03	5.15
PFDoA	307-55-1	2.06 U	H8663-FS(3)	10.000	9/10/2020	0.63	2.06	5.15
PFTTrDA	72629-94-8	7.58 J	H8663-FS(3)	10.000	9/10/2020	0.29	1.03	5.15
PFTeDA	376-06-7	2.58 U	H8663-FS(3)	10.000	9/10/2020	1.11	2.58	5.15
NMeFOSAA	2355-31-9	2.58 U	H8663-FS(3)	10.000	9/10/2020	1.05	2.58	5.15
NEtFOSAA	2991-50-6	2.06 U	H8663-FS(3)	10.000	9/10/2020	0.77	2.06	5.15
PFBS	375-73-5	1.03 U	H8663-FS(3)	10.000	9/10/2020	0.36	1.03	5.15
PFHxS	355-46-4	14.70	H8663-FS(3)	10.000	9/10/2020	0.84	2.06	5.15
PFOS	1763-23-1	30.02	H8663-FS(3)	10.000	9/10/2020	0.71	2.06	5.15
HFPO-DA	13252-13-6	2.06 U	H8663-FS(3)	10.000	9/10/2020	0.66	2.06	5.15
Adona	919005-14-4	2.06 U	H8663-FS(3)	10.000	9/10/2020	0.86	2.06	5.15
11Cl-PF3OUdS	763051-92-9	1.55 U	H8663-FS(3)	10.000	9/10/2020	0.54	1.55	5.15
9Cl-PF3ONS	756426-58-1	1.03 U	H8663-FS(3)	10.000	9/10/2020	0.49	1.03	5.15

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NW 10/28/20

Analyzed by: Schumitz, Denise
 Printed: 9/18/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

2

Client ID PX-S41-SB30-0304

Battelle ID H8664-FS
 Sample Type SA
 Collection Date 08/19/2020
 Extraction Date 08/27/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture 5.47
 Matrix SOIL
 Sample Size 1.79
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.82 J	H8664-FS(3)	10.000	9/10/2020	0.79	2.23	5.59
PFHpA	375-85-9	1.68 U	H8664-FS(3)	10.000	9/10/2020	0.57	1.68	5.59
PFOA	335-67-1	1.76 J	H8664-FS(3)	10.000	9/10/2020	0.68	2.23	5.59
PFNA	375-95-1	0.63 J	H8664-FS(3)	10.000	9/10/2020	0.55	1.12	5.59
PFDA	335-76-2	3.50 J	H8664-FS(3)	10.000	9/10/2020	0.51	1.12	5.59
PFUnA	2058-94-8	1.12 U	H8664-FS(3)	10.000	9/10/2020	0.51	1.12	5.59
PFDoA	307-55-1	2.23 U	H8664-FS(3)	10.000	9/10/2020	0.68	2.23	5.59
PFTTrDA	72629-94-8	3.87 J J	H8664-FS(3)	10.000	9/10/2020	0.31	1.12	5.59
PFTeDA	376-06-7	2.79 U	H8664-FS(3)	10.000	9/10/2020	1.21	2.79	5.59
NMeFOSAA	2355-31-9	6.07 J J	H8664-FS(3)	10.000	9/10/2020	1.14	2.79	5.59
NEtFOSAA	2991-50-6	2.23 U	H8664-FS(3)	10.000	9/10/2020	0.84	2.23	5.59
PFBS	375-73-5	1.12 U	H8664-FS(3)	10.000	9/10/2020	0.39	1.12	5.59
PFHxS	355-46-4	4.18 J	H8664-FS(3)	10.000	9/10/2020	0.91	2.23	5.59
PFOS	1763-23-1	56.26	H8664-FS(3)	10.000	9/10/2020	0.77	2.23	5.59
HFPO-DA	13252-13-6	2.23 U	H8664-FS(3)	10.000	9/10/2020	0.72	2.23	5.59
Adona	919005-14-4	2.23 U	H8664-FS(3)	10.000	9/10/2020	0.93	2.23	5.59
11CI-PF3OUdS	763051-92-9	1.68 U	H8664-FS(3)	10.000	9/10/2020	0.58	1.68	5.59
9CI-PF3ONS	756426-58-1	1.12 U	H8664-FS(3)	10.000	9/10/2020	0.54	1.12	5.59

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9/10/2020
 Analyzed by: Schumitz, Denise
 Printed: 9/18/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

3

Client ID PX-S41-SS29-000H

Battelle ID H8666-FS
 Sample Type SA
 Collection Date 08/19/2020
 Extraction Date 08/27/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture 15.83
 Matrix SOIL
 Sample Size 1.56
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.15 J	H8666-FS(3)	10.000	9/10/2020	0.91	2.56	6.41
PFHpA	375-85-9	0.75 J	H8666-FS(3)	10.000	9/10/2020	0.65	1.92	6.41
PFOA	335-67-1	1.32 J	H8666-FS(3)	10.000	9/10/2020	0.78	2.56	6.41
PFNA	375-95-1	1.69 J	H8666-FS(3)	10.000	9/10/2020	0.63	1.28	6.41
PFDA	335-76-2	0.96 J	H8666-FS(3)	10.000	9/10/2020	0.59	1.28	6.41
PFUnA	2058-94-8	0.76 J	H8666-FS(3)	10.000	9/10/2020	0.59	1.28	6.41
PFDoA	307-55-1	2.56 U	H8666-FS(3)	10.000	9/10/2020	0.78	2.56	6.41
PFTeDA	72629-94-8	1.28 U	H8666-FS(3)	10.000	9/10/2020	0.36	1.28	6.41
PFTeDA	376-06-7	3.21 U	H8666-FS(3)	10.000	9/10/2020	1.38	3.21	6.41
NMeFOSAA	2355-31-9	3.21 U	H8666-FS(3)	10.000	9/10/2020	1.31	3.21	6.41
NEtFOSAA	2991-50-6	2.56 U	H8666-FS(3)	10.000	9/10/2020	0.96	2.56	6.41
PFBS	375-73-5	1.28 U	H8666-FS(3)	10.000	9/10/2020	0.45	1.28	6.41
PFHxS	355-46-4	2.38 J	H8666-FS(3)	10.000	9/10/2020	1.04	2.56	6.41
PFOS	1763-23-1	74.30	H8666-FS(3)	10.000	9/10/2020	0.88	2.56	6.41
HFPO-DA	13252-13-6	2.56 U	H8666-FS(3)	10.000	9/10/2020	0.82	2.56	6.41
Adona	919005-14-4	2.56 U	H8666-FS(3)	10.000	9/10/2020	1.06	2.56	6.41
11CI-PF3OUdS	763051-92-9	1.92 U	H8666-FS(3)	10.000	9/10/2020	0.67	1.92	6.41
9CI-PF3ONS	756426-58-1	1.28 U	H8666-FS(3)	10.000	9/10/2020	0.62	1.28	6.41

ANALYZED 9/28/20
 Analyzed by: Schumitz, Denise
 Printed: 9/18/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

4

Client ID PX-S41-SS29P-000H

Battelle ID H8667-FS
 Sample Type SA
 Collection Date 08/19/2020
 Extraction Date 08/27/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture 17.60
 Matrix SOIL
 Sample Size 1.73
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.31 J	H8667-FS(3)	10.000	9/10/2020	0.82	2.31	5.78
PFHpA	375-85-9	0.79 J	H8667-FS(3)	10.000	9/10/2020	0.59	1.73	5.78
PFOA	335-67-1	1.42 J	H8667-FS(3)	10.000	9/10/2020	0.71	2.31	5.78
PFNA	375-95-1	1.85 J	H8667-FS(3)	10.000	9/10/2020	0.57	1.16	5.78
PFDA	335-76-2	1.06 J	H8667-FS(3)	10.000	9/10/2020	0.53	1.16	5.78
PFUnA	2058-94-8	0.82 J	H8667-FS(3)	10.000	9/10/2020	0.53	1.16	5.78
PFDoA	307-55-1	2.31 U	H8667-FS(3)	10.000	9/10/2020	0.71	2.31	5.78
PFTTrDA	72629-94-8	1.16 U	H8667-FS(3)	10.000	9/10/2020	0.32	1.16	5.78
PFTeDA	376-06-7	2.89 U	H8667-FS(3)	10.000	9/10/2020	1.25	2.89	5.78
NMeFOSAA	2355-31-9	2.89 U	H8667-FS(3)	10.000	9/10/2020	1.18	2.89	5.78
NEtFOSAA	2991-50-6	2.31 U	H8667-FS(3)	10.000	9/10/2020	0.87	2.31	5.78
PFBS	375-73-5	1.16 U	H8667-FS(3)	10.000	9/10/2020	0.40	1.16	5.78
PFHxS	355-46-4	2.54 J	H8667-FS(3)	10.000	9/10/2020	0.94	2.31	5.78
PFOS	1763-23-1	84.67	H8667-FS(3)	10.000	9/10/2020	0.80	2.31	5.78
HFPO-DA	13252-13-6	2.31 U	H8667-FS(3)	10.000	9/10/2020	0.74	2.31	5.78
Adona	919005-14-4	2.31 U	H8667-FS(3)	10.000	9/10/2020	0.96	2.31	5.78
11CI-PF3OUdS	763051-92-9	1.73 U	H8667-FS(3)	10.000	9/10/2020	0.60	1.73	5.78
9CI-PF3ONS	756426-58-1	1.16 U	H8667-FS(3)	10.000	9/10/2020	0.55	1.16	5.78

mw 10/28/20
 Analyzed by: Schumitz, Denise
 Printed: 9/18/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

5

Client ID PX-S41-SB29-0304

Battelle ID H8668-FS
 Sample Type SA
 Collection Date 08/19/2020
 Extraction Date 08/27/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture 4.52
 Matrix SOIL
 Sample Size 1.94
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.06 U	H8668-FS(3)	10.000	9/10/2020	0.73	2.06	5.15
PFHpA	375-85-9	1.55 U	H8668-FS(3)	10.000	9/10/2020	0.53	1.55	5.15
PFOA	335-67-1	2.06 U	H8668-FS(3)	10.000	9/10/2020	0.63	2.06	5.15
PFNA	375-95-1	1.03 U	H8668-FS(3)	10.000	9/10/2020	0.51	1.03	5.15
PFDA	335-76-2	1.03 U	H8668-FS(3)	10.000	9/10/2020	0.47	1.03	5.15
PFUnA	2058-94-8	1.03 U	H8668-FS(3)	10.000	9/10/2020	0.47	1.03	5.15
PFDoA	307-55-1	2.06 U	H8668-FS(3)	10.000	9/10/2020	0.63	2.06	5.15
PFTeDA	72629-94-8	1.03 U	H8668-FS(3)	10.000	9/10/2020	0.29	1.03	5.15
PFTeDA	376-06-7	2.58 U	H8668-FS(3)	10.000	9/10/2020	1.11	2.58	5.15
NMeFOSAA	2355-31-9	2.58 U	H8668-FS(3)	10.000	9/10/2020	1.05	2.58	5.15
NEtFOSAA	2991-50-6	2.06 U	H8668-FS(3)	10.000	9/10/2020	0.77	2.06	5.15
PFBS	375-73-5	1.03 U	H8668-FS(3)	10.000	9/10/2020	0.36	1.03	5.15
PFHxS	355-46-4	2.06 U	H8668-FS(3)	10.000	9/10/2020	0.84	2.06	5.15
PFOS	1763-23-1	4.86 U	H8668-FS(3)	10.000	9/10/2020	0.71	2.06	5.15
HFPO-DA	13252-13-6	2.06 U	H8668-FS(3)	10.000	9/10/2020	0.66	2.06	5.15
Adona	919005-14-4	2.06 U	H8668-FS(3)	10.000	9/10/2020	0.86	2.06	5.15
11CI-PF3OUdS	763051-92-9	1.55 U	H8668-FS(3)	10.000	9/10/2020	0.54	1.55	5.15
9CI-PF3ONS	756426-58-1	1.03 U	H8668-FS(3)	10.000	9/10/2020	0.49	1.03	5.15

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ANALYZED BY: SCHUMITZ, DENISE
 PRINTED: 9/18/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

6

Client ID PX-S41-SS28-000H

Battelle ID H8670-FS
 Sample Type SA
 Collection Date 08/19/2020
 Extraction Date 08/27/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture 9.52
 Matrix SOIL
 Sample Size 1.78
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.06 J	H8670-FS(3)	10.000	9/10/2020	0.80	2.25	5.62
PFHpA	375-85-9	1.69 U	H8670-FS(3)	10.000	9/10/2020	0.57	1.69	5.62
PFOA	335-67-1	1.14 J	H8670-FS(3)	10.000	9/10/2020	0.69	2.25	5.62
PFNA	375-95-1	1.08 J	H8670-FS(3)	10.000	9/10/2020	0.55	1.12	5.62
PFDA	335-76-2	1.10 J	H8670-FS(3)	10.000	9/10/2020	0.52	1.12	5.62
PFUnA	2058-94-8	0.92 J	H8670-FS(3)	10.000	9/10/2020	0.52	1.12	5.62
PFDoA	307-55-1	2.25 U	H8670-FS(3)	10.000	9/10/2020	0.69	2.25	5.62
PFTrDA	72629-94-8	0.40 J	H8670-FS(3)	10.000	9/10/2020	0.31	1.12	5.62
PFTeDA	376-06-7	2.81 U	H8670-FS(3)	10.000	9/10/2020	1.21	2.81	5.62
NMeFOSAA	2355-31-9	2.81 U	H8670-FS(3)	10.000	9/10/2020	1.15	2.81	5.62
NEtFOSAA	2991-50-6	2.25 U	H8670-FS(3)	10.000	9/10/2020	0.84	2.25	5.62
PFBS	375-73-5	1.12 U	H8670-FS(3)	10.000	9/10/2020	0.39	1.12	5.62
PFHxS	355-46-4	5.43 J	H8670-FS(3)	10.000	9/10/2020	0.91	2.25	5.62
PFOS	1763-23-1	172.54 ✓	H8670-FS-D(5)	50.000	9/11/2020	3.88	11.24	28.09
HFPO-DA	13252-13-6	2.25 U	H8670-FS(3)	10.000	9/10/2020	0.72	2.25	5.62
Adona	919005-14-4	2.25 U	H8670-FS(3)	10.000	9/10/2020	0.93	2.25	5.62
11CI-PF3OUdS	763051-92-9	1.69 U	H8670-FS(3)	10.000	9/10/2020	0.58	1.69	5.62
9CI-PF3ONS	756426-58-1	1.12 U	H8670-FS(3)	10.000	9/10/2020	0.54	1.12	5.62

NW 10/28/20

Analyzed by: Schumitz, Denise
 Printed: 9/18/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-S41-SB28-0304

Battelle ID H8671-FS
 Sample Type SA
 Collection Date 08/19/2020
 Extraction Date 08/27/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture 17.73
 Matrix SOIL
 Sample Size 1.69
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.37 U	H8671-FS(3)	10.000	9/10/2020	0.84	2.37	5.92
PFHpA	375-85-9	1.78 U	H8671-FS(3)	10.000	9/10/2020	0.60	1.78	5.92
PFOA	335-67-1	2.37 U	H8671-FS(3)	10.000	9/10/2020	0.72	2.37	5.92
PFNA	375-95-1	1.18 U	H8671-FS(3)	10.000	9/10/2020	0.58	1.18	5.92
PFDA	335-76-2	1.18 U	H8671-FS(3)	10.000	9/10/2020	0.54	1.18	5.92
PFUnA	2058-94-8	1.18 U	H8671-FS(3)	10.000	9/10/2020	0.54	1.18	5.92
PFDoA	307-55-1	2.37 U	H8671-FS(3)	10.000	9/10/2020	0.72	2.37	5.92
PFTTrDA	72629-94-8	1.18 U	H8671-FS(3)	10.000	9/10/2020	0.33	1.18	5.92
PFTeDA	376-06-7	2.96 U	H8671-FS(3)	10.000	9/10/2020	1.28	2.96	5.92
NMeFOSAA	2355-31-9	2.96 U	H8671-FS(3)	10.000	9/10/2020	1.21	2.96	5.92
NEtFOSAA	2991-50-6	2.37 U	H8671-FS(3)	10.000	9/10/2020	0.89	2.37	5.92
PFBS	375-73-5	1.18 U	H8671-FS(3)	10.000	9/10/2020	0.41	1.18	5.92
PFHxS	355-46-4	2.37 U	H8671-FS(3)	10.000	9/10/2020	0.96	2.37	5.92
PFOS	1763-23-1	2.37 U	H8671-FS(3)	10.000	9/10/2020	0.82	2.37	5.92
HFPO-DA	13252-13-6	2.37 U	H8671-FS(3)	10.000	9/10/2020	0.76	2.37	5.92
Adona	919005-14-4	2.37 U	H8671-FS(3)	10.000	9/10/2020	0.98	2.37	5.92
11CI-PF3OUdS	763051-92-9	1.78 U	H8671-FS(3)	10.000	9/10/2020	0.62	1.78	5.92
9CI-PF3ONS	756426-58-1	1.18 U	H8671-FS(3)	10.000	9/10/2020	0.57	1.18	5.92

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ANALYZED 9/10/2020
 Analyzed by: Schumitz, Denise
 Printed: 9/18/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-S41-SS26-000H

Battelle ID H8672-FS
 Sample Type SA
 Collection Date 08/19/2020
 Extraction Date 08/27/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture 10.06
 Matrix SOIL
 Sample Size 1.81
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.21 U	H8672-FS(3)	10.000	9/10/2020	0.78	2.21	5.52
PFHpA	375-85-9	1.66 U	H8672-FS(3)	10.000	9/10/2020	0.56	1.66	5.52
PFOA	335-67-1	0.79 JQ 5	H8672-FS(3)	10.000	9/10/2020	0.67	2.21	5.52
PFNA	375-95-1	1.07 J	H8672-FS(3)	10.000	9/10/2020	0.54	1.10	5.52
PFDA	335-76-2	1.10 U	H8672-FS(3)	10.000	9/10/2020	0.51	1.10	5.52
PFUnA	2058-94-8	1.10 U	H8672-FS(3)	10.000	9/10/2020	0.51	1.10	5.52
PFDoA	307-55-1	2.21 U	H8672-FS(3)	10.000	9/10/2020	0.67	2.21	5.52
PFTTrDA	72629-94-8	1.10 U	H8672-FS(3)	10.000	9/10/2020	0.31	1.10	5.52
PFTeDA	376-06-7	2.76 U	H8672-FS(3)	10.000	9/10/2020	1.19	2.76	5.52
NMeFOSAA	2355-31-9	2.76 U	H8672-FS(3)	10.000	9/10/2020	1.13	2.76	5.52
NEtFOSAA	2991-50-6	2.21 U	H8672-FS(3)	10.000	9/10/2020	0.83	2.21	5.52
PFBS	375-73-5	1.10 U	H8672-FS(3)	10.000	9/10/2020	0.39	1.10	5.52
PFHxS	355-46-4	2.21 U	H8672-FS(3)	10.000	9/10/2020	0.90	2.21	5.52
PFOS	1763-23-1	50.45	H8672-FS(3)	10.000	9/10/2020	0.76	2.21	5.52
HFPO-DA	13252-13-6	2.21 U	H8672-FS(3)	10.000	9/10/2020	0.71	2.21	5.52
Adona	919005-14-4	2.21 U	H8672-FS(3)	10.000	9/10/2020	0.92	2.21	5.52
11CI-PF3OUds	763051-92-9	1.66 U	H8672-FS(3)	10.000	9/10/2020	0.57	1.66	5.52
9CI-PF3ONS	756426-58-1	1.10 U	H8672-FS(3)	10.000	9/10/2020	0.53	1.10	5.52

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 Analyzed by: Schumitz, Denise
 Printed: 9/18/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

9

Client ID PX-S41-SB26-0304

Battelle ID H8673-FS
 Sample Type SA
 Collection Date 08/19/2020
 Extraction Date 08/27/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture 5.18
 Matrix SOIL
 Sample Size 1.88
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.13 U	H8673-FS(3)	10.000	9/10/2020	0.76	2.13	5.32
PFHpA	375-85-9	1.60 U	H8673-FS(3)	10.000	9/10/2020	0.54	1.60	5.32
PFOA	335-67-1	1.30 J	H8673-FS(3)	10.000	9/10/2020	0.65	2.13	5.32
PFNA	375-95-1	0.82 J	H8673-FS(3)	10.000	9/10/2020	0.52	1.06	5.32
PFDA	335-76-2	1.06 U	H8673-FS(3)	10.000	9/10/2020	0.49	1.06	5.32
PFUnA	2058-94-8	1.06 U	H8673-FS(3)	10.000	9/10/2020	0.49	1.06	5.32
PFDoA	307-55-1	2.13 U	H8673-FS(3)	10.000	9/10/2020	0.65	2.13	5.32
PFTTrDA	72629-94-8	1.06 U	H8673-FS(3)	10.000	9/10/2020	0.30	1.06	5.32
PFTeDA	376-06-7	2.66 U	H8673-FS(3)	10.000	9/10/2020	1.15	2.66	5.32
NMeFOSAA	2355-31-9	2.66 U	H8673-FS(3)	10.000	9/10/2020	1.09	2.66	5.32
NEtFOSAA	2991-50-6	2.13 U	H8673-FS(3)	10.000	9/10/2020	0.80	2.13	5.32
PFBS	375-73-5	1.06 U	H8673-FS(3)	10.000	9/10/2020	0.37	1.06	5.32
PFHxS	355-46-4	1.38 J	H8673-FS(3)	10.000	9/10/2020	0.86	2.13	5.32
PFOS	1763-23-1	111.98	H8673-FS(3)	10.000	9/10/2020	0.73	2.13	5.32
HFPO-DA	13252-13-6	2.13 U	H8673-FS(3)	10.000	9/10/2020	0.68	2.13	5.32
Adona	919005-14-4	2.13 U	H8673-FS(3)	10.000	9/10/2020	0.88	2.13	5.32
11CI-PF3OUdS	763051-92-9	1.60 U	H8673-FS(3)	10.000	9/10/2020	0.55	1.60	5.32
9CI-PF3ONS	756426-58-1	1.06 U	H8673-FS(3)	10.000	9/10/2020	0.51	1.06	5.32

md 10/28/20
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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

10

Client ID PX-S41-SS27-000H

Battelle ID H8679-FS
 Sample Type SA
 Collection Date 08/19/2020
 Extraction Date 08/27/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture 5.13
 Matrix SOIL
 Sample Size 1.87
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.14 U	H8679-FS(3)	10.000	9/10/2020	0.76	2.14	5.35
PFHpA	375-85-9	1.60 U	H8679-FS(3)	10.000	9/10/2020	0.55	1.60	5.35
PFOA	335-67-1	2.14 U	H8679-FS(3)	10.000	9/10/2020	0.65	2.14	5.35
PFNA	375-95-1	1.07 U	H8679-FS(3)	10.000	9/10/2020	0.52	1.07	5.35
PFDA	335-76-2	1.07 U	H8679-FS(3)	10.000	9/10/2020	0.49	1.07	5.35
PFUnA	2058-94-8	1.07 U	H8679-FS(3)	10.000	9/10/2020	0.49	1.07	5.35
PFDoA	307-55-1	2.14 U	H8679-FS(3)	10.000	9/10/2020	0.65	2.14	5.35
PFTeDA	72629-94-8	1.07 U	H8679-FS(3)	10.000	9/10/2020	0.30	1.07	5.35
PFTeDA	376-06-7	2.67 U	H8679-FS(3)	10.000	9/10/2020	1.16	2.67	5.35
NMeFOSAA	2355-31-9	2.67 U	H8679-FS(3)	10.000	9/10/2020	1.09	2.67	5.35
NEtFOSAA	2991-50-6	2.14 U	H8679-FS(3)	10.000	9/10/2020	0.80	2.14	5.35
PFBS	375-73-5	1.07 U	H8679-FS(3)	10.000	9/10/2020	0.37	1.07	5.35
PFHxS	355-46-4	2.14 U	H8679-FS(3)	10.000	9/10/2020	0.87	2.14	5.35
PFOS	1763-23-1	3.18 U	H8679-FS(3)	10.000	9/10/2020	0.74	2.14	5.35
HFPO-DA	13252-13-6	2.14 U	H8679-FS(3)	10.000	9/10/2020	0.68	2.14	5.35
Adona	919005-14-4	2.14 U	H8679-FS(3)	10.000	9/10/2020	0.89	2.14	5.35
11CI-PF3OUdS	763051-92-9	1.60 U	H8679-FS(3)	10.000	9/10/2020	0.56	1.60	5.35
9CI-PF3ONS	756426-58-1	1.07 U	H8679-FS(3)	10.000	9/10/2020	0.51	1.07	5.35

EBL

9/18/2020
 Analyzed by: Schumitz, Denise
 Printed: 9/18/2020

**DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND**

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-0989
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: October 28, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-S41-SB27-0304	H8682-FS	Soil
2	PX-S41-SS25-000H	H8688-FS	Soil
3	PX-S41-SB25-0304	H8689-FS	Soil
4	PX-S41-SB25P-0304	H8690-FS	Soil
5	PX-H2133-SS03-000H	H8692-FS	Soil
5MS	PX-H2133-SS03-000HMS	H8693-FSMS	Soil
5MSD	PX-H2133-SS03-000HMSD	H8694-FSMSD	Soil
6	PX-H2133-SB03-0304	H8695-FS	Soil
7	PX-H2133-SS04-000H	H8696-FS	Soil
8	PX-H2133-SB04-0304	H8697-FS	Soil
9	PX-H2133-SS02-000H	H8699-FS	Soil
10	PX-H2133-SB02-0304	H8700-FS	Soil

A Stage 2B/4 data validation was performed on the analytical data for ten soil samples collected on August 19-20, 2020 by CH2M HILL at the NAS Patuxent River site in Maryland. The samples were analyzed under the Analysis of Poly and Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-08

The data have been validated according to the protocols and quality control (QC) requirements of the analytical methods, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, Webster Field Annex, Naval Air Station Patuxent River, Maryland, April 2020, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, St. Mary's County, Naval Air Station Patuxent River, Maryland, April 2020, and the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

Organics

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A full (Stage 2B/4) data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

Per- and Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for soil samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-S41-FB01-081920	None - ND	-	-	-
PX-S41-EB01-081920-SO	PFOS	3.51	U	2
PX-H2133-EB01-082020-SO	None - ND	-	-	-
PX-H2133-FB01-082020-SO	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

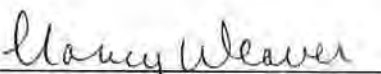
Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

Compound	PX-S41-SB25-0304 ng/g	PX-S41-SB25P-0304 ng/g	RPD	Qualifier
None	ND	ND	-	-

Please contact the undersigned at (757) 564-0090 if you have any questions or need further information.

Signed:


Nancy Weaver
Senior Chemist

Dated: 10/31/20

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-S41-SB27-0304

Battelle ID H8682-FS
 Sample Type SA
 Collection Date 08/19/2020
 Extraction Date 08/27/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture 7.11
 Matrix SOIL
 Sample Size 1.94
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.06 U	H8682-FS(3)	10.000	9/10/2020	0.73	2.06	5.15
PFHpA	375-85-9	1.55 U	H8682-FS(3)	10.000	9/10/2020	0.53	1.55	5.15
PFOA	335-67-1	2.06 U	H8682-FS(3)	10.000	9/10/2020	0.63	2.06	5.15
PFNA	375-95-1	1.03 U	H8682-FS(3)	10.000	9/10/2020	0.51	1.03	5.15
PFDA	335-76-2	1.03 U	H8682-FS(3)	10.000	9/10/2020	0.47	1.03	5.15
PFUnA	2058-94-8	1.03 U	H8682-FS(3)	10.000	9/10/2020	0.47	1.03	5.15
PFDoA	307-55-1	2.06 U	H8682-FS(3)	10.000	9/10/2020	0.63	2.06	5.15
PFTTrDA	72629-94-8	1.03 U	H8682-FS(3)	10.000	9/10/2020	0.29	1.03	5.15
PFTeDA	376-06-7	2.58 U	H8682-FS(3)	10.000	9/10/2020	1.11	2.58	5.15
NMeFOSAA	2355-31-9	2.58 U	H8682-FS(3)	10.000	9/10/2020	1.05	2.58	5.15
NEtFOSAA	2991-50-6	2.06 U	H8682-FS(3)	10.000	9/10/2020	0.77	2.06	5.15
PFBS	375-73-5	1.03 U	H8682-FS(3)	10.000	9/10/2020	0.36	1.03	5.15
PFHxS	355-46-4	2.06 U	H8682-FS(3)	10.000	9/10/2020	0.84	2.06	5.15
PFOS	1763-23-1	2.06 U	H8682-FS(3)	10.000	9/10/2020	0.71	2.06	5.15
HFPO-DA	13252-13-6	2.06 U	H8682-FS(3)	10.000	9/10/2020	0.66	2.06	5.15
Adona	919005-14-4	2.06 U	H8682-FS(3)	10.000	9/10/2020	0.86	2.06	5.15
11CI-PF3OUdS	763051-92-9	1.55 U	H8682-FS(3)	10.000	9/10/2020	0.54	1.55	5.15
9CI-PF3ONS	756426-58-1	1.03 U	H8682-FS(3)	10.000	9/10/2020	0.49	1.03	5.15

9/18/2020

Analyzed by: Schumitz, Denise

Printed: 9/18/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

2

Client ID PX-S41-SS25-000H

Battelle ID H8688-FS
 Sample Type SA
 Collection Date 08/19/2020
 Extraction Date 08/27/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture 4.98
 Matrix SOIL
 Sample Size 1.95
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.05 U	H8688-FS(3)	10.000	9/10/2020	0.73	2.05	5.13
PFHpA	375-85-9	1.54 U	H8688-FS(3)	10.000	9/10/2020	0.52	1.54	5.13
PFOA	335-67-1	2.05 U	H8688-FS(3)	10.000	9/10/2020	0.63	2.05	5.13
PFNA	375-95-1	1.03 U	H8688-FS(3)	10.000	9/10/2020	0.50	1.03	5.13
PFDA	335-76-2	1.03 U	H8688-FS(3)	10.000	9/10/2020	0.47	1.03	5.13
PFUnA	2058-94-8	1.03 U	H8688-FS(3)	10.000	9/10/2020	0.47	1.03	5.13
PFDoA	307-55-1	2.05 U	H8688-FS(3)	10.000	9/10/2020	0.63	2.05	5.13
PFTeDA	72629-94-8	1.03 U	H8688-FS(3)	10.000	9/10/2020	0.29	1.03	5.13
PFTeDA	376-06-7	2.56 U	H8688-FS(3)	10.000	9/10/2020	1.11	2.56	5.13
NMeFOSAA	2355-31-9	2.56 U	H8688-FS(3)	10.000	9/10/2020	1.05	2.56	5.13
NEtFOSAA	2991-50-6	2.05 U	H8688-FS(3)	10.000	9/10/2020	0.77	2.05	5.13
PFBS	375-73-5	1.03 U	H8688-FS(3)	10.000	9/10/2020	0.36	1.03	5.13
PFHxS	355-46-4	2.05 U	H8688-FS(3)	10.000	9/10/2020	0.83	2.05	5.13
PFOS	1763-23-1	2.53 U	H8688-FS(3)	10.000	9/10/2020	0.71	2.05	5.13
HFPO-DA	13252-13-6	2.05 U	H8688-FS(3)	10.000	9/10/2020	0.66	2.05	5.13
Adona	919005-14-4	2.05 U	H8688-FS(3)	10.000	9/10/2020	0.85	2.05	5.13
11CI-PF3OUdS	763051-92-9	1.54 U	H8688-FS(3)	10.000	9/10/2020	0.53	1.54	5.13
9CI-PF3ONS	756426-58-1	1.03 U	H8688-FS(3)	10.000	9/10/2020	0.49	1.03	5.13

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ms 10/28/20
 Analyzed by: Schumitz, Denise
 Printed: 9/18/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

3

Client ID PX-S41-SB25-0304

Battelle ID H8689-FS
 Sample Type SA
 Collection Date 08/19/2020
 Extraction Date 08/27/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture 3.49
 Matrix SOIL
 Sample Size 1.87
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.14 U	H8689-FS(3)	10.000	9/10/2020	0.76	2.14	5.35
PFHpA	375-85-9	1.60 U	H8689-FS(3)	10.000	9/10/2020	0.55	1.60	5.35
PFOA	335-67-1	2.14 U	H8689-FS(3)	10.000	9/10/2020	0.65	2.14	5.35
PFNA	375-95-1	1.07 U	H8689-FS(3)	10.000	9/10/2020	0.52	1.07	5.35
PFDA	335-76-2	1.07 U	H8689-FS(3)	10.000	9/10/2020	0.49	1.07	5.35
PFUnA	2058-94-8	1.07 U	H8689-FS(3)	10.000	9/10/2020	0.49	1.07	5.35
PFDoA	307-55-1	2.14 U	H8689-FS(3)	10.000	9/10/2020	0.65	2.14	5.35
PFTeDA	72629-94-8	1.07 U	H8689-FS(3)	10.000	9/10/2020	0.30	1.07	5.35
PFTeDA	376-06-7	2.67 U	H8689-FS(3)	10.000	9/10/2020	1.16	2.67	5.35
NMeFOSAA	2355-31-9	2.67 U	H8689-FS(3)	10.000	9/10/2020	1.09	2.67	5.35
NEtFOSAA	2991-50-6	2.14 U	H8689-FS(3)	10.000	9/10/2020	0.80	2.14	5.35
PFBS	375-73-5	1.07 U	H8689-FS(3)	10.000	9/10/2020	0.37	1.07	5.35
PFHxS	355-46-4	2.14 U	H8689-FS(3)	10.000	9/10/2020	0.87	2.14	5.35
PFOS	1763-23-1	2.14 U	H8689-FS(3)	10.000	9/10/2020	0.74	2.14	5.35
HFPO-DA	13252-13-6	2.14 U	H8689-FS(3)	10.000	9/10/2020	0.68	2.14	5.35
Adona	919005-14-4	2.14 U	H8689-FS(3)	10.000	9/10/2020	0.89	2.14	5.35
11CI-PF3OUdS	763051-92-9	1.60 U	H8689-FS(3)	10.000	9/10/2020	0.56	1.60	5.35
9CI-PF3ONS	756426-58-1	1.07 U	H8689-FS(3)	10.000	9/10/2020	0.51	1.07	5.35

MW 10/28/20
 Analyzed by: Schumitz, Denise
 Printed: 9/18/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

4

Client ID PX-S41-SB25P-0304

Battelle ID H8690-FS
 Sample Type SA
 Collection Date 08/19/2020
 Extraction Date 08/27/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture 4.97
 Matrix SOIL
 Sample Size 1.94
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.06 U	H8690-FS(3)	10.000	9/10/2020	0.73	2.06	5.15
PFHpA	375-85-9	1.55 U	H8690-FS(3)	10.000	9/10/2020	0.53	1.55	5.15
PFOA	335-67-1	2.06 U	H8690-FS(3)	10.000	9/10/2020	0.63	2.06	5.15
PFNA	375-95-1	1.03 U	H8690-FS(3)	10.000	9/10/2020	0.51	1.03	5.15
PFDA	335-76-2	1.03 U	H8690-FS(3)	10.000	9/10/2020	0.47	1.03	5.15
PFUnA	2058-94-8	1.03 U	H8690-FS(3)	10.000	9/10/2020	0.47	1.03	5.15
PFDoA	307-55-1	2.06 U	H8690-FS(3)	10.000	9/10/2020	0.63	2.06	5.15
PFTTrDA	72629-94-8	1.03 U	H8690-FS(3)	10.000	9/10/2020	0.29	1.03	5.15
PFTeDA	376-06-7	2.58 U	H8690-FS(3)	10.000	9/10/2020	1.11	2.58	5.15
NMeFOSAA	2355-31-9	2.58 U	H8690-FS(3)	10.000	9/10/2020	1.05	2.58	5.15
NEtFOSAA	2991-50-6	2.06 U	H8690-FS(3)	10.000	9/10/2020	0.77	2.06	5.15
PFBS	375-73-5	1.03 U	H8690-FS(3)	10.000	9/10/2020	0.36	1.03	5.15
PFHxS	355-46-4	2.06 U	H8690-FS(3)	10.000	9/10/2020	0.84	2.06	5.15
PFOS	1763-23-1	2.06 U	H8690-FS(3)	10.000	9/10/2020	0.71	2.06	5.15
HFPO-DA	13252-13-6	2.06 U	H8690-FS(3)	10.000	9/10/2020	0.66	2.06	5.15
Adona	919005-14-4	2.06 U	H8690-FS(3)	10.000	9/10/2020	0.86	2.06	5.15
11CI-PF3OUdS	763051-92-9	1.55 U	H8690-FS(3)	10.000	9/10/2020	0.54	1.55	5.15
9CI-PF3ONS	756426-58-1	1.03 U	H8690-FS(3)	10.000	9/10/2020	0.49	1.03	5.15

ANALYZED 9/10/2020
 Analyzed by: Schumitz, Denise
 Printed: 9/18/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

5

Client ID PX-H2133-SS03-000H

Battelle ID H8692-FS
 Sample Type SA
 Collection Date 08/20/2020
 Extraction Date 08/27/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture 18.20
 Matrix SOIL
 Sample Size 1.76
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.27 U	H8692-FS(3)	10.000	9/10/2020	0.81	2.27	5.68
PFHpA	375-85-9	1.70 U	H8692-FS(3)	10.000	9/10/2020	0.58	1.70	5.68
PFOA	335-67-1	2.27 U	H8692-FS(3)	10.000	9/10/2020	0.69	2.27	5.68
PFNA	375-95-1	1.14 U	H8692-FS(3)	10.000	9/10/2020	0.56	1.14	5.68
PFDA	335-76-2	1.14 U	H8692-FS(3)	10.000	9/10/2020	0.52	1.14	5.68
PFUnA	2058-94-8	1.14 U	H8692-FS(3)	10.000	9/10/2020	0.52	1.14	5.68
PFDoA	307-55-1	2.27 U	H8692-FS(3)	10.000	9/10/2020	0.69	2.27	5.68
PFTeDA	72629-94-8	1.14 U	H8692-FS(3)	10.000	9/10/2020	0.32	1.14	5.68
PFTeDA	376-06-7	2.84 U	H8692-FS(3)	10.000	9/10/2020	1.23	2.84	5.68
NMeFOSAA	2355-31-9	2.84 U	H8692-FS(3)	10.000	9/10/2020	1.16	2.84	5.68
NEtFOSAA	2991-50-6	2.27 U	H8692-FS(3)	10.000	9/10/2020	0.85	2.27	5.68
PFBS	375-73-5	1.14 U	H8692-FS(3)	10.000	9/10/2020	0.40	1.14	5.68
PFHxS	355-46-4	2.27 U	H8692-FS(3)	10.000	9/10/2020	0.92	2.27	5.68
PFOS	1763-23-1	1.59 J	H8692-FS(3)	10.000	9/10/2020	0.78	2.27	5.68
HFPO-DA	13252-13-6	2.27 U	H8692-FS(3)	10.000	9/10/2020	0.73	2.27	5.68
Adona	919005-14-4	2.27 U	H8692-FS(3)	10.000	9/10/2020	0.94	2.27	5.68
11Cl-PF3OUdS	763051-92-9	1.70 U	H8692-FS(3)	10.000	9/10/2020	0.59	1.70	5.68
9Cl-PF3ONS	756426-58-1	1.14 U	H8692-FS(3)	10.000	9/10/2020	0.55	1.14	5.68

ANALYZED 9/18/2020
 Analyzed by: Schumitz, Denise
 Printed: 9/18/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-H2133-SB03-0304

Battelle ID H8695-FS
 Sample Type SA
 Collection Date 08/20/2020
 Extraction Date 08/27/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture 12.01
 Matrix SOIL
 Sample Size 1.88
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.13 U	H8695-FS(3)	10.000	9/10/2020	0.76	2.13	5.32
PFHpA	375-85-9	1.60 U	H8695-FS(3)	10.000	9/10/2020	0.54	1.60	5.32
PFOA	335-67-1	2.13 U	H8695-FS(3)	10.000	9/10/2020	0.65	2.13	5.32
PFNA	375-95-1	1.06 U	H8695-FS(3)	10.000	9/10/2020	0.52	1.06	5.32
PFDA	335-76-2	1.06 U	H8695-FS(3)	10.000	9/10/2020	0.49	1.06	5.32
PFUnA	2058-94-8	1.06 U	H8695-FS(3)	10.000	9/10/2020	0.49	1.06	5.32
PFDoA	307-55-1	2.13 U	H8695-FS(3)	10.000	9/10/2020	0.65	2.13	5.32
PFTTrDA	72629-94-8	1.06 U	H8695-FS(3)	10.000	9/10/2020	0.30	1.06	5.32
PFTeDA	376-06-7	2.66 U	H8695-FS(3)	10.000	9/10/2020	1.15	2.66	5.32
NMeFOSAA	2355-31-9	2.66 U	H8695-FS(3)	10.000	9/10/2020	1.09	2.66	5.32
NEtFOSAA	2991-50-6	2.13 U	H8695-FS(3)	10.000	9/10/2020	0.80	2.13	5.32
PFBS	375-73-5	1.06 U	H8695-FS(3)	10.000	9/10/2020	0.37	1.06	5.32
PFHxS	355-46-4	2.13 U	H8695-FS(3)	10.000	9/10/2020	0.86	2.13	5.32
PFOS	1763-23-1	2.13 U	H8695-FS(3)	10.000	9/10/2020	0.73	2.13	5.32
HFPO-DA	13252-13-6	2.13 U	H8695-FS(3)	10.000	9/10/2020	0.68	2.13	5.32
Adona	919005-14-4	2.13 U	H8695-FS(3)	10.000	9/10/2020	0.88	2.13	5.32
11CI-PF3OUdS	763051-92-9	1.60 U	H8695-FS(3)	10.000	9/10/2020	0.55	1.60	5.32
9CI-PF3ONS	756426-58-1	1.06 U	H8695-FS(3)	10.000	9/10/2020	0.51	1.06	5.32

ANALYZED BY: SCHUMITZ, DENISE
 PRINTED: 9/18/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

7

Client ID PX-H2133-SS04-000H

Battelle ID H8696-FS
 Sample Type SA
 Collection Date 08/20/2020
 Extraction Date 08/27/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture 14.89
 Matrix SOIL
 Sample Size 1.70
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.93 J	H8696-FS(3)	10.000	9/10/2020	0.84	2.35	5.88
PFHpA	375-85-9	1.76 U	H8696-FS(3)	10.000	9/10/2020	0.60	1.76	5.88
PFOA	335-67-1	2.04 J	H8696-FS(3)	10.000	9/10/2020	0.72	2.35	5.88
PFNA	375-95-1	0.99 J	H8696-FS(3)	10.000	9/10/2020	0.58	1.18	5.88
PFDA	335-76-2	1.08 J	H8696-FS(3)	10.000	9/10/2020	0.54	1.18	5.88
PFUnA	2058-94-8	0.74 J	H8696-FS(3)	10.000	9/10/2020	0.54	1.18	5.88
PFDoA	307-55-1	2.35 U	H8696-FS(3)	10.000	9/10/2020	0.72	2.35	5.88
PFTTrDA	72629-94-8	1.18 U	H8696-FS(3)	10.000	9/10/2020	0.33	1.18	5.88
PFTeDA	376-06-7	2.94 U	H8696-FS(3)	10.000	9/10/2020	1.27	2.94	5.88
NMeFOSAA	2355-31-9	2.94 U	H8696-FS(3)	10.000	9/10/2020	1.20	2.94	5.88
NEtFOSAA	2991-50-6	2.35 U	H8696-FS(3)	10.000	9/10/2020	0.88	2.35	5.88
PFBS	375-73-5	1.18 U	H8696-FS(3)	10.000	9/10/2020	0.41	1.18	5.88
PFHxS	355-46-4	2.35 U	H8696-FS(3)	10.000	9/10/2020	0.95	2.35	5.88
PFOS	1763-23-1	2.35 U	H8696-FS(3)	10.000	9/10/2020	0.81	2.35	5.88
HFPO-DA	13252-13-6	2.35 U	H8696-FS(3)	10.000	9/10/2020	0.75	2.35	5.88
Adona	919005-14-4	2.35 U	H8696-FS(3)	10.000	9/10/2020	0.98	2.35	5.88
11CI-PF3OUdS	763051-92-9	1.76 U	H8696-FS(3)	10.000	9/10/2020	0.61	1.76	5.88
9CI-PF3ONS	756426-58-1	1.18 U	H8696-FS(3)	10.000	9/10/2020	0.56	1.18	5.88

mw 10/28/20
 Analyzed by: Schumitz, Denise
 Printed: 9/18/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

8

Client ID PX-H2133-SB04-0304

Battelle ID H8697-FS
 Sample Type SA
 Collection Date 08/20/2020
 Extraction Date 08/27/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture 16.22
 Matrix SOIL
 Sample Size 1.73
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.31 U	H8697-FS(3)	10.000	9/10/2020	0.82	2.31	5.78
PFHpA	375-85-9	1.73 U	H8697-FS(3)	10.000	9/10/2020	0.59	1.73	5.78
PFOA	335-67-1	2.31 U	H8697-FS(3)	10.000	9/10/2020	0.71	2.31	5.78
PFNA	375-95-1	1.16 U	H8697-FS(3)	10.000	9/10/2020	0.57	1.16	5.78
PFDA	335-76-2	1.16 U	H8697-FS(3)	10.000	9/10/2020	0.53	1.16	5.78
PFUnA	2058-94-8	1.16 U	H8697-FS(3)	10.000	9/10/2020	0.53	1.16	5.78
PFDoA	307-55-1	2.31 U	H8697-FS(3)	10.000	9/10/2020	0.71	2.31	5.78
PFTTrDA	72629-94-8	1.16 U	H8697-FS(3)	10.000	9/10/2020	0.32	1.16	5.78
PFTeDA	376-06-7	2.89 U	H8697-FS(3)	10.000	9/10/2020	1.25	2.89	5.78
NMeFOSAA	2355-31-9	2.89 U	H8697-FS(3)	10.000	9/10/2020	1.18	2.89	5.78
NEtFOSAA	2991-50-6	2.31 U	H8697-FS(3)	10.000	9/10/2020	0.87	2.31	5.78
PFBS	375-73-5	1.16 U	H8697-FS(3)	10.000	9/10/2020	0.40	1.16	5.78
PFHxS	355-46-4	2.31 U	H8697-FS(3)	10.000	9/10/2020	0.94	2.31	5.78
PFOS	1763-23-1	2.31 U	H8697-FS(3)	10.000	9/10/2020	0.80	2.31	5.78
HFPO-DA	13252-13-6	2.31 U	H8697-FS(3)	10.000	9/10/2020	0.74	2.31	5.78
Adona	919005-14-4	2.31 U	H8697-FS(3)	10.000	9/10/2020	0.96	2.31	5.78
11CI-PF3OUdS	763051-92-9	1.73 U	H8697-FS(3)	10.000	9/10/2020	0.60	1.73	5.78
9CI-PF3ONS	756426-58-1	1.16 U	H8697-FS(3)	10.000	9/10/2020	0.55	1.16	5.78

10/12/20
 Analyzed by: Schumitz, Denise
 Printed: 9/18/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

9

Client ID PX-H2133-SS02-000H

Battelle ID H8699-FS
 Sample Type SA
 Collection Date 08/20/2020
 Extraction Date 08/27/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture 16.70
 Matrix SOIL
 Sample Size 1.67
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.22 J	H8699-FS(3)	10.000	9/10/2020	0.85	2.40	5.99
PFHpA	375-85-9	1.09 J	H8699-FS(3)	10.000	9/10/2020	0.61	1.80	5.99
PFOA	335-67-1	2.66 J	H8699-FS(3)	10.000	9/10/2020	0.73	2.40	5.99
PFNA	375-95-1	2.20 J	H8699-FS(3)	10.000	9/10/2020	0.59	1.20	5.99
PFDA	335-76-2	0.85 J	H8699-FS(3)	10.000	9/10/2020	0.55	1.20	5.99
PFUnA	2058-94-8	1.20 U	H8699-FS(3)	10.000	9/10/2020	0.55	1.20	5.99
PFDoA	307-55-1	2.40 U	H8699-FS(3)	10.000	9/10/2020	0.73	2.40	5.99
PFTTrDA	72629-94-8	1.20 U	H8699-FS(3)	10.000	9/10/2020	0.34	1.20	5.99
PFTeDA	376-06-7	2.99 U	H8699-FS(3)	10.000	9/10/2020	1.29	2.99	5.99
NMeFOSAA	2355-31-9	2.99 U	H8699-FS(3)	10.000	9/10/2020	1.22	2.99	5.99
NEtFOSAA	2991-50-6	2.40 U	H8699-FS(3)	10.000	9/10/2020	0.90	2.40	5.99
PFBS	375-73-5	1.20 U	H8699-FS(3)	10.000	9/10/2020	0.42	1.20	5.99
PFHxS	355-46-4	2.16 J	H8699-FS(3)	10.000	9/10/2020	0.97	2.40	5.99
PFOS	1763-23-1	14.85	H8699-FS(3)	10.000	9/10/2020	0.83	2.40	5.99
HFPO-DA	13252-13-6	2.40 U	H8699-FS(3)	10.000	9/10/2020	0.77	2.40	5.99
Adona	919005-14-4	2.40 U	H8699-FS(3)	10.000	9/10/2020	0.99	2.40	5.99
11CI-PF3OUdS	763051-92-9	1.80 U	H8699-FS(3)	10.000	9/10/2020	0.62	1.80	5.99
9CI-PF3ONS	756426-58-1	1.20 U	H8699-FS(3)	10.000	9/10/2020	0.57	1.20	5.99

mw 10/28/20
 Analyzed by: Schumitz, Denise
 Printed: 9/18/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

10

Client ID PX-H2133-SB02-0304

Battelle ID H8700-FS
 Sample Type SA
 Collection Date 08/20/2020
 Extraction Date 08/27/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture 13.68
 Matrix SOIL
 Sample Size 1.78
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.25 U	H8700-FS(3)	10.000	9/10/2020	0.80	2.25	5.62
PFHpA	375-85-9	0.78 J	H8700-FS(3)	10.000	9/10/2020	0.57	1.69	5.62
PFOA	335-67-1	2.25 U	H8700-FS(3)	10.000	9/10/2020	0.69	2.25	5.62
PFNA	375-95-1	1.12 U	H8700-FS(3)	10.000	9/10/2020	0.55	1.12	5.62
PFDA	335-76-2	1.12 U	H8700-FS(3)	10.000	9/10/2020	0.52	1.12	5.62
PFUnA	2058-94-8	1.12 U	H8700-FS(3)	10.000	9/10/2020	0.52	1.12	5.62
PFDoA	307-55-1	2.25 U	H8700-FS(3)	10.000	9/10/2020	0.69	2.25	5.62
PFTTrDA	72629-94-8	1.12 U	H8700-FS(3)	10.000	9/10/2020	0.31	1.12	5.62
PFTeDA	376-06-7	2.81 U	H8700-FS(3)	10.000	9/10/2020	1.21	2.81	5.62
NMeFOSAA	2355-31-9	2.81 U	H8700-FS(3)	10.000	9/10/2020	1.15	2.81	5.62
NEtFOSAA	2991-50-6	2.25 U	H8700-FS(3)	10.000	9/10/2020	0.84	2.25	5.62
PFBS	375-73-5	1.12 U	H8700-FS(3)	10.000	9/10/2020	0.39	1.12	5.62
PFHxS	355-46-4	2.25 U	H8700-FS(3)	10.000	9/10/2020	0.91	2.25	5.62
PFOS	1763-23-1	2.25 U	H8700-FS(3)	10.000	9/10/2020	0.78	2.25	5.62
HFPO-DA	13252-13-6	2.25 U	H8700-FS(3)	10.000	9/10/2020	0.72	2.25	5.62
Adona	919005-14-4	2.25 U	H8700-FS(3)	10.000	9/10/2020	0.93	2.25	5.62
11CI-PF3OUdS	763051-92-9	1.69 U	H8700-FS(3)	10.000	9/10/2020	0.58	1.69	5.62
9CI-PF3ONS	756426-58-1	1.12 U	H8700-FS(3)	10.000	9/10/2020	0.54	1.12	5.62

MW 10/28/20
 Analyzed by: Schumitz, Denise
 Printed: 9/18/2020

**DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND**

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-1118
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: October 27, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-S41-WT03-0820	H8678-FS1	Water
2	PX-H2133-WT03-0820	H8698-FS1	Water
3	PX-H2133-SW01-0820	H8712-FS1	Water
4	PX-H2133-SW01P-0820	H8713-FS1	Water
5	PX-H2133-WT02-0820	H8714-FS1	Water
6	PX-H2133-WT06P-0820	H8721-FS1	Water

A Stage 2B/4 data validation was performed on the analytical data for six water samples collected on August 19-20, 2020 by CH2M HILL at the NAS Patuxent River site in Maryland. The samples were analyzed under the Analysis of Poly and Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-08

The data have been validated according to the protocols and quality control (QC) requirements of the analytical methods, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, Webster Field Annex, Naval Air Station Patuxent River, Maryland, April 2020, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, St. Mary's County, Naval Air Station Patuxent River, Maryland, April 2020, and the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

Organics

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A full (Stage 2B/4) data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

Per- and Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted at 26 or 27 days which is outside of the 14 days for water samples criteria. All results were qualified as estimated (J/UJ) in all samples.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-S41-FB01-081920	None - ND	-	-	-
PX-S41-EB01-081920-GW	None - ND	-	-	-
PX-H2133-FB01-082020	None - ND	-	-	-
PX-H2133-EB01-082020-GW	None - ND	-	-	-

Surrogate Spike Recoveries

- Several samples exhibited low surrogate percent recoveries (%R) for several surrogate compounds, however, all results were already qualified due to holding times and no further action was required.

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- The samples were analyzed at various dilutions due to high concentrations of target compounds. The reporting limits were adjusted accordingly. No action was required.
- All samples were originally analyzed in SDGs 20-0985 and 20-0986 with low surrogate recoveries. The samples were re-extracted outside of holding times and reanalyzed in this data package. The original analysis results should be used for reporting purposes.

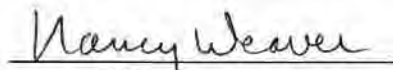
Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

Compound	PX-H2133-SW01-0820 ng/L	PX-H2133-SW01P-0820 ng/L	RPD	Qualifier
PFHxA	58.40	50.39	15%	None
PFHpA	46.68	41.23	12%	
PFOA	41.19	36.62	12%	
PFNA	11.48	9.99	14%	
PFDA	3.32	2.74	19%	
PFUnA	0.89	0.84	6%	
PFDoA	0.19	0.22	15%	
PFTTrDA	0.47U	0.17	NC	
PFBS	4.59	3.97	14%	
PFHxS	3.96	4.19	6%	
PFOS	7.53	6.56	14%	

Please contact the undersigned at (757) 564-0090 if you have any questions or need further information.

Signed:


Nancy Weaver
Senior Chemist

Dated: 10/31/20

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-S41-WT03-0820

Battelle ID H8678-FS1
 Sample Type SA
 Collection Date 08/19/2020
 Extraction Date 09/15/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.270
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	77.35 T	H8678-FS1(0)	1.000	9/16/2020	0.49	1.39	4.63
PFHpA	375-85-9	33.22 T	H8678-FS1(0)	1.000	9/16/2020	0.24	0.93	4.63
PFOA	335-67-1	105.85 T	H8678-FS1(0)	1.000	9/16/2020	0.47	1.39	4.63
PFNA	375-95-1	45.61 T	H8678-FS1(0)	1.000	9/16/2020	0.29	0.93	4.63
PFDA	335-76-2	0.18 JT	H8678-FS1(0)	1.000	9/16/2020	0.13	0.46	4.63
PFUnA	2058-94-8	0.46 UT	H8678-FS1(0)	1.000	9/16/2020	0.20	0.46	4.63
PFDoA	307-55-1	0.46 UT	H8678-FS1(0)	1.000	9/16/2020	0.18	0.46	4.63
PFTeDA	72629-94-8	0.46 UT	H8678-FS1(0)	1.000	9/16/2020	0.14	0.46	4.63
PFTeDA	376-06-7	1.85 UT	H8678-FS1(0)	1.000	9/16/2020	0.68	1.85	4.63
NMeFOSAA	2355-31-9	0.93 UT	H8678-FS1(0)	1.000	9/16/2020	0.32	0.93	4.63
NEtFOSAA	2991-50-6	0.93 UT	H8678-FS1(0)	1.000	9/16/2020	0.46	0.93	4.63
PFBS	375-73-5	13.80 T	H8678-FS1(0)	1.000	9/16/2020	0.13	0.46	4.63
PFHxS	355-46-4	899.22 TD	H8678-FS1-D(5)	12.500	9/16/2020	1.27	4.63	57.87
PFOS	1763-23-1	2351.48 TD	H8678-FS1-D(7)	31.250	9/16/2020	12.73	28.94	144.68
HFPO-DA	13252-13-6	0.46 UT	H8678-FS1(0)	1.000	9/16/2020	0.23	0.46	4.63
Adona	919005-14-4	0.93 UT	H8678-FS1(0)	1.000	9/16/2020	0.25	0.93	4.63
11CI-PF3OUdS	763051-92-9	0.46 UT	H8678-FS1(0)	1.000	9/16/2020	0.21	0.46	4.63
9CI-PF3ONS	756426-58-1	0.93 UT	H8678-FS1(0)	1.000	9/16/2020	0.25	0.93	4.63

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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-S41-WT03-0820
 Battelle ID H8678-FS1
 Sample Type SA
 Collection Date 08/19/2020
 Extraction Date 09/15/2020
 Analytical Instrument Sciex 5500 LC/MS/MS

use original

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	84	H8678-FS1(0)	9/16/2020
13C4-PFHpA	80	H8678-FS1(0)	9/16/2020
13C8-PFOA	80	H8678-FS1(0)	9/16/2020
13C9-PFNA	62	H8678-FS1(0)	9/16/2020
13C6-PFDA	83	H8678-FS1(0)	9/16/2020
13C7-PFUnA	75	H8678-FS1(0)	9/16/2020
13C2-PFDoA	57	H8678-FS1(0)	9/16/2020
13C2-PFToDA	28	H8678-FS1(0)	9/16/2020
d3-MeFOSAA	88	H8678-FS1-D(7)	9/16/2020
d5-EtFOSAA	101	H8678-FS1-D(7)	9/16/2020
13C3-PFBS	98	H8678-FS1-D(7)	9/16/2020
13C3-PFHxS	95	H8678-FS1-D(7)	9/16/2020
13C8-PFOS	94	H8678-FS1-D(7)	9/16/2020
13C3-HFPO-DA	81	H8678-FS1(0)	9/16/2020

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 Printed: 9/18/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-H2133-WT03-0820

Battelle ID H8698-FS1
 Sample Type SA
 Collection Date 08/20/2020
 Extraction Date 09/15/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.270
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.57 JT	H8698-FS1(0)	1.000	9/16/2020	0.49	1.39	4.63
PFHpA	375-85-9	2.39 JT	H8698-FS1(0)	1.000	9/16/2020	0.24	0.93	4.63
PFOA	335-67-1	3.27 JT	H8698-FS1(0)	1.000	9/16/2020	0.47	1.39	4.63
PFNA	375-95-1	0.97 JT	H8698-FS1(0)	1.000	9/16/2020	0.29	0.93	4.63
PFDA	335-76-2	0.46 UT	H8698-FS1(0)	1.000	9/16/2020	0.13	0.46	4.63
PFUnA	2058-94-8	0.46 UT	H8698-FS1(0)	1.000	9/16/2020	0.20	0.46	4.63
PFDoA	307-55-1	0.46 UT	H8698-FS1(0)	1.000	9/16/2020	0.18	0.46	4.63
PFTTrDA	72629-94-8	0.46 UT	H8698-FS1(0)	1.000	9/16/2020	0.14	0.46	4.63
PFTeDA	376-06-7	1.85 UT	H8698-FS1(0)	1.000	9/16/2020	0.68	1.85	4.63
NMeFOSAA	2355-31-9	0.93 UT	H8698-FS1(0)	1.000	9/16/2020	0.32	0.93	4.63
NEtFOSAA	2991-50-6	0.93 UT	H8698-FS1(0)	1.000	9/16/2020	0.46	0.93	4.63
PFBS	375-73-5	1.10 JT	H8698-FS1(0)	1.000	9/16/2020	0.13	0.46	4.63
PFHxS	355-46-4	6.97 T	H8698-FS1(0)	1.000	9/16/2020	0.10	0.37	4.63
PFOS	1763-23-1	6.40 T	H8698-FS1(0)	1.000	9/16/2020	0.41	0.93	4.63
HFPO-DA	13252-13-6	0.46 UT	H8698-FS1(0)	1.000	9/16/2020	0.23	0.46	4.63
Adona	919005-14-4	0.93 UT	H8698-FS1(0)	1.000	9/16/2020	0.25	0.93	4.63
11CI-PF3OUdS	763051-92-9	0.46 UT	H8698-FS1(0)	1.000	9/16/2020	0.21	0.46	4.63
9CI-PF3ONS	756426-58-1	0.93 UT	H8698-FS1(0)	1.000	9/16/2020	0.25	0.93	4.63

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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-H2133-WT03-0820
 Battelle ID H8698-FS1
 Sample Type SA
 Collection Date 08/20/2020
 Extraction Date 09/15/2020
 Analytical Instrument Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	86	H8698-FS1(0)	9/16/2020
13C4-PFHxA	89	H8698-FS1(0)	9/16/2020
13C8-PFOA	87	H8698-FS1(0)	9/16/2020
13C9-PFNA	84	H8698-FS1(0)	9/16/2020
13C6-PFDA	84	H8698-FS1(0)	9/16/2020
13C7-PFUnA	82	H8698-FS1(0)	9/16/2020
13C2-PFDoA	63	H8698-FS1(0)	9/16/2020
13C2-PFTeDA	30	H8698-FS1(0)	9/16/2020
d3-MeFOSAA	83	H8698-FS1(0)	9/16/2020
d5-EtFOSAA	92	H8698-FS1(0)	9/16/2020
13C3-PFBS	90	H8698-FS1(0)	9/16/2020
13C3-PFHxS	91	H8698-FS1(0)	9/16/2020
13C8-PFOS	82	H8698-FS1(0)	9/16/2020
13C3-HFPO-DA	82	H8698-FS1(0)	9/16/2020

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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-H2133-SW01-0820

Battelle ID H8712-FS1
 Sample Type SA
 Collection Date 08/20/2020
 Extraction Date 09/15/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.270
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	86.14 T J	H8712-FS1(0)	1.000	9/16/2020	0.49	1.39	4.63
PFHpA	375-85-9	70.79 T	H8712-FS1(0)	1.000	9/16/2020	0.24	0.93	4.63
PFOA	335-67-1	56.55 T	H8712-FS1(0)	1.000	9/16/2020	0.47	1.39	4.63
PFNA	375-95-1	13.65 T	H8712-FS1(0)	1.000	9/16/2020	0.29	0.93	4.63
PFDA	335-76-2	3.39 JT	H8712-FS1(0)	1.000	9/16/2020	0.13	0.46	4.63
PFUnA	2058-94-8	0.86 JT	H8712-FS1(0)	1.000	9/16/2020	0.20	0.46	4.63
PFDoA	307-55-1	0.29 JT	H8712-FS1(0)	1.000	9/16/2020	0.18	0.46	4.63
PFTTrDA	72629-94-8	0.46 UT	H8712-FS1(0)	1.000	9/16/2020	0.14	0.46	4.63
PFTeDA	376-06-7	1.85 UT	H8712-FS1(0)	1.000	9/16/2020	0.68	1.85	4.63
NMeFOSAA	2355-31-9	0.93 UT	H8712-FS1(0)	1.000	9/16/2020	0.32	0.93	4.63
NEtFOSAA	2991-50-6	0.93 UT	H8712-FS1(0)	1.000	9/16/2020	0.46	0.93	4.63
PFBS	375-73-5	4.83 T J	H8712-FS1(0)	1.000	9/16/2020	0.13	0.46	4.63
PFHxS	355-46-4	8.32 T J	H8712-FS1(0)	1.000	9/16/2020	0.10	0.37	4.63
PFOS	1763-23-1	8.13 T J	H8712-FS1(0)	1.000	9/16/2020	0.41	0.93	4.63
HFPO-DA	13252-13-6	0.46 UT	H8712-FS1(0)	1.000	9/16/2020	0.23	0.46	4.63
Adona	919005-14-4	0.93 UT	H8712-FS1(0)	1.000	9/16/2020	0.25	0.93	4.63
11CI-PF3OUdS	763051-92-9	0.46 UT	H8712-FS1(0)	1.000	9/16/2020	0.21	0.46	4.63
9CI-PF3ONS	756426-58-1	0.93 UT	H8712-FS1(0)	1.000	9/16/2020	0.25	0.93	4.63

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ANALYST: 10/23/20
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 Printed: 9/18/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-H2133-SW01-0820
 Battelle ID H8712-FS1
 Sample Type SA
 Collection Date 08/20/2020
 Extraction Date 09/15/2020
 Analytical Instrument Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	65	H8712-FS1(0)	9/16/2020
13C4-PFHpA	79	H8712-FS1(0)	9/16/2020
13C8-PFOA	75	H8712-FS1(0)	9/16/2020
13C9-PFNA	74	H8712-FS1(0)	9/16/2020
13C6-PFDA	70	H8712-FS1(0)	9/16/2020
13C7-PFUnA	61	H8712-FS1(0)	9/16/2020
13C2-PFDoA	42	H8712-FS1(0)	9/16/2020
13C2-PFTeDA	31	H8712-FS1(0)	9/16/2020
d3-MeFOSAA	66	H8712-FS1(0)	9/16/2020
d5-EtFOSAA	70	H8712-FS1(0)	9/16/2020
13C3-PFBS	62	H8712-FS1(0)	9/16/2020
13C3-PFHxS	82	H8712-FS1(0)	9/16/2020
13C8-PFOS	67	H8712-FS1(0)	9/16/2020
13C3-HFPO-DA	69	H8712-FS1(0)	9/16/2020

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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-H2133-SW01P-0820

Battelle ID H8713-FS1
 Sample Type SA
 Collection Date 08/20/2020
 Extraction Date 09/15/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.270
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	54.45 T J	H8713-FS1(0)	1.000	9/16/2020	0.49	1.39	4.63
PFHpA	375-85-9	43.43 T	H8713-FS1(0)	1.000	9/16/2020	0.24	0.93	4.63
PFOA	335-67-1	40.02 T	H8713-FS1(0)	1.000	9/16/2020	0.47	1.39	4.63
PFNA	375-95-1	10.22 T	H8713-FS1(0)	1.000	9/16/2020	0.29	0.93	4.63
PFDA	335-76-2	2.94 JT	H8713-FS1(0)	1.000	9/16/2020	0.13	0.46	4.63
PFUnA	2058-94-8	0.53 JT	H8713-FS1(0)	1.000	9/16/2020	0.20	0.46	4.63
PFDoA	307-55-1	0.46 UT	H8713-FS1(0)	1.000	9/16/2020	0.18	0.46	4.63
PFTrDA	72629-94-8	0.46 UT	H8713-FS1(0)	1.000	9/16/2020	0.14	0.46	4.63
PFTeDA	376-06-7	1.85 UT	H8713-FS1(0)	1.000	9/16/2020	0.68	1.85	4.63
NMeFOSAA	2355-31-9	0.93 UT	H8713-FS1(0)	1.000	9/16/2020	0.32	0.93	4.63
NEtFOSAA	2991-50-6	0.93 UT	H8713-FS1(0)	1.000	9/16/2020	0.46	0.93	4.63
PFBS	375-73-5	4.69 T J	H8713-FS1(0)	1.000	9/16/2020	0.13	0.46	4.63
PFHxS	355-46-4	3.92 JT	H8713-FS1(0)	1.000	9/16/2020	0.10	0.37	4.63
PFOS	1763-23-1	8.05 T	H8713-FS1(0)	1.000	9/16/2020	0.41	0.93	4.63
HFPO-DA	13252-13-6	0.46 UT	H8713-FS1(0)	1.000	9/16/2020	0.23	0.46	4.63
Adona	919005-14-4	0.93 UT	H8713-FS1(0)	1.000	9/16/2020	0.25	0.93	4.63
11CI-PF3OUdS	763051-92-9	0.46 UT	H8713-FS1(0)	1.000	9/16/2020	0.21	0.46	4.63
9CI-PF3ONS	756426-58-1	0.93 UT	H8713-FS1(0)	1.000	9/16/2020	0.25	0.93	4.63

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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-H2133-SW01P-0820

Battelle ID H8713-FS1
 Sample Type SA
 Collection Date 08/20/2020
 Extraction Date 09/15/2020
 Analytical Instrument Sciex 5500 LC/MS/MS

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use original

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	65	H8713-FS1(0)	9/16/2020
13C4-PFHpA	79	H8713-FS1(0)	9/16/2020
13C8-PFOA	76	H8713-FS1(0)	9/16/2020
13C9-PFNA	72	H8713-FS1(0)	9/16/2020
13C6-PFDA	60	H8713-FS1(0)	9/16/2020
13C7-PFUnA	42 N	H8713-FS1(0)	9/16/2020
13C2-PFDoA	25 N	H8713-FS1(0)	9/16/2020
13C2-PFTeDA	10 N	H8713-FS1(0)	9/16/2020
d3-MeFOSAA	54	H8713-FS1(0)	9/16/2020
d5-EtFOSAA	50	H8713-FS1(0)	9/16/2020
13C3-PFBS	68	H8713-FS1(0)	9/16/2020
13C3-PFHxS	96	H8713-FS1(0)	9/16/2020
13C8-PFOS	66	H8713-FS1(0)	9/16/2020
13C3-HFPO-DA	69	H8713-FS1(0)	9/16/2020

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Analyzed by: Griffith, Lauren
 Printed: 9/18/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-H2133-WT02-0820

Battelle ID H8714-FS1
 Sample Type SA
 Collection Date 08/20/2020
 Extraction Date 09/15/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.255
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	146.55 TD	H8714-FS1-D(3)	5.000	9/16/2020	2.60	7.35	24.51
PFHpA	375-85-9	40.38 T	H8714-FS1(0)	1.000	9/16/2020	0.25	0.98	4.90
PFOA	335-67-1	6.99 T	H8714-FS1(0)	1.000	9/16/2020	0.50	1.47	4.90
PFNA	375-95-1	0.68 JT	H8714-FS1(0)	1.000	9/16/2020	0.30	0.98	4.90
PFDA	335-76-2	0.49 UT	H8714-FS1(0)	1.000	9/16/2020	0.14	0.49	4.90
PFUnA	2058-94-8	0.49 UT	H8714-FS1(0)	1.000	9/16/2020	0.22	0.49	4.90
PFDoA	307-55-1	0.49 UT	H8714-FS1(0)	1.000	9/16/2020	0.19	0.49	4.90
PFTTrDA	72629-94-8	0.49 UT	H8714-FS1(0)	1.000	9/16/2020	0.15	0.49	4.90
PFTeDA	376-06-7	1.96 UT	H8714-FS1(0)	1.000	9/16/2020	0.72	1.96	4.90
NMeFOSAA	2355-31-9	0.98 UT	H8714-FS1(0)	1.000	9/16/2020	0.34	0.98	4.90
NEtFOSAA	2991-50-6	0.98 UT	H8714-FS1(0)	1.000	9/16/2020	0.49	0.98	4.90
PFBS	375-73-5	30.84 T	H8714-FS1(0)	1.000	9/16/2020	0.14	0.49	4.90
PFHxS	355-46-4	15.32 T	H8714-FS1(0)	1.000	9/16/2020	0.11	0.39	4.90
PFOS	1763-23-1	7.32 T	H8714-FS1(0)	1.000	9/16/2020	0.43	0.98	4.90
HFPO-DA	13252-13-6	0.49 UT	H8714-FS1(0)	1.000	9/16/2020	0.25	0.49	4.90
Adona	919005-14-4	0.98 UT	H8714-FS1(0)	1.000	9/16/2020	0.26	0.98	4.90
11CI-PF3OUds	763051-92-9	0.49 UT	H8714-FS1(0)	1.000	9/16/2020	0.23	0.49	4.90
9CI-PF3ONS	756426-58-1	0.98 UT	H8714-FS1(0)	1.000	9/16/2020	0.26	0.98	4.90

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9/10/2020
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 Printed: 9/18/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-H2133-WT02-0820
 Battelle ID H8714-FS1
 Sample Type SA
 Collection Date 08/20/2020
 Extraction Date 09/15/2020
 Analytical Instrument Sciex 5500 LC/MS/MS

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 use
 original
 results

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	86 D	H8714-FS1-D(3)	9/16/2020
13C4-PFHxA	81	H8714-FS1(0)	9/16/2020
13C8-PFOA	76	H8714-FS1(0)	9/16/2020
13C9-PFNA	75	H8714-FS1(0)	9/16/2020
13C6-PFDA	65	H8714-FS1(0)	9/16/2020
13C7-PFUnA	59	H8714-FS1(0)	9/16/2020
13C2-PFDoA	44 N	H8714-FS1(0)	9/16/2020
13C2-PFTeDA	28 N	H8714-FS1(0)	9/16/2020
d3-MeFOSAA	64	H8714-FS1(0)	9/16/2020
d5-EtFOSAA	69	H8714-FS1(0)	9/16/2020
13C3-PFBS	79	H8714-FS1(0)	9/16/2020
13C3-PFHxS	82	H8714-FS1(0)	9/16/2020
13C8-PFOS	68	H8714-FS1(0)	9/16/2020
13C3-HFPO-DA	72	H8714-FS1(0)	9/16/2020

NW 10/27/20

Analyzed by: Griffith, Lauren
 Printed: 9/18/2020



Project Client: CH2M
Project Name: CTO-4256: PAX Basewide PFAS
Project No.: 100142032

Client ID PX-H2133-WT06P-0820

Battelle ID H8721-F51
Sample Type SA
Collection Date 08/20/2020
Extraction Date 09/15/2020
Analytical Instrument Sciex 5500 LC/MS/MS
% Moisture NA
Matrix WATER
Sample Size 0.265
Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	525.69 TD	H8721-F51-D(5)	25.000	9/17/2020	12.50	35.38	117.92
PFHpA	375-85-9	460.57 TD	H8721-F51-D(5)	25.000	9/17/2020	6.13	23.58	117.92
PFOA	335-67-1	189.63 TD	H8721-F51-D(3)	5.000	9/16/2020	2.41	7.08	23.58
PFNA	375-95-1	65.42 T	H8721-F51(0)	1.000	9/16/2020	0.29	0.94	4.72
PFDA	335-76-2	33.14 T	H8721-F51(0)	1.000	9/16/2020	0.13	0.47	4.72
PFUnA	2058-94-8	4.09 JT	H8721-F51(0)	1.000	9/16/2020	0.21	0.47	4.72
PFDoA	307-55-1	0.57 JT	H8721-F51(0)	1.000	9/16/2020	0.18	0.47	4.72
PFTTrDA	72629-94-8	0.47 UT	H8721-F51(0)	1.000	9/16/2020	0.14	0.47	4.72
PFTeDA	376-06-7	1.89 UT	H8721-F51(0)	1.000	9/16/2020	0.69	1.89	4.72
NMeFOSAA	2355-31-9	0.94 UT	H8721-F51(0)	1.000	9/16/2020	0.33	0.94	4.72
NEtFOSAA	2991-50-6	0.94 UT	H8721-F51(0)	1.000	9/16/2020	0.47	0.94	4.72
PFBS	375-73-5	4.12 JT	H8721-F51(0)	1.000	9/16/2020	0.13	0.47	4.72
PFHxS	355-46-4	4.41 JT	H8721-F51(0)	1.000	9/16/2020	0.10	0.38	4.72
PFOS	1763-23-1	13.45 T	H8721-F51(0)	1.000	9/16/2020	0.42	0.94	4.72
HFPO-DA	13252-13-6	0.42 JT	H8721-F51(0)	1.000	9/16/2020	0.24	0.47	4.72
Adona	919005-14-4	0.94 UT	H8721-F51(0)	1.000	9/16/2020	0.25	0.94	4.72
11CI-PF3OUdS	763051-92-9	0.47 UT	H8721-F51(0)	1.000	9/16/2020	0.22	0.47	4.72
9CI-PF3ONS	756426-58-1	0.94 UT	H8721-F51(0)	1.000	9/16/2020	0.25	0.94	4.72

Use original results in 20-0986

HT

HW 10/27/20
Analyzed by: Griffith, Lauren
Printed: 9/18/2020

**DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND**

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-1133
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: October 29, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-H2835-WT03-0920	H9862-FS	Water
2	PX-H2835-WT02-0920	H9863-FS	Water
3	PX-H2835-WT02P-0920	H9864-FS	Water
4	PX-H2835-WT01-0920	H9865-FS	Water
5	PX-H2835-WT04-0920	H9866-FS	Water
5MS	PX-H2835-WT04-0920MS	H9867-FSMS	Water
5MSD	PX-H2835-WT04-0920MSD	H9868-FSMSD	Water
6	PX-H2835-WT05-0920	H9869-FS	Water
7	PX-H2835-WT06-0920	H9870-FS	Water
8	PX-H2835-FB01-091120	H9871-FS	Water
9	PX-H2835-EB01-091120-GW	H9872-FS	Water
10	PX-H2835-EB01-091120-SO	H9884-FS	Water
11	PX-FFDA-WT01-0920	H9885-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for eight water samples, two aqueous equipment blank samples, and one aqueous field blank sample collected on September 11-12, 2020 by CH2M HILL at the NAS Patuxent River site in Maryland. The samples were analyzed under the Analysis of Poly and Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-08

The data have been validated according to the protocols and quality control (QC) requirements of the analytical methods, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, Webster Field Annex, Naval Air Station Patuxent River, Maryland, April 2020, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, St. Mary's County, Naval Air Station Patuxent River, Maryland, April 2020, and the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

Organics

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A full (Stage 2B/4) data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

Per- and Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-H2835-FB01-091120	None - ND	-	-	-
PX-H2835-EB01-091120-GW	None - ND	-	-	-
PX-H2835-EB01-091120-SO	None - ND	-	-	-
PX-FFDA-FB01-091220	None - ND	-	-	-
PX-FFDA-EB01-091220	None - ND	-	-	-

Surrogate Spike Recoveries

- Several samples exhibited low surrogate percent recoveries (%R) for several surrogate compounds. These compounds were qualified as estimated (J/UJ) in each sample. Please refer to the Form Is for specific recoveries and qualifications.

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values except for the following.

EDS Sample ID	Compound	MS %R/MSD %R/RDP	Qualifier
5	PFHxA	133%/OK/OK	None - 4X Rule Applies
	PFHpA	138%/OK/48.6	None - 4X Rule Applies
	PFOA	137%/OK/43.6	None - 4X Rule Applies
	PFNA	OK/160%/OK	None - 4X Rule Applies
	HFPO-DA	57%/55%/OK	UJ

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- The samples were analyzed at several dilutions due to high concentrations of target compounds. The reporting limits were adjusted accordingly. No action was required.

Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

Compound	PX-H2835-WT02-0920 ng/g	PX-H2835-WT02P-0920 ng/g	RPD	Qualifier
PFHxA	38.47	39.97	4%	None
PFHpA	53.61	54.57	2%	
PFOA	37.71	34.35	9%	
PFNA	15.11	16.11	6%	
PFDA	6.91	6.51	6%	
PFUnA	0.76	0.70	8%	
PFBS	5.52	5.24	5%	
PFHxS	8.18	8.29	1%	
PFOS	17.09	16.26	5%	

Please contact the undersigned at (757) 564-0090 if you have any questions or need further information.

Signed:

Nancy Weaver
Nancy Weaver
Senior Chemist

Dated: 11/2/20

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-H2835-WT03-0920

Battelle ID H9862-FS
 Sample Type SA
 Collection Date 09/11/2020
 Extraction Date 09/22/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.270
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	314.34 D	H9862-FS-D(3)	5.000	10/9/2020	2.45	6.94	23.15
PFHpA	375-85-9	469.87 D	H9862-FS-D(5)	25.000	10/11/2020	6.02	23.15	115.74
PFOA	335-67-1	451.26 D	H9862-FS-D(3)	5.000	10/9/2020	2.36	6.94	23.15
PFNA	375-95-1	254.06 D	H9862-FS-D(3)	5.000	10/9/2020	1.44	4.63	23.15
PFDA	335-76-2	49.64	H9862-FS(0)	1.000	10/9/2020	0.13	0.46	4.63
PFUnA	2058-94-8	0.20 J	H9862-FS(0)	1.000	10/9/2020	0.20	0.46	4.63
PFDoA	307-55-1	0.46 U	H9862-FS(0)	1.000	10/9/2020	0.18	0.46	4.63
PFTTrDA	72629-94-8	0.46 U	H9862-FS(0)	1.000	10/9/2020	0.14	0.46	4.63
PFTeDA	376-06-7	1.85 U	H9862-FS(0)	1.000	10/9/2020	0.68	1.85	4.63
NMeFOSAA	2355-31-9	0.93 U	H9862-FS(0)	1.000	10/9/2020	0.32	0.93	4.63
NEtFOSAA	2991-50-6	0.93 U	H9862-FS(0)	1.000	10/9/2020	0.46	0.93	4.63
PFBS	375-73-5	3.33 J	H9862-FS(0)	1.000	10/9/2020	0.13	0.46	4.63
PFHxS	355-46-4	178.03 D	H9862-FS-D(3)	5.000	10/9/2020	0.51	1.85	23.15
PFOS	1763-23-1	57.44	H9862-FS(0)	1.000	10/9/2020	0.41	0.93	4.63
HFPO-DA	13252-13-6	0.46 U	H9862-FS(0)	1.000	10/9/2020	0.23	0.46	4.63
Adona	919005-14-4	0.93 U	H9862-FS(0)	1.000	10/9/2020	0.25	0.93	4.63
11CI-PF3OUdS	763051-92-9	0.46 U	H9862-FS(0)	1.000	10/9/2020	0.21	0.46	4.63
9CI-PF3ONS	756426-58-1	0.93 U	H9862-FS(0)	1.000	10/9/2020	0.25	0.93	4.63

mw 10/29/20
 Analyzed by: S. Sumitz, Denise
 Printed: 10/12/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

2

Client ID PX-H2835-WT02-0920

Battelle ID H9863-FS
 Sample Type SA
 Collection Date 09/11/2020
 Extraction Date 09/22/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.275
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	38.47 J	H9863-FS(0)	1.000	10/9/2020	0.48	1.36	4.55
PFHpA	375-85-9	53.61 J	H9863-FS(0)	1.000	10/9/2020	0.24	0.91	4.55
PFOA	335-67-1	37.71	H9863-FS(0)	1.000	10/9/2020	0.46	1.36	4.55
PFNA	375-95-1	15.11	H9863-FS(0)	1.000	10/9/2020	0.28	0.91	4.55
PFDA	335-76-2	6.91	H9863-FS(0)	1.000	10/9/2020	0.13	0.45	4.55
PFUnA	2058-94-8	0.76 J	H9863-FS(0)	1.000	10/9/2020	0.20	0.45	4.55
PFDoA	307-55-1	0.45 U	H9863-FS(0)	1.000	10/9/2020	0.17	0.45	4.55
PFTrDA	72629-94-8	0.45 U	H9863-FS(0)	1.000	10/9/2020	0.14	0.45	4.55
PFTeDA	376-06-7	1.82 U	H9863-FS(0)	1.000	10/9/2020	0.66	1.82	4.55
NMeFOSAA	2355-31-9	0.91 U	H9863-FS(0)	1.000	10/9/2020	0.32	0.91	4.55
NEtFOSAA	2991-50-6	0.91 U	H9863-FS(0)	1.000	10/9/2020	0.45	0.91	4.55
PFBS	375-73-5	5.52	H9863-FS(0)	1.000	10/9/2020	0.13	0.45	4.55
PFHxS	355-46-4	8.18	H9863-FS(0)	1.000	10/9/2020	0.10	0.36	4.55
PFOS	1763-23-1	17.09	H9863-FS(0)	1.000	10/9/2020	0.40	0.91	4.55
HFPO-DA	13252-13-6	0.45 U	H9863-FS(0)	1.000	10/9/2020	0.23	0.45	4.55
Adona	919005-14-4	0.91 U	H9863-FS(0)	1.000	10/9/2020	0.25	0.91	4.55
11CI-PF3OUdS	763051-92-9	0.45 U	H9863-FS(0)	1.000	10/9/2020	0.21	0.45	4.55
9CI-PF3ONS	756426-58-1	0.91 U	H9863-FS(0)	1.000	10/9/2020	0.25	0.91	4.55

SSL
SSL

10/12/20
 Analyzed by: Schumitz, Denise
 Printed: 10/12/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

2

Client ID PX-H2835-WT02-0920
 Battelle ID H9863-FS
 Sample Type SA
 Collection Date 09/11/2020
 Extraction Date 09/22/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	40	H9863-FS(0)	10/9/2020
13C4-PFHpA	49	H9863-FS(0)	10/9/2020
13C8-PFOA	50	H9863-FS(0)	10/9/2020
13C9-PFNA	66	H9863-FS(0)	10/9/2020
13C6-PFDA	73	H9863-FS(0)	10/9/2020
13C7-PFUnA	84	H9863-FS(0)	10/9/2020
13C2-PFDoA	84	H9863-FS(0)	10/9/2020
13C2-PFTeDA	91	H9863-FS(0)	10/9/2020
d3-MeFOSAA	95	H9863-FS(0)	10/9/2020
d5-EtFOSAA	103	H9863-FS(0)	10/9/2020
13C3-PFBS	67	H9863-FS(0)	10/9/2020
13C3-PFHxS	81	H9863-FS(0)	10/9/2020
13C8-PFOS	92	H9863-FS(0)	10/9/2020
13C3-HFPQ-DA	56	H9863-FS(0)	10/9/2020

ANALYZED BY: SCHUMITZ, DENISE
 PRINTED: 10/12/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

3

Client ID PX-H2835-WT02P-0920

Battelle ID H9864-FS
 Sample Type SA
 Collection Date 09/11/2020
 Extraction Date 09/22/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.275
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	39.97 J	H9864-FS(0)	1.000	10/9/2020	0.48	1.36	4.55
PFHpA	375-85-9	54.57	H9864-FS(0)	1.000	10/9/2020	0.24	0.91	4.55
PFOA	335-67-1	34.35	H9864-FS(0)	1.000	10/9/2020	0.46	1.36	4.55
PFNA	375-95-1	16.11	H9864-FS(0)	1.000	10/9/2020	0.28	0.91	4.55
PFDA	335-76-2	6.51	H9864-FS(0)	1.000	10/9/2020	0.13	0.45	4.55
PFUnA	2058-94-8	0.70 J	H9864-FS(0)	1.000	10/9/2020	0.20	0.45	4.55
PFDoA	307-55-1	0.45 U	H9864-FS(0)	1.000	10/9/2020	0.17	0.45	4.55
PFTTrDA	72629-94-8	0.45 U	H9864-FS(0)	1.000	10/9/2020	0.14	0.45	4.55
PFTeDA	376-06-7	1.82 U	H9864-FS(0)	1.000	10/9/2020	0.66	1.82	4.55
NMeFOSAA	2355-31-9	0.91 U	H9864-FS(0)	1.000	10/9/2020	0.32	0.91	4.55
NEtFOSAA	2991-50-6	0.91 U	H9864-FS(0)	1.000	10/9/2020	0.45	0.91	4.55
PFBS	375-73-5	5.24	H9864-FS(0)	1.000	10/9/2020	0.13	0.45	4.55
PFHxS	355-46-4	8.29	H9864-FS(0)	1.000	10/9/2020	0.10	0.36	4.55
PFOS	1763-23-1	16.26	H9864-FS(0)	1.000	10/9/2020	0.40	0.91	4.55
HFPO-DA	13252-13-6	0.45 U	H9864-FS(0)	1.000	10/9/2020	0.23	0.45	4.55
Adona	919005-14-4	0.91 U	H9864-FS(0)	1.000	10/9/2020	0.25	0.91	4.55
11CI-PF3OUdS	763051-92-9	0.45 U	H9864-FS(0)	1.000	10/9/2020	0.21	0.45	4.55
9CI-PF3ONS	756426-58-1	0.91 U	H9864-FS(0)	1.000	10/9/2020	0.25	0.91	4.55

SSL

10/12/2020
 Analyzed by: Schumitz, Denise
 Printed: 10/12/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

3

Client ID PX-H2835-WT02P-0920

Battelle ID H9864-FS
 Sample Type SA
 Collection Date 09/11/2020
 Extraction Date 09/22/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	44 N	H9864-FS(0)	10/9/2020
13C4-PFHpA	57	H9864-FS(0)	10/9/2020
13C8-PFOA	68	H9864-FS(0)	10/9/2020
13C9-PFNA	76	H9864-FS(0)	10/9/2020
13C6-PFDA	80	H9864-FS(0)	10/9/2020
13C7-PFUnA	89	H9864-FS(0)	10/9/2020
13C2-PFDoA	86	H9864-FS(0)	10/9/2020
13C2-PFTeDA	82	H9864-FS(0)	10/9/2020
d3-MeFOSAA	100	H9864-FS(0)	10/9/2020
d5-EtFOSAA	105	H9864-FS(0)	10/9/2020
13C3-PFBS	69	H9864-FS(0)	10/9/2020
13C3-PFHxS	78	H9864-FS(0)	10/9/2020
13C8-PFOS	88	H9864-FS(0)	10/9/2020
13C3-HFPO-DA	62	H9864-FS(0)	10/9/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

4

Client ID PX-H2835-WT01-0920

Battelle ID H9865-FS
 Sample Type SA
 Collection Date 09/11/2020
 Extraction Date 09/22/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.275
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.02 J	H9865-FS(0)	1.000	10/9/2020	0.48	1.36	4.55
PFHpA	375-85-9	0.48 J	H9865-FS(0)	1.000	10/9/2020	0.24	0.91	4.55
PFOA	335-67-1	1.82 J	H9865-FS(0)	1.000	10/9/2020	0.46	1.36	4.55
PFNA	375-95-1	0.91 U	H9865-FS(0)	1.000	10/9/2020	0.28	0.91	4.55
PFDA	335-76-2	0.45 U	H9865-FS(0)	1.000	10/9/2020	0.13	0.45	4.55
PFUnA	2058-94-8	0.45 U	H9865-FS(0)	1.000	10/9/2020	0.20	0.45	4.55
PFDoA	307-55-1	0.45 U	H9865-FS(0)	1.000	10/9/2020	0.17	0.45	4.55
PFTrDA	72629-94-8	0.45 U	H9865-FS(0)	1.000	10/9/2020	0.14	0.45	4.55
PFTeDA	376-06-7	1.82 U	H9865-FS(0)	1.000	10/9/2020	0.66	1.82	4.55
NMeFOSAA	2355-31-9	0.91 U	H9865-FS(0)	1.000	10/9/2020	0.32	0.91	4.55
NEtFOSAA	2991-50-6	0.91 U	H9865-FS(0)	1.000	10/9/2020	0.45	0.91	4.55
PFBS	375-73-5	1.17 J	H9865-FS(0)	1.000	10/9/2020	0.13	0.45	4.55
PFHxS	355-46-4	14.75	H9865-FS(0)	1.000	10/9/2020	0.10	0.36	4.55
PFOS	1763-23-1	4.45 J	H9865-FS(0)	1.000	10/9/2020	0.40	0.91	4.55
HFPO-DA	13252-13-6	0.45 U	H9865-FS(0)	1.000	10/9/2020	0.23	0.45	4.55
Adona	919005-14-4	0.91 U	H9865-FS(0)	1.000	10/9/2020	0.25	0.91	4.55
11CI-PF3OUdS	763051-92-9	0.45 U	H9865-FS(0)	1.000	10/9/2020	0.21	0.45	4.55
9CI-PF3ONS	756426-58-1	0.91 U	H9865-FS(0)	1.000	10/9/2020	0.25	0.91	4.55

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Project Client: CH2M
Project Name: CTO-4256: PAX Basewide PFAS
Project No.: 100142032

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Client ID PX-H2835-WT01-0920
Battelle ID H9865-FS
Sample Type SA
Collection Date 09/11/2020
Extraction Date 09/22/2020
Analytical Instrument Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	48	H9865-FS(0)	10/9/2020
13C4-PFHpA	61	H9865-FS(0)	10/9/2020
13C8-PFOA	67	H9865-FS(0)	10/9/2020
13C9-PFNA	77	H9865-FS(0)	10/9/2020
13C6-PFDA	85	H9865-FS(0)	10/9/2020
13C7-PFUnA	88	H9865-FS(0)	10/9/2020
13C2-PFDoA	94	H9865-FS(0)	10/9/2020
13C2-PFTeDA	88	H9865-FS(0)	10/9/2020
d3-MeFOSAA	75	H9865-FS(0)	10/9/2020
d5-EtFOSAA	82	H9865-FS(0)	10/9/2020
13C3-PFBS	72	H9865-FS(0)	10/9/2020
13C3-PFHxS	82	H9865-FS(0)	10/9/2020
13C8-PFOS	91	H9865-FS(0)	10/9/2020
13C3-HFPD-DA	54	H9865-FS(0)	10/9/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-H2835-WT04-0920

Battelle ID H9866-FS
 Sample Type SA
 Collection Date 09/11/2020
 Extraction Date 09/22/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.275
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	183.45 P	H9866-FS-D(3)	5.000	10/9/2020	2.41	6.82	22.73
PFHpA	375-85-9	361.88 P	H9866-FS-D(3)	5.000	10/9/2020	1.18	4.55	22.73
PFOA	335-67-1	200.84 P	H9866-FS-D(3)	5.000	10/9/2020	2.32	6.82	22.73
PFNA	375-95-1	196.47 P	H9866-FS-D(3)	5.000	10/9/2020	1.41	4.55	22.73
PFDA	335-76-2	55.60	H9866-FS(0)	1.000	10/9/2020	0.13	0.45	4.55
PFUnA	2058-94-8	1.48 J	H9866-FS(0)	1.000	10/9/2020	0.20	0.45	4.55
PFDoA	307-55-1	0.45 U	H9866-FS(0)	1.000	10/9/2020	0.17	0.45	4.55
PFTrDA	72629-94-8	0.45 U	H9866-FS(0)	1.000	10/9/2020	0.14	0.45	4.55
PFTeDA	376-06-7	1.82 U	H9866-FS(0)	1.000	10/9/2020	0.66	1.82	4.55
NMeFOSAA	2355-31-9	0.91 U	H9866-FS(0)	1.000	10/9/2020	0.32	0.91	4.55
NEtFOSAA	2991-50-6	0.91 U	H9866-FS(0)	1.000	10/9/2020	0.45	0.91	4.55
PFBS	375-73-5	5.44	H9866-FS(0)	1.000	10/9/2020	0.13	0.45	4.55
PFHxS	355-46-4	21.75	H9866-FS(0)	1.000	10/9/2020	0.10	0.36	4.55
PFOS	1763-23-1	98.55 P	H9866-FS-D(3)	5.000	10/9/2020	2.00	4.55	22.73
HFPO-DA	13252-13-6	0.45 WJ	H9866-FS(0)	1.000	10/9/2020	0.23	0.45	4.55
Adona	919005-14-4	0.91 U	H9866-FS(0)	1.000	10/9/2020	0.25	0.91	4.55
11CI-PF3OUdS	763051-92-9	0.45 U	H9866-FS(0)	1.000	10/9/2020	0.21	0.45	4.55
9CI-PF3ONS	756426-58-1	0.91 U	H9866-FS(0)	1.000	10/9/2020	0.25	0.91	4.55

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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-H2835-WT05-0920

Battelle ID H9869-FS
 Sample Type SA
 Collection Date 09/11/2020
 Extraction Date 09/22/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.270
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.04 J	H9869-FS(0)	1.000	10/9/2020	0.49	1.39	4.63
PFHpA	375-85-9	0.29 J	H9869-FS(0)	1.000	10/9/2020	0.24	0.93	4.63
PFOA	335-67-1	0.86 J	H9869-FS(0)	1.000	10/9/2020	0.47	1.39	4.63
PFNA	375-95-1	0.93 U	H9869-FS(0)	1.000	10/9/2020	0.29	0.93	4.63
PFDA	335-76-2	0.46 U	H9869-FS(0)	1.000	10/9/2020	0.13	0.46	4.63
PFUnA	2058-94-8	0.46 U	H9869-FS(0)	1.000	10/9/2020	0.20	0.46	4.63
PFDoA	307-55-1	0.46 U	H9869-FS(0)	1.000	10/9/2020	0.18	0.46	4.63
PFTrDA	72629-94-8	0.46 U	H9869-FS(0)	1.000	10/9/2020	0.14	0.46	4.63
PFTeDA	376-06-7	1.85 U J	H9869-FS(0)	1.000	10/9/2020	0.68	1.85	4.63
NMeFOSAA	2355-31-9	0.93 U	H9869-FS(0)	1.000	10/9/2020	0.32	0.93	4.63
NEtFOSAA	2991-50-6	0.93 U	H9869-FS(0)	1.000	10/9/2020	0.46	0.93	4.63
PFBS	375-73-5	0.74 J	H9869-FS(0)	1.000	10/9/2020	0.13	0.46	4.63
PFHxS	355-46-4	3.49 J	H9869-FS(0)	1.000	10/9/2020	0.10	0.37	4.63
PFOS	1763-23-1	2.00 J	H9869-FS(0)	1.000	10/9/2020	0.41	0.93	4.63
HFPO-DA	13252-13-6	0.46 U	H9869-FS(0)	1.000	10/9/2020	0.23	0.46	4.63
Adona	919005-14-4	0.93 U	H9869-FS(0)	1.000	10/9/2020	0.25	0.93	4.63
11CI-PF3OUdS	763051-92-9	0.46 U	H9869-FS(0)	1.000	10/9/2020	0.21	0.46	4.63
9CI-PF3ONS	756426-58-1	0.93 U	H9869-FS(0)	1.000	10/9/2020	0.25	0.93	4.63

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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-H2835-WT05-0920
 Battelle ID H9869-FS
 Sample Type SA
 Collection Date 09/11/2020
 Extraction Date 09/22/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	51	H9869-FS(0)	10/9/2020
13C4-PFHpA	68	H9869-FS(0)	10/9/2020
13C8-PFOA	78	H9869-FS(0)	10/9/2020
13C9-PFNA	80	H9869-FS(0)	10/9/2020
13C6-PFDA	84	H9869-FS(0)	10/9/2020
13C7-PFUnA	81	H9869-FS(0)	10/9/2020
13C2-PFDoA	81	H9869-FS(0)	10/9/2020
13C2-PFTeDA	48	H9869-FS(0)	10/9/2020
d3-MeFOSAA	84	H9869-FS(0)	10/9/2020
d5-EtFOSAA	98	H9869-FS(0)	10/9/2020
13C3-PFBS	68	H9869-FS(0)	10/9/2020
13C3-PFHxS	84	H9869-FS(0)	10/9/2020
13C8-PFOS	101	H9869-FS(0)	10/9/2020
13C3-HFPO-DA	52	H9869-FS(0)	10/9/2020

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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-H2835-WT06-0920

Battelle ID H9870-FS
 Sample Type SA
 Collection Date 09/11/2020
 Extraction Date 09/22/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.270
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	16.11 J	H9870-FS(0)	1.000	10/9/2020	0.49	1.39	4.63
PFHpA	375-85-9	13.44	H9870-FS(0)	1.000	10/9/2020	0.24	0.93	4.63
PFOA	335-67-1	8.73	H9870-FS(0)	1.000	10/9/2020	0.47	1.39	4.63
PFNA	375-95-1	3.89 J	H9870-FS(0)	1.000	10/9/2020	0.29	0.93	4.63
PFDA	335-76-2	0.42 J	H9870-FS(0)	1.000	10/9/2020	0.13	0.46	4.63
PFUnA	2058-94-8	0.46 U	H9870-FS(0)	1.000	10/9/2020	0.20	0.46	4.63
PFDoA	307-55-1	0.46 U	H9870-FS(0)	1.000	10/9/2020	0.18	0.46	4.63
PFTTrDA	72629-94-8	0.46 U	H9870-FS(0)	1.000	10/9/2020	0.14	0.46	4.63
PFTeDA	376-06-7	1.85 U	H9870-FS(0)	1.000	10/9/2020	0.68	1.85	4.63
NMeFOSAA	2355-31-9	0.93 U	H9870-FS(0)	1.000	10/9/2020	0.32	0.93	4.63
NEtFOSAA	2991-50-6	0.93 U	H9870-FS(0)	1.000	10/9/2020	0.46	0.93	4.63
PFBS	375-73-5	3.83 J	H9870-FS(0)	1.000	10/9/2020	0.13	0.46	4.63
PFHxS	355-46-4	8.45	H9870-FS(0)	1.000	10/9/2020	0.10	0.37	4.63
PFOS	1763-23-1	3.92 J	H9870-FS(0)	1.000	10/9/2020	0.41	0.93	4.63
HFPO-DA	13252-13-6	0.46 U	H9870-FS(0)	1.000	10/9/2020	0.23	0.46	4.63
Adona	919005-14-4	0.93 U	H9870-FS(0)	1.000	10/9/2020	0.25	0.93	4.63
11CI-PF3OUdS	763051-92-9	0.46 U	H9870-FS(0)	1.000	10/9/2020	0.21	0.46	4.63
9CI-PF3ONS	756426-58-1	0.93 U	H9870-FS(0)	1.000	10/9/2020	0.25	0.93	4.63

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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-H2835-WT06-0920

Battelle ID H9870-FS
 Sample Type SA
 Collection Date 09/11/2020
 Extraction Date 09/22/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	46	H9870-FS(0)	10/9/2020
13C4-PFHpA	65	H9870-FS(0)	10/9/2020
13C8-PFOA	80	H9870-FS(0)	10/9/2020
13C9-PFNA	89	H9870-FS(0)	10/9/2020
13C6-PFDA	89	H9870-FS(0)	10/9/2020
13C7-PFUnA	91	H9870-FS(0)	10/9/2020
13C2-PFDoA	87	H9870-FS(0)	10/9/2020
13C2-PFTeDA	87	H9870-FS(0)	10/9/2020
d3-MeFOSAA	96	H9870-FS(0)	10/9/2020
d5-EtFOSAA	107	H9870-FS(0)	10/9/2020
13C3-PFBS	67	H9870-FS(0)	10/9/2020
13C3-PFHxS	93	H9870-FS(0)	10/9/2020
13C8-PFOS	97	H9870-FS(0)	10/9/2020
13C3-HFPO-DA	62	H9870-FS(0)	10/9/2020

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 Analyzed by: Schumitz, Denise
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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-H2835-FB01-091120

Battelle ID H9871-FS
 Sample Type SA
 Collection Date 09/11/2020
 Extraction Date 09/22/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.270
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.39 U	H9871-FS(0)	1.000	10/9/2020	0.49	1.39	4.63
PFHpA	375-85-9	0.93 U	H9871-FS(0)	1.000	10/9/2020	0.24	0.93	4.63
PFOA	335-67-1	1.39 U	H9871-FS(0)	1.000	10/9/2020	0.47	1.39	4.63
PFNA	375-95-1	0.93 U	H9871-FS(0)	1.000	10/9/2020	0.29	0.93	4.63
PFDA	335-76-2	0.46 U	H9871-FS(0)	1.000	10/9/2020	0.13	0.46	4.63
PFUnA	2058-94-8	0.46 U	H9871-FS(0)	1.000	10/9/2020	0.20	0.46	4.63
PFDoA	307-55-1	0.46 U	H9871-FS(0)	1.000	10/9/2020	0.18	0.46	4.63
PFTTrDA	72629-94-8	0.46 U	H9871-FS(0)	1.000	10/9/2020	0.14	0.46	4.63
PFTeDA	376-06-7	1.85 U	H9871-FS(0)	1.000	10/9/2020	0.68	1.85	4.63
NMeFOSAA	2355-31-9	0.93 U	H9871-FS(0)	1.000	10/9/2020	0.32	0.93	4.63
NeFOSAA	2991-50-6	0.93 U	H9871-FS(0)	1.000	10/9/2020	0.46	0.93	4.63
PFBS	375-73-5	0.46 U	H9871-FS(0)	1.000	10/9/2020	0.13	0.46	4.63
PFHxS	355-46-4	0.37 U	H9871-FS(0)	1.000	10/9/2020	0.10	0.37	4.63
PFOS	1763-23-1	0.93 U	H9871-FS(0)	1.000	10/9/2020	0.41	0.93	4.63
HFPO-DA	13252-13-6	0.46 U	H9871-FS(0)	1.000	10/9/2020	0.23	0.46	4.63
Adona	919005-14-4	0.93 U	H9871-FS(0)	1.000	10/9/2020	0.25	0.93	4.63
11Cl-PF3OUdS	763051-92-9	0.46 U	H9871-FS(0)	1.000	10/9/2020	0.21	0.46	4.63
9Cl-PF3ONS	756426-58-1	0.93 U	H9871-FS(0)	1.000	10/9/2020	0.25	0.93	4.63

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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-H2835-EB01-091120-GW

Battelle ID H9872-FS
 Sample Type SA
 Collection Date 09/11/2020
 Extraction Date 09/22/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.270
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.39 U	H9872-FS(0)	1.000	10/9/2020	0.49	1.39	4.63
PFHpA	375-85-9	0.93 U	H9872-FS(0)	1.000	10/9/2020	0.24	0.93	4.63
PFOA	335-67-1	1.39 U	H9872-FS(0)	1.000	10/9/2020	0.47	1.39	4.63
PFNA	375-95-1	0.93 U	H9872-FS(0)	1.000	10/9/2020	0.29	0.93	4.63
PFDA	335-76-2	0.46 U	H9872-FS(0)	1.000	10/9/2020	0.13	0.46	4.63
PFUnA	2058-94-8	0.46 U	H9872-FS(0)	1.000	10/9/2020	0.20	0.46	4.63
PFDoA	307-55-1	0.46 U	H9872-FS(0)	1.000	10/9/2020	0.18	0.46	4.63
PFTTrDA	72629-94-8	0.46 U	H9872-FS(0)	1.000	10/9/2020	0.14	0.46	4.63
PFTeDA	376-06-7	1.85 U	H9872-FS(0)	1.000	10/9/2020	0.68	1.85	4.63
NMeFOSAA	2355-31-9	0.93 U	H9872-FS(0)	1.000	10/9/2020	0.32	0.93	4.63
NeFOSAA	2991-50-6	0.93 U	H9872-FS(0)	1.000	10/9/2020	0.46	0.93	4.63
PFBS	375-73-5	0.46 U	H9872-FS(0)	1.000	10/9/2020	0.13	0.46	4.63
PFHxS	355-46-4	0.37 U	H9872-FS(0)	1.000	10/9/2020	0.10	0.37	4.63
PFOS	1763-23-1	0.93 U	H9872-FS(0)	1.000	10/9/2020	0.41	0.93	4.63
HFPO-DA	13252-13-6	0.46 U	H9872-FS(0)	1.000	10/9/2020	0.23	0.46	4.63
Adona	919005-14-4	0.93 U	H9872-FS(0)	1.000	10/9/2020	0.25	0.93	4.63
11CI-PF3OUdS	763051-92-9	0.46 U	H9872-FS(0)	1.000	10/9/2020	0.21	0.46	4.63
9CI-PF3ONS	756426-58-1	0.93 U	H9872-FS(0)	1.000	10/9/2020	0.25	0.93	4.63

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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-H2835-EB01-091120-SO

Battelle ID H9884-FS
 Sample Type SA
 Collection Date 09/11/2020
 Extraction Date 09/22/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.270
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.39 U	H9884-FS(0)	1.000	10/9/2020	0.49	1.39	4.63
PFHpA	375-85-9	0.93 U	H9884-FS(0)	1.000	10/9/2020	0.24	0.93	4.63
PFOA	335-67-1	1.39 U	H9884-FS(0)	1.000	10/9/2020	0.47	1.39	4.63
PFNA	375-95-1	0.93 U	H9884-FS(0)	1.000	10/9/2020	0.29	0.93	4.63
PFDA	335-76-2	0.46 U	H9884-FS(0)	1.000	10/9/2020	0.13	0.46	4.63
PFUnA	2058-94-8	0.46 U	H9884-FS(0)	1.000	10/9/2020	0.20	0.46	4.63
PFDoA	307-55-1	0.46 U	H9884-FS(0)	1.000	10/9/2020	0.18	0.46	4.63
PFTrDA	72629-94-8	0.46 U	H9884-FS(0)	1.000	10/9/2020	0.14	0.46	4.63
PFTeDA	376-06-7	1.85 U	H9884-FS(0)	1.000	10/9/2020	0.68	1.85	4.63
NMeFOSAA	2355-31-9	0.93 U	H9884-FS(0)	1.000	10/9/2020	0.32	0.93	4.63
NEtFOSAA	2991-50-6	0.93 U	H9884-FS(0)	1.000	10/9/2020	0.46	0.93	4.63
PFBS	375-73-5	0.46 U	H9884-FS(0)	1.000	10/9/2020	0.13	0.46	4.63
PFHxS	355-46-4	0.37 U	H9884-FS(0)	1.000	10/9/2020	0.10	0.37	4.63
PFOS	1763-23-1	0.93 U	H9884-FS(0)	1.000	10/9/2020	0.41	0.93	4.63
HFPO-DA	13252-13-6	0.46 U	H9884-FS(0)	1.000	10/9/2020	0.23	0.46	4.63
Adona	919005-14-4	0.93 U	H9884-FS(0)	1.000	10/9/2020	0.25	0.93	4.63
11CI-PF3OUdS	763051-92-9	0.46 U	H9884-FS(0)	1.000	10/9/2020	0.21	0.46	4.63
9CI-PF3ONS	756426-58-1	0.93 U	H9884-FS(0)	1.000	10/9/2020	0.25	0.93	4.63

ANALYZED BY
 Analyzed by: Schumitz, Denise
 Printed: 10/12/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-FFDA-WT01-0920

Battelle ID H9885-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/22/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.270
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	16.74 J	H9885-FS(0)	1.000	10/9/2020	0.49	1.39	4.63
PFHpA	375-85-9	8.27	H9885-FS(0)	1.000	10/9/2020	0.24	0.93	4.63
PFOA	335-67-1	18.09	H9885-FS(0)	1.000	10/9/2020	0.47	1.39	4.63
PFNA	375-95-1	2.89 J	H9885-FS(0)	1.000	10/9/2020	0.29	0.93	4.63
PFDA	335-76-2	0.46 U	H9885-FS(0)	1.000	10/9/2020	0.13	0.46	4.63
PFUnA	2058-94-8	0.46 U	H9885-FS(0)	1.000	10/9/2020	0.20	0.46	4.63
PFDoA	307-55-1	0.46 U	H9885-FS(0)	1.000	10/9/2020	0.18	0.46	4.63
PFTTrDA	72629-94-8	0.46 U	H9885-FS(0)	1.000	10/9/2020	0.14	0.46	4.63
PFTeDA	376-06-7	1.85 J U	H9885-FS(0)	1.000	10/9/2020	0.68	1.85	4.63
NMeFOSAA	2355-31-9	0.93 U	H9885-FS(0)	1.000	10/9/2020	0.32	0.93	4.63
NEtFOSAA	2991-50-6	0.93 U	H9885-FS(0)	1.000	10/9/2020	0.46	0.93	4.63
PFBS	375-73-5	2.00 J	H9885-FS(0)	1.000	10/9/2020	0.13	0.46	4.63
PFHxS	355-46-4	28.88	H9885-FS(0)	1.000	10/9/2020	0.10	0.37	4.63
PFOS	1763-23-1	104.52 J	H9885-FS-D(3)	5.000	10/9/2020	2.04	4.63	23.15
HFPO-DA	13252-13-6	0.46 U	H9885-FS(0)	1.000	10/9/2020	0.23	0.46	4.63
Adona	919005-14-4	0.93 U	H9885-FS(0)	1.000	10/9/2020	0.25	0.93	4.63
11CI-PF3OUdS	763051-92-9	0.46 U	H9885-FS(0)	1.000	10/9/2020	0.21	0.46	4.63
9CI-PF3ONS	756426-58-1	0.93 U	H9885-FS(0)	1.000	10/9/2020	0.25	0.93	4.63

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10/12/20
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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-FFDA-WT01-0920
 Battelle ID H9885-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/22/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	44 ✓	H9885-FS(0)	10/9/2020
13C4-PFHpA	52	H9885-FS(0)	10/9/2020
13C8-PFOA	63	H9885-FS(0)	10/9/2020
13C9-PFNA	63	H9885-FS(0)	10/9/2020
13C6-PFDA	85	H9885-FS(0)	10/9/2020
13C7-PFUnA	80	H9885-FS(0)	10/9/2020
13C2-PFDoA	73	H9885-FS(0)	10/9/2020
13C2-PFTeDA	29 ✓	H9885-FS(0)	10/9/2020
d3-MeFOSAA	84	H9885-FS-D(3)	10/9/2020
d5-EtFOSAA	87	H9885-FS-D(3)	10/9/2020
13C3-PFBS	93	H9885-FS-D(3)	10/9/2020
13C3-PFHxS	99	H9885-FS-D(3)	10/9/2020
13C8-PFOS	98	H9885-FS-D(3)	10/9/2020
13C3-HFPD-DA	60	H9885-FS(0)	10/9/2020

10/12/2020
 Analyzed by: Schumitz, Denise
 Printed: 10/12/2020

**DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND**

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-1134
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: October 29, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-FFDA-WT04-0920	H9886-FS	Water
1MS	PX-FFDA-WT04-0920MS	H9887-FSMS	Water
1MSD	PX-FFDA-WT04-0920MSD	H9888-FSMSD	Water
2	PX-FFDA-WT05-0920	H9889-FS	Water
3	PX-FFDA-WT03-0920	H9890-FS	Water
4	PX-FFDA-WT02-0920	H9891-FS	Water
5	PX-FFDA-WT02P-0920	H9892-FS	Water
6	PX-FFDA-FB01-091220	H9893-FS	Water
7	PX-FFDA-EB01-091220-GW	H9894-FS	Water
8	PX-S14-WT07-0920	H9895-FS	Water
9	PX-S14-WT05-0920	H9896-FS	Water
10	PX-S14-WT06-0920	H9897-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for eight water samples, one aqueous equipment blank sample, and one aqueous field blank sample collected on September 12, 2020 by CH2M HILL at the NAS Patuxent River site in Maryland. The samples were analyzed under the Analysis of Poly and Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-08

The data have been validated according to the protocols and quality control (QC) requirements of the analytical methods, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, Webster Field Annex, Naval Air Station Patuxent River, Maryland, April 2020, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, St. Mary's County, Naval Air Station Patuxent River, Maryland, April 2020, and the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

Organics

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A full (Stage 2B/4) data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

Per- and Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-FFDA-FB01-091220	None - ND	-	-	-
PX-FFDA-EB01-091220	None - ND	-	-	-
PX-S14-FB01-091220	None - ND	-	-	-
PX-S14-EB01-091220-GW	None - ND	-	-	-

Surrogate Spike Recoveries

- Several samples exhibited low surrogate percent recoveries (%R) for several surrogate compounds. These compounds were qualified as estimated (J/UJ) in each sample. Please refer to the Form Is for specific recoveries and qualifications.

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- The samples were analyzed at several dilutions due to high concentrations of target compounds. The reporting limits were adjusted accordingly. No action was required.

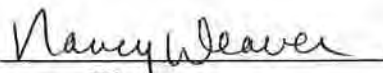
Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

Compound	PX-FFDA-WT02-0920 ng/L	PX-FFDA-WT02P-0920 ng/L	RPD	Qualifier
PFHxA	13.77	13.80	0%	None
PFHpA	3.32	3.51	6%	
PFOA	21.20	19.88	6%	
PFNA	0.96	0.93	3%	
PFBS	6.09	5.77	5%	
PFHxS	62.59	57.88	8%	
PFOS	75.64	88.90	16%	

Please contact the undersigned at (757) 564-0090 if you have any questions or need further information.

Signed:


Nancy Weaver
Senior Chemist

Dated: 11/21/20

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-FFDA-WT04-0920

Battelle ID H9886-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.260
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	27.10	H9886-FS(0)	1.000	10/9/2020	0.51	1.44	4.81
PFHpA	375-85-9	9.27	H9886-FS(0)	1.000	10/9/2020	0.25	0.96	4.81
PFOA	335-67-1	11.17	H9886-FS(0)	1.000	10/9/2020	0.49	1.44	4.81
PFNA	375-95-1	1.21 J	H9886-FS(0)	1.000	10/9/2020	0.30	0.96	4.81
PFDA	335-76-2	1.28 J	H9886-FS(0)	1.000	10/9/2020	0.13	0.48	4.81
PFUnA	2058-94-8	1.01 J	H9886-FS(0)	1.000	10/9/2020	0.21	0.48	4.81
PFDoA	307-55-1	1.07 J	H9886-FS(0)	1.000	10/9/2020	0.18	0.48	4.81
PFTrDA	72629-94-8	1.09 J	H9886-FS(0)	1.000	10/9/2020	0.14	0.48	4.81
PFTeDA	376-06-7	1.13 J	H9886-FS(0)	1.000	10/9/2020	0.70	1.92	4.81
NMeFOSAA	2355-31-9	1.12 J	H9886-FS(0)	1.000	10/9/2020	0.34	0.96	4.81
NEtFOSAA	2991-50-6	1.06 J	H9886-FS(0)	1.000	10/9/2020	0.48	0.96	4.81
PFBS	375-73-5	12.15	H9886-FS(0)	1.000	10/9/2020	0.13	0.48	4.81
PFHxS	355-46-4	42.19	H9886-FS(0)	1.000	10/9/2020	0.11	0.38	4.81
PFOS	1763-23-1	3.62 J	H9886-FS(0)	1.000	10/9/2020	0.42	0.96	4.81
HFPO-DA	13252-13-6	0.83 J	H9886-FS(0)	1.000	10/9/2020	0.24	0.48	4.81
Adona	919005-14-4	1.11 J	H9886-FS(0)	1.000	10/9/2020	0.26	0.96	4.81
11CI-PF3OUdS	763051-92-9	0.94 J	H9886-FS(0)	1.000	10/9/2020	0.22	0.48	4.81
9CI-PF3ONS	756426-58-1	1.04 J	H9886-FS(0)	1.000	10/9/2020	0.26	0.96	4.81

NW 10/29/20
 Analyzed by: Schumitz, Denise
 Printed: 10/12/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

2

Client ID PX-FFDA-WT05-0920

Battelle ID H9889-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.265
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	3.33 J	H9889-FS(0)	1.000	10/9/2020	0.50	1.42	4.72
PFHpA	375-85-9	1.53 J	H9889-FS(0)	1.000	10/9/2020	0.25	0.94	4.72
PFOA	335-67-1	10.54	H9889-FS(0)	1.000	10/9/2020	0.48	1.42	4.72
PFNA	375-95-1	0.94 U	H9889-FS(0)	1.000	10/9/2020	0.29	0.94	4.72
PFDA	335-76-2	0.47 U	H9889-FS(0)	1.000	10/9/2020	0.13	0.47	4.72
RFUnA	2058-94-8	0.47 U	H9889-FS(0)	1.000	10/9/2020	0.21	0.47	4.72
PFDoA	307-55-1	0.47 U	H9889-FS(0)	1.000	10/9/2020	0.18	0.47	4.72
PFTTrDA	72629-94-8	0.47 U	H9889-FS(0)	1.000	10/9/2020	0.14	0.47	4.72
PFTeDA	376-06-7	1.89 UJ	H9889-FS(0)	1.000	10/9/2020	0.69	1.89	4.72
NMeFOSAA	2355-31-9	0.94 U	H9889-FS(0)	1.000	10/9/2020	0.33	0.94	4.72
NEtFOSAA	2991-50-6	0.94 U	H9889-FS(0)	1.000	10/9/2020	0.47	0.94	4.72
PFBS	375-73-5	1.97 J	H9889-FS(0)	1.000	10/9/2020	0.13	0.47	4.72
PFHxS	355-46-4	21.97	H9889-FS(0)	1.000	10/9/2020	0.10	0.38	4.72
PFOS	1763-23-1	3.51 J	H9889-FS(0)	1.000	10/9/2020	0.42	0.94	4.72
HFPO-DA	13252-13-6	0.47 U	H9889-FS(0)	1.000	10/9/2020	0.24	0.47	4.72
Adona	919005-14-4	0.94 U	H9889-FS(0)	1.000	10/9/2020	0.25	0.94	4.72
11CI-PF3OUdS	763051-92-9	0.47 U	H9889-FS(0)	1.000	10/9/2020	0.22	0.47	4.72
9CI-PF3ONS	756426-58-1	0.94 U	H9889-FS(0)	1.000	10/9/2020	0.25	0.94	4.72

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10/12/2020

Analyzed by: Schumitz, Denise
 Printed: 10/12/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

2

Client ID PX-FFDA-WT05-0920

Battelle ID H9889-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	49	H9889-FS(0)	10/9/2020
13C4-PFHpA	69	H9889-FS(0)	10/9/2020
13C8-PFOA	86	H9889-FS(0)	10/9/2020
13C9-PFNA	97	H9889-FS(0)	10/9/2020
13C6-PFDA	97	H9889-FS(0)	10/9/2020
13C7-PFUnA	92	H9889-FS(0)	10/9/2020
13C2-PFDoA	77	H9889-FS(0)	10/9/2020
13C2-PFTeDA	23	H9889-FS(0)	10/9/2020
d3-MeFOSAA	82	H9889-FS(0)	10/9/2020
d5-EtFOSAA	75	H9889-FS(0)	10/9/2020
13C3-PFBS	65	H9889-FS(0)	10/9/2020
13C3-PFHxS	95	H9889-FS(0)	10/9/2020
13C8-PFOS	96	H9889-FS(0)	10/9/2020
13C3-HFPO-DA	60	H9889-FS(0)	10/9/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

3

Client ID PX-FFDA-WT03-0920

Battelle ID H9890-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.260
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	30.10 J	H9890-FS(0)	1.000	10/9/2020	0.51	1.44	4.81
PFHpA	375-85-9	6.94	H9890-FS(0)	1.000	10/9/2020	0.25	0.96	4.81
PFOA	335-67-1	55.00	H9890-FS(0)	1.000	10/9/2020	0.49	1.44	4.81
PFNA	375-95-1	0.61 J	H9890-FS(0)	1.000	10/9/2020	0.30	0.96	4.81
PFDA	335-76-2	0.48 U	H9890-FS(0)	1.000	10/9/2020	0.13	0.48	4.81
PFUnA	2058-94-8	0.48 U	H9890-FS(0)	1.000	10/9/2020	0.21	0.48	4.81
PFDoA	307-55-1	0.48 U J	H9890-FS(0)	1.000	10/9/2020	0.18	0.48	4.81
PFTtDA	72629-94-8	0.48 U	H9890-FS(0)	1.000	10/9/2020	0.14	0.48	4.81
PFTeDA	376-06-7	1.92 U J	H9890-FS(0)	1.000	10/9/2020	0.70	1.92	4.81
NMeFOSAA	2355-31-9	0.96 U J	H9890-FS(0)	1.000	10/9/2020	0.34	0.96	4.81
NEtFOSAA	2991-50-6	0.96 U J	H9890-FS(0)	1.000	10/9/2020	0.48	0.96	4.81
PFBS	375-73-5	17.20	H9890-FS(0)	1.000	10/9/2020	0.13	0.48	4.81
PFHxS	355-46-4	66.01	H9890-FS(0)	1.000	10/9/2020	0.11	0.38	4.81
PFOS	1763-23-1	9.80	H9890-FS(0)	1.000	10/9/2020	0.42	0.96	4.81
HFPO-DA	13252-13-6	0.48 U	H9890-FS(0)	1.000	10/9/2020	0.24	0.48	4.81
Adona	919005-14-4	0.96 U	H9890-FS(0)	1.000	10/9/2020	0.26	0.96	4.81
11CI-PF3OUdS	763051-92-9	0.48 U	H9890-FS(0)	1.000	10/9/2020	0.22	0.48	4.81
9CI-PF3ONS	756426-58-1	0.96 U	H9890-FS(0)	1.000	10/9/2020	0.26	0.96	4.81

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NW 10/29/20

Analyzed by: Schumitz, Denise
 Printed: 10/12/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

3

Client ID PX-FFDA-WT03-0920

Battelle ID H9890-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	43 N	H9890-FS(0)	10/9/2020
13C4-PFHpA	54	H9890-FS(0)	10/9/2020
13C8-PFOA	69	H9890-FS(0)	10/9/2020
13C9-PFNA	84	H9890-FS(0)	10/9/2020
13C6-PFDA	78	H9890-FS(0)	10/9/2020
13C7-PFUnA	78	H9890-FS(0)	10/9/2020
13C2-PFDoA	46 M	H9890-FS(0)	10/9/2020
13C2-PFTeDA	13 N	H9890-FS(0)	10/9/2020
d3-MeFOSAA	48 N	H9890-FS(0)	10/9/2020
d5-EtFOSAA	43 N	H9890-FS(0)	10/9/2020
13C3-PFBS	66	H9890-FS(0)	10/9/2020
13C3-PFHxS	80	H9890-FS(0)	10/9/2020
13C8-PFOS	86	H9890-FS(0)	10/9/2020
13C3-HFPO-DA	67	H9890-FS(0)	10/9/2020

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 Analyzed by: Schumitz, Denise
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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

4

Client ID PX-FFDA-WT02-0920

Battelle ID H9891-F5
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.255
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	13.77 J	H9891-F5(0)	1.000	10/9/2020	0.52	1.47	4.90
PFHpA	375-85-9	3.32 J	H9891-F5(0)	1.000	10/9/2020	0.25	0.98	4.90
PFOA	335-67-1	21.20	H9891-F5(0)	1.000	10/9/2020	0.50	1.47	4.90
PFNA	375-95-1	0.96 J	H9891-F5(0)	1.000	10/9/2020	0.30	0.98	4.90
PFDA	335-76-2	0.49 U	H9891-F5(0)	1.000	10/9/2020	0.14	0.49	4.90
PFUnA	2058-94-8	0.49 U	H9891-F5(0)	1.000	10/9/2020	0.22	0.49	4.90
PFDoA	307-55-1	0.49 U	H9891-F5(0)	1.000	10/9/2020	0.19	0.49	4.90
PFTTrDA	72629-94-8	0.49 U	H9891-F5(0)	1.000	10/9/2020	0.15	0.49	4.90
PFTeDA	376-06-7	1.96 U	H9891-F5(0)	1.000	10/9/2020	0.72	1.96	4.90
NMeFOSAA	2355-31-9	0.98 U	H9891-F5(0)	1.000	10/9/2020	0.34	0.98	4.90
NeFOSAA	2991-50-6	0.98 U	H9891-F5(0)	1.000	10/9/2020	0.49	0.98	4.90
PFBS	375-73-5	6.09	H9891-F5(0)	1.000	10/9/2020	0.14	0.49	4.90
PFHxS	355-46-4	62.59	H9891-F5(0)	1.000	10/9/2020	0.11	0.39	4.90
PFOS	1763-23-1	75.64	H9891-F5(0)	1.000	10/9/2020	0.43	0.98	4.90
HFPO-DA	13252-13-6	0.49 U	H9891-F5(0)	1.000	10/9/2020	0.25	0.49	4.90
Adona	919005-14-4	0.98 U	H9891-F5(0)	1.000	10/9/2020	0.26	0.98	4.90
11CI-PF3OUdS	763051-92-9	0.49 U	H9891-F5(0)	1.000	10/9/2020	0.23	0.49	4.90
9CI-PF3ONS	756426-58-1	0.98 U	H9891-F5(0)	1.000	10/9/2020	0.26	0.98	4.90

SSL

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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-FFDA-WT02-0920
 Battelle ID H9891-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	48	H9891-FS(0)	10/9/2020
13C4-PFHpA	58	H9891-FS(0)	10/9/2020
13C8-PFOA	66	H9891-FS(0)	10/9/2020
13C9-PFNA	77	H9891-FS(0)	10/9/2020
13C6-PFDA	94	H9891-FS(0)	10/9/2020
13C7-PFUnA	96	H9891-FS(0)	10/9/2020
13C2-PFDoA	91	H9891-FS(0)	10/9/2020
13C2-PFTeDA	55	H9891-FS(0)	10/9/2020
d3-MeFOSAA	92	H9891-FS(0)	10/9/2020
d5-EtFOSAA	96	H9891-FS(0)	10/9/2020
13C3-PFBS	72	H9891-FS(0)	10/9/2020
13C3-PFHxS	82	H9891-FS(0)	10/9/2020
13C8-PFOS	98	H9891-FS(0)	10/9/2020
13C3-HFPO-DA	58	H9891-FS(0)	10/9/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-FFDA-WT02P-0920

Battelle ID H9892-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.255
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	13.80	H9892-FS(0)	1.000	10/9/2020	0.52	1.47	4.90
PFHpA	375-85-9	3.51 J	H9892-FS(0)	1.000	10/9/2020	0.25	0.98	4.90
PFOA	335-67-1	19.88	H9892-FS(0)	1.000	10/9/2020	0.50	1.47	4.90
PFNA	375-95-1	0.93 J	H9892-FS(0)	1.000	10/9/2020	0.30	0.98	4.90
PFDA	335-76-2	0.49 U	H9892-FS(0)	1.000	10/9/2020	0.14	0.49	4.90
PFUnA	2058-94-8	0.49 U	H9892-FS(0)	1.000	10/9/2020	0.22	0.49	4.90
PFDoA	307-55-1	0.49 U	H9892-FS(0)	1.000	10/9/2020	0.19	0.49	4.90
PFTTrDA	72629-94-8	0.49 U	H9892-FS(0)	1.000	10/9/2020	0.15	0.49	4.90
PFTeDA	376-06-7	1.96 U	H9892-FS(0)	1.000	10/9/2020	0.72	1.96	4.90
NMeFOSAA	2355-31-9	0.98 U	H9892-FS(0)	1.000	10/9/2020	0.34	0.98	4.90
NeFOSAA	2991-50-6	0.98 U	H9892-FS(0)	1.000	10/9/2020	0.49	0.98	4.90
PFBS	375-73-5	5.77	H9892-FS(0)	1.000	10/9/2020	0.14	0.49	4.90
PFHxS	355-46-4	57.88	H9892-FS(0)	1.000	10/9/2020	0.11	0.39	4.90
PFOS	1763-23-1	88.90	H9892-FS(0)	1.000	10/9/2020	0.43	0.98	4.90
HFPO-DA	13252-13-6	0.49 U	H9892-FS(0)	1.000	10/9/2020	0.25	0.49	4.90
Adona	919005-14-4	0.98 U	H9892-FS(0)	1.000	10/9/2020	0.26	0.98	4.90
11CI-PF3OUdS	763051-92-9	0.49 U	H9892-FS(0)	1.000	10/9/2020	0.23	0.49	4.90
9CI-PF3ONS	756426-58-1	0.98 U	H9892-FS(0)	1.000	10/9/2020	0.26	0.98	4.90

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 Analyzed by: Schumitz, Denise
 Printed: 10/12/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-FFDA-FB01-091220

Battelle ID H9893-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.265
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.42 U	H9893-FS(0)	1.000	10/9/2020	0.50	1.42	4.72
PFHpA	375-85-9	0.94 U	H9893-FS(0)	1.000	10/9/2020	0.25	0.94	4.72
PFOA	335-67-1	1.42 U	H9893-FS(0)	1.000	10/9/2020	0.48	1.42	4.72
PFNA	375-95-1	0.94 U	H9893-FS(0)	1.000	10/9/2020	0.29	0.94	4.72
PFDA	335-76-2	0.47 U	H9893-FS(0)	1.000	10/9/2020	0.13	0.47	4.72
PFUnA	2058-94-8	0.47 U	H9893-FS(0)	1.000	10/9/2020	0.21	0.47	4.72
PFDoA	307-55-1	0.47 U	H9893-FS(0)	1.000	10/9/2020	0.18	0.47	4.72
PFTroA	72629-94-8	0.47 U	H9893-FS(0)	1.000	10/9/2020	0.14	0.47	4.72
PFTeDA	376-06-7	1.89 U	H9893-FS(0)	1.000	10/9/2020	0.69	1.89	4.72
NMeFOSAA	2355-31-9	0.94 U	H9893-FS(0)	1.000	10/9/2020	0.33	0.94	4.72
NeFOSAA	2991-50-6	0.94 U	H9893-FS(0)	1.000	10/9/2020	0.47	0.94	4.72
PFBS	375-73-5	0.47 U	H9893-FS(0)	1.000	10/9/2020	0.13	0.47	4.72
PFHxS	355-46-4	0.38 U	H9893-FS(0)	1.000	10/9/2020	0.10	0.38	4.72
PFOS	1763-23-1	0.94 U	H9893-FS(0)	1.000	10/9/2020	0.42	0.94	4.72
HFPO-DA	13252-13-6	0.47 U	H9893-FS(0)	1.000	10/9/2020	0.24	0.47	4.72
Adona	919005-14-4	0.94 U	H9893-FS(0)	1.000	10/9/2020	0.25	0.94	4.72
11CI-PF3OUdS	763051-92-9	0.47 U	H9893-FS(0)	1.000	10/9/2020	0.22	0.47	4.72
9CI-PF3ONS	756426-58-1	0.94 U	H9893-FS(0)	1.000	10/9/2020	0.25	0.94	4.72

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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

7

Client ID PX-FFDA-EB01-091220-GW

Battelle ID H9894-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.270
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.39 U	H9894-FS(0)	1.000	10/9/2020	0.49	1.39	4.63
PFHpA	375-85-9	0.93 U	H9894-FS(0)	1.000	10/9/2020	0.24	0.93	4.63
PFOA	335-67-1	1.39 U	H9894-FS(0)	1.000	10/9/2020	0.47	1.39	4.63
PFNA	375-95-1	0.93 U	H9894-FS(0)	1.000	10/9/2020	0.29	0.93	4.63
PFDA	335-76-2	0.46 U	H9894-FS(0)	1.000	10/9/2020	0.13	0.46	4.63
PFUnA	2058-94-8	0.46 U	H9894-FS(0)	1.000	10/9/2020	0.20	0.46	4.63
PFDoA	307-55-1	0.46 U	H9894-FS(0)	1.000	10/9/2020	0.18	0.46	4.63
PFTTrDA	72629-94-8	0.46 U	H9894-FS(0)	1.000	10/9/2020	0.14	0.46	4.63
PFTeDA	376-06-7	1.85 U	H9894-FS(0)	1.000	10/9/2020	0.68	1.85	4.63
NMeFOSAA	2355-31-9	0.93 U	H9894-FS(0)	1.000	10/9/2020	0.32	0.93	4.63
NeFOSAA	2991-50-6	0.93 U	H9894-FS(0)	1.000	10/9/2020	0.46	0.93	4.63
PFBS	375-73-5	0.46 U	H9894-FS(0)	1.000	10/9/2020	0.13	0.46	4.63
PFHxS	355-46-4	0.37 U	H9894-FS(0)	1.000	10/9/2020	0.10	0.37	4.63
PFOS	1763-23-1	0.93 U	H9894-FS(0)	1.000	10/9/2020	0.41	0.93	4.63
HFPO-DA	13252-13-6	0.46 U	H9894-FS(0)	1.000	10/9/2020	0.23	0.46	4.63
Adona	919005-14-4	0.93 U	H9894-FS(0)	1.000	10/9/2020	0.25	0.93	4.63
11Cl-PF3OUdS	763051-92-9	0.46 U	H9894-FS(0)	1.000	10/9/2020	0.21	0.46	4.63
9Cl-PF3ONS	756426-58-1	0.93 U	H9894-FS(0)	1.000	10/9/2020	0.25	0.93	4.63

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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-S14-WT07-0920

Battelle ID H9895-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.260
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	16.34	H9895-FS(0)	1.000	10/9/2020	0.51	1.44	4.81
PFHpA	375-85-9	4.36 J	H9895-FS(0)	1.000	10/9/2020	0.25	0.96	4.81
PFOA	335-67-1	63.77	H9895-FS(0)	1.000	10/9/2020	0.49	1.44	4.81
PFNA	375-95-1	1.91 J	H9895-FS(0)	1.000	10/9/2020	0.30	0.96	4.81
PFDA	335-76-2	0.86 J	H9895-FS(0)	1.000	10/9/2020	0.13	0.48	4.81
PFUnA	2058-94-8	0.48 U	H9895-FS(0)	1.000	10/9/2020	0.21	0.48	4.81
PFDoA	307-55-1	0.48 U	H9895-FS(0)	1.000	10/9/2020	0.18	0.48	4.81
PFTTrDA	72629-94-8	0.48 U	H9895-FS(0)	1.000	10/9/2020	0.14	0.48	4.81
PFTeDA	376-06-7	1.92 U	H9895-FS(0)	1.000	10/9/2020	0.70	1.92	4.81
NMeFOSAA	2355-31-9	0.96 U	H9895-FS(0)	1.000	10/9/2020	0.34	0.96	4.81
NEtFOSAA	2991-50-6	0.96 U	H9895-FS(0)	1.000	10/9/2020	0.48	0.96	4.81
PFBS	375-73-5	8.97	H9895-FS(0)	1.000	10/9/2020	0.13	0.48	4.81
PFHxS	355-46-4	193.35	H9895-FS-D(3)	5.000	10/9/2020	0.53	1.92	24.04
PFOS	1763-23-1	65.77	H9895-FS(0)	1.000	10/9/2020	0.42	0.96	4.81
HFPO-DA	13252-13-6	0.48 U	H9895-FS(0)	1.000	10/9/2020	0.24	0.48	4.81
Adona	919005-14-4	0.96 U	H9895-FS(0)	1.000	10/9/2020	0.26	0.96	4.81
11CI-PF3OUdS	763051-92-9	0.48 U	H9895-FS(0)	1.000	10/9/2020	0.22	0.48	4.81
9CI-PF3ONS	756426-58-1	0.96 U	H9895-FS(0)	1.000	10/9/2020	0.26	0.96	4.81

10/10/2020
 Analyzed by: Schumitz, Denise
 Printed: 10/12/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-S14-WT05-0920

Battelle ID H9896-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.260
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	374.55	H9896-FS-D(3)	5.000	10/9/2020	2.55	7.21	24.04
PFHpA	375-85-9	97.19	H9896-FS(0)	1.000	10/9/2020	0.25	0.96	4.81
PFOA	335-67-1	287.43	H9896-FS-D(3)	5.000	10/9/2020	2.45	7.21	24.04
PFNA	375-95-1	20.07	H9896-FS(0)	1.000	10/9/2020	0.30	0.96	4.81
PFDA	335-76-2	1.99 J	H9896-FS(0)	1.000	10/9/2020	0.13	0.48	4.81
PFUnA	2058-94-8	0.48 U	H9896-FS(0)	1.000	10/9/2020	0.21	0.48	4.81
PFDoA	307-55-1	0.48 U	H9896-FS(0)	1.000	10/9/2020	0.18	0.48	4.81
PFTTrDA	72629-94-8	0.48 U	H9896-FS(0)	1.000	10/9/2020	0.14	0.48	4.81
PFTeDA	376-06-7	1.92 U	H9896-FS(0)	1.000	10/9/2020	0.70	1.92	4.81
NMeFOSAA	2355-31-9	0.96 U	H9896-FS(0)	1.000	10/9/2020	0.34	0.96	4.81
NeFOSAA	2991-50-6	0.96 U	H9896-FS(0)	1.000	10/9/2020	0.48	0.96	4.81
PFBS	375-73-5	177.98	H9896-FS-D(3)	5.000	10/9/2020	0.67	2.40	24.04
PFHxS	355-46-4	3244.30	H9896-FS-D(7)	312.500	10/9/2020	33.05	120.19	1502.40
PFOS	1763-23-1	6489.84	H9896-FS-D(7)	312.500	10/9/2020	132.21	300.48	1502.40
HFPO-DA	13252-13-6	0.48 U	H9896-FS(0)	1.000	10/9/2020	0.24	0.48	4.81
Adona	919005-14-4	0.96 U	H9896-FS(0)	1.000	10/9/2020	0.26	0.96	4.81
11CI-PF3OUdS	763051-92-9	0.48 U	H9896-FS(0)	1.000	10/9/2020	0.22	0.48	4.81
9CI-PF3ONS	756426-58-1	0.96 U	H9896-FS(0)	1.000	10/9/2020	0.26	0.96	4.81

SSL

10/12/2020
 Analyzed by: Schumitz, Denise
 Printed: 10/12/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-S14-WT05-0920
 Battelle ID H9896-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	73 D	H9896-FS-D(3)	10/9/2020
13C4-PFHpA	53 D	H9896-FS-D(3)	10/9/2020
13C8-PFOA	80 D	H9896-FS-D(3)	10/9/2020
13C9-PFNA	50 D	H9896-FS-D(3)	10/9/2020
13C6-PFDA	79	H9896-FS(0)	10/9/2020
13C7-PFUnA	82	H9896-FS(0)	10/9/2020
13C2-PFDoA	78	H9896-FS(0)	10/9/2020
13C2-PFTeDA	47 N	H9896-FS(0)	10/9/2020
d3-MeFOSAA	110 D	H9896-FS-D(7)	10/9/2020
d5-EtFOSAA	104 D	H9896-FS-D(7)	10/9/2020
13C3-PFBS	105 D	H9896-FS-D(7)	10/9/2020
13C3-PFHxS	118 D	H9896-FS-D(7)	10/9/2020
13C8-PFOS	103 D	H9896-FS-D(7)	10/9/2020
13C3-HFPO-DA	82 D	H9896-FS-D(3)	10/9/2020

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 Analyzed by: Schumitz, Denise
 Printed: 10/12/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

10

Client ID PX-S14-WT06-0920

Battelle ID H9897-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.255
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	205.22 P	H9897-FS-D(3)	5.000	10/9/2020	2.60	7.35	24.51
PFHpA	375-85-9	62.24	H9897-FS(0)	1.000	10/9/2020	0.25	0.98	4.90
PFOA	335-67-1	745.57 P	H9897-FS-D(5)	25.000	10/9/2020	12.50	36.76	122.55
PFNA	375-95-1	9.60	H9897-FS(0)	1.000	10/9/2020	0.30	0.98	4.90
PFDA	335-76-2	5.46	H9897-FS(0)	1.000	10/9/2020	0.14	0.49	4.90
PFUnA	2058-94-8	0.49 U	H9897-FS(0)	1.000	10/9/2020	0.22	0.49	4.90
PFDoA	307-55-1	0.49 U	H9897-FS(0)	1.000	10/9/2020	0.19	0.49	4.90
PFTTrDA	72629-94-8	0.49 U	H9897-FS(0)	1.000	10/9/2020	0.15	0.49	4.90
PFTeDA	376-06-7	1.96 UJ	H9897-FS(0)	1.000	10/9/2020	0.72	1.96	4.90
NMeFOSAA	2355-31-9	0.98 U	H9897-FS(0)	1.000	10/9/2020	0.34	0.98	4.90
NeFOSAA	2991-50-6	0.98 U	H9897-FS(0)	1.000	10/9/2020	0.49	0.98	4.90
PFBS	375-73-5	58.49	H9897-FS(0)	1.000	10/9/2020	0.14	0.49	4.90
PFHxS	355-46-4	1178.74 P	H9897-FS-D(5)	25.000	10/9/2020	2.70	9.80	122.55
PFOS	1763-23-1	1350.45 P	H9897-FS-D(5)	25.000	10/9/2020	10.78	24.51	122.55
HFPO-DA	13252-13-6	0.49 U	H9897-FS(0)	1.000	10/9/2020	0.25	0.49	4.90
Adona	919005-14-4	0.98 U	H9897-FS(0)	1.000	10/9/2020	0.26	0.98	4.90
11Cl-PF3OUdS	763051-92-9	0.49 U	H9897-FS(0)	1.000	10/9/2020	0.23	0.49	4.90
9Cl-PF3ONS	756426-58-1	0.98 U	H9897-FS(0)	1.000	10/9/2020	0.26	0.98	4.90

SSL

NW 10/29/20
 Analyzed by: Schumitz, Denise
 Printed: 10/12/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-S14-WT06-0920

Battelle ID H9897-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	94 D	H9897-FS-D(5)	10/9/2020
13C4-PFHpA	90 D	H9897-FS-D(5)	10/9/2020
13C8-PFOA	98 D	H9897-FS-D(5)	10/9/2020
13C9-PFNA	105 D	H9897-FS-D(5)	10/9/2020
13C6-PFDA	83	H9897-FS(0)	10/9/2020
13C7-PFUnA	87	H9897-FS(0)	10/9/2020
13C2-PFDoA	78	H9897-FS(0)	10/9/2020
13C2-PFTeDA	43 D	H9897-FS(0)	10/9/2020
d3-MeFOSAA	98 D	H9897-FS-D(5)	10/9/2020
d5-EtFOSAA	95 D	H9897-FS-D(5)	10/9/2020
13C3-PFBS	103 D	H9897-FS-D(5)	10/9/2020
13C3-PFHs	103 D	H9897-FS-D(5)	10/9/2020
13C8-PFOS	94 D	H9897-FS-D(5)	10/9/2020
13C3-HFPO-DA	79 D	H9897-FS-D(5)	10/9/2020

**DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND**

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-1135
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: October 29, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-S14-WT04-0920	H9904-FS	Water
1MS	PX-S14-WT04-0920MS	H9905-FSMS	Water
1MSD	PX-S14-WT04-0920MSD	H9906-FSMSD	Water
2	PX-FFDA-EB01-091220-SO	H9921-FS	Water
3	PX-S41-EB01-091220-SO	H9935-FS	Water
4	PX-CTIA-FB01-091320	H9941-FS	Water
5	PX-CTIA-EB01-091320-GW	H9942-FS	Water
6	PX-CTIA-WT03-0920	H9943-FS	Water
7	PX-CTIA-WT02-0920	H9944-FS	Water
8	PX-CTIA-WT02P-0920	H9945-FS	Water
9	PX-CTIA-WT01-0920	H9946-FS	Water
10	PX-CTIA-WT05-0920	H9947-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for six water samples, three aqueous equipment blank samples, and one aqueous field blank sample collected on September 12-13, 2020 by CH2M HILL at the NAS Patuxent River site in Maryland. The samples were analyzed under the Analysis of Poly and Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-08

The data have been validated according to the protocols and quality control (QC) requirements of the analytical methods, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, Webster Field Annex, Naval Air Station Patuxent River, Maryland, April 2020, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, St. Mary's County, Naval Air Station Patuxent River, Maryland, April 2020, and the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

Organics

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A full (Stage 2B/4) data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

Per- and Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-FFDA-EB01-091220-SO	PFOS	2.00	None	Applies to other packages
PX-S14-EB01-091220-SO	None - ND	-	-	-
PX-CTIA-FB01-091320	None - ND	-	-	-
PX-CTIA-EB01-091320-GW	None - ND	-	-	-

Surrogate Spike Recoveries

- Several samples exhibited low surrogate percent recoveries (%R) for several surrogate compounds. These compounds were qualified as estimated (J/UJ) in each sample. Please refer to the Form Is for specific recoveries and qualifications.

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- The samples were analyzed at several dilutions due to high concentrations of target compounds. The reporting limits were adjusted accordingly. No action was required.

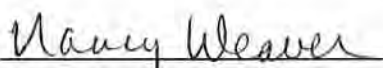
Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

Compound	PX-CTIA-WT02-0920 ng/g	PX-CTIA-WT02P-0920 ng/g	RPD	Qualifier
PFHxA	248.24	206.53	18%	None
PFHpA	167.86	130.10	25%	
PFOA	135.59	117.21	15%	
PFNA	43.98	37.80	15%	
PFDA	9.70	8.33	15%	
PFUnA	7.66	6.47	17%	
PFDoA	0.73	0.64	13%	
PFTTrDA	1.52	1.14	29%	
NMeFOSAA	0.40	0.38	5%	
NEtFOSAA	1.09	0.96	13%	
PFBS	35.94	34.76	3%	
PFHxS	1625.09	1407.56	14%	
PFOS	3205.21	2676.26	18%	

Please contact the undersigned at (757) 564-0090 if you have any questions or need further information.

Signed:


Nancy Weaver
Senior Chemist

Dated: 11/2/20

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-S14-WT04-0920

Battelle ID H9904-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.270
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	13.04 J	H9904-FS(0)	1.000	10/9/2020	0.49	1.39	4.63
PFHpA	375-85-9	7.57	H9904-FS(0)	1.000	10/9/2020	0.24	0.93	4.63
PFOA	335-67-1	66.80	H9904-FS(0)	1.000	10/9/2020	0.47	1.39	4.63
PFNA	375-95-1	0.73 J	H9904-FS(0)	1.000	10/9/2020	0.29	0.93	4.63
PFDA	335-76-2	0.46 U	H9904-FS(0)	1.000	10/9/2020	0.13	0.46	4.63
PFUnA	2058-94-8	0.46 U	H9904-FS(0)	1.000	10/9/2020	0.20	0.46	4.63
PFDoA	307-55-1	0.46 U	H9904-FS(0)	1.000	10/9/2020	0.18	0.46	4.63
PFTroA	72629-94-8	0.46 U	H9904-FS(0)	1.000	10/9/2020	0.14	0.46	4.63
PFTeDA	376-06-7	1.85 U	H9904-FS(0)	1.000	10/9/2020	0.68	1.85	4.63
NMeFOSAA	2355-31-9	0.93 U	H9904-FS(0)	1.000	10/9/2020	0.32	0.93	4.63
NEtFOSAA	2991-50-6	0.93 U	H9904-FS(0)	1.000	10/9/2020	0.46	0.93	4.63
PFBS	375-73-5	2.46 J	H9904-FS(0)	1.000	10/9/2020	0.13	0.46	4.63
PFHxS	355-46-4	39.73	H9904-FS(0)	1.000	10/9/2020	0.10	0.37	4.63
PFOS	1763-23-1	15.46	H9904-FS(0)	1.000	10/9/2020	0.41	0.93	4.63
HFPO-DA	13252-13-6	0.46 U	H9904-FS(0)	1.000	10/9/2020	0.23	0.46	4.63
Adona	919005-14-4	0.93 U	H9904-FS(0)	1.000	10/9/2020	0.25	0.93	4.63
11CI-PF3OUdS	763051-92-9	0.46 U	H9904-FS(0)	1.000	10/9/2020	0.21	0.46	4.63
9CI-PF3ONS	756426-58-1	0.93 U	H9904-FS(0)	1.000	10/9/2020	0.25	0.93	4.63

SSL

ANALYZED BY: SCHUMITZ, DENISE
 PRINTED: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-S14-WT04-0920

Battelle ID H9904-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	44	H9904-FS(0)	10/9/2020
13C4-PFHpA	51	H9904-FS(0)	10/9/2020
13C8-PFOA	54	H9904-FS(0)	10/9/2020
13C9-PFNA	64	H9904-FS(0)	10/9/2020
13C6-PFDA	76	H9904-FS(0)	10/9/2020
13C7-PFUnA	83	H9904-FS(0)	10/9/2020
13C2-PFDoA	86	H9904-FS(0)	10/9/2020
13C2-PFTeDA	73	H9904-FS(0)	10/9/2020
d3-MeFOSAA	73	H9904-FS(0)	10/9/2020
d5-EtFOSAA	95	H9904-FS(0)	10/9/2020
13C3-PFBS	58	H9904-FS(0)	10/9/2020
13C3-PFHxS	79	H9904-FS(0)	10/9/2020
13C8-PFOS	83	H9904-FS(0)	10/9/2020
13C3-HFPO-DA	50	H9904-FS(0)	10/9/2020

NW10129120
 Analyzed by: Schumitz, Denise
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

2

Client ID PX-FFDA-EB01-091220-SO

Battelle ID H9921-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.255
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.47 U	H9921-FS(0)	1.000	10/9/2020	0.52	1.47	4.90
PFHpA	375-85-9	0.98 U	H9921-FS(0)	1.000	10/9/2020	0.25	0.98	4.90
PFOA	335-67-1	1.47 U	H9921-FS(0)	1.000	10/9/2020	0.50	1.47	4.90
PFNA	375-95-1	0.98 U	H9921-FS(0)	1.000	10/9/2020	0.30	0.98	4.90
PFDA	335-76-2	0.49 U	H9921-FS(0)	1.000	10/9/2020	0.14	0.49	4.90
PFUnA	2058-94-8	0.49 U	H9921-FS(0)	1.000	10/9/2020	0.22	0.49	4.90
PFDoA	307-55-1	0.49 U	H9921-FS(0)	1.000	10/9/2020	0.19	0.49	4.90
PFTeDA	72629-94-8	0.49 U	H9921-FS(0)	1.000	10/9/2020	0.15	0.49	4.90
PFTeDA	376-06-7	1.96 U	H9921-FS(0)	1.000	10/9/2020	0.72	1.96	4.90
NMeFOSAA	2355-31-9	0.98 U	H9921-FS(0)	1.000	10/9/2020	0.34	0.98	4.90
NeFOSAA	2991-50-6	0.98 U	H9921-FS(0)	1.000	10/9/2020	0.49	0.98	4.90
PFBS	375-73-5	0.49 U	H9921-FS(0)	1.000	10/9/2020	0.14	0.49	4.90
PFHxS	355-46-4	0.39 U	H9921-FS(0)	1.000	10/9/2020	0.11	0.39	4.90
PFOS	1763-23-1	2.00 J	H9921-FS(0)	1.000	10/9/2020	0.43	0.98	4.90
HFPO-DA	13252-13-6	0.49 U	H9921-FS(0)	1.000	10/9/2020	0.25	0.49	4.90
Adona	919005-14-4	0.98 U	H9921-FS(0)	1.000	10/9/2020	0.26	0.98	4.90
11CI-PF3OUdS	763051-92-9	0.49 U	H9921-FS(0)	1.000	10/9/2020	0.23	0.49	4.90
9CI-PF3ONS	756426-58-1	0.98 U	H9921-FS(0)	1.000	10/9/2020	0.26	0.98	4.90

MW 10/29/20
 Analyzed by: Schumitz, Denise
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

3

Client ID PX-S14-EB01-091220-SO

Battelle ID H9935-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.265
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.42 U	H9935-FS(0)	1.000	10/9/2020	0.50	1.42	4.72
PFHpA	375-85-9	0.94 U	H9935-FS(0)	1.000	10/9/2020	0.25	0.94	4.72
PFOA	335-67-1	1.42 U	H9935-FS(0)	1.000	10/9/2020	0.48	1.42	4.72
PFNA	375-95-1	0.94 U	H9935-FS(0)	1.000	10/9/2020	0.29	0.94	4.72
PFDA	335-76-2	0.47 U	H9935-FS(0)	1.000	10/9/2020	0.13	0.47	4.72
PFUnA	2058-94-8	0.47 U	H9935-FS(0)	1.000	10/9/2020	0.21	0.47	4.72
PFDoA	307-55-1	0.47 U	H9935-FS(0)	1.000	10/9/2020	0.18	0.47	4.72
PFTTrDA	72629-94-8	0.47 U	H9935-FS(0)	1.000	10/9/2020	0.14	0.47	4.72
PFTeDA	376-06-7	1.89 U	H9935-FS(0)	1.000	10/9/2020	0.69	1.89	4.72
NMeFOSAA	2355-31-9	0.94 U	H9935-FS(0)	1.000	10/9/2020	0.33	0.94	4.72
NEtFOSAA	2991-50-6	0.94 U	H9935-FS(0)	1.000	10/9/2020	0.47	0.94	4.72
PFBS	375-73-5	0.47 U	H9935-FS(0)	1.000	10/9/2020	0.13	0.47	4.72
PFHxS	355-46-4	0.38 U	H9935-FS(0)	1.000	10/9/2020	0.10	0.38	4.72
PFOS	1763-23-1	0.94 U	H9935-FS(0)	1.000	10/9/2020	0.42	0.94	4.72
HFPO-DA	13252-13-6	0.47 U	H9935-FS(0)	1.000	10/9/2020	0.24	0.47	4.72
Adona	919005-14-4	0.94 U	H9935-FS(0)	1.000	10/9/2020	0.25	0.94	4.72
11CI-PF3OUdS	763051-92-9	0.47 U	H9935-FS(0)	1.000	10/9/2020	0.22	0.47	4.72
9CI-PF3ONS	756426-58-1	0.94 U	H9935-FS(0)	1.000	10/9/2020	0.25	0.94	4.72

10/10/29/20
 Analyzed by: Schumitz, Denise
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

4

Client ID PX-CTIA-FB01-091320

Battelle ID H9941-FS
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.250
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.50 U	H9941-FS(0)	1.000	10/9/2020	0.53	1.50	5.00
PFHpA	375-85-9	1.00 U	H9941-FS(0)	1.000	10/9/2020	0.26	1.00	5.00
PFOA	335-67-1	1.50 U	H9941-FS(0)	1.000	10/9/2020	0.51	1.50	5.00
PFNA	375-95-1	1.00 U	H9941-FS(0)	1.000	10/9/2020	0.31	1.00	5.00
PFDA	335-76-2	0.50 U	H9941-FS(0)	1.000	10/9/2020	0.14	0.50	5.00
PFUnA	2058-94-8	0.50 U	H9941-FS(0)	1.000	10/9/2020	0.22	0.50	5.00
PFDoA	307-55-1	0.50 U	H9941-FS(0)	1.000	10/9/2020	0.19	0.50	5.00
PFTrDA	72629-94-8	0.50 U	H9941-FS(0)	1.000	10/9/2020	0.15	0.50	5.00
PFTeDA	376-06-7	2.00 U	H9941-FS(0)	1.000	10/9/2020	0.73	2.00	5.00
NMeFOSAA	2355-31-9	1.00 U	H9941-FS(0)	1.000	10/9/2020	0.35	1.00	5.00
NEtFOSAA	2991-50-6	1.00 U	H9941-FS(0)	1.000	10/9/2020	0.50	1.00	5.00
PFBS	375-73-5	0.50 U	H9941-FS(0)	1.000	10/9/2020	0.14	0.50	5.00
PFHxS	355-46-4	0.40 U	H9941-FS(0)	1.000	10/9/2020	0.11	0.40	5.00
PFOS	1763-23-1	1.00 U	H9941-FS(0)	1.000	10/9/2020	0.44	1.00	5.00
HFPO-DA	13252-13-6	0.50 U	H9941-FS(0)	1.000	10/9/2020	0.25	0.50	5.00
Adona	919005-14-4	1.00 U	H9941-FS(0)	1.000	10/9/2020	0.27	1.00	5.00
11CI-PF3OUdS	763051-92-9	0.50 U	H9941-FS(0)	1.000	10/9/2020	0.23	0.50	5.00
9CI-PF3ONS	756426-58-1	1.00 U	H9941-FS(0)	1.000	10/9/2020	0.27	1.00	5.00

10/10/2020
 Analyzed by: Schumitz, Denise
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-CTIA-EB01-091320-GW

Battelle ID H9942-FS
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.260
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.44 U	H9942-FS(0)	1.000	10/9/2020	0.51	1.44	4.81
PFHpA	375-85-9	0.96 U	H9942-FS(0)	1.000	10/9/2020	0.25	0.96	4.81
PFOA	335-67-1	1.44 U	H9942-FS(0)	1.000	10/9/2020	0.49	1.44	4.81
PFNA	375-95-1	0.96 U	H9942-FS(0)	1.000	10/9/2020	0.30	0.96	4.81
PFDA	335-76-2	0.48 U	H9942-FS(0)	1.000	10/9/2020	0.13	0.48	4.81
PFUnA	2058-94-8	0.48 U	H9942-FS(0)	1.000	10/9/2020	0.21	0.48	4.81
PFDoA	307-55-1	0.48 U	H9942-FS(0)	1.000	10/9/2020	0.18	0.48	4.81
PFTrDA	72629-94-8	0.48 U	H9942-FS(0)	1.000	10/9/2020	0.14	0.48	4.81
PFTeDA	376-06-7	1.92 U	H9942-FS(0)	1.000	10/9/2020	0.70	1.92	4.81
NMeFOSAA	2355-31-9	0.96 U	H9942-FS(0)	1.000	10/9/2020	0.34	0.96	4.81
NEtFOSAA	2991-50-6	0.96 U	H9942-FS(0)	1.000	10/9/2020	0.48	0.96	4.81
PFBS	375-73-5	0.48 U	H9942-FS(0)	1.000	10/9/2020	0.13	0.48	4.81
PFHxS	355-46-4	0.38 U	H9942-FS(0)	1.000	10/9/2020	0.11	0.38	4.81
PFOS	1763-23-1	0.96 U	H9942-FS(0)	1.000	10/9/2020	0.42	0.96	4.81
HFPO-DA	13252-13-6	0.48 U	H9942-FS(0)	1.000	10/9/2020	0.24	0.48	4.81
Adona	919005-14-4	0.96 U	H9942-FS(0)	1.000	10/9/2020	0.26	0.96	4.81
11CI-PF3OUdS	763051-92-9	0.48 U	H9942-FS(0)	1.000	10/9/2020	0.22	0.48	4.81
9CI-PF3ONS	756426-58-1	0.96 U	H9942-FS(0)	1.000	10/9/2020	0.26	0.96	4.81

10/10/2020
 Analyzed by: Schumitz, Denise
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-CTIA-WT03-0920

Battelle ID H9943-FS
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.255
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1072.22 ✓	H9943-FS-D(5)	156.250	10/9/2020	81.19	229.78	765.93
PFHpA	375-85-9	539.63	H9943-FS(0)	1.000	10/9/2020	0.25	0.98	4.90
PFOA	335-67-1	1348.08 ✓	H9943-FS-D(5)	156.250	10/9/2020	78.13	229.78	765.93
PFNA	375-95-1	204.09	H9943-FS(0)	1.000	10/9/2020	0.30	0.98	4.90
PFDA	335-76-2	24.34	H9943-FS(0)	1.000	10/9/2020	0.14	0.49	4.90
PFUnA	2058-94-8	4.34 ✓ J	H9943-FS(0)	1.000	10/9/2020	0.22	0.49	4.90
PFDoA	307-55-1	0.49 U	H9943-FS(0)	1.000	10/9/2020	0.19	0.49	4.90
PFTrDA	72629-94-8	0.49 U	H9943-FS(0)	1.000	10/9/2020	0.15	0.49	4.90
PFTeDA	376-06-7	1.96 U	H9943-FS(0)	1.000	10/9/2020	0.72	1.96	4.90
NMeFOSAA	2355-31-9	6.71	H9943-FS(0)	1.000	10/9/2020	0.34	0.98	4.90
NEtFOSAA	2991-50-6	1.72 J	H9943-FS(0)	1.000	10/9/2020	0.49	0.98	4.90
PFBS	375-73-5	127.20	H9943-FS(0)	1.000	10/9/2020	0.14	0.49	4.90
PFHxS	355-46-4	14344.09	H9943-FS-D(7)	390.625	10/9/2020	42.13	153.19	1914.83
PFOS	1763-23-1	35787.16	H9943-FS-D(7)	390.625	10/9/2020	168.50	382.97	1914.83
HFPO-DA	13252-13-6	0.49 U	H9943-FS(0)	1.000	10/9/2020	0.25	0.49	4.90
Adona	919005-14-4	0.98 U	H9943-FS(0)	1.000	10/9/2020	0.26	0.98	4.90
11CI-PF3OUdS	763051-92-9	0.49 U	H9943-FS(0)	1.000	10/9/2020	0.23	0.49	4.90
9CI-PF3ONS	756426-58-1	0.98 U	H9943-FS(0)	1.000	10/9/2020	0.26	0.98	4.90

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 Analyzed by: Schumitz, Denise
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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-CTIA-WT03-0920
 Battelle ID H9943-FS
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	102 D	H9943-FS-D(5)	10/9/2020
13C4-PFHpA	87 D	H9943-FS-D(5)	10/9/2020
13C8-PFOA	92 D	H9943-FS-D(5)	10/9/2020
13C9-PFNA	80 D	H9943-FS-D(5)	10/9/2020
13C6-PFDA	77	H9943-FS(0)	10/9/2020
13C7-PFUnA	191 M	H9943-FS(0)	10/9/2020
13C2-PFDoA	210 M	H9943-FS(0)	10/9/2020
13C2-PFTeDA	204 M	H9943-FS(0)	10/9/2020
d3-MeFOSAA	102 D	H9943-FS-D(7)	10/9/2020
d5-EtFOSAA	110 D	H9943-FS-D(7)	10/9/2020
13C3-PFBS	103 D	H9943-FS-D(7)	10/9/2020
13C3-PFHxS	111 D	H9943-FS-D(7)	10/9/2020
13C8-PFOS	97 D	H9943-FS-D(7)	10/9/2020
13C3-HFPO-DA	88 D	H9943-FS-D(5)	10/9/2020

MW 10/29/20
 Analyzed by: Schumitz, Denise
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-CTIA-WT02-0920

Battelle ID H9944-FS
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.255
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	248.24 ϕ	H9944-FS-D(3)	5.000	10/9/2020	2.60	7.35	24.51
PFHpA	375-85-9	167.86	H9944-FS(0)	1.000	10/9/2020	0.25	0.98	4.90
PFOA	335-67-1	135.59 ϕ	H9944-FS-D(3)	5.000	10/9/2020	2.50	7.35	24.51
PFNA	375-95-1	43.98	H9944-FS(0)	1.000	10/9/2020	0.30	0.98	4.90
PFDA	335-76-2	9.70	H9944-FS(0)	1.000	10/9/2020	0.14	0.49	4.90
PFUnA	2058-94-8	7.66	H9944-FS(0)	1.000	10/9/2020	0.22	0.49	4.90
PFDoA	307-55-1	0.73 J	H9944-FS(0)	1.000	10/9/2020	0.19	0.49	4.90
PFTrDA	72629-94-8	1.52 J	H9944-FS(0)	1.000	10/9/2020	0.15	0.49	4.90
PFTeDA	376-06-7	1.96 U	H9944-FS(0)	1.000	10/9/2020	0.72	1.96	4.90
NMeFOSAA	2355-31-9	0.40 J	H9944-FS(0)	1.000	10/9/2020	0.34	0.98	4.90
NEtFOSAA	2991-50-6	1.09 J	H9944-FS(0)	1.000	10/9/2020	0.49	0.98	4.90
PFBS	375-73-5	35.94	H9944-FS(0)	1.000	10/9/2020	0.14	0.49	4.90
PFHxS	355-46-4	1625.09 ϕ	H9944-FS-D(9)	156.250	10/9/2020	16.85	61.27	765.93
PFOS	1763-23-1	3205.21 ϕ	H9944-FS-D(9)	156.250	10/9/2020	67.40	153.19	765.93
HFPO-DA	13252-13-6	0.49 U	H9944-FS(0)	1.000	10/9/2020	0.25	0.49	4.90
Adona	919005-14-4	0.98 U	H9944-FS(0)	1.000	10/9/2020	0.26	0.98	4.90
11CI-PF3OUdS	763051-92-9	0.49 U	H9944-FS(0)	1.000	10/9/2020	0.23	0.49	4.90
9CI-PF3ONS	756426-58-1	0.98 U	H9944-FS(0)	1.000	10/9/2020	0.26	0.98	4.90

Analyzed by: Schumitz, Denise
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-CTIA-WT02P-0920

Battelle ID H9945-FS
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.260
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	206.53 <i>U</i>	H9945-FS-D(3)	5.000	10/10/2020	2.55	7.21	24.04
PFHpA	375-85-9	130.10	H9945-FS(0)	1.000	10/9/2020	0.25	0.96	4.81
PFOA	335-67-1	117.21 <i>P</i>	H9945-FS-D(3)	5.000	10/10/2020	2.45	7.21	24.04
PFNA	375-95-1	37.80	H9945-FS(0)	1.000	10/9/2020	0.30	0.96	4.81
PFDA	335-76-2	8.33	H9945-FS(0)	1.000	10/9/2020	0.13	0.48	4.81
PFUnA	2058-94-8	6.47	H9945-FS(0)	1.000	10/9/2020	0.21	0.48	4.81
PFDoA	307-55-1	0.64 J	H9945-FS(0)	1.000	10/9/2020	0.18	0.48	4.81
PFTrDA	72629-94-8	1.14 J	H9945-FS(0)	1.000	10/9/2020	0.14	0.48	4.81
PFTeDA	376-06-7	1.92 <i>UJ</i>	H9945-FS(0)	1.000	10/9/2020	0.70	1.92	4.81
NMeFOSAA	2355-31-9	0.38 J	H9945-FS(0)	1.000	10/9/2020	0.34	0.96	4.81
NEtFOSAA	2991-50-6	0.96 J	H9945-FS(0)	1.000	10/9/2020	0.48	0.96	4.81
PFBS	375-73-5	34.76	H9945-FS(0)	1.000	10/9/2020	0.13	0.48	4.81
PFHxS	355-46-4	1407.56 <i>P</i>	H9945-FS-D(7)	31.250	10/10/2020	3.31	12.02	150.24
PFOS	1763-23-1	2676.26 <i>P</i>	H9945-FS-D(7)	31.250	10/10/2020	13.22	30.05	150.24
HFPO-DA	13252-13-6	0.48 U	H9945-FS(0)	1.000	10/9/2020	0.24	0.48	4.81
Adona	919005-14-4	0.96 U	H9945-FS(0)	1.000	10/9/2020	0.26	0.96	4.81
11CI-PF3OUdS	763051-92-9	0.48 U	H9945-FS(0)	1.000	10/9/2020	0.22	0.48	4.81
9CI-PF3ONS	756426-58-1	0.96 U	H9945-FS(0)	1.000	10/9/2020	0.26	0.96	4.81

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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-CTIA-WT02P-0920

Battelle ID H9945-FS
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	78 D	H9945-FS-D(3)	10/10/2020
13C4-PFHpA	65 D	H9945-FS-D(3)	10/10/2020
13C8-PFOA	86 D	H9945-FS-D(3)	10/10/2020
13C9-PFNA	65 D	H9945-FS-D(3)	10/10/2020
13C6-PFDA	74	H9945-FS(0)	10/9/2020
13C7-PFUnA	84	H9945-FS(0)	10/9/2020
13C2-PFDoA	73	H9945-FS(0)	10/9/2020
13C2-PFTeDA	44 N	H9945-FS(0)	10/9/2020
d3-MeFOSAA	107 D	H9945-FS-D(7)	10/10/2020
d5-EtFOSAA	110 D	H9945-FS-D(7)	10/10/2020
13C3-PFBS	117 D	H9945-FS-D(7)	10/10/2020
13C3-PFHxS	122 D	H9945-FS-D(7)	10/10/2020
13C8-PFOS	109 D	H9945-FS-D(7)	10/10/2020
13C3-HFPO-DA	71 D	H9945-FS-D(3)	10/10/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

9

Client ID PX-CTIA-WT01-0920

Battelle ID H9946-FS
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.260
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	7.79 J	H9946-FS(0)	1.000	10/9/2020	0.51	1.44	4.81
PFHpA	375-85-9	2.57 J	H9946-FS(0)	1.000	10/9/2020	0.25	0.96	4.81
PFOA	335-67-1	8.69	H9946-FS(0)	1.000	10/9/2020	0.49	1.44	4.81
PFNA	375-95-1	0.42 J	H9946-FS(0)	1.000	10/9/2020	0.30	0.96	4.81
PFDA	335-76-2	0.48 U	H9946-FS(0)	1.000	10/9/2020	0.13	0.48	4.81
PFUnA	2058-94-8	0.48 U	H9946-FS(0)	1.000	10/9/2020	0.21	0.48	4.81
PFDoA	307-55-1	0.48 U	H9946-FS(0)	1.000	10/9/2020	0.18	0.48	4.81
PFTroDA	72629-94-8	0.48 U	H9946-FS(0)	1.000	10/9/2020	0.14	0.48	4.81
PFTeDA	376-06-7	1.92 J U	H9946-FS(0)	1.000	10/9/2020	0.70	1.92	4.81
NMeFOSAA	2355-31-9	0.96 U	H9946-FS(0)	1.000	10/9/2020	0.34	0.96	4.81
NEtFOSAA	2991-50-6	0.96 U	H9946-FS(0)	1.000	10/9/2020	0.48	0.96	4.81
PFBS	375-73-5	2.81 J	H9946-FS(0)	1.000	10/9/2020	0.13	0.48	4.81
PFHxS	355-46-4	41.37	H9946-FS(0)	1.000	10/9/2020	0.11	0.38	4.81
PFOS	1763-23-1	33.91	H9946-FS(0)	1.000	10/9/2020	0.42	0.96	4.81
HFPO-DA	13252-13-6	0.48 U	H9946-FS(0)	1.000	10/9/2020	0.24	0.48	4.81
Adona	919005-14-4	0.96 U	H9946-FS(0)	1.000	10/9/2020	0.26	0.96	4.81
11CI-PF3OUdS	763051-92-9	0.48 U	H9946-FS(0)	1.000	10/9/2020	0.22	0.48	4.81
9CI-PF3ONS	756426-58-1	0.96 U	H9946-FS(0)	1.000	10/9/2020	0.26	0.96	4.81

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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-CTIA-WT01-0920

Battelle ID H9946-FS
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS

<i>Surrogate Recoveries (%)</i>	<i>Recovery</i>	<i>Extract ID</i>	<i>Analysis Date</i>
13C5-PFHxA	43 <i>N</i>	H9946-FS(0)	10/9/2020
13C4-PFHpA	55	H9946-FS(0)	10/9/2020
13C8-PFOA	70	H9946-FS(0)	10/9/2020
13C9-PFNA	80	H9946-FS(0)	10/9/2020
13C6-PFDA	77	H9946-FS(0)	10/9/2020
13C7-PFUnA	80	H9946-FS(0)	10/9/2020
13C2-PFDoA	77	H9946-FS(0)	10/9/2020
13C2-PFTeDA	45 <i>N</i>	H9946-FS(0)	10/9/2020
d3-MeFOSAA	88	H9946-FS(0)	10/9/2020
d5-EtFOSAA	77	H9946-FS(0)	10/9/2020
13C3-PFBS	56	H9946-FS(0)	10/9/2020
13C3-PFHxS	75	H9946-FS(0)	10/9/2020
13C8-PFOS	83	H9946-FS(0)	10/9/2020
13C3-HFPO-DA	63	H9946-FS(0)	10/9/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-CTIA-WT05-0920

Battelle ID H9947-FS
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.260
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	7.51 J	H9947-FS(0)	1.000	10/9/2020	0.51	1.44	4.81
PFHpA	375-85-9	1.77 J	H9947-FS(0)	1.000	10/9/2020	0.25	0.96	4.81
PFOA	335-67-1	5.09	H9947-FS(0)	1.000	10/9/2020	0.49	1.44	4.81
PFNA	375-95-1	0.95 J	H9947-FS(0)	1.000	10/9/2020	0.30	0.96	4.81
PFDA	335-76-2	5.75	H9947-FS(0)	1.000	10/9/2020	0.13	0.48	4.81
PFUnA	2058-94-8	0.48 U	H9947-FS(0)	1.000	10/9/2020	0.21	0.48	4.81
PFDoA	307-55-1	0.48 U	H9947-FS(0)	1.000	10/9/2020	0.18	0.48	4.81
PFTTrDA	72629-94-8	0.48 U	H9947-FS(0)	1.000	10/9/2020	0.14	0.48	4.81
PFTeDA	376-06-7	1.92 y u J	H9947-FS(0)	1.000	10/9/2020	0.70	1.92	4.81
NMeFOSAA	2355-31-9	0.96 U	H9947-FS(0)	1.000	10/9/2020	0.34	0.96	4.81
NEtFOSAA	2991-50-6	0.96 U	H9947-FS(0)	1.000	10/9/2020	0.48	0.96	4.81
PFBS	375-73-5	0.89 J	H9947-FS(0)	1.000	10/9/2020	0.13	0.48	4.81
PFHxS	355-46-4	9.72	H9947-FS(0)	1.000	10/9/2020	0.11	0.38	4.81
PFOS	1763-23-1	13.13	H9947-FS(0)	1.000	10/9/2020	0.42	0.96	4.81
HFPO-DA	13252-13-6	0.48 U	H9947-FS(0)	1.000	10/9/2020	0.24	0.48	4.81
Adona	919005-14-4	0.96 U	H9947-FS(0)	1.000	10/9/2020	0.26	0.96	4.81
11CI-PF3OUds	763051-92-9	0.48 U	H9947-FS(0)	1.000	10/9/2020	0.22	0.48	4.81
9CI-PF3ONS	756426-58-1	0.96 U	H9947-FS(0)	1.000	10/9/2020	0.26	0.96	4.81

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 Analyzed by: Schumitz, Denise
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-CTIA-WT05-0920

Battelle ID H9947-FS
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	48	H9947-FS(0)	10/9/2020
13C4-PFHpA	64	H9947-FS(0)	10/9/2020
13C8-PFOA	70	H9947-FS(0)	10/9/2020
13C9-PFNA	75	H9947-FS(0)	10/9/2020
13C6-PFDA	89	H9947-FS(0)	10/9/2020
13C7-PFUnA	86	H9947-FS(0)	10/9/2020
13C2-PFDoA	73	H9947-FS(0)	10/9/2020
13C2-PFTeDA	34	H9947-FS(0)	10/9/2020
d3-MeFOSAA	83	H9947-FS(0)	10/9/2020
d5-EtFOSAA	82	H9947-FS(0)	10/9/2020
13C3-PFBS	69	H9947-FS(0)	10/9/2020
13C3-PFHxS	92	H9947-FS(0)	10/9/2020
13C8-PFOS	86	H9947-FS(0)	10/9/2020
13C3-HFPO-DA	55	H9947-FS(0)	10/9/2020

10/29/20
 Analyzed by: Schumitz, Denise
 Printed: 10/13/2020

**DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND**

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-1136
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: October 29, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-S14-FB01-091220	H9898-FS	Water
2	PX-S14-EB01-091220-GW	H9899-FS	Water
3	PX-S14-WT02-0920	H9901-FS	Water
4	PX-S14-WT02P-0920	H9902-FS	Water
5	PX-S14-WT03-0920	H9903-FS	Water
6	PX-CTIA-WT04-0920	H9948-FS	Water
6MS	PX-CTIA-WT04-0920MS	H9949-FSMS	Water
6MSD	PX-CTIA-WT04-0920MSD	H9950-FSMSD	Water
7	PX-CTIA-WT06-0920	H9951-FS	Water
8	PX-CTIA-EB01-091320-SO	H9961-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for five water samples, two aqueous equipment blank samples, and one aqueous field blank sample collected on September 12-13, 2020 by CH2M HILL at the NAS Patuxent River site in Maryland. The samples were analyzed under the Analysis of Poly and Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-08

The data have been validated according to the protocols and quality control (QC) requirements of the analytical methods, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, Webster Field Annex, Naval Air Station Patuxent River, Maryland, April 2020, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, St. Mary's County, Naval Air Station Patuxent River, Maryland, April 2020, and the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;

- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

Organics

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A full (Stage 2B/4) data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were serious deficiencies of data. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

- PFTeDA was qualified (X) in one sample due to a severely low surrogate recovery.

The remaining data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

Per- and Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-S14-FB01-091220	None - ND	-	-	-
PX-S14-EB01-091220-GW	None - ND	-	-	-
PX-CTIA-EB01-091320-SO	PFHxS	0.27	None	Associated Samples >5X

Surrogate Spike Recoveries

- Three samples exhibited low surrogate percent recoveries (%R) for several surrogate compounds. These compounds were qualified as estimated (J/UJ/X) in each sample. Please refer to the Form Is for specific recoveries and qualifications.

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values except for the following.

EDS Sample ID	Compound	MS %R/MSD %R/RDP	Qualifier
6	PFHxA	OK/44%/60.3	None - 4X Rule Applies
	PFHxS	364%/0%/200	None - 4X Rule Applies
	PFOS	328%/OK/89.6	None - 4X Rule Applies

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- The samples were analyzed at several dilutions due to high concentrations of target compounds. The reporting limits were adjusted accordingly. No action was required.

Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was unacceptable for PFOA. Both results were qualified as estimated (J).

Compound	PX-S14-WT02-0920 ng/g	PX-S14-WT02P-0920 ng/g	RPD	Qualifier
PFHxA	1110.21	813.66	31%	None
PFHpA	133.76	119.55	11%	
PFOA	570.91	398.02	36%	J
PFNA	4.42	6.50	38%	None - <5X LOQ None
PFDA	5.01	4.12	19%	
PFUnA	0.38	0.43	12%	
NMeFOSAA	2.34	1.69	32%	
PFBS	160.99	163.86	2%	
PFHxS	3618.06	2570.93	34%	
PFOS	752.11	585.61	25%	

Please contact the undersigned at (757) 564-0090 if you have any questions or need further information.

Signed:

Nancy Weaver

Nancy Weaver
Senior Chemist

Dated: 11/2/20

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-S14-FB01-091220

Battelle ID H9898-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.260
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.44 U	H9898-FS(0)	1.000	10/9/2020	0.51	1.44	4.81
PFHpA	375-85-9	0.96 U	H9898-FS(0)	1.000	10/9/2020	0.25	0.96	4.81
PFOA	335-67-1	1.44 U	H9898-FS(0)	1.000	10/9/2020	0.49	1.44	4.81
PFNA	375-95-1	0.96 U	H9898-FS(0)	1.000	10/9/2020	0.30	0.96	4.81
PFDA	335-76-2	0.48 U	H9898-FS(0)	1.000	10/9/2020	0.13	0.48	4.81
PFUnA	2058-94-8	0.48 U	H9898-FS(0)	1.000	10/9/2020	0.21	0.48	4.81
PFDoA	307-55-1	0.48 U	H9898-FS(0)	1.000	10/9/2020	0.18	0.48	4.81
PFTTrDA	72629-94-8	0.48 U	H9898-FS(0)	1.000	10/9/2020	0.14	0.48	4.81
PFTeDA	376-06-7	1.92 U	H9898-FS(0)	1.000	10/9/2020	0.70	1.92	4.81
NMeFOSAA	2355-31-9	0.96 U	H9898-FS(0)	1.000	10/9/2020	0.34	0.96	4.81
NEtFOSAA	2991-50-6	0.96 U	H9898-FS(0)	1.000	10/9/2020	0.48	0.96	4.81
PFBS	375-73-5	0.48 U	H9898-FS(0)	1.000	10/9/2020	0.13	0.48	4.81
PFHxS	355-46-4	0.38 U	H9898-FS(0)	1.000	10/9/2020	0.11	0.38	4.81
PFOS	1763-23-1	0.96 U	H9898-FS(0)	1.000	10/9/2020	0.42	0.96	4.81
HFPO-DA	13252-13-6	0.48 U	H9898-FS(0)	1.000	10/9/2020	0.24	0.48	4.81
Adona	919005-14-4	0.96 U	H9898-FS(0)	1.000	10/9/2020	0.26	0.96	4.81
11CI-PF3OUdS	763051-92-9	0.48 U	H9898-FS(0)	1.000	10/9/2020	0.22	0.48	4.81
9CI-PF3ONS	756426-58-1	0.96 U	H9898-FS(0)	1.000	10/9/2020	0.26	0.96	4.81

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 Analyzed by: Schultz, Stephanie
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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-S14-EB01-091220-GW

Battelle ID H9899-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.265
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.42 U	H9899-FS(0)	1.000	10/9/2020	0.50	1.42	4.72
PFHpA	375-85-9	0.94 U	H9899-FS(0)	1.000	10/9/2020	0.25	0.94	4.72
PFOA	335-67-1	1.42 U	H9899-FS(0)	1.000	10/9/2020	0.48	1.42	4.72
PFNA	375-95-1	0.94 U	H9899-FS(0)	1.000	10/9/2020	0.29	0.94	4.72
PFDA	335-76-2	0.47 U	H9899-FS(0)	1.000	10/9/2020	0.13	0.47	4.72
PFUnA	2058-94-8	0.47 U	H9899-FS(0)	1.000	10/9/2020	0.21	0.47	4.72
PFDoA	307-55-1	0.47 U	H9899-FS(0)	1.000	10/9/2020	0.18	0.47	4.72
PFTTrDA	72629-94-8	0.47 U	H9899-FS(0)	1.000	10/9/2020	0.14	0.47	4.72
PFTeDA	376-06-7	1.89 U	H9899-FS(0)	1.000	10/9/2020	0.69	1.89	4.72
NMeFOSAA	2355-31-9	0.94 U	H9899-FS(0)	1.000	10/9/2020	0.33	0.94	4.72
NEtFOSAA	2991-50-6	0.94 U	H9899-FS(0)	1.000	10/9/2020	0.47	0.94	4.72
PFBS	375-73-5	0.47 U	H9899-FS(0)	1.000	10/9/2020	0.13	0.47	4.72
PFHxS	355-46-4	0.38 U	H9899-FS(0)	1.000	10/9/2020	0.10	0.38	4.72
PFOS	1763-23-1	0.94 U	H9899-FS(0)	1.000	10/9/2020	0.42	0.94	4.72
HFPO-DA	13252-13-6	0.47 U	H9899-FS(0)	1.000	10/9/2020	0.24	0.47	4.72
Adona	919005-14-4	0.94 U	H9899-FS(0)	1.000	10/9/2020	0.25	0.94	4.72
11CI-PF3OUdS	763051-92-9	0.47 U	H9899-FS(0)	1.000	10/9/2020	0.22	0.47	4.72
9CI-PF3ONS	756426-58-1	0.94 U	H9899-FS(0)	1.000	10/9/2020	0.25	0.94	4.72

10/10/2020
 Analyzed by: Schultz, Stephanie
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

3

Client ID PX-S14-WT02-0920

Battelle ID H9901-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.265
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1110.21 <i>✓</i>	H9901-FS-D(3)	12.500	10/10/2020	6.25	17.69	58.96
PFHpA	375-85-9	133.76	H9901-FS(0)	1.000	10/9/2020	0.25	0.94	4.72
PFOA	335-67-1	570.91 <i>✓ J</i>	H9901-FS-D(3)	12.500	10/10/2020	6.01	17.69	58.96
PFNA	375-95-1	4.42 J	H9901-FS(0)	1.000	10/9/2020	0.29	0.94	4.72
PFDA	335-76-2	5.01	H9901-FS(0)	1.000	10/9/2020	0.13	0.47	4.72
PFUnA	2058-94-8	0.38 J	H9901-FS(0)	1.000	10/9/2020	0.21	0.47	4.72
PFDoA	307-55-1	0.47 <i>✓ U J</i>	H9901-FS(0)	1.000	10/9/2020	0.18	0.47	4.72
PFTrDA	72629-94-8	0.47 U	H9901-FS(0)	1.000	10/9/2020	0.14	0.47	4.72
PFTeDA	376-06-7	1.89 <i>✓ X</i>	H9901-FS(0)	1.000	10/9/2020	0.69	1.89	4.72
NMeFOSAA	2355-31-9	2.34 J	H9901-FS(0)	1.000	10/9/2020	0.33	0.94	4.72
NEtFOSAA	2991-50-6	0.94 U	H9901-FS(0)	1.000	10/9/2020	0.47	0.94	4.72
PFBS	375-73-5	160.99	H9901-FS(0)	1.000	10/9/2020	0.13	0.47	4.72
PFHxS	355-46-4	3618.06 <i>✓</i>	H9901-FS-D(5)	62.500	10/10/2020	6.49	23.58	294.81
PFOS	1763-23-1	752.11 <i>✓</i>	H9901-FS-D(3)	12.500	10/10/2020	5.19	11.79	58.96
HFPO-DA	13252-13-6	0.47 U	H9901-FS(0)	1.000	10/9/2020	0.24	0.47	4.72
Adona	919005-14-4	0.94 U	H9901-FS(0)	1.000	10/9/2020	0.25	0.94	4.72
11CI-PF3OUdS	763051-92-9	0.47 U	H9901-FS(0)	1.000	10/9/2020	0.22	0.47	4.72
9CI-PF3ONS	756426-58-1	0.94 U	H9901-FS(0)	1.000	10/9/2020	0.25	0.94	4.72

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10/29/20
 Analyzed by: Schultz, Stephanie
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

3

Client ID PX-S14-WT02-0920

Battelle ID H9901-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS

<u>Surrogate Recoveries (%)</u>	<u>Recovery</u>	<u>Extract ID</u>	<u>Analysis Date</u>
13C5-PFHxA	71 D	H9901-FS-D(3)	10/10/2020
13C4-PFHpA	68 D	H9901-FS-D(3)	10/10/2020
13C8-PFOA	81 D	H9901-FS-D(3)	10/10/2020
13C9-PFNA	79 D	H9901-FS-D(3)	10/10/2020
13C6-PFDA	74	H9901-FS(0)	10/9/2020
13C7-PFUnA	71	H9901-FS(0)	10/9/2020
13C2-PFDoA	45 N	H9901-FS(0)	10/9/2020
13C2-PFTeDA	9 N	H9901-FS(0)	10/9/2020
d3-MeFOSAA	83 D	H9901-FS-D(3)	10/10/2020
d5-EtFOSAA	93 D	H9901-FS-D(3)	10/10/2020
13C3-PFBS	97 D	H9901-FS-D(3)	10/10/2020
13C3-PFHxS	96 D	H9901-FS-D(5)	10/10/2020
13C8-PFOS	91 D	H9901-FS-D(3)	10/10/2020
13C3-HFPO-DA	74 D	H9901-FS-D(3)	10/10/2020



Project Client: CH2M
Project Name: CTO-4256: PAX Basewide PFAS
Project No.: 100142032

4

Client ID PX-S14-WT02P-0920

Battelle ID H9902-FS
Sample Type SA
Collection Date 09/12/2020
Extraction Date 09/23/2020
Analytical Instrument Sciex 6500+ LC/MS/MS
% Moisture NA
Matrix WATER
Sample Size 0.265
Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	813.66 <i>U</i>	H9902-FS-D(3)	12.500	10/10/2020	6.25	17.69	58.96
PFHpA	375-85-9	119.55	H9902-FS(0)	1.000	10/9/2020	0.25	0.94	4.72
PFOA	335-67-1	398.02 <i>U J</i>	H9902-FS-D(3)	12.500	10/10/2020	6.01	17.69	58.96
PFNA	375-95-1	6.50	H9902-FS(0)	1.000	10/9/2020	0.29	0.94	4.72
PFDA	335-76-2	4.12 J	H9902-FS(0)	1.000	10/9/2020	0.13	0.47	4.72
PFUnA	2058-94-8	0.43 J	H9902-FS(0)	1.000	10/9/2020	0.21	0.47	4.72
PFDoA	307-55-1	0.47 <i>U U J</i>	H9902-FS(0)	1.000	10/9/2020	0.18	0.47	4.72
PFTTrDA	72629-94-8	0.47 U	H9902-FS(0)	1.000	10/9/2020	0.14	0.47	4.72
PFTeDA	376-06-7	1.89 <i>U U J</i>	H9902-FS(0)	1.000	10/9/2020	0.69	1.89	4.72
NMeFOSAA	2355-31-9	1.69 J	H9902-FS(0)	1.000	10/9/2020	0.33	0.94	4.72
NEtFOSAA	2991-50-6	0.94 U	H9902-FS(0)	1.000	10/9/2020	0.47	0.94	4.72
PFBS	375-73-5	163.86	H9902-FS(0)	1.000	10/9/2020	0.13	0.47	4.72
PFHxS	355-46-4	2570.93 <i>U</i>	H9902-FS-D(5)	62.500	10/10/2020	6.49	23.58	294.81
PFOS	1763-23-1	585.61 <i>U</i>	H9902-FS-D(3)	12.500	10/10/2020	5.19	11.79	58.96
HFPO-DA	13252-13-6	0.47 U	H9902-FS(0)	1.000	10/9/2020	0.24	0.47	4.72
Adona	919005-14-4	0.94 U	H9902-FS(0)	1.000	10/9/2020	0.25	0.94	4.72
11CI-PF3OUdS	763051-92-9	0.47 U	H9902-FS(0)	1.000	10/9/2020	0.22	0.47	4.72
9CI-PF3ONS	756426-58-1	0.94 U	H9902-FS(0)	1.000	10/9/2020	0.25	0.94	4.72

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NW10/29/20
Analyzed by: Schultz, Stephanie
Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

4

Client ID PX-S14-WT02P-0920
 Battelle ID H9902-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	83 D	H9902-FS-D(3)	10/10/2020
13C4-PFHpA	69 D	H9902-FS-D(3)	10/10/2020
13C8-PFOA	91 D	H9902-FS-D(3)	10/10/2020
13C9-PFNA	87 D	H9902-FS-D(3)	10/10/2020
13C6-PFDA	72	H9902-FS(0)	10/9/2020
13C7-PFUnA	72	H9902-FS(0)	10/9/2020
13C2-PFDoA	47 N	H9902-FS(0)	10/9/2020
13C2-PFTeDA	17 N	H9902-FS(0)	10/9/2020
d3-MeFOSAA	90 D	H9902-FS-D(3)	10/10/2020
d5-EtFOSAA	99 D	H9902-FS-D(3)	10/10/2020
13C3-PFBS	98 D	H9902-FS-D(3)	10/10/2020
13C3-PFHxS	110 D	H9902-FS-D(5)	10/10/2020
13C8-PFOS	96 D	H9902-FS-D(3)	10/10/2020
13C3-HFPO-DA	78 D	H9902-FS-D(3)	10/10/2020

10/29/20
 Analyzed by: Schultz, Stephanie
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-S14-WT03-0920

Battelle ID H9903-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.265
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	53.24	H9903-FS(0)	1.000	10/9/2020	0.50	1.42	4.72
PFHpA	375-85-9	10.06	H9903-FS(0)	1.000	10/9/2020	0.25	0.94	4.72
PFOA	335-67-1	129.41 J	H9903-FS-D(3)	5.000	10/10/2020	2.41	7.08	23.58
PFNA	375-95-1	2.22 J	H9903-FS(0)	1.000	10/9/2020	0.29	0.94	4.72
PFDA	335-76-2	1.91 J	H9903-FS(0)	1.000	10/9/2020	0.13	0.47	4.72
PFUnA	2058-94-8	0.47 U	H9903-FS(0)	1.000	10/9/2020	0.21	0.47	4.72
PFDoA	307-55-1	0.47 U	H9903-FS(0)	1.000	10/9/2020	0.18	0.47	4.72
PFTTrDA	72629-94-8	0.47 U	H9903-FS(0)	1.000	10/9/2020	0.14	0.47	4.72
PFTeDA	376-06-7	1.89 U	H9903-FS(0)	1.000	10/9/2020	0.69	1.89	4.72
NMeFOSAA	2355-31-9	0.94 U	H9903-FS(0)	1.000	10/9/2020	0.33	0.94	4.72
NEtFOSAA	2991-50-6	0.94 U	H9903-FS(0)	1.000	10/9/2020	0.47	0.94	4.72
PFBS	375-73-5	17.49	H9903-FS(0)	1.000	10/9/2020	0.13	0.47	4.72
PFHxS	355-46-4	298.20 P	H9903-FS-D(3)	5.000	10/10/2020	0.52	1.89	23.58
PFOS	1763-23-1	181.64 P	H9903-FS-D(3)	5.000	10/10/2020	2.08	4.72	23.58
HFPO-DA	13252-13-6	0.47 U	H9903-FS(0)	1.000	10/9/2020	0.24	0.47	4.72
Adona	919005-14-4	0.94 U	H9903-FS(0)	1.000	10/9/2020	0.25	0.94	4.72
11CI-PF3OUdS	763051-92-9	0.47 U	H9903-FS(0)	1.000	10/9/2020	0.22	0.47	4.72
9CI-PF3ONS	756426-58-1	0.94 U	H9903-FS(0)	1.000	10/9/2020	0.25	0.94	4.72

10/10/2020
 Analyzed by: Schultz, Stephanie
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-CTIA-WT04-0920

Battelle ID H9948-FS
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.250
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	317.00 P	H9948-FS-D(3)	5.000	10/10/2020	2.65	7.50	25.00
PFHpA	375-85-9	226.82	H9948-FS(0)	1.000	10/9/2020	0.26	1.00	5.00
PFOA	335-67-1	234.78 P	H9948-FS-D(3)	5.000	10/10/2020	2.55	7.50	25.00
PFNA	375-95-1	104.43	H9948-FS(0)	1.000	10/9/2020	0.31	1.00	5.00
PFDA	335-76-2	7.74	H9948-FS(0)	1.000	10/9/2020	0.14	0.50	5.00
PFUnA	2058-94-8	3.85 J	H9948-FS(0)	1.000	10/9/2020	0.22	0.50	5.00
PFDoA	307-55-1	2.75 J	H9948-FS(0)	1.000	10/9/2020	0.19	0.50	5.00
PFTrDA	72629-94-8	0.50 U	H9948-FS(0)	1.000	10/9/2020	0.15	0.50	5.00
PFTeDA	376-06-7	2.00 V UJ	H9948-FS(0)	1.000	10/9/2020	0.73	2.00	5.00
NMeFOSAA	2355-31-9	1.00 U	H9948-FS(0)	1.000	10/9/2020	0.35	1.00	5.00
NEtFOSAA	2991-50-6	1.48 J	H9948-FS(0)	1.000	10/9/2020	0.50	1.00	5.00
PFBS	375-73-5	40.28	H9948-FS(0)	1.000	10/9/2020	0.14	0.50	5.00
PFHxS	355-46-4	1910.79 P	H9948-FS-D(7)	62.500	10/10/2020	6.88	25.00	312.50
PFOS	1763-23-1	3865.70 P	H9948-FS-D(7)	62.500	10/10/2020	27.50	62.50	312.50
HFPO-DA	13252-13-6	0.50 U	H9948-FS(0)	1.000	10/9/2020	0.25	0.50	5.00
Adona	919005-14-4	1.00 U	H9948-FS(0)	1.000	10/9/2020	0.27	1.00	5.00
11CI-PF3OUdS	763051-92-9	0.50 U	H9948-FS(0)	1.000	10/9/2020	0.23	0.50	5.00
9CI-PF3ONS	756426-58-1	1.00 U	H9948-FS(0)	1.000	10/9/2020	0.27	1.00	5.00

SSL



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-CTIA-WT04-0920

Battelle ID H9948-FS
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	81 D	H9948-FS-D(3)	10/10/2020
13C4-PFHpA	64 D	H9948-FS-D(3)	10/10/2020
13C8-PFOA	83 D	H9948-FS-D(3)	10/10/2020
13C9-PFNA	59 D	H9948-FS-D(3)	10/10/2020
13C6-PFDA	81	H9948-FS(0)	10/9/2020
13C7-PFUnA	91	H9948-FS(0)	10/9/2020
13C2-PFDoA	76	H9948-FS(0)	10/9/2020
13C2-PFTeDA	48 M	H9948-FS(0)	10/9/2020
d3-MeFOSAA	90 D	H9948-FS-D(7)	10/10/2020
d5-EtFOSAA	92 D	H9948-FS-D(7)	10/10/2020
13C3-PFBS	95 D	H9948-FS-D(7)	10/10/2020
13C3-PFHxS	101 D	H9948-FS-D(7)	10/10/2020
13C8-PFOS	87 D	H9948-FS-D(7)	10/10/2020
13C3-HFPO-DA	73 D	H9948-FS-D(3)	10/10/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-CTIA-WT06-0920

Battelle ID H9951-FS
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.260
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	49.25 J	H9951-FS(0)	1.000	10/9/2020	0.51	1.44	4.81	SSL
PFHpA	375-85-9	48.89 J	H9951-FS(0)	1.000	10/9/2020	0.25	0.96	4.81	SSL
PFOA	335-67-1	73.35	H9951-FS(0)	1.000	10/9/2020	0.49	1.44	4.81	
PFNA	375-95-1	55.13 J	H9951-FS(0)	1.000	10/9/2020	0.30	0.96	4.81	SSL
PFDA	335-76-2	8.83	H9951-FS(0)	1.000	10/9/2020	0.13	0.48	4.81	
PFUnA	2058-94-8	2.65 J	H9951-FS(0)	1.000	10/9/2020	0.21	0.48	4.81	
PFDoA	307-55-1	0.48 U	H9951-FS(0)	1.000	10/9/2020	0.18	0.48	4.81	
PFTTrDA	72629-94-8	0.48 U	H9951-FS(0)	1.000	10/9/2020	0.14	0.48	4.81	
PFTeDA	376-06-7	1.92 J U J	H9951-FS(0)	1.000	10/9/2020	0.70	1.92	4.81	SSL
NMeFOSAA	2355-31-9	0.96 U	H9951-FS(0)	1.000	10/9/2020	0.34	0.96	4.81	
NEtFOSAA	2991-50-6	0.96 U	H9951-FS(0)	1.000	10/9/2020	0.48	0.96	4.81	
PFBS	375-73-5	5.94	H9951-FS(0)	1.000	10/9/2020	0.13	0.48	4.81	
PFHxS	355-46-4	197.03 J	H9951-FS-D(3)	5.000	10/10/2020	0.53	1.92	24.04	
PFOS	1763-23-1	1831.53 J	H9951-FS-D(5)	62.500	10/10/2020	26.44	60.10	300.48	
HFPO-DA	13252-13-6	0.48 U	H9951-FS(0)	1.000	10/9/2020	0.24	0.48	4.81	
Adona	919005-14-4	0.96 U	H9951-FS(0)	1.000	10/9/2020	0.26	0.96	4.81	
11CI-PF3OUdS	763051-92-9	0.48 U	H9951-FS(0)	1.000	10/9/2020	0.22	0.48	4.81	
9CI-PF3ONS	756426-58-1	0.96 U	H9951-FS(0)	1.000	10/9/2020	0.26	0.96	4.81	

10/10/2020
 Analyzed by: Schultz, Stephanie
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-CTIA-WT06-0920

Battelle ID H9951-FS
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	38 N	H9951-FS(0)	10/9/2020
13C4-PFHpA	43 N	H9951-FS(0)	10/9/2020
13C8-PFOA	60	H9951-FS(0)	10/9/2020
13C9-PFNA	29 N	H9951-FS(0)	10/9/2020
13C6-PFDA	67	H9951-FS(0)	10/9/2020
13C7-PFUnA	71	H9951-FS(0)	10/9/2020
13C2-PFDoA	60	H9951-FS(0)	10/9/2020
13C2-PFTeDA	32 N	H9951-FS(0)	10/9/2020
d3-MeFOSAA	101 D	H9951-FS-D(5)	10/10/2020
d5-EtFOSAA	101 D	H9951-FS-D(5)	10/10/2020
13C3-PFBS	97 D	H9951-FS-D(5)	10/10/2020
13C3-PFHxS	108 D	H9951-FS-D(5)	10/10/2020
13C8-PFOS	108 D	H9951-FS-D(5)	10/10/2020
13C3-HFPO-DA	56	H9951-FS(0)	10/9/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-CTIA-EB01-091320-SO

Battelle ID H9961-FS
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.265
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.42 U	H9961-FS(0)	1.000	10/9/2020	0.50	1.42	4.72
PFHpA	375-85-9	0.94 U	H9961-FS(0)	1.000	10/9/2020	0.25	0.94	4.72
PFOA	335-67-1	1.42 U	H9961-FS(0)	1.000	10/9/2020	0.48	1.42	4.72
PFNA	375-95-1	0.94 U	H9961-FS(0)	1.000	10/9/2020	0.29	0.94	4.72
PFDA	335-76-2	0.47 U	H9961-FS(0)	1.000	10/9/2020	0.13	0.47	4.72
PFUnA	2058-94-8	0.47 U	H9961-FS(0)	1.000	10/9/2020	0.21	0.47	4.72
PFDoA	307-55-1	0.47 U	H9961-FS(0)	1.000	10/9/2020	0.18	0.47	4.72
PFTTrDA	72629-94-8	0.47 U	H9961-FS(0)	1.000	10/9/2020	0.14	0.47	4.72
PFTeDA	376-06-7	1.89 U	H9961-FS(0)	1.000	10/9/2020	0.69	1.89	4.72
NMeFOSAA	2355-31-9	0.94 U	H9961-FS(0)	1.000	10/9/2020	0.33	0.94	4.72
NEtFOSAA	2991-50-6	0.94 U	H9961-FS(0)	1.000	10/9/2020	0.47	0.94	4.72
PFBS	375-73-5	0.47 U	H9961-FS(0)	1.000	10/9/2020	0.13	0.47	4.72
PFHxS	355-46-4	0.27 J	H9961-FS(0)	1.000	10/9/2020	0.10	0.38	4.72
PFOS	1763-23-1	0.94 U	H9961-FS(0)	1.000	10/9/2020	0.42	0.94	4.72
HFPO-DA	13252-13-6	0.47 U	H9961-FS(0)	1.000	10/9/2020	0.24	0.47	4.72
Adona	919005-14-4	0.94 U	H9961-FS(0)	1.000	10/9/2020	0.25	0.94	4.72
11Cl-PF3OUdS	763051-92-9	0.47 U	H9961-FS(0)	1.000	10/9/2020	0.22	0.47	4.72
9Cl-PF3ONS	756426-58-1	0.94 U	H9961-FS(0)	1.000	10/9/2020	0.25	0.94	4.72

10/10/2020
 Analyzed by: Schultz, Stephanie
 Printed: 10/13/2020

**DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND**

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-1137
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: October 30, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-H2835-SS03-000H	H9873-FS	Soil
1MS	PX-H2835-SS03-000HMS	H9874-FSMS	Soil
1MSD	PX-H2835-SS03-000HMSD	H9875-FSMSD	Soil
2	PX-H2835-SB03-0304	H9876-FS	Soil
3	PX-H2835-SS02-000H	H9877-FS	Soil
4	PX-H2835-SB02-0304	H9878-FS	Soil
5	PX-H2835-SS04-000H	H9879-FS	Soil
6	PX-H2835-SB04-0304	H9880-FS	Soil
7	PX-H2835-SS01-000H	H9881-FS	Soil
8	PX-H2835-SB01P-0304	H9882-FS	Soil
9	PX-H2835-SB01-0304	H9883-FS	Soil
10	PX-FFDA-SS01-000H	H9907-FS	Soil
11	PX-FFDA-SB01-0304	H9908-FS	Soil
12	PX-FFDA-SB01P-0304	H9909-FS	Soil

A Stage 2B/4 data validation was performed on the analytical data for twelve soil samples collected on September 11-12, 2020 by CH2M HILL at the NAS Patuxent River site in Maryland. The samples were analyzed under the Analysis of Poly and Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-08

The data have been validated according to the protocols and quality control (QC) requirements of the analytical methods, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, Webster Field Annex, Naval Air Station Patuxent River, Maryland, April 2020, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, St. Mary's County, Naval Air Station Patuxent River, Maryland, April 2020, and the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

Organics

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A full (Stage 2B/4) data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

Per- and Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for soil samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-H2835-FB01-091120	None - ND	-	-	-
PX-H2835-EB01-091120-SO	None - ND	-	-	-
PX-FFDA-FB01-091220	None - ND	-	-	-
PX-FFDA-EB01-091220	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

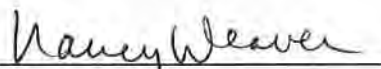
- Field duplicate results are summarized below. The precision was acceptable.

Compound	PX-H2835-SS01-000H ng/g	PX-H2835-SB01P-0304 ng/g	RPD	Qualifier
PFOS	1.01	2.65U	NC	None

Compound	PX-FFDA-SB01-0304 ng/g	PX-FFDA-SB01P-0304 ng/g	RPD	Qualifier
None	ND	ND	-	-

Please contact the undersigned at (757) 564-0090 if you have any questions or need further information.

Signed:


Nancy Weaver
Senior Chemist

Dated: 11/2/20

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-H2835-SS03-000H

Battelle ID H9873-FS
 Sample Type SA
 Collection Date 09/11/2020
 Extraction Date 09/18/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 19.51
 Matrix SOIL
 Sample Size 1.72
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.33 U	H9873-FS(3)	10.000	10/9/2020	0.83	2.33	5.81
PFHpA	375-85-9	1.74 U	H9873-FS(3)	10.000	10/9/2020	0.59	1.74	5.81
PFOA	335-67-1	0.97 J	H9873-FS(3)	10.000	10/9/2020	0.71	2.33	5.81
PFNA	375-95-1	1.16 U	H9873-FS(3)	10.000	10/9/2020	0.57	1.16	5.81
PFDA	335-76-2	0.87 J	H9873-FS(3)	10.000	10/9/2020	0.53	1.16	5.81
PFUnA	2058-94-8	0.69 J	H9873-FS(3)	10.000	10/9/2020	0.53	1.16	5.81
PFDoA	307-55-1	2.33 U	H9873-FS(3)	10.000	10/9/2020	0.71	2.33	5.81
PFTTrDA	72629-94-8	1.16 U	H9873-FS(5)	10.000	10/12/2020	0.33	1.16	5.81
PFTeDA	376-06-7	2.91 U	H9873-FS(5)	10.000	10/12/2020	1.26	2.91	5.81
NMeFOSAA	2355-31-9	2.91 U	H9873-FS(3)	10.000	10/9/2020	1.19	2.91	5.81
NEtFOSAA	2991-50-6	2.33 U	H9873-FS(3)	10.000	10/9/2020	0.87	2.33	5.81
PFBS	375-73-5	1.16 U	H9873-FS(3)	10.000	10/9/2020	0.41	1.16	5.81
PFHxS	355-46-4	1.36 J	H9873-FS(3)	10.000	10/9/2020	0.94	2.33	5.81
PFOS	1763-23-1	3.53 J	H9873-FS(3)	10.000	10/9/2020	0.80	2.33	5.81
HFPO-DA	13252-13-6	2.33 U	H9873-FS(3)	10.000	10/9/2020	0.74	2.33	5.81
Adona	919005-14-4	2.33 U	H9873-FS(3)	10.000	10/9/2020	0.97	2.33	5.81
11CI-PF3OUdS	763051-92-9	1.74 U	H9873-FS(3)	10.000	10/9/2020	0.60	1.74	5.81
9CI-PF3ONS	756426-58-1	1.16 U	H9873-FS(3)	10.000	10/9/2020	0.56	1.16	5.81

mw 10/30/20
 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

2

Client ID PX-H2835-SB03-0304

Battelle ID H9876-FS
 Sample Type SA
 Collection Date 09/11/2020
 Extraction Date 09/18/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 7.47
 Matrix SOIL
 Sample Size 1.80
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.22 U	H9876-FS(3)	10.000	10/9/2020	0.79	2.22	5.56
PFHpA	375-85-9	1.67 U	H9876-FS(3)	10.000	10/9/2020	0.57	1.67	5.56
PFOA	335-67-1	2.22 U	H9876-FS(3)	10.000	10/9/2020	0.68	2.22	5.56
PFNA	375-95-1	1.11 U	H9876-FS(3)	10.000	10/9/2020	0.54	1.11	5.56
PFDA	335-76-2	1.11 U	H9876-FS(3)	10.000	10/9/2020	0.51	1.11	5.56
PFUnA	2058-94-8	1.11 U	H9876-FS(3)	10.000	10/9/2020	0.51	1.11	5.56
PFDoA	307-55-1	2.22 U	H9876-FS(3)	10.000	10/9/2020	0.68	2.22	5.56
PFTrDA	72629-94-8	1.11 U	H9876-FS(3)	10.000	10/9/2020	0.31	1.11	5.56
PFTeDA	376-06-7	2.78 U	H9876-FS(3)	10.000	10/9/2020	1.20	2.78	5.56
NMeFOSAA	2355-31-9	2.78 U	H9876-FS(3)	10.000	10/9/2020	1.13	2.78	5.56
NEtFOSAA	2991-50-6	2.22 U	H9876-FS(3)	10.000	10/9/2020	0.83	2.22	5.56
PFBS	375-73-5	1.11 U	H9876-FS(3)	10.000	10/9/2020	0.39	1.11	5.56
PFHxS	355-46-4	2.22 U	H9876-FS(3)	10.000	10/9/2020	0.90	2.22	5.56
PFOS	1763-23-1	2.22 U	H9876-FS(3)	10.000	10/9/2020	0.77	2.22	5.56
HFPO-DA	13252-13-6	2.22 U	H9876-FS(3)	10.000	10/9/2020	0.71	2.22	5.56
Adona	919005-14-4	2.22 U	H9876-FS(3)	10.000	10/9/2020	0.92	2.22	5.56
11CI-PF3OUdS	763051-92-9	1.67 U	H9876-FS(3)	10.000	10/9/2020	0.58	1.67	5.56
9CI-PF3ONS	756426-58-1	1.11 U	H9876-FS(3)	10.000	10/9/2020	0.53	1.11	5.56

10/13/2020

Analyzed by: Griffith, Lauren

Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

3

Client ID PX-H2835-SS02-000H

Battelle ID H9877-FS
 Sample Type SA
 Collection Date 09/11/2020
 Extraction Date 09/18/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 13.15
 Matrix SOIL
 Sample Size 1.75
 Size Unit-Basis g

Analysis Date	DL	LOD	LOQ	DF	Extract ID	Result (ng/g_Dry)	CAS No.	Analyte
10/9/2020	0.81	2.29	5.71	10.000	H9877-FS(3)	2.29 U	307-24-4	PFHxA
10/9/2020	0.58	1.71	5.71	10.000	H9877-FS(3)	1.71 U	375-85-9	PFHpA
10/9/2020	0.70	2.29	5.71	10.000	H9877-FS(3)	2.29 U	335-67-1	PFOA
10/9/2020	0.56	1.14	5.71	10.000	H9877-FS(3)	1.14 U	375-95-1	PFNA
10/9/2020	0.53	1.14	5.71	10.000	H9877-FS(3)	1.14 U	335-76-2	PFDA
10/9/2020	0.53	1.14	5.71	10.000	H9877-FS(3)	1.14 U	2058-94-8	PFUnA
10/9/2020	0.70	2.29	5.71	10.000	H9877-FS(3)	2.29 U	307-55-1	PFDoA
10/12/2020	0.32	1.14	5.71	10.000	H9877-FS(5)	1.14 U	72629-94-8	PFTrDA
10/12/2020	1.23	2.86	5.71	10.000	H9877-FS(5)	2.86 U	376-06-7	PFTeDA
10/9/2020	1.17	2.86	5.71	10.000	H9877-FS(3)	2.86 U	2355-31-9	NMeFOSAA
10/9/2020	0.86	2.29	5.71	10.000	H9877-FS(3)	2.29 U	2991-50-6	NEtFOSAA
10/9/2020	0.40	1.14	5.71	10.000	H9877-FS(3)	1.14 U	375-73-5	PFBS
10/9/2020	0.93	2.29	5.71	10.000	H9877-FS(3)	2.29 U	355-46-4	PFHxS
10/9/2020	0.79	2.29	5.71	10.000	H9877-FS(3)	1.74 J	1763-23-1	PFOS
10/9/2020	0.73	2.29	5.71	10.000	H9877-FS(3)	2.29 U	13252-13-6	HFPO-DA
10/9/2020	0.95	2.29	5.71	10.000	H9877-FS(3)	2.29 U	919005-14-4	Adona
10/9/2020	0.59	1.71	5.71	10.000	H9877-FS(3)	1.71 U	763051-92-9	11CI-PF3OUdS
10/9/2020	0.55	1.14	5.71	10.000	H9877-FS(3)	1.14 U	756426-58-1	9CI-PF3ONS

10/13/2020

Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

4

Client ID PX-H2835-SB02-0304

Battelle ID H9878-FS
 Sample Type SA
 Collection Date 09/11/2020
 Extraction Date 09/18/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 14.90
 Matrix SOIL
 Sample Size 1.68
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.38 U	H9878-FS(3)	10.000	10/9/2020	0.85	2.38	5.95
PFHpA	375-85-9	1.79 U	H9878-FS(3)	10.000	10/9/2020	0.61	1.79	5.95
PFOA	335-67-1	2.38 U	H9878-FS(3)	10.000	10/9/2020	0.73	2.38	5.95
PFNA	375-95-1	1.19 U	H9878-FS(3)	10.000	10/9/2020	0.58	1.19	5.95
PFDA	335-76-2	1.19 U	H9878-FS(3)	10.000	10/9/2020	0.55	1.19	5.95
PFUnA	2058-94-8	1.19 U	H9878-FS(3)	10.000	10/9/2020	0.55	1.19	5.95
PFDoA	307-55-1	2.38 U	H9878-FS(3)	10.000	10/9/2020	0.73	2.38	5.95
PFTrDA	72629-94-8	1.19 U	H9878-FS(5)	10.000	10/12/2020	0.33	1.19	5.95
PFTeDA	376-06-7	2.98 U	H9878-FS(5)	10.000	10/12/2020	1.29	2.98	5.95
NMeFOSAA	2355-31-9	2.98 U	H9878-FS(3)	10.000	10/9/2020	1.21	2.98	5.95
NEtFOSAA	2991-50-6	2.38 U	H9878-FS(3)	10.000	10/9/2020	0.89	2.38	5.95
PFBS	375-73-5	1.19 U	H9878-FS(3)	10.000	10/9/2020	0.42	1.19	5.95
PFHxS	355-46-4	2.38 U	H9878-FS(3)	10.000	10/9/2020	0.96	2.38	5.95
PFOS	1763-23-1	2.38 U	H9878-FS(3)	10.000	10/9/2020	0.82	2.38	5.95
HFPO-DA	13252-13-6	2.38 U	H9878-FS(3)	10.000	10/9/2020	0.76	2.38	5.95
Adona	919005-14-4	2.38 U	H9878-FS(3)	10.000	10/9/2020	0.99	2.38	5.95
11CI-PF3OUdS	763051-92-9	1.79 U	H9878-FS(3)	10.000	10/9/2020	0.62	1.79	5.95
9CI-PF3ONS	756426-58-1	1.19 U	H9878-FS(3)	10.000	10/9/2020	0.57	1.19	5.95

NW 10/30/20
 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

5

Client ID PX-H2835-SS04-000H

Battelle ID H9879-FS
 Sample Type SA
 Collection Date 09/11/2020
 Extraction Date 09/18/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 12.88
 Matrix SOIL
 Sample Size 1.60
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.10 J	H9879-FS(3)	10.000	10/9/2020	0.89	2.50	6.25
PFHpA	375-85-9	1.30 J	H9879-FS(3)	10.000	10/9/2020	0.64	1.88	6.25
PFOA	335-67-1	2.35 J	H9879-FS(3)	10.000	10/9/2020	0.76	2.50	6.25
PFNA	375-95-1	1.37 J	H9879-FS(3)	10.000	10/9/2020	0.61	1.25	6.25
PFDA	335-76-2	7.89	H9879-FS(3)	10.000	10/9/2020	0.58	1.25	6.25
PFUnA	2058-94-8	6.03 J	H9879-FS(3)	10.000	10/9/2020	0.58	1.25	6.25
PFDoA	307-55-1	6.89	H9879-FS(3)	10.000	10/9/2020	0.76	2.50	6.25
PFTrDA	72629-94-8	1.97 J	H9879-FS(3)	10.000	10/9/2020	0.35	1.25	6.25
PFTeDA	376-06-7	1.71 J	H9879-FS(3)	10.000	10/9/2020	1.35	3.13	6.25
NMeFOSAA	2355-31-9	3.13 U	H9879-FS(3)	10.000	10/9/2020	1.28	3.13	6.25
NEtFOSAA	2991-50-6	2.50 U	H9879-FS(3)	10.000	10/9/2020	0.94	2.50	6.25
PFBS	375-73-5	1.25 U	H9879-FS(3)	10.000	10/9/2020	0.44	1.25	6.25
PFHxS	355-46-4	2.50 U	H9879-FS(3)	10.000	10/9/2020	1.01	2.50	6.25
PFOS	1763-23-1	2.50 U	H9879-FS(3)	10.000	10/9/2020	0.86	2.50	6.25
HFPO-DA	13252-13-6	2.50 U	H9879-FS(3)	10.000	10/9/2020	0.80	2.50	6.25
Adona	919005-14-4	2.50 U	H9879-FS(3)	10.000	10/9/2020	1.04	2.50	6.25
11CI-PF3OUdS	763051-92-9	1.88 U	H9879-FS(3)	10.000	10/9/2020	0.65	1.88	6.25
9CI-PF3ONS	756426-58-1	1.25 U	H9879-FS(3)	10.000	10/9/2020	0.60	1.25	6.25

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 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-H2835-SB04-0304

Battelle ID H9880-FS
 Sample Type SA
 Collection Date 09/11/2020
 Extraction Date 09/18/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 4.21
 Matrix SOIL
 Sample Size 1.81
 Size Unit-Basis g

Analysis Date	DL	LOD	LOQ	DF	Extract ID	Result (ng/g_Dry)	CAS No.	Analyte
10/10/2020	0.78	2.21	5.52	10.000	H9880-FS(3)	2.21 U	307-24-4	PFHxA
10/10/2020	0.56	1.66	5.52	10.000	H9880-FS(3)	0.61 J	375-85-9	PFHpA
10/10/2020	0.67	2.21	5.52	10.000	H9880-FS(3)	0.88 J	335-67-1	PFOA
10/10/2020	0.54	1.10	5.52	10.000	H9880-FS(3)	0.86 J	375-95-1	PFNA
10/10/2020	0.51	1.10	5.52	10.000	H9880-FS(3)	1.22 J	335-76-2	PFDA
10/10/2020	0.51	1.10	5.52	10.000	H9880-FS(3)	1.10 U	2058-94-8	PFUnA
10/10/2020	0.67	2.21	5.52	10.000	H9880-FS(3)	2.21 U	307-55-1	PFDoA
10/10/2020	0.31	1.10	5.52	10.000	H9880-FS(3)	1.10 U	72629-94-8	PFTTrDA
10/10/2020	1.19	2.76	5.52	10.000	H9880-FS(3)	2.76 U	376-06-7	PFTeDA
10/10/2020	1.13	2.76	5.52	10.000	H9880-FS(3)	2.76 U	2355-31-9	NMeFOSAA
10/10/2020	0.83	2.21	5.52	10.000	H9880-FS(3)	2.21 U	2991-50-6	NEtFOSAA
10/10/2020	0.39	1.10	5.52	10.000	H9880-FS(3)	1.10 U	375-73-5	PFBS
10/10/2020	0.90	2.21	5.52	10.000	H9880-FS(3)	2.21 U	355-46-4	PFHxS
10/10/2020	0.76	2.21	5.52	10.000	H9880-FS(3)	2.21 U	1763-23-1	PFOS
10/10/2020	0.71	2.21	5.52	10.000	H9880-FS(3)	2.21 U	13252-13-6	HFPO-DA
10/10/2020	0.92	2.21	5.52	10.000	H9880-FS(3)	2.21 U	919005-14-4	Adona
10/10/2020	0.57	1.66	5.52	10.000	H9880-FS(3)	1.66 U	763051-92-9	11CI-PF3OUdS
10/10/2020	0.53	1.10	5.52	10.000	H9880-FS(3)	1.10 U	756426-58-1	9CI-PF3ONS

mw 10/30/20
 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

7

Client ID PX-H2835-SS01-000H

Battelle ID H9881-FS
 Sample Type SA
 Collection Date 09/11/2020
 Extraction Date 09/18/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 23.15
 Matrix SOIL
 Sample Size 1.68
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.38 U	H9881-FS(3)	10.000	10/10/2020	0.85	2.38	5.95
PFHpA	375-85-9	1.79 U	H9881-FS(3)	10.000	10/10/2020	0.61	1.79	5.95
PFOA	335-67-1	2.38 U	H9881-FS(3)	10.000	10/10/2020	0.73	2.38	5.95
PFNA	375-95-1	1.19 U	H9881-FS(3)	10.000	10/10/2020	0.58	1.19	5.95
PFDA	335-76-2	1.19 U	H9881-FS(3)	10.000	10/10/2020	0.55	1.19	5.95
PFUnA	2058-94-8	1.19 U	H9881-FS(3)	10.000	10/10/2020	0.55	1.19	5.95
PFDoA	307-55-1	2.38 U	H9881-FS(3)	10.000	10/10/2020	0.73	2.38	5.95
PFTTrDA	72629-94-8	1.19 U	H9881-FS(3)	10.000	10/10/2020	0.33	1.19	5.95
PFTeDA	376-06-7	2.98 U	H9881-FS(3)	10.000	10/10/2020	1.29	2.98	5.95
NMeFOSAA	2355-31-9	2.98 U	H9881-FS(3)	10.000	10/10/2020	1.21	2.98	5.95
NEtFOSAA	2991-50-6	2.38 U	H9881-FS(3)	10.000	10/10/2020	0.89	2.38	5.95
PFBS	375-73-5	1.19 U	H9881-FS(3)	10.000	10/10/2020	0.42	1.19	5.95
PFHxS	355-46-4	2.38 U	H9881-FS(3)	10.000	10/10/2020	0.96	2.38	5.95
PFOS	1763-23-1	1.01 J	H9881-FS(3)	10.000	10/10/2020	0.82	2.38	5.95
HFPO-DA	13252-13-6	2.38 U	H9881-FS(3)	10.000	10/10/2020	0.76	2.38	5.95
Adona	919005-14-4	2.38 U	H9881-FS(3)	10.000	10/10/2020	0.99	2.38	5.95
11CI-PF3OUdS	763051-92-9	1.79 U	H9881-FS(3)	10.000	10/10/2020	0.62	1.79	5.95
9CI-PF3ONS	756426-58-1	1.19 U	H9881-FS(3)	10.000	10/10/2020	0.57	1.19	5.95

10/13/20
 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

8

Client ID PX-H2835-SB01P-0304

Battelle ID H9882-FS
 Sample Type SA
 Collection Date 09/11/2020
 Extraction Date 09/18/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 17.94
 Matrix SOIL
 Sample Size 1.51
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.65 U	H9882-FS(3)	10.000	10/10/2020	0.94	2.65	6.62
PFHpA	375-85-9	1.99 U	H9882-FS(3)	10.000	10/10/2020	0.68	1.99	6.62
PFOA	335-67-1	2.65 U	H9882-FS(3)	10.000	10/10/2020	0.81	2.65	6.62
PFNA	375-95-1	1.32 U	H9882-FS(3)	10.000	10/10/2020	0.65	1.32	6.62
PFDA	335-76-2	1.32 U	H9882-FS(3)	10.000	10/10/2020	0.61	1.32	6.62
PFUnA	2058-94-8	1.32 U	H9882-FS(3)	10.000	10/10/2020	0.61	1.32	6.62
PFDoA	307-55-1	2.65 U	H9882-FS(3)	10.000	10/10/2020	0.81	2.65	6.62
PFTrDA	72629-94-8	1.32 U	H9882-FS(3)	10.000	10/10/2020	0.37	1.32	6.62
PFTeDA	376-06-7	3.31 U	H9882-FS(3)	10.000	10/10/2020	1.43	3.31	6.62
NMeFOSAA	2355-31-9	3.31 U	H9882-FS(3)	10.000	10/10/2020	1.35	3.31	6.62
NEtFOSAA	2991-50-6	2.65 U	H9882-FS(3)	10.000	10/10/2020	0.99	2.65	6.62
PFBS	375-73-5	1.32 U	H9882-FS(3)	10.000	10/10/2020	0.46	1.32	6.62
PFHxS	355-46-4	2.65 U	H9882-FS(3)	10.000	10/10/2020	1.07	2.65	6.62
PFOS	1763-23-1	2.65 U	H9882-FS(3)	10.000	10/10/2020	0.91	2.65	6.62
HFPO-DA	13252-13-6	2.65 U	H9882-FS(3)	10.000	10/10/2020	0.85	2.65	6.62
Adona	919005-14-4	2.65 U	H9882-FS(3)	10.000	10/10/2020	1.10	2.65	6.62
11CI-PF3OUdS	763051-92-9	1.99 U	H9882-FS(3)	10.000	10/10/2020	0.69	1.99	6.62
9CI-PF3ONS	756426-58-1	1.32 U	H9882-FS(3)	10.000	10/10/2020	0.64	1.32	6.62

ANALYZED BY: GRIFFITH, LAUREN
 PRINTED: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

9

Client ID PX-H2835-SB01-0304

Battelle ID H9883-FS
 Sample Type SA
 Collection Date 09/11/2020
 Extraction Date 09/18/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 14.50
 Matrix SOIL
 Sample Size 1.85
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.16 U	H9883-FS(3)	10.000	10/10/2020	0.77	2.16	5.41
PFHpA	375-85-9	1.62 U	H9883-FS(3)	10.000	10/10/2020	0.55	1.62	5.41
PFOA	335-67-1	2.16 U	H9883-FS(3)	10.000	10/10/2020	0.66	2.16	5.41
PFNA	375-95-1	1.08 U	H9883-FS(3)	10.000	10/10/2020	0.53	1.08	5.41
PFDA	335-76-2	1.08 U	H9883-FS(3)	10.000	10/10/2020	0.50	1.08	5.41
PFUnA	2058-94-8	1.08 U	H9883-FS(3)	10.000	10/10/2020	0.50	1.08	5.41
PFDoA	307-55-1	2.16 U	H9883-FS(3)	10.000	10/10/2020	0.66	2.16	5.41
PFTeDA	72629-94-8	1.08 U	H9883-FS(3)	10.000	10/10/2020	0.30	1.08	5.41
PFTeDA	376-06-7	2.70 U	H9883-FS(3)	10.000	10/10/2020	1.17	2.70	5.41
NMeFOSAA	2355-31-9	2.70 U	H9883-FS(3)	10.000	10/10/2020	1.10	2.70	5.41
NEtFOSAA	2991-50-6	2.16 U	H9883-FS(3)	10.000	10/10/2020	0.81	2.16	5.41
PFBS	375-73-5	1.08 U	H9883-FS(3)	10.000	10/10/2020	0.38	1.08	5.41
PFHxS	355-46-4	2.16 U	H9883-FS(3)	10.000	10/10/2020	0.88	2.16	5.41
PFOS	1763-23-1	2.16 U	H9883-FS(3)	10.000	10/10/2020	0.75	2.16	5.41
HFPO-DA	13252-13-6	2.16 U	H9883-FS(3)	10.000	10/10/2020	0.69	2.16	5.41
Adona	919005-14-4	2.16 U	H9883-FS(3)	10.000	10/10/2020	0.90	2.16	5.41
11CI-PF3OUdS	763051-92-9	1.62 U	H9883-FS(3)	10.000	10/10/2020	0.56	1.62	5.41
9CI-PF3ONS	756426-58-1	1.08 U	H9883-FS(3)	10.000	10/10/2020	0.52	1.08	5.41

10/13/20
 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

10

Client ID PX-FFDA-SS01-000H

Battelle ID H9907-FS

Sample Type SA

Collection Date 09/12/2020

Extraction Date 09/18/2020

Analytical Instrument Sciex 5500 LC/MS/MS

% Moisture 9.37

Matrix SOIL

Sample Size 1.69

Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.37 U	H9907-FS(3)	10.000	10/10/2020	0.84	2.37	5.92
PFHpA	375-85-9	1.78 U	H9907-FS(3)	10.000	10/10/2020	0.60	1.78	5.92
PFOA	335-67-1	2.37 U	H9907-FS(3)	10.000	10/10/2020	0.72	2.37	5.92
PFNA	375-95-1	1.18 U	H9907-FS(3)	10.000	10/10/2020	0.58	1.18	5.92
PFDA	335-76-2	1.18 U	H9907-FS(3)	10.000	10/10/2020	0.54	1.18	5.92
PFUnA	2058-94-8	1.18 U	H9907-FS(3)	10.000	10/10/2020	0.54	1.18	5.92
PFDoA	307-55-1	2.37 U	H9907-FS(3)	10.000	10/10/2020	0.72	2.37	5.92
PFTTrDA	72629-94-8	1.18 U	H9907-FS(3)	10.000	10/10/2020	0.33	1.18	5.92
PFTeDA	376-06-7	2.96 U	H9907-FS(3)	10.000	10/10/2020	1.28	2.96	5.92
NMeFOSAA	2355-31-9	2.96 U	H9907-FS(3)	10.000	10/10/2020	1.21	2.96	5.92
NEtFOSAA	2991-50-6	2.37 U	H9907-FS(3)	10.000	10/10/2020	0.89	2.37	5.92
PFBS	375-73-5	1.18 U	H9907-FS(3)	10.000	10/10/2020	0.41	1.18	5.92
PFHxS	355-46-4	2.37 U	H9907-FS(3)	10.000	10/10/2020	0.96	2.37	5.92
PFOS	1763-23-1	1.38 J	H9907-FS(3)	10.000	10/10/2020	0.82	2.37	5.92
HFPO-DA	13252-13-6	2.37 U	H9907-FS(3)	10.000	10/10/2020	0.76	2.37	5.92
Adona	919005-14-4	2.37 U	H9907-FS(3)	10.000	10/10/2020	0.98	2.37	5.92
11CI-PF3OUdS	763051-92-9	1.78 U	H9907-FS(3)	10.000	10/10/2020	0.62	1.78	5.92
9CI-PF3ONS	756426-58-1	1.18 U	H9907-FS(3)	10.000	10/10/2020	0.57	1.18	5.92

10/10/2020

Analyzed by: Griffith, Lauren

Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

11

Client ID PX-FFDA-SB01-0304

Battelle ID H9908-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/18/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 21.07
 Matrix SOIL
 Sample Size 1.44
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.78 U	H9908-FS(3)	10.000	10/10/2020	0.99	2.78	6.94
PFHpA	375-85-9	2.08 U	H9908-FS(3)	10.000	10/10/2020	0.71	2.08	6.94
PFOA	335-67-1	2.78 U	H9908-FS(3)	10.000	10/10/2020	0.85	2.78	6.94
PFNA	375-95-1	1.39 U	H9908-FS(3)	10.000	10/10/2020	0.68	1.39	6.94
PFDA	335-76-2	1.39 U	H9908-FS(3)	10.000	10/10/2020	0.64	1.39	6.94
PFUnA	2058-94-8	1.39 U	H9908-FS(3)	10.000	10/10/2020	0.64	1.39	6.94
PFDoA	307-55-1	2.78 U	H9908-FS(3)	10.000	10/10/2020	0.85	2.78	6.94
PFTeDA	72629-94-8	1.39 U	H9908-FS(3)	10.000	10/10/2020	0.39	1.39	6.94
PFTeDA	376-06-7	3.47 U	H9908-FS(3)	10.000	10/10/2020	1.50	3.47	6.94
NMeFOSAA	2355-31-9	3.47 U	H9908-FS(3)	10.000	10/10/2020	1.42	3.47	6.94
NEtFOSAA	2991-50-6	2.78 U	H9908-FS(3)	10.000	10/10/2020	1.04	2.78	6.94
PFBS	375-73-5	1.39 U	H9908-FS(3)	10.000	10/10/2020	0.49	1.39	6.94
PFHxS	355-46-4	2.78 U	H9908-FS(3)	10.000	10/10/2020	1.13	2.78	6.94
PFOS	1763-23-1	2.78 U	H9908-FS(3)	10.000	10/10/2020	0.96	2.78	6.94
HFPO-DA	13252-13-6	2.78 U	H9908-FS(3)	10.000	10/10/2020	0.89	2.78	6.94
Adona	919005-14-4	2.78 U	H9908-FS(3)	10.000	10/10/2020	1.15	2.78	6.94
11CI-PF3OUdS	763051-92-9	2.08 U	H9908-FS(3)	10.000	10/10/2020	0.72	2.08	6.94
9CI-PF3ONS	756426-58-1	1.39 U	H9908-FS(3)	10.000	10/10/2020	0.67	1.39	6.94

10/13/20
 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

12

Client ID PX-FFDA-SB01P-0304

Battelle ID H9909-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/18/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 22.71
 Matrix SOIL
 Sample Size 1.64
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.44 U	H9909-FS(3)	10.000	10/10/2020	0.87	2.44	6.10
PFHpA	375-85-9	1.83 U	H9909-FS(3)	10.000	10/10/2020	0.62	1.83	6.10
PFOA	335-67-1	2.44 U	H9909-FS(3)	10.000	10/10/2020	0.74	2.44	6.10
PFNA	375-95-1	1.22 U	H9909-FS(3)	10.000	10/10/2020	0.60	1.22	6.10
PFDA	335-76-2	1.22 U	H9909-FS(3)	10.000	10/10/2020	0.56	1.22	6.10
PFUnA	2058-94-8	1.22 U	H9909-FS(3)	10.000	10/10/2020	0.56	1.22	6.10
PFDoA	307-55-1	2.44 U	H9909-FS(3)	10.000	10/10/2020	0.74	2.44	6.10
PFTrDA	72629-94-8	1.22 U	H9909-FS(3)	10.000	10/10/2020	0.34	1.22	6.10
PFTeDA	376-06-7	3.05 U	H9909-FS(3)	10.000	10/10/2020	1.32	3.05	6.10
NMeFOSAA	2355-31-9	3.05 U	H9909-FS(3)	10.000	10/10/2020	1.24	3.05	6.10
NEtFOSAA	2991-50-6	2.44 U	H9909-FS(3)	10.000	10/10/2020	0.91	2.44	6.10
PFBS	375-73-5	1.22 U	H9909-FS(3)	10.000	10/10/2020	0.43	1.22	6.10
PFHxS	355-46-4	2.44 U	H9909-FS(3)	10.000	10/10/2020	0.99	2.44	6.10
PFOS	1763-23-1	2.44 U	H9909-FS(3)	10.000	10/10/2020	0.84	2.44	6.10
HFPO-DA	13252-13-6	2.44 U	H9909-FS(3)	10.000	10/10/2020	0.78	2.44	6.10
Adona	919005-14-4	2.44 U	H9909-FS(3)	10.000	10/10/2020	1.01	2.44	6.10
11CI-PF3OUdS	763051-92-9	1.83 U	H9909-FS(3)	10.000	10/10/2020	0.63	1.83	6.10
9CI-PF3ONS	756426-58-1	1.22 U	H9909-FS(3)	10.000	10/10/2020	0.59	1.22	6.10

10/13/20
 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020

**DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND**

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-1138
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: October 30, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-FFDA-SS04-000H	H9910-FS	Soil
2	PX-FFDA-SB04-0304	H9911-FS	Soil
3	PX-FFDA-SS07-000H	H9912-FS	Soil
4	PX-FFDA-SB07-0304	H9913-FS	Soil
5	PX-FFDA-SS05-000H	H9914-FS	Soil
6	PX-FFDA-SS05P-000H	H9915-FS	Soil
7	PX-FFDA-SB05-0304	H9916-FS	Soil
8	PX-FFDA-SS03-000H	H9917-FS	Soil
8MS	PX-FFDA-SS03-000HMS	H9918-FSMS	Soil
8MSD	PX-FFDA-SS03-000HMSD	H9919-FSMSD	Soil
9	PX-FFDA-SB03-0304	H9920-FS	Soil
10	PX-FFDA-SS02-000H	H9922-FS	Soil
11	PX-FFDA-SB02-0304	H9923-FS	Soil
12	PX-FFDA-SS06-000H	H9924-FS	Soil
13	PX-FFDA-SB06-0304	H9925-FS	Soil

A Stage 2B/4 data validation was performed on the analytical data for thirteen soil samples collected on September 12, 2020 by CH2M HILL at the NAS Patuxent River site in Maryland. The samples were analyzed under the Analysis of Poly and Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-08

The data have been validated according to the protocols and quality control (QC) requirements of the analytical methods, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, Webster Field Annex, Naval Air Station Patuxent River, Maryland, April 2020, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, St. Mary's County, Naval Air Station Patuxent River, Maryland, April 2020, and the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

Organics

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A full (Stage 2B/4) data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

Per- and Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for soil samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-FFDA-FB01-091220	None - ND	-	-	-
PX-FFDA-EB01-091220	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

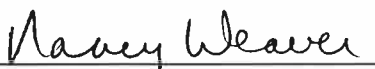
Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

Compound	PX-FFDA-SS05-000H ng/g	PX-FFDA-SS05P-000H ng/g	RPD	Qualifier
PFOS	1.07	0.90	17%	None

Please contact the undersigned at (757) 564-0090 if you have any questions or need further information.

Signed:


Nancy Weaver
Senior Chemist

Dated: 11/2/20

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-FFDA-SS04-000H

Battelle ID H9910-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 21.07
 Matrix SOIL
 Sample Size 1.51
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.65 U	H9910-FS(3)	10.000	10/12/2020	0.94	2.65	6.62
PFHpA	375-85-9	1.99 U	H9910-FS(3)	10.000	10/12/2020	0.68	1.99	6.62
PFOA	335-67-1	1.04 J	H9910-FS(3)	10.000	10/12/2020	0.81	2.65	6.62
PFNA	375-95-1	1.32 U	H9910-FS(3)	10.000	10/12/2020	0.65	1.32	6.62
PFDA	335-76-2	1.32 U	H9910-FS(3)	10.000	10/12/2020	0.61	1.32	6.62
PFUnA	2058-94-8	1.32 U	H9910-FS(3)	10.000	10/12/2020	0.61	1.32	6.62
PFDoA	307-55-1	2.65 U	H9910-FS(3)	10.000	10/12/2020	0.81	2.65	6.62
PFTTrDA	72629-94-8	1.32 U	H9910-FS(3)	10.000	10/12/2020	0.37	1.32	6.62
PFTeDA	376-06-7	3.31 U	H9910-FS(3)	10.000	10/12/2020	1.43	3.31	6.62
NMeFOSAA	2355-31-9	3.31 U	H9910-FS(3)	10.000	10/12/2020	1.35	3.31	6.62
NEtFOSAA	2991-50-6	2.65 U	H9910-FS(3)	10.000	10/12/2020	0.99	2.65	6.62
PFBS	375-73-5	1.32 U	H9910-FS(3)	10.000	10/12/2020	0.46	1.32	6.62
PFHxS	355-46-4	1.40 J	H9910-FS(3)	10.000	10/12/2020	1.07	2.65	6.62
PFOS	1763-23-1	2.18 J	H9910-FS(3)	10.000	10/12/2020	0.91	2.65	6.62
HFPO-DA	13252-13-6	2.65 U	H9910-FS(3)	10.000	10/12/2020	0.85	2.65	6.62
Adona	919005-14-4	2.65 U	H9910-FS(3)	10.000	10/12/2020	1.10	2.65	6.62
11Cl-PF3OUdS	763051-92-9	1.99 U	H9910-FS(3)	10.000	10/12/2020	0.69	1.99	6.62
9Cl-PF3ONS	756426-58-1	1.32 U	H9910-FS(3)	10.000	10/12/2020	0.64	1.32	6.62

ANALYZED 10/30/20
 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



2

Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-FFDA-SB04-0304

Battelle ID H9911-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 4.23
 Matrix SOIL
 Sample Size 1.82
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.20 U	H9911-FS(3)	10.000	10/12/2020	0.78	2.20	5.49
PFHpA	375-85-9	1.65 U	H9911-FS(3)	10.000	10/12/2020	0.56	1.65	5.49
PFOA	335-67-1	2.20 U	H9911-FS(3)	10.000	10/12/2020	0.67	2.20	5.49
PFNA	375-95-1	1.10 U	H9911-FS(3)	10.000	10/12/2020	0.54	1.10	5.49
PFDA	335-76-2	1.10 U	H9911-FS(3)	10.000	10/12/2020	0.51	1.10	5.49
PFUnA	2058-94-8	1.10 U	H9911-FS(3)	10.000	10/12/2020	0.51	1.10	5.49
PFDoA	307-55-1	2.20 U	H9911-FS(3)	10.000	10/12/2020	0.67	2.20	5.49
PFTTrDA	72629-94-8	1.10 U	H9911-FS(3)	10.000	10/12/2020	0.31	1.10	5.49
PFTeDA	376-06-7	2.75 U	H9911-FS(3)	10.000	10/12/2020	1.19	2.75	5.49
NMeFOSAA	2355-31-9	2.75 U	H9911-FS(3)	10.000	10/12/2020	1.12	2.75	5.49
NEtFOSAA	2991-50-6	2.20 U	H9911-FS(3)	10.000	10/12/2020	0.82	2.20	5.49
PFBS	375-73-5	1.10 U	H9911-FS(3)	10.000	10/12/2020	0.38	1.10	5.49
PFHxS	355-46-4	2.20 U	H9911-FS(3)	10.000	10/12/2020	0.89	2.20	5.49
PFOS	1763-23-1	2.20 U	H9911-FS(3)	10.000	10/12/2020	0.76	2.20	5.49
HFPO-DA	13252-13-6	2.20 U	H9911-FS(3)	10.000	10/12/2020	0.70	2.20	5.49
Adona	919005-14-4	2.20 U	H9911-FS(3)	10.000	10/12/2020	0.91	2.20	5.49
11CI-PF3OUdS	763051-92-9	1.65 U	H9911-FS(3)	10.000	10/12/2020	0.57	1.65	5.49
9CI-PF3ONS	756426-58-1	1.10 U	H9911-FS(3)	10.000	10/12/2020	0.53	1.10	5.49

mw 10/30/20
 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

3

Client ID PX-FFDA-SS07-000H

Battelle ID H9912-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 14.90
 Matrix SOIL
 Sample Size 1.72
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.33 U	H9912-FS(3)	10.000	10/12/2020	0.83	2.33	5.81
PFHpA	375-85-9	1.74 U	H9912-FS(3)	10.000	10/12/2020	0.59	1.74	5.81
PFOA	335-67-1	2.33 U	H9912-FS(3)	10.000	10/12/2020	0.71	2.33	5.81
PFNA	375-95-1	1.16 U	H9912-FS(3)	10.000	10/12/2020	0.57	1.16	5.81
PFDA	335-76-2	1.16 U	H9912-FS(3)	10.000	10/12/2020	0.53	1.16	5.81
PFUnA	2058-94-8	1.16 U	H9912-FS(3)	10.000	10/12/2020	0.53	1.16	5.81
PFDoA	307-55-1	2.33 U	H9912-FS(3)	10.000	10/12/2020	0.71	2.33	5.81
PFTTrDA	72629-94-8	1.16 U	H9912-FS(3)	10.000	10/12/2020	0.33	1.16	5.81
PFTeDA	376-06-7	2.91 U	H9912-FS(3)	10.000	10/12/2020	1.26	2.91	5.81
NMeFOSAA	2355-31-9	2.91 U	H9912-FS(3)	10.000	10/12/2020	1.19	2.91	5.81
NEtFOSAA	2991-50-6	2.33 U	H9912-FS(3)	10.000	10/12/2020	0.87	2.33	5.81
PFBS	375-73-5	1.16 U	H9912-FS(3)	10.000	10/12/2020	0.41	1.16	5.81
PFHxS	355-46-4	2.33 U	H9912-FS(3)	10.000	10/12/2020	0.94	2.33	5.81
PFOS	1763-23-1	3.14 J	H9912-FS(3)	10.000	10/12/2020	0.80	2.33	5.81
HFPO-DA	13252-13-6	2.33 U	H9912-FS(3)	10.000	10/12/2020	0.74	2.33	5.81
Adona	919005-14-4	2.33 U	H9912-FS(3)	10.000	10/12/2020	0.97	2.33	5.81
11CI-PF3OUdS	763051-92-9	1.74 U	H9912-FS(3)	10.000	10/12/2020	0.60	1.74	5.81
9CI-PF3ONS	756426-58-1	1.16 U	H9912-FS(3)	10.000	10/12/2020	0.56	1.16	5.81

ANALYZED 10/13/2020
 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-FFDA-SB07-0304

Battelle ID H9913-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 10.63
 Matrix SOIL
 Sample Size 1.86
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.15 U	H9913-FS(3)	10.000	10/12/2020	0.76	2.15	5.38
PFHpA	375-85-9	1.61 U	H9913-FS(3)	10.000	10/12/2020	0.55	1.61	5.38
PFOA	335-67-1	2.15 U	H9913-FS(3)	10.000	10/12/2020	0.66	2.15	5.38
PFNA	375-95-1	1.08 U	H9913-FS(3)	10.000	10/12/2020	0.53	1.08	5.38
PFDA	335-76-2	1.08 U	H9913-FS(3)	10.000	10/12/2020	0.49	1.08	5.38
PFUnA	2058-94-8	1.08 U	H9913-FS(3)	10.000	10/12/2020	0.49	1.08	5.38
PFDoA	307-55-1	2.15 U	H9913-FS(3)	10.000	10/12/2020	0.66	2.15	5.38
PFTrDA	72629-94-8	1.08 U	H9913-FS(3)	10.000	10/12/2020	0.30	1.08	5.38
PFTeDA	376-06-7	2.69 U	H9913-FS(3)	10.000	10/12/2020	1.16	2.69	5.38
NMeFOSAA	2355-31-9	2.69 U	H9913-FS(3)	10.000	10/12/2020	1.10	2.69	5.38
NEtFOSAA	2991-50-6	2.15 U	H9913-FS(3)	10.000	10/12/2020	0.81	2.15	5.38
PFBS	375-73-5	1.08 U	H9913-FS(3)	10.000	10/12/2020	0.38	1.08	5.38
PFHxS	355-46-4	2.15 U	H9913-FS(3)	10.000	10/12/2020	0.87	2.15	5.38
PFOS	1763-23-1	2.15 U	H9913-FS(3)	10.000	10/12/2020	0.74	2.15	5.38
HFPO-DA	13252-13-6	2.15 U	H9913-FS(3)	10.000	10/12/2020	0.69	2.15	5.38
Adona	919005-14-4	2.15 U	H9913-FS(3)	10.000	10/12/2020	0.89	2.15	5.38
11CI-PF3OUdS	763051-92-9	1.61 U	H9913-FS(3)	10.000	10/12/2020	0.56	1.61	5.38
9CI-PF3ONS	756426-58-1	1.08 U	H9913-FS(3)	10.000	10/12/2020	0.52	1.08	5.38

mw 10/30/20
 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-FFDA-SS05-000H

Battelle ID H9914-FS

Sample Type SA

Collection Date 09/12/2020

Extraction Date 09/23/2020

Analytical Instrument Sciex 5500 LC/MS/MS

% Moisture 17.66

Matrix SOIL

Sample Size 1.56

Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.56 U	H9914-FS(3)	10.000	10/12/2020	0.91	2.56	6.41
PFHpA	375-85-9	1.92 U	H9914-FS(3)	10.000	10/12/2020	0.65	1.92	6.41
PFOA	335-67-1	2.56 U	H9914-FS(3)	10.000	10/12/2020	0.78	2.56	6.41
PFNA	375-95-1	1.28 U	H9914-FS(3)	10.000	10/12/2020	0.63	1.28	6.41
PFDA	335-76-2	1.28 U	H9914-FS(3)	10.000	10/12/2020	0.59	1.28	6.41
PFUnA	2058-94-8	1.28 U	H9914-FS(3)	10.000	10/12/2020	0.59	1.28	6.41
PFDoA	307-55-1	2.56 U	H9914-FS(3)	10.000	10/12/2020	0.78	2.56	6.41
PFTeDA	72629-94-8	1.28 U	H9914-FS(3)	10.000	10/12/2020	0.36	1.28	6.41
PFTeDA	376-06-7	3.21 U	H9914-FS(3)	10.000	10/12/2020	1.38	3.21	6.41
NMeFOSAA	2355-31-9	3.21 U	H9914-FS(3)	10.000	10/12/2020	1.31	3.21	6.41
NEtFOSAA	2991-50-6	2.56 U	H9914-FS(3)	10.000	10/12/2020	0.96	2.56	6.41
PFBS	375-73-5	1.28 U	H9914-FS(3)	10.000	10/12/2020	0.45	1.28	6.41
PFHxS	355-46-4	2.56 U	H9914-FS(3)	10.000	10/12/2020	1.04	2.56	6.41
PFOS	1763-23-1	1.07 J	H9914-FS(3)	10.000	10/12/2020	0.88	2.56	6.41
HFPO-DA	13252-13-6	2.56 U	H9914-FS(3)	10.000	10/12/2020	0.82	2.56	6.41
Adona	919005-14-4	2.56 U	H9914-FS(3)	10.000	10/12/2020	1.06	2.56	6.41
11CI-PF3OUdS	763051-92-9	1.92 U	H9914-FS(3)	10.000	10/12/2020	0.67	1.92	6.41
9CI-PF3ONS	756426-58-1	1.28 U	H9914-FS(3)	10.000	10/12/2020	0.62	1.28	6.41

Nov 10/30/20

Analyzed by: Griffith, Lauren

Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-FFDA-SS05P-000H

Battelle ID H9915-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 18.20
 Matrix SOIL
 Sample Size 1.77
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.26 U	H9915-FS(3)	10.000	10/12/2020	0.80	2.26	5.65
PFHpA	375-85-9	1.69 U	H9915-FS(3)	10.000	10/12/2020	0.58	1.69	5.65
PFOA	335-67-1	2.26 U	H9915-FS(3)	10.000	10/12/2020	0.69	2.26	5.65
PFNA	375-95-1	1.13 U	H9915-FS(3)	10.000	10/12/2020	0.55	1.13	5.65
PFDA	335-76-2	1.13 U	H9915-FS(3)	10.000	10/12/2020	0.52	1.13	5.65
PFUnA	2058-94-8	1.13 U	H9915-FS(3)	10.000	10/12/2020	0.52	1.13	5.65
PFDoA	307-55-1	2.26 U	H9915-FS(3)	10.000	10/12/2020	0.69	2.26	5.65
PFTTrDA	72629-94-8	1.13 U	H9915-FS(3)	10.000	10/12/2020	0.32	1.13	5.65
PFTeDA	376-06-7	2.82 U	H9915-FS(3)	10.000	10/12/2020	1.22	2.82	5.65
NMeFOSAA	2355-31-9	2.82 U	H9915-FS(3)	10.000	10/12/2020	1.15	2.82	5.65
NEtFOSAA	2991-50-6	2.26 U	H9915-FS(3)	10.000	10/12/2020	0.85	2.26	5.65
PFBS	375-73-5	1.13 U	H9915-FS(3)	10.000	10/12/2020	0.40	1.13	5.65
PFHxS	355-46-4	2.26 U	H9915-FS(3)	10.000	10/12/2020	0.92	2.26	5.65
PFOS	1763-23-1	0.90 J	H9915-FS(3)	10.000	10/12/2020	0.78	2.26	5.65
HFPO-DA	13252-13-6	2.26 U	H9915-FS(3)	10.000	10/12/2020	0.72	2.26	5.65
Adona	919005-14-4	2.26 U	H9915-FS(3)	10.000	10/12/2020	0.94	2.26	5.65
11CI-PF3OUds	763051-92-9	1.69 U	H9915-FS(3)	10.000	10/12/2020	0.59	1.69	5.65
9CI-PF3ONS	756426-58-1	1.13 U	H9915-FS(3)	10.000	10/12/2020	0.54	1.13	5.65

10/13/2020

Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-FFDA-SB05-0304

Battelle ID H9916-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 10.93
 Matrix SOIL
 Sample Size 1.85
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.16 U	H9916-FS(3)	10.000	10/12/2020	0.77	2.16	5.41
PFHpA	375-85-9	1.62 U	H9916-FS(3)	10.000	10/12/2020	0.55	1.62	5.41
PFOA	335-67-1	2.16 U	H9916-FS(3)	10.000	10/12/2020	0.66	2.16	5.41
PFNA	375-95-1	1.08 U	H9916-FS(3)	10.000	10/12/2020	0.53	1.08	5.41
PFDA	335-76-2	1.08 U	H9916-FS(3)	10.000	10/12/2020	0.50	1.08	5.41
PFUnA	2058-94-8	1.08 U	H9916-FS(3)	10.000	10/12/2020	0.50	1.08	5.41
PFDoA	307-55-1	2.16 U	H9916-FS(3)	10.000	10/12/2020	0.66	2.16	5.41
PFTeDA	72629-94-8	1.08 U	H9916-FS(3)	10.000	10/12/2020	0.30	1.08	5.41
PFTeDA	376-06-7	2.70 U	H9916-FS(3)	10.000	10/12/2020	1.17	2.70	5.41
NMeFOSAA	2355-31-9	2.70 U	H9916-FS(3)	10.000	10/12/2020	1.10	2.70	5.41
NEtFOSAA	2991-50-6	2.16 U	H9916-FS(3)	10.000	10/12/2020	0.81	2.16	5.41
PFBS	375-73-5	1.08 U	H9916-FS(3)	10.000	10/12/2020	0.38	1.08	5.41
PFHxS	355-46-4	2.16 U	H9916-FS(3)	10.000	10/12/2020	0.88	2.16	5.41
PFOS	1763-23-1	2.16 U	H9916-FS(3)	10.000	10/12/2020	0.75	2.16	5.41
HFPO-DA	13252-13-6	2.16 U	H9916-FS(3)	10.000	10/12/2020	0.69	2.16	5.41
Adona	919005-14-4	2.16 U	H9916-FS(3)	10.000	10/12/2020	0.90	2.16	5.41
11CI-PF3OUdS	763051-92-9	1.62 U	H9916-FS(3)	10.000	10/12/2020	0.56	1.62	5.41
9CI-PF3ONS	756426-58-1	1.08 U	H9916-FS(3)	10.000	10/12/2020	0.52	1.08	5.41

10/13/2020
 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-FFDA-SS03-000H

Battelle ID H9917-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 7.45
 Matrix SOIL
 Sample Size 1.77
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.26 U	H9917-FS(3)	10.000	10/12/2020	0.80	2.26	5.65
PFHpA	375-85-9	1.69 U	H9917-FS(3)	10.000	10/12/2020	0.58	1.69	5.65
PFOA	335-67-1	2.26 U	H9917-FS(3)	10.000	10/12/2020	0.69	2.26	5.65
PFNA	375-95-1	1.13 U	H9917-FS(3)	10.000	10/12/2020	0.55	1.13	5.65
PFDA	335-76-2	1.13 U	H9917-FS(3)	10.000	10/12/2020	0.52	1.13	5.65
PFUnA	2058-94-8	1.13 U	H9917-FS(3)	10.000	10/12/2020	0.52	1.13	5.65
PFDoA	307-55-1	2.26 U	H9917-FS(3)	10.000	10/12/2020	0.69	2.26	5.65
PFTeDA	72629-94-8	1.13 U	H9917-FS(3)	10.000	10/12/2020	0.32	1.13	5.65
PFTeDA	376-06-7	2.82 U	H9917-FS(3)	10.000	10/12/2020	1.22	2.82	5.65
NMeFOSAA	2355-31-9	2.82 U	H9917-FS(3)	10.000	10/12/2020	1.15	2.82	5.65
NEtFOSAA	2991-50-6	2.26 U	H9917-FS(3)	10.000	10/12/2020	0.85	2.26	5.65
PFBS	375-73-5	1.13 U	H9917-FS(3)	10.000	10/12/2020	0.40	1.13	5.65
PFHxS	355-46-4	2.26 U	H9917-FS(3)	10.000	10/12/2020	0.92	2.26	5.65
PFOS	1763-23-1	2.26 U	H9917-FS(3)	10.000	10/12/2020	0.78	2.26	5.65
HFPO-DA	13252-13-6	2.26 U	H9917-FS(3)	10.000	10/12/2020	0.72	2.26	5.65
Adona	919005-14-4	2.26 U	H9917-FS(3)	10.000	10/12/2020	0.94	2.26	5.65
11CI-PF3OUdS	763051-92-9	1.69 U	H9917-FS(3)	10.000	10/12/2020	0.59	1.69	5.65
9CI-PF3ONS	756426-58-1	1.13 U	H9917-FS(3)	10.000	10/12/2020	0.54	1.13	5.65

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 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-FFDA-SB03-0304

Battelle ID H9920-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 5.48
 Matrix SOIL
 Sample Size 1.90
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.11 U	H9920-FS(3)	10.000	10/12/2020	0.75	2.11	5.26
PFHpA	375-85-9	1.58 U	H9920-FS(3)	10.000	10/12/2020	0.54	1.58	5.26
PFOA	335-67-1	2.11 U	H9920-FS(3)	10.000	10/12/2020	0.64	2.11	5.26
PFNA	375-95-1	1.05 U	H9920-FS(3)	10.000	10/12/2020	0.52	1.05	5.26
PFDA	335-76-2	1.05 U	H9920-FS(3)	10.000	10/12/2020	0.48	1.05	5.26
PFUnA	2058-94-8	1.05 U	H9920-FS(3)	10.000	10/12/2020	0.48	1.05	5.26
PFDoA	307-55-1	2.11 U	H9920-FS(3)	10.000	10/12/2020	0.64	2.11	5.26
PFTTrDA	72629-94-8	1.05 U	H9920-FS(3)	10.000	10/12/2020	0.29	1.05	5.26
PFTeDA	376-06-7	2.63 U	H9920-FS(3)	10.000	10/12/2020	1.14	2.63	5.26
NMeFOSAA	2355-31-9	2.63 U	H9920-FS(3)	10.000	10/12/2020	1.07	2.63	5.26
NEtFOSAA	2991-50-6	2.11 U	H9920-FS(3)	10.000	10/12/2020	0.79	2.11	5.26
PFBS	375-73-5	1.05 U	H9920-FS(3)	10.000	10/12/2020	0.37	1.05	5.26
PFHxS	355-46-4	2.11 U	H9920-FS(3)	10.000	10/12/2020	0.85	2.11	5.26
PFOS	1763-23-1	2.11 U	H9920-FS(3)	10.000	10/12/2020	0.73	2.11	5.26
HFPO-DA	13252-13-6	2.11 U	H9920-FS(3)	10.000	10/12/2020	0.67	2.11	5.26
Adona	919005-14-4	2.11 U	H9920-FS(3)	10.000	10/12/2020	0.87	2.11	5.26
11CI-PF3OUdS	763051-92-9	1.58 U	H9920-FS(3)	10.000	10/12/2020	0.55	1.58	5.26
9CI-PF3ONS	756426-58-1	1.05 U	H9920-FS(3)	10.000	10/12/2020	0.51	1.05	5.26

10/13/2020
 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-FFDA-SS02-000H

Battelle ID H9922-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 8.15
 Matrix SOIL
 Sample Size 1.77

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.26 U	H9922-FS(3)	10.000	10/12/2020	0.80	2.26	5.65
PFHpA	375-85-9	1.69 U	H9922-FS(3)	10.000	10/12/2020	0.58	1.69	5.65
PFOA	335-67-1	2.26 U	H9922-FS(3)	10.000	10/12/2020	0.69	2.26	5.65
PFNA	375-95-1	1.13 U	H9922-FS(3)	10.000	10/12/2020	0.55	1.13	5.65
PFDA	335-76-2	1.13 U	H9922-FS(3)	10.000	10/12/2020	0.52	1.13	5.65
PFUnA	2058-94-8	1.13 U	H9922-FS(3)	10.000	10/12/2020	0.52	1.13	5.65
PFDoA	307-55-1	2.26 U	H9922-FS(3)	10.000	10/12/2020	0.69	2.26	5.65
PFTTrDA	72629-94-8	1.13 U	H9922-FS(3)	10.000	10/12/2020	0.32	1.13	5.65
PFTeDA	376-06-7	2.82 U	H9922-FS(3)	10.000	10/12/2020	1.22	2.82	5.65
NMeFOSAA	2355-31-9	2.82 U	H9922-FS(3)	10.000	10/12/2020	1.15	2.82	5.65
NEtFOSAA	2991-50-6	2.26 U	H9922-FS(3)	10.000	10/12/2020	0.85	2.26	5.65
PFBS	375-73-5	1.13 U	H9922-FS(3)	10.000	10/12/2020	0.40	1.13	5.65
PFHxS	355-46-4	1.12 J	H9922-FS(3)	10.000	10/12/2020	0.92	2.26	5.65
PFOS	1763-23-1	3.81 J	H9922-FS(3)	10.000	10/12/2020	0.78	2.26	5.65
HFPO-DA	13252-13-6	2.26 U	H9922-FS(3)	10.000	10/12/2020	0.72	2.26	5.65
Adona	919005-14-4	2.26 U	H9922-FS(3)	10.000	10/12/2020	0.94	2.26	5.65
11CI-PF3OUdS	763051-92-9	1.69 U	H9922-FS(3)	10.000	10/12/2020	0.59	1.69	5.65
9CI-PF3ONS	756426-58-1	1.13 U	H9922-FS(3)	10.000	10/12/2020	0.54	1.13	5.65

10/13/20
 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-FFDA-SB02-0304

Battelle ID H9923-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 10.81
 Matrix SOIL
 Sample Size 1.69
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.37 U	H9923-FS(3)	10.000	10/12/2020	0.84	2.37	5.92
PFHpA	375-85-9	1.78 U	H9923-FS(3)	10.000	10/12/2020	0.60	1.78	5.92
PFOA	335-67-1	2.37 U	H9923-FS(3)	10.000	10/12/2020	0.72	2.37	5.92
PFNA	375-95-1	1.18 U	H9923-FS(3)	10.000	10/12/2020	0.58	1.18	5.92
PFDA	335-76-2	1.18 U	H9923-FS(3)	10.000	10/12/2020	0.54	1.18	5.92
PFUnA	2058-94-8	1.18 U	H9923-FS(3)	10.000	10/12/2020	0.54	1.18	5.92
PFDoA	307-55-1	2.37 U	H9923-FS(3)	10.000	10/12/2020	0.72	2.37	5.92
PFTTrDA	72629-94-8	1.18 U	H9923-FS(3)	10.000	10/12/2020	0.33	1.18	5.92
PFTeDA	376-06-7	2.96 U	H9923-FS(3)	10.000	10/12/2020	1.28	2.96	5.92
NMeFOSAA	2355-31-9	2.96 U	H9923-FS(3)	10.000	10/12/2020	1.21	2.96	5.92
NEtFOSAA	2991-50-6	2.37 U	H9923-FS(3)	10.000	10/12/2020	0.89	2.37	5.92
PFBS	375-73-5	1.18 U	H9923-FS(3)	10.000	10/12/2020	0.41	1.18	5.92
PFHxS	355-46-4	2.37 U	H9923-FS(3)	10.000	10/12/2020	0.96	2.37	5.92
PFOS	1763-23-1	2.37 U	H9923-FS(3)	10.000	10/12/2020	0.82	2.37	5.92
HFPO-DA	13252-13-6	2.37 U	H9923-FS(3)	10.000	10/12/2020	0.76	2.37	5.92
Adona	919005-14-4	2.37 U	H9923-FS(3)	10.000	10/12/2020	0.98	2.37	5.92
11CI-PF3OUdS	763051-92-9	1.78 U	H9923-FS(3)	10.000	10/12/2020	0.62	1.78	5.92
9CI-PF3ONS	756426-58-1	1.18 U	H9923-FS(3)	10.000	10/12/2020	0.57	1.18	5.92

10/13/2020
 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-FFDA-SS06-000H

Battelle ID H9924-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 7.08
 Matrix SOIL
 Sample Size 1.70
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.35 U	H9924-FS(3)	10.000	10/12/2020	0.84	2.35	5.88
PFHpA	375-85-9	1.76 U	H9924-FS(3)	10.000	10/12/2020	0.60	1.76	5.88
PFOA	335-67-1	2.35 U	H9924-FS(3)	10.000	10/12/2020	0.72	2.35	5.88
PFNA	375-95-1	1.18 U	H9924-FS(3)	10.000	10/12/2020	0.58	1.18	5.88
PFDA	335-76-2	1.18 U	H9924-FS(3)	10.000	10/12/2020	0.54	1.18	5.88
PFUnA	2058-94-8	1.18 U	H9924-FS(3)	10.000	10/12/2020	0.54	1.18	5.88
PFDoA	307-55-1	2.35 U	H9924-FS(3)	10.000	10/12/2020	0.72	2.35	5.88
PFTTrDA	72629-94-8	1.18 U	H9924-FS(3)	10.000	10/12/2020	0.33	1.18	5.88
PFTeDA	376-06-7	2.94 U	H9924-FS(3)	10.000	10/12/2020	1.27	2.94	5.88
NMeFOSAA	2355-31-9	2.94 U	H9924-FS(3)	10.000	10/12/2020	1.20	2.94	5.88
NEtFOSAA	2991-50-6	2.35 U	H9924-FS(3)	10.000	10/12/2020	0.88	2.35	5.88
PFBS	375-73-5	1.18 U	H9924-FS(3)	10.000	10/12/2020	0.41	1.18	5.88
PFHxS	355-46-4	2.35 U	H9924-FS(3)	10.000	10/12/2020	0.95	2.35	5.88
PFOS	1763-23-1	2.35 U	H9924-FS(3)	10.000	10/12/2020	0.81	2.35	5.88
HFPO-DA	13252-13-6	2.35 U	H9924-FS(3)	10.000	10/12/2020	0.75	2.35	5.88
Adona	919005-14-4	2.35 U	H9924-FS(3)	10.000	10/12/2020	0.98	2.35	5.88
11CI-PF3OUdS	763051-92-9	1.76 U	H9924-FS(3)	10.000	10/12/2020	0.61	1.76	5.88
9CI-PF3ONS	756426-58-1	1.18 U	H9924-FS(3)	10.000	10/12/2020	0.56	1.18	5.88

10/13/20
 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

13

Client ID PX-FFDA-SB06-0304

Battelle ID H9925-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/23/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 6.14
 Matrix SOIL
 Sample Size 2.04
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.96 U	H9925-FS(3)	10.000	10/12/2020	0.70	1.96	4.90
PFHpA	375-85-9	1.47 U	H9925-FS(3)	10.000	10/12/2020	0.50	1.47	4.90
PFOA	335-67-1	1.96 U	H9925-FS(3)	10.000	10/12/2020	0.60	1.96	4.90
PFNA	375-95-1	0.98 U	H9925-FS(3)	10.000	10/12/2020	0.48	0.98	4.90
PFDA	335-76-2	0.98 U	H9925-FS(3)	10.000	10/12/2020	0.45	0.98	4.90
PFUnA	2058-94-8	0.98 U	H9925-FS(3)	10.000	10/12/2020	0.45	0.98	4.90
PFDoA	307-55-1	1.96 U	H9925-FS(3)	10.000	10/12/2020	0.60	1.96	4.90
PFTTrDA	72629-94-8	0.98 U	H9925-FS(3)	10.000	10/12/2020	0.27	0.98	4.90
PFTeDA	376-06-7	2.45 U	H9925-FS(3)	10.000	10/12/2020	1.06	2.45	4.90
NMeFOSAA	2355-31-9	2.45 U	H9925-FS(3)	10.000	10/12/2020	1.00	2.45	4.90
NeFOSAA	2991-50-6	1.96 U	H9925-FS(3)	10.000	10/12/2020	0.74	1.96	4.90
PFBS	375-73-5	0.98 U	H9925-FS(3)	10.000	10/12/2020	0.34	0.98	4.90
PFHxS	355-46-4	1.96 U	H9925-FS(3)	10.000	10/12/2020	0.79	1.96	4.90
PFOS	1763-23-1	1.96 U	H9925-FS(3)	10.000	10/12/2020	0.68	1.96	4.90
HFPO-DA	13252-13-6	1.96 U	H9925-FS(3)	10.000	10/12/2020	0.63	1.96	4.90
Adona	919005-14-4	1.96 U	H9925-FS(3)	10.000	10/12/2020	0.81	1.96	4.90
11CI-PF3OUdS	763051-92-9	1.47 U	H9925-FS(3)	10.000	10/12/2020	0.51	1.47	4.90
9CI-PF3ONS	756426-58-1	0.98 U	H9925-FS(3)	10.000	10/12/2020	0.47	0.98	4.90

2020/10/13
 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020

**DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND**

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-1139
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: October 30, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-S14-SS62-000H	H9926-FS	Soil
2	PX-S14-SS62P-000H	H9927-FS	Soil
3	PX-S14-SB62-0304	H9928-FS	Soil
4	PX-S14-SS61-000H	H9929-FS	Soil
5	PX-S14-SB61-0304	H9930-FS	Soil
6	PX-S14-SS60-000H	H9931-FS	Soil
6MS	PX-S14-SS60-000HMS	H9932-FSMS	Soil
6MSD	PX-S14-SS60-000HMSD	H9933-FSMSD	Soil
7	PX-S14-SB60-0304	H9934-FS	Soil
8	PX-S14-SS58-000H	H9936-FS	Soil
9	PX-S14-SB58-0304	H9937-FS	Soil
10	PX-S14-SS59-000H	H9938-FS	Soil
11	PX-S14-SB59-0304	H9939-FS	Soil
12	PX-S14-SB59P-0304	H9940-FS	Soil

A Stage 2B/4 data validation was performed on the analytical data for twelve soil samples collected on September 12, 2020 by CH2M HILL at the NAS Patuxent River site in Maryland. The samples were analyzed under the Analysis of Poly and Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-08

The data have been validated according to the protocols and quality control (QC) requirements of the analytical methods, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, Webster Field Annex, Naval Air Station Patuxent River, Maryland, April 2020, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, St. Mary's County, Naval Air Station Patuxent River, Maryland, April 2020, and the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

Organics

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A full (Stage 2B/4) data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

Per- and Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for soil samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-S14-FB01-091220	None - ND	-	-	-
PX-S14-EB01-091220-SO	None - ND	-	-	-

Surrogate Spike Recoveries

- Several samples exhibited low surrogate percent recoveries (%R) for several surrogate compounds. These compounds were qualified as estimated (J/UJ) in each sample. Please refer to the Form Is for specific recoveries and qualifications.

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

Compound	PX-S14-SS62-000H ng/g	PX-S14-SS62P-000H ng/g	RPD	Qualifier
PFOS	1.39	1.90	31%	None

Compound	PX-S14-SB59-0304 ng/g	PX-S14-SB59P-0304 ng/g	RPD	Qualifier
None	ND	ND	-	-

Please contact the undersigned at (757) 564-0090 if you have any questions or need further information.

Signed: Nancy Weaver
Nancy Weaver
Senior Chemist

Dated: 11/2/20

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-S14-SS62-000H

Battelle ID H9926-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/24/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 10.87
 Matrix SOIL
 Sample Size 1.84
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.17 U	H9926-FS(3)	10.000	10/12/2020	0.77	2.17	5.43
PFHpA	375-85-9	1.63 U	H9926-FS(3)	10.000	10/12/2020	0.55	1.63	5.43
PFOA	335-67-1	2.17 U	H9926-FS(3)	10.000	10/12/2020	0.66	2.17	5.43
PFNA	375-95-1	1.09 U	H9926-FS(3)	10.000	10/12/2020	0.53	1.09	5.43
PFDA	335-76-2	1.09 U	H9926-FS(3)	10.000	10/12/2020	0.50	1.09	5.43
PFUnA	2058-94-8	1.09 U	H9926-FS(3)	10.000	10/12/2020	0.50	1.09	5.43
PFDoA	307-55-1	2.17 U	H9926-FS(3)	10.000	10/12/2020	0.66	2.17	5.43
PFTeDA	72629-94-8	1.09 U	H9926-FS(3)	10.000	10/12/2020	0.30	1.09	5.43
PFTeDA	376-06-7	2.72 U	H9926-FS(3)	10.000	10/12/2020	1.17	2.72	5.43
NMeFOSAA	2355-31-9	2.72 U	H9926-FS(3)	10.000	10/12/2020	1.11	2.72	5.43
NeFOSAA	2991-50-6	2.17 U	H9926-FS(3)	10.000	10/12/2020	0.82	2.17	5.43
PFBS	375-73-5	1.09 U	H9926-FS(3)	10.000	10/12/2020	0.38	1.09	5.43
PFHxS	355-46-4	2.17 U	H9926-FS(3)	10.000	10/12/2020	0.88	2.17	5.43
PFOS	1763-23-1	1.39 J	H9926-FS(3)	10.000	10/12/2020	0.75	2.17	5.43
HFPO-DA	13252-13-6	2.17 U	H9926-FS(3)	10.000	10/12/2020	0.70	2.17	5.43
Adona	919005-14-4	2.17 U	H9926-FS(3)	10.000	10/12/2020	0.90	2.17	5.43
11CI-PF3OUdS	763051-92-9	1.63 U	H9926-FS(3)	10.000	10/12/2020	0.57	1.63	5.43
9CI-PF3ONS	756426-58-1	1.09 U	H9926-FS(3)	10.000	10/12/2020	0.52	1.09	5.43

MW 10/30/20
 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-S14-SS62P-000H

Battelle ID H9927-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/24/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 11.82
 Matrix SOIL
 Sample Size 1.87
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.14 U	H9927-FS(3)	10.000	10/12/2020	0.76	2.14	5.35
PFHpA	375-85-9	1.60 U	H9927-FS(3)	10.000	10/12/2020	0.55	1.60	5.35
PFOA	335-67-1	2.14 U	H9927-FS(3)	10.000	10/12/2020	0.65	2.14	5.35
PFNA	375-95-1	1.07 U	H9927-FS(3)	10.000	10/12/2020	0.52	1.07	5.35
PFDA	335-76-2	1.07 U	H9927-FS(3)	10.000	10/12/2020	0.49	1.07	5.35
PFUnA	2058-94-8	1.07 U	H9927-FS(3)	10.000	10/12/2020	0.49	1.07	5.35
PFDoA	307-55-1	2.14 U	H9927-FS(3)	10.000	10/12/2020	0.65	2.14	5.35
PFTTrDA	72629-94-8	1.07 U	H9927-FS(3)	10.000	10/12/2020	0.30	1.07	5.35
PFTeDA	376-06-7	2.67 U	H9927-FS(3)	10.000	10/12/2020	1.16	2.67	5.35
NMeFOSAA	2355-31-9	2.67 U	H9927-FS(3)	10.000	10/12/2020	1.09	2.67	5.35
NEtFOSAA	2991-50-6	2.14 U	H9927-FS(3)	10.000	10/12/2020	0.80	2.14	5.35
PFBS	375-73-5	1.07 U	H9927-FS(3)	10.000	10/12/2020	0.37	1.07	5.35
PFHxS	355-46-4	2.14 U	H9927-FS(3)	10.000	10/12/2020	0.87	2.14	5.35
PFOS	1763-23-1	1.90 J	H9927-FS(3)	10.000	10/12/2020	0.74	2.14	5.35
HFPO-DA	13252-13-6	2.14 U	H9927-FS(3)	10.000	10/12/2020	0.68	2.14	5.35
Adona	919005-14-4	2.14 U	H9927-FS(3)	10.000	10/12/2020	0.89	2.14	5.35
11CI-PF3OUdS	763051-92-9	1.60 U	H9927-FS(3)	10.000	10/12/2020	0.56	1.60	5.35
9CI-PF3ONS	756426-58-1	1.07 U	H9927-FS(3)	10.000	10/12/2020	0.51	1.07	5.35



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

3

Client ID PX-S14-SB62-0304

Battelle ID H9928-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/24/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 11.46
 Matrix SOIL
 Sample Size 1.88
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.13 U	H9928-FS(3)	10.000	10/12/2020	0.76	2.13	5.32
PFHpA	375-85-9	1.60 U	H9928-FS(3)	10.000	10/12/2020	0.54	1.60	5.32
PFOA	335-67-1	2.13 U	H9928-FS(3)	10.000	10/12/2020	0.65	2.13	5.32
PFNA	375-95-1	1.06 U	H9928-FS(3)	10.000	10/12/2020	0.52	1.06	5.32
PFDA	335-76-2	1.06 U	H9928-FS(3)	10.000	10/12/2020	0.49	1.06	5.32
PFUnA	2058-94-8	1.06 U	H9928-FS(3)	10.000	10/12/2020	0.49	1.06	5.32
PFDoA	307-55-1	2.13 U	H9928-FS(3)	10.000	10/12/2020	0.65	2.13	5.32
PFTTrDA	72629-94-8	1.06 U	H9928-FS(3)	10.000	10/12/2020	0.30	1.06	5.32
PFTeDA	376-06-7	2.66 U	H9928-FS(3)	10.000	10/12/2020	1.15	2.66	5.32
NMeFOSAA	2355-31-9	2.66 U	H9928-FS(3)	10.000	10/12/2020	1.09	2.66	5.32
NEtFOSAA	2991-50-6	2.13 U	H9928-FS(3)	10.000	10/12/2020	0.80	2.13	5.32
PFBS	375-73-5	1.06 U	H9928-FS(3)	10.000	10/12/2020	0.37	1.06	5.32
PFHxS	355-46-4	2.13 U	H9928-FS(3)	10.000	10/12/2020	0.86	2.13	5.32
PFOS	1763-23-1	2.13 U	H9928-FS(3)	10.000	10/12/2020	0.73	2.13	5.32
HFPO-DA	13252-13-6	2.13 U	H9928-FS(3)	10.000	10/12/2020	0.68	2.13	5.32
Adona	919005-14-4	2.13 U	H9928-FS(3)	10.000	10/12/2020	0.88	2.13	5.32
11CI-PF3OUdS	763051-92-9	1.60 U	H9928-FS(3)	10.000	10/12/2020	0.55	1.60	5.32
9CI-PF3ONS	756426-58-1	1.06 U	H9928-FS(3)	10.000	10/12/2020	0.51	1.06	5.32

10/13/2020
 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-S14-S561-000H

Battelle ID H9929-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/24/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 10.60
 Matrix SOIL
 Sample Size 1.66
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.41 U	H9929-FS(3)	10.000	10/12/2020	0.86	2.41	6.02
PFHpA	375-85-9	1.81 U	H9929-FS(3)	10.000	10/12/2020	0.61	1.81	6.02
PFOA	335-67-1	2.41 U	H9929-FS(3)	10.000	10/12/2020	0.73	2.41	6.02
PFNA	375-95-1	1.20 U	H9929-FS(3)	10.000	10/12/2020	0.59	1.20	6.02
PFDA	335-76-2	1.20 U	H9929-FS(3)	10.000	10/12/2020	0.55	1.20	6.02
PFUnA	2058-94-8	1.20 U	H9929-FS(3)	10.000	10/12/2020	0.55	1.20	6.02
PFDoA	307-55-1	2.41 U	H9929-FS(3)	10.000	10/12/2020	0.73	2.41	6.02
PFTeDA	72629-94-8	1.20 U	H9929-FS(3)	10.000	10/12/2020	0.34	1.20	6.02
PFTeDA	376-06-7	3.01 U	H9929-FS(3)	10.000	10/12/2020	1.30	3.01	6.02
NMeFOSAA	2355-31-9	3.01 U	H9929-FS(3)	10.000	10/12/2020	1.23	3.01	6.02
NEtFOSAA	2991-50-6	2.41 U	H9929-FS(3)	10.000	10/12/2020	0.90	2.41	6.02
PFBS	375-73-5	1.20 U	H9929-FS(3)	10.000	10/12/2020	0.42	1.20	6.02
PFHxS	355-46-4	2.41 U	H9929-FS(3)	10.000	10/12/2020	0.98	2.41	6.02
PFOS	1763-23-1	1.43 J	H9929-FS(3)	10.000	10/12/2020	0.83	2.41	6.02
HFPO-DA	13252-13-6	2.41 U	H9929-FS(3)	10.000	10/12/2020	0.77	2.41	6.02
Adona	919005-14-4	2.41 U	H9929-FS(3)	10.000	10/12/2020	1.00	2.41	6.02
11CI-PF3OUdS	763051-92-9	1.81 U	H9929-FS(3)	10.000	10/12/2020	0.63	1.81	6.02
9CI-PF3ONS	756426-58-1	1.20 U	H9929-FS(3)	10.000	10/12/2020	0.58	1.20	6.02

NW 10130120
 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-S14-SB61-0304

Battelle ID H9930-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/24/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 4.69
 Matrix SOIL
 Sample Size 1.98
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.02 U	H9930-FS(3)	10.000	10/12/2020	0.72	2.02	5.05
PFHpA	375-85-9	1.52 U	H9930-FS(3)	10.000	10/12/2020	0.52	1.52	5.05
PFOA	335-67-1	2.02 U	H9930-FS(3)	10.000	10/12/2020	0.62	2.02	5.05
PFNA	375-95-1	1.01 U	H9930-FS(3)	10.000	10/12/2020	0.49	1.01	5.05
PFDA	335-76-2	1.01 U	H9930-FS(3)	10.000	10/12/2020	0.46	1.01	5.05
PFUnA	2058-94-8	1.01 U	H9930-FS(3)	10.000	10/12/2020	0.46	1.01	5.05
PFDoA	307-55-1	2.02 U	H9930-FS(3)	10.000	10/12/2020	0.62	2.02	5.05
PFTTrDA	72629-94-8	1.01 U	H9930-FS(3)	10.000	10/12/2020	0.28	1.01	5.05
PFTeDA	376-06-7	2.53 U	H9930-FS(3)	10.000	10/12/2020	1.09	2.53	5.05
NMeFOSAA	2355-31-9	2.53 U	H9930-FS(3)	10.000	10/12/2020	1.03	2.53	5.05
NEtFOSAA	2991-50-6	2.02 U	H9930-FS(3)	10.000	10/12/2020	0.76	2.02	5.05
PFBS	375-73-5	1.01 U	H9930-FS(3)	10.000	10/12/2020	0.35	1.01	5.05
PFHxS	355-46-4	2.02 U	H9930-FS(3)	10.000	10/12/2020	0.82	2.02	5.05
PFOS	1763-23-1	2.02 U	H9930-FS(3)	10.000	10/12/2020	0.70	2.02	5.05
HFPO-DA	13252-13-6	2.02 U	H9930-FS(3)	10.000	10/12/2020	0.65	2.02	5.05
Adona	919005-14-4	2.02 U	H9930-FS(3)	10.000	10/12/2020	0.84	2.02	5.05
11CI-PF3OUdS	763051-92-9	1.52 U	H9930-FS(3)	10.000	10/12/2020	0.53	1.52	5.05
9CI-PF3ONS	756426-58-1	1.01 U	H9930-FS(3)	10.000	10/12/2020	0.48	1.01	5.05

MW10/30/20
 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-S14-SS60-000H

Battelle ID H9931-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/24/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 7.95
 Matrix SOIL
 Sample Size 1.87
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.14 U	H9931-FS(3)	10.000	10/12/2020	0.76	2.14	5.35
PFHpA	375-85-9	1.60 U	H9931-FS(3)	10.000	10/12/2020	0.55	1.60	5.35
PFOA	335-67-1	2.14 U	H9931-FS(3)	10.000	10/12/2020	0.65	2.14	5.35
PFNA	375-95-1	1.07 U	H9931-FS(3)	10.000	10/12/2020	0.52	1.07	5.35
PFDA	335-76-2	1.07 U	H9931-FS(3)	10.000	10/12/2020	0.49	1.07	5.35
PFUnA	2058-94-8	1.07 U	H9931-FS(3)	10.000	10/12/2020	0.49	1.07	5.35
PFDoA	307-55-1	2.14 U	H9931-FS(3)	10.000	10/12/2020	0.65	2.14	5.35
PFTeDA	72629-94-8	1.07 U	H9931-FS(3)	10.000	10/12/2020	0.30	1.07	5.35
PFTeDA	376-06-7	2.67 U	H9931-FS(3)	10.000	10/12/2020	1.16	2.67	5.35
NMeFOSAA	2355-31-9	2.67 U	H9931-FS(3)	10.000	10/12/2020	1.09	2.67	5.35
NEtFOSAA	2991-50-6	2.14 U	H9931-FS(3)	10.000	10/12/2020	0.80	2.14	5.35
PFBS	375-73-5	1.07 U	H9931-FS(3)	10.000	10/12/2020	0.37	1.07	5.35
PFHxS	355-46-4	2.14 U	H9931-FS(3)	10.000	10/12/2020	0.87	2.14	5.35
PFOS	1763-23-1	2.14 U	H9931-FS(3)	10.000	10/12/2020	0.74	2.14	5.35
HFPO-DA	13252-13-6	2.14 U	H9931-FS(3)	10.000	10/12/2020	0.68	2.14	5.35
Adona	919005-14-4	2.14 U	H9931-FS(3)	10.000	10/12/2020	0.89	2.14	5.35
11CI-PF3OUdS	763051-92-9	1.60 U	H9931-FS(3)	10.000	10/12/2020	0.56	1.60	5.35
9CI-PF3ONS	756426-58-1	1.07 U	H9931-FS(3)	10.000	10/12/2020	0.51	1.07	5.35



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-S14-SS60-000H

Battelle ID H9931-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/24/2020
 Analytical Instrument Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	57	H9931-FS(3)	10/12/2020
13C4-PFHpA	65	H9931-FS(3)	10/12/2020
13C8-PFOA	68	H9931-FS(3)	10/12/2020
13C9-PFNA	76	H9931-FS(3)	10/12/2020
13C6-PFDA	78	H9931-FS(3)	10/12/2020
13C7-PFUnA	91	H9931-FS(3)	10/12/2020
13C2-PFDoA	90	H9931-FS(3)	10/12/2020
13C2-PFTeDA	94	H9931-FS(3)	10/12/2020
d3-MeFOSAA	111	H9931-FS(3)	10/12/2020
d5-EtFOSAA	147	H9931-FS(3)	10/12/2020
13C3-PFBS	92	H9931-FS(3)	10/12/2020
13C3-PFHxS	105	H9931-FS(3)	10/12/2020
13C8-PFOS	99	H9931-FS(3)	10/12/2020
13C3-HFPO-DA	45	H9931-FS(3)	10/12/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-S14-SB60-0304

Battelle ID H9934-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/24/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 9.18
 Matrix SOIL
 Sample Size 1.76
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.27 U	H9934-FS(3)	10.000	10/12/2020	0.81	2.27	5.68
PFHpA	375-85-9	1.70 U	H9934-FS(3)	10.000	10/12/2020	0.58	1.70	5.68
PFOA	335-67-1	2.27 U	H9934-FS(3)	10.000	10/12/2020	0.69	2.27	5.68
PFNA	375-95-1	1.14 U	H9934-FS(3)	10.000	10/12/2020	0.56	1.14	5.68
PFDA	335-76-2	1.14 U	H9934-FS(3)	10.000	10/12/2020	0.52	1.14	5.68
PFUnA	2058-94-8	1.14 U	H9934-FS(3)	10.000	10/12/2020	0.52	1.14	5.68
PFDoA	307-55-1	2.27 U	H9934-FS(3)	10.000	10/12/2020	0.69	2.27	5.68
PFTTrDA	72629-94-8	1.14 U	H9934-FS(3)	10.000	10/12/2020	0.32	1.14	5.68
PFTeDA	376-06-7	2.84 U	H9934-FS(3)	10.000	10/12/2020	1.23	2.84	5.68
NMeFOSAA	2355-31-9	2.84 U	H9934-FS(3)	10.000	10/12/2020	1.16	2.84	5.68
NEtFOSAA	2991-50-6	2.27 U	H9934-FS(3)	10.000	10/12/2020	0.85	2.27	5.68
PFBS	375-73-5	1.14 U	H9934-FS(3)	10.000	10/12/2020	0.40	1.14	5.68
PFHxS	355-46-4	2.27 U	H9934-FS(3)	10.000	10/12/2020	0.92	2.27	5.68
PFOS	1763-23-1	2.27 U	H9934-FS(3)	10.000	10/12/2020	0.78	2.27	5.68
HFPO-DA	13252-13-6	2.27 U	H9934-FS(3)	10.000	10/12/2020	0.73	2.27	5.68
Adona	919005-14-4	2.27 U	H9934-FS(3)	10.000	10/12/2020	0.94	2.27	5.68
11CI-PF3OUdS	763051-92-9	1.70 U	H9934-FS(3)	10.000	10/12/2020	0.59	1.70	5.68
9CI-PF3ONS	756426-58-1	1.14 U	H9934-FS(3)	10.000	10/12/2020	0.55	1.14	5.68

ANALYZED BY: GRIFFITH, LAUREN
 PRINTED: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

8

Client ID PX-S14-SS58-000H

Battelle ID H9936-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/24/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 18.08
 Matrix SOIL
 Sample Size 1.70
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.07 J	H9936-FS(3)	10.000	10/12/2020	0.84	2.35	5.88
PFHpA	375-85-9	1.76 U	H9936-FS(3)	10.000	10/12/2020	0.60	1.76	5.88
PFOA	335-67-1	0.89 J	H9936-FS(3)	10.000	10/12/2020	0.72	2.35	5.88
PFNA	375-95-1	1.18 U	H9936-FS(3)	10.000	10/12/2020	0.58	1.18	5.88
PFDA	335-76-2	1.18 U	H9936-FS(3)	10.000	10/12/2020	0.54	1.18	5.88
PFUnA	2058-94-8	1.18 U	H9936-FS(3)	10.000	10/12/2020	0.54	1.18	5.88
PFDoA	307-55-1	2.35 U	H9936-FS(3)	10.000	10/12/2020	0.72	2.35	5.88
PFTTrDA	72629-94-8	1.18 U	H9936-FS(3)	10.000	10/12/2020	0.33	1.18	5.88
PFTeDA	376-06-7	2.94 U	H9936-FS(3)	10.000	10/12/2020	1.27	2.94	5.88
NMeFOSAA	2355-31-9	2.94 U	H9936-FS(3)	10.000	10/12/2020	1.20	2.94	5.88
NEtFOSAA	2991-50-6	2.35 U	H9936-FS(3)	10.000	10/12/2020	0.88	2.35	5.88
PFBS	375-73-5	1.18 U	H9936-FS(3)	10.000	10/12/2020	0.41	1.18	5.88
PFHxS	355-46-4	4.92 J	H9936-FS(3)	10.000	10/12/2020	0.95	2.35	5.88
PFOS	1763-23-1	11.14	H9936-FS(3)	10.000	10/12/2020	0.81	2.35	5.88
HFPO-DA	13252-13-6	2.35 U	H9936-FS(3)	10.000	10/12/2020	0.75	2.35	5.88
Adona	919005-14-4	2.35 U	H9936-FS(3)	10.000	10/12/2020	0.98	2.35	5.88
11CI-PF3OUdS	763051-92-9	1.76 U	H9936-FS(3)	10.000	10/12/2020	0.61	1.76	5.88
9CI-PF3ONS	756426-58-1	1.18 U	H9936-FS(3)	10.000	10/12/2020	0.56	1.18	5.88



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-S14-SB58-0304

Battelle ID H9937-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/24/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 15.43
 Matrix SOIL
 Sample Size 1.83
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.19 U	H9937-FS(3)	10.000	10/12/2020	0.78	2.19	5.46
PFHpA	375-85-9	1.64 U	H9937-FS(3)	10.000	10/12/2020	0.56	1.64	5.46
PFOA	335-67-1	2.19 U	H9937-FS(3)	10.000	10/12/2020	0.67	2.19	5.46
PFNA	375-95-1	1.09 U	H9937-FS(3)	10.000	10/12/2020	0.54	1.09	5.46
PFDA	335-76-2	1.09 U	H9937-FS(3)	10.000	10/12/2020	0.50	1.09	5.46
PFUnA	2058-94-8	1.09 U	H9937-FS(3)	10.000	10/12/2020	0.50	1.09	5.46
PFDoA	307-55-1	2.19 U	H9937-FS(3)	10.000	10/12/2020	0.67	2.19	5.46
PFTeDA	72629-94-8	1.09 U	H9937-FS(3)	10.000	10/12/2020	0.31	1.09	5.46
PFTeDA	376-06-7	2.73 U	H9937-FS(3)	10.000	10/12/2020	1.18	2.73	5.46
NMeFOSAA	2355-31-9	2.73 U	H9937-FS(3)	10.000	10/12/2020	1.11	2.73	5.46
NEtFOSAA	2991-50-6	2.19 U	H9937-FS(3)	10.000	10/12/2020	0.82	2.19	5.46
PFBS	375-73-5	1.09 U	H9937-FS(3)	10.000	10/12/2020	0.38	1.09	5.46
PFHxS	355-46-4	2.19 U	H9937-FS(3)	10.000	10/12/2020	0.89	2.19	5.46
PFOS	1763-23-1	2.19 U	H9937-FS(3)	10.000	10/12/2020	0.75	2.19	5.46
HFPO-DA	13252-13-6	2.19 U	H9937-FS(3)	10.000	10/12/2020	0.70	2.19	5.46
Adona	919005-14-4	2.19 U	H9937-FS(3)	10.000	10/12/2020	0.91	2.19	5.46
11CI-PF3OUdS	763051-92-9	1.64 U	H9937-FS(3)	10.000	10/12/2020	0.57	1.64	5.46
9CI-PF3ONS	756426-58-1	1.09 U	H9937-FS(3)	10.000	10/12/2020	0.52	1.09	5.46

new 10/30/20
 Analyzed by: Griffith, Lauren
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Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-S14-SS59-000H

Battelle ID H9938-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/24/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 18.15
 Matrix SOIL
 Sample Size 1.57
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.55 U	H9938-FS(3)	10.000	10/12/2020	0.90	2.55	6.37
PFHpA	375-85-9	1.91 U	H9938-FS(3)	10.000	10/12/2020	0.65	1.91	6.37
PFOA	335-67-1	2.55 U	H9938-FS(3)	10.000	10/12/2020	0.78	2.55	6.37
PFNA	375-95-1	1.27 U	H9938-FS(3)	10.000	10/12/2020	0.62	1.27	6.37
PFDA	335-76-2	1.27 U	H9938-FS(3)	10.000	10/12/2020	0.59	1.27	6.37
PFUnA	2058-94-8	1.27 U	H9938-FS(3)	10.000	10/12/2020	0.59	1.27	6.37
PFDoA	307-55-1	2.55 U	H9938-FS(3)	10.000	10/12/2020	0.78	2.55	6.37
PFTTrDA	72629-94-8	1.27 U	H9938-FS(3)	10.000	10/12/2020	0.36	1.27	6.37
PFTeDA	376-06-7	3.18 U	H9938-FS(3)	10.000	10/12/2020	1.38	3.18	6.37
NMeFOSAA	2355-31-9	3.18 U	H9938-FS(3)	10.000	10/12/2020	1.30	3.18	6.37
NEtFOSAA	2991-50-6	2.55 U	H9938-FS(3)	10.000	10/12/2020	0.96	2.55	6.37
PFBS	375-73-5	1.27 U	H9938-FS(3)	10.000	10/12/2020	0.45	1.27	6.37
PFHxS	355-46-4	2.55 U	H9938-FS(3)	10.000	10/12/2020	1.03	2.55	6.37
PFOS	1763-23-1	1.52 J	H9938-FS(3)	10.000	10/12/2020	0.88	2.55	6.37
HFPO-DA	13252-13-6	2.55 U	H9938-FS(3)	10.000	10/12/2020	0.82	2.55	6.37
Adona	919005-14-4	2.55 U	H9938-FS(3)	10.000	10/12/2020	1.06	2.55	6.37
11CI-PF3OUdS	763051-92-9	1.91 U	H9938-FS(3)	10.000	10/12/2020	0.66	1.91	6.37
9CI-PF3ONS	756426-58-1	1.27 U	H9938-FS(3)	10.000	10/12/2020	0.61	1.27	6.37

10/13/20
 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



Project Client: CH2M
Project Name: CTO-4256: PAX Basewide PFAS
Project No.: 100142032

Client ID PX-S14-SB59-0304

Battelle ID H9939-FS
Sample Type SA
Collection Date 09/12/2020
Extraction Date 09/24/2020
Analytical Instrument Sciex 5500 LC/MS/MS
% Moisture 15.99
Matrix SOIL
Sample Size 1.74
Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.30 U	H9939-FS(3)	10.000	10/12/2020	0.82	2.30	5.75
PFHpA	375-85-9	1.72 U	H9939-FS(3)	10.000	10/12/2020	0.59	1.72	5.75
PFOA	335-67-1	2.30 U	H9939-FS(3)	10.000	10/12/2020	0.70	2.30	5.75
PFNA	375-95-1	1.15 U	H9939-FS(3)	10.000	10/12/2020	0.56	1.15	5.75
PFDA	335-76-2	1.15 U	H9939-FS(3)	10.000	10/12/2020	0.53	1.15	5.75
PFUnA	2058-94-8	1.15 U	H9939-FS(3)	10.000	10/12/2020	0.53	1.15	5.75
PFDoA	307-55-1	2.30 U	H9939-FS(3)	10.000	10/12/2020	0.70	2.30	5.75
PFTTrDA	72629-94-8	1.15 U	H9939-FS(3)	10.000	10/12/2020	0.32	1.15	5.75
PFTeDA	376-06-7	2.87 U	H9939-FS(3)	10.000	10/12/2020	1.24	2.87	5.75
NMeFOSAA	2355-31-9	2.87 U	H9939-FS(3)	10.000	10/12/2020	1.17	2.87	5.75
NEtFOSAA	2991-50-6	2.30 U	H9939-FS(3)	10.000	10/12/2020	0.86	2.30	5.75
PFBS	375-73-5	1.15 U	H9939-FS(3)	10.000	10/12/2020	0.40	1.15	5.75
PFHxS	355-46-4	2.30 U	H9939-FS(3)	10.000	10/12/2020	0.93	2.30	5.75
PFOS	1763-23-1	2.30 U	H9939-FS(3)	10.000	10/12/2020	0.79	2.30	5.75
HFPO-DA	13252-13-6	2.30 U	H9939-FS(3)	10.000	10/12/2020	0.74	2.30	5.75
Adona	919005-14-4	2.30 U	H9939-FS(3)	10.000	10/12/2020	0.95	2.30	5.75
11Cl-PF3OUdS	763051-92-9	1.72 U	H9939-FS(3)	10.000	10/12/2020	0.60	1.72	5.75
9Cl-PF3ONS	756426-58-1	1.15 U	H9939-FS(3)	10.000	10/12/2020	0.55	1.15	5.75

10/13/20
Analyzed by: Griffith, Lauren
Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

12

Client ID PX-S14-SB59P-0304

Battelle ID H9940-FS
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 09/24/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 9.22
 Matrix SOIL
 Sample Size 1.87
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.14 U	H9940-FS(3)	10.000	10/12/2020	0.76	2.14	5.35
PFHpA	375-85-9	1.60 U	H9940-FS(3)	10.000	10/12/2020	0.55	1.60	5.35
PFOA	335-67-1	2.14 U	H9940-FS(3)	10.000	10/12/2020	0.65	2.14	5.35
PFNA	375-95-1	1.07 U	H9940-FS(3)	10.000	10/12/2020	0.52	1.07	5.35
PFDA	335-76-2	1.07 U	H9940-FS(3)	10.000	10/12/2020	0.49	1.07	5.35
PFUnA	2058-94-8	1.07 U	H9940-FS(3)	10.000	10/12/2020	0.49	1.07	5.35
PFDoA	307-55-1	2.14 U	H9940-FS(3)	10.000	10/12/2020	0.65	2.14	5.35
PFTeDA	72629-94-8	1.07 U	H9940-FS(3)	10.000	10/12/2020	0.30	1.07	5.35
PFTeDA	376-06-7	2.67 U	H9940-FS(3)	10.000	10/12/2020	1.16	2.67	5.35
NMeFOSAA	2355-31-9	2.67 U	H9940-FS(3)	10.000	10/12/2020	1.09	2.67	5.35
NEtFOSAA	2991-50-6	2.14 U	H9940-FS(3)	10.000	10/12/2020	0.80	2.14	5.35
PFBS	375-73-5	1.07 U	H9940-FS(3)	10.000	10/12/2020	0.37	1.07	5.35
PFHxS	355-46-4	2.14 U	H9940-FS(3)	10.000	10/12/2020	0.87	2.14	5.35
PFOS	1763-23-1	2.14 U	H9940-FS(3)	10.000	10/12/2020	0.74	2.14	5.35
HFPO-DA	13252-13-6	2.14 U	H9940-FS(3)	10.000	10/12/2020	0.68	2.14	5.35
Adona	919005-14-4	2.14 U	H9940-FS(3)	10.000	10/12/2020	0.89	2.14	5.35
11CI-PF3OUdS	763051-92-9	1.60 U	H9940-FS(3)	10.000	10/12/2020	0.56	1.60	5.35
9CI-PF3ONS	756426-58-1	1.07 U	H9940-FS(3)	10.000	10/12/2020	0.51	1.07	5.35

11/10/2020
 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020

**DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND**

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-1140
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: October 30, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-CTIA-SS03-000H	H9952-FS	Soil
1MS	PX-CTIA-SS03-000HMS	H9953-FSMS	Soil
1MSD	PX-CTIA-SS03-000HMSD	H9954-FSMSD	Soil
2	PX-CTIA-SB03-0304	H9955-FS	Soil
3	PX-CTIA-SS02-000H	H9956-FS	Soil
4	PX-CTIA-SB02-0304	H9957-FS	Soil
5	PX-CTIA-SS01-000H	H9958-FS	Soil
6	PX-CTIA-SB01-0304	H9959-FS	Soil
7	PX-CTIA-SB01P-0304	H9960-FS	Soil
8	PX-CTIA-SS04-000H	H9962-FS	Soil
9	PX-CTIA-SS04P-000H	H9963-FS	Soil
10	PX-CTIA-SB04-0304	H9964-FS	Soil

A Stage 2B/4 data validation was performed on the analytical data for ten soil samples collected on September 13, 2020 by CH2M HILL at the NAS Patuxent River site in Maryland. The samples were analyzed under the Analysis of Poly and Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-08

The data have been validated according to the protocols and quality control (QC) requirements of the analytical methods, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, Webster Field Annex, Naval Air Station Patuxent River, Maryland, April 2020, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, St. Mary's County, Naval Air Station Patuxent River, Maryland, April 2020, and the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

Organics

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A full (Stage 2B/4) data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

Per- and Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for soil samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-CTIA-FB01-091320	None - ND	-	-	-
PX-CTIA-EB01-091320-SO	PFHxS	0.27	None	Samples ND or >5X

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values except for the following.

MS/MSD Sample	Compound	MS %R/MSD %R/RPD	Qualifier	Affected Samples
1	PFHxS	59%/58%/OK	J	1
	PFOS	0%/0%/NC	Non	4X Rule Applies

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was unacceptable for PFOS in one field duplicate pair. These results were qualified as estimated (J).

Compound	PX-CTIA-SB01-0304 ng/g	PX-CTIA-SB01P-0304 ng/g	RPD	Qualifier
PFOS	1.00	2.29	78%	None - <5X LOQ

Compound	PX-CTIA-SS04-000H ng/g	PX-CTIA-SS04P-000H ng/g	RPD	Qualifier
PFNA	1.00	1.20U	NC	None
PFOS	64.68	37.85	52%	J

Please contact the undersigned at (757) 564-0090 if you have any questions or need further information.

Signed:

Nancy Weaver
Nancy Weaver
Senior Chemist

Dated: 11/2/20

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-CTIA-SS03-000H

Battelle ID H9952-FS
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 09/24/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 14.94
 Matrix SOIL
 Sample Size 1.72
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.53 J	H9952-FS(3)	10.000	10/9/2020	0.83	2.33	5.81
PFHpA	375-85-9	1.74 U	H9952-FS(3)	10.000	10/9/2020	0.59	1.74	5.81
PFOA	335-67-1	1.86 J	H9952-FS(3)	10.000	10/9/2020	0.71	2.33	5.81
PFNA	375-95-1	3.60 J	H9952-FS(3)	10.000	10/9/2020	0.57	1.16	5.81
PFDA	335-76-2	1.16 U	H9952-FS(3)	10.000	10/9/2020	0.53	1.16	5.81
PFUnA	2058-94-8	1.16 U	H9952-FS(3)	10.000	10/9/2020	0.53	1.16	5.81
PFDoA	307-55-1	2.33 U	H9952-FS(3)	10.000	10/9/2020	0.71	2.33	5.81
PFTTrDA	72629-94-8	1.16 U	H9952-FS(3)	10.000	10/9/2020	0.33	1.16	5.81
PFTeDA	376-06-7	2.91 U	H9952-FS(3)	10.000	10/9/2020	1.26	2.91	5.81
NMeFOSAA	2355-31-9	2.91 U	H9952-FS(3)	10.000	10/9/2020	1.19	2.91	5.81
NEtFOSAA	2991-50-6	2.33 U	H9952-FS(3)	10.000	10/9/2020	0.87	2.33	5.81
PFBS	375-73-5	1.16 U	H9952-FS(3)	10.000	10/9/2020	0.41	1.16	5.81
PFHxS	355-46-4	30.12 J	H9952-FS(3)	10.000	10/9/2020	0.94	2.33	5.81
PFOS	1763-23-1	471.93 J	H9952-FS-D(5)	50.000	10/12/2020	4.01	11.63	29.07
HFPO-DA	13252-13-6	2.33 U	H9952-FS(3)	10.000	10/9/2020	0.74	2.33	5.81
Adona	919005-14-4	2.33 U	H9952-FS(3)	10.000	10/9/2020	0.97	2.33	5.81
11Cl-PF3OUdS	763051-92-9	1.74 U	H9952-FS(3)	10.000	10/9/2020	0.60	1.74	5.81
9Cl-PF3ONS	756426-58-1	1.16 U	H9952-FS(3)	10.000	10/9/2020	0.56	1.16	5.81

MSL

mw 10/30/20
 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

2

Client ID PX-CTIA-SB03-0304

Battelle ID H9955-FS
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 09/24/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 8.26
 Matrix SOIL
 Sample Size 1.75
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.29 U	H9955-FS(3)	10.000	10/9/2020	0.81	2.29	5.71
PFHpA	375-85-9	1.71 U	H9955-FS(3)	10.000	10/9/2020	0.58	1.71	5.71
PFOA	335-67-1	1.95 J	H9955-FS(3)	10.000	10/9/2020	0.70	2.29	5.71
PFNA	375-95-1	0.65 J	H9955-FS(3)	10.000	10/9/2020	0.56	1.14	5.71
PFDA	335-76-2	1.14 U	H9955-FS(3)	10.000	10/9/2020	0.53	1.14	5.71
PFUnA	2058-94-8	1.14 U	H9955-FS(3)	10.000	10/9/2020	0.53	1.14	5.71
PFDoA	307-55-1	2.29 U	H9955-FS(3)	10.000	10/9/2020	0.70	2.29	5.71
PFTrDA	72629-94-8	1.14 U	H9955-FS(3)	10.000	10/9/2020	0.32	1.14	5.71
PFTeDA	376-06-7	2.86 U	H9955-FS(3)	10.000	10/9/2020	1.23	2.86	5.71
NMeFOSAA	2355-31-9	2.86 U	H9955-FS(3)	10.000	10/9/2020	1.17	2.86	5.71
NEtFOSAA	2991-50-6	2.29 U	H9955-FS(3)	10.000	10/9/2020	0.86	2.29	5.71
PFBS	375-73-5	1.14 U	H9955-FS(3)	10.000	10/9/2020	0.40	1.14	5.71
PFHxS	355-46-4	16.44	H9955-FS(3)	10.000	10/9/2020	0.93	2.29	5.71
PFOS	1763-23-1	88.06	H9955-FS(3)	10.000	10/9/2020	0.79	2.29	5.71
HFPO-DA	13252-13-6	2.29 U	H9955-FS(3)	10.000	10/9/2020	0.73	2.29	5.71
Adona	919005-14-4	2.29 U	H9955-FS(3)	10.000	10/9/2020	0.95	2.29	5.71
11CI-PF3OUdS	763051-92-9	1.71 U	H9955-FS(3)	10.000	10/9/2020	0.59	1.71	5.71
9CI-PF3ONS	756426-58-1	1.14 U	H9955-FS(3)	10.000	10/9/2020	0.55	1.14	5.71

MW 10/30/20
 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

3

Client ID PX-CTIA-SS02-000H

Battelle ID H9956-FS
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 09/24/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 14.95
 Matrix SOIL
 Sample Size 1.63
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.35 J	H9956-FS(3)	10.000	10/9/2020	0.87	2.45	6.13
PFHpA	375-85-9	0.68 J	H9956-FS(3)	10.000	10/9/2020	0.63	1.84	6.13
PFOA	335-67-1	0.88 J	H9956-FS(3)	10.000	10/9/2020	0.75	2.45	6.13
PFNA	375-95-1	0.74 J	H9956-FS(3)	10.000	10/9/2020	0.60	1.23	6.13
PFDA	335-76-2	1.23 U	H9956-FS(3)	10.000	10/9/2020	0.56	1.23	6.13
PFUnA	2058-94-8	0.90 J	H9956-FS(3)	10.000	10/9/2020	0.56	1.23	6.13
PFDoA	307-55-1	2.45 U	H9956-FS(3)	10.000	10/9/2020	0.75	2.45	6.13
PFTTrDA	72629-94-8	1.23 U	H9956-FS(3)	10.000	10/9/2020	0.34	1.23	6.13
PFTeDA	376-06-7	3.07 U	H9956-FS(3)	10.000	10/9/2020	1.33	3.07	6.13
NMeFOSAA	2355-31-9	3.07 U	H9956-FS(3)	10.000	10/9/2020	1.25	3.07	6.13
NEtFOSAA	2991-50-6	2.45 U	H9956-FS(3)	10.000	10/9/2020	0.92	2.45	6.13
PFBS	375-73-5	1.23 U	H9956-FS(3)	10.000	10/9/2020	0.43	1.23	6.13
PFHxS	355-46-4	6.80	H9956-FS(3)	10.000	10/9/2020	0.99	2.45	6.13
PFOS	1763-23-1	58.51	H9956-FS(3)	10.000	10/9/2020	0.85	2.45	6.13
HFPO-DA	13252-13-6	2.45 U	H9956-FS(3)	10.000	10/9/2020	0.79	2.45	6.13
Adona	919005-14-4	2.45 U	H9956-FS(3)	10.000	10/9/2020	1.02	2.45	6.13
11CI-PF3OUdS	763051-92-9	1.84 U	H9956-FS(3)	10.000	10/9/2020	0.64	1.84	6.13
9CI-PF3ONS	756426-58-1	1.23 U	H9956-FS(3)	10.000	10/9/2020	0.59	1.23	6.13

10/13/20
 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

4

Client ID PX-CTIA-SB02-0304

Battelle ID H9957-FS
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 09/24/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 9.13
 Matrix SOIL
 Sample Size 1.66
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.41 U	H9957-FS(3)	10.000	10/9/2020	0.86	2.41	6.02
PFHpA	375-85-9	1.81 U	H9957-FS(3)	10.000	10/9/2020	0.61	1.81	6.02
PFOA	335-67-1	1.03 J	H9957-FS(3)	10.000	10/9/2020	0.73	2.41	6.02
PFNA	375-95-1	2.44 J	H9957-FS(3)	10.000	10/9/2020	0.59	1.20	6.02
PFDA	335-76-2	1.20 U	H9957-FS(3)	10.000	10/9/2020	0.55	1.20	6.02
PFUnA	2058-94-8	1.20 U	H9957-FS(3)	10.000	10/9/2020	0.55	1.20	6.02
PFDoA	307-55-1	2.41 U	H9957-FS(3)	10.000	10/9/2020	0.73	2.41	6.02
PFTeDA	72629-94-8	1.20 U	H9957-FS(3)	10.000	10/9/2020	0.34	1.20	6.02
PFTeDA	376-06-7	3.01 U	H9957-FS(3)	10.000	10/9/2020	1.30	3.01	6.02
NMeFOSAA	2355-31-9	3.01 U	H9957-FS(3)	10.000	10/9/2020	1.23	3.01	6.02
NEtFOSAA	2991-50-6	2.41 U	H9957-FS(3)	10.000	10/9/2020	0.90	2.41	6.02
PFBS	375-73-5	1.20 U	H9957-FS(3)	10.000	10/9/2020	0.42	1.20	6.02
PFHxS	355-46-4	9.11	H9957-FS(3)	10.000	10/9/2020	0.98	2.41	6.02
PFOS	1763-23-1	376.40	H9957-FS-D(5)	50.000	10/12/2020	4.16	12.05	30.12
HFPO-DA	13252-13-6	2.41 U	H9957-FS(3)	10.000	10/9/2020	0.77	2.41	6.02
Adona	919005-14-4	2.41 U	H9957-FS(3)	10.000	10/9/2020	1.00	2.41	6.02
11CI-PF3OUdS	763051-92-9	1.81 U	H9957-FS(3)	10.000	10/9/2020	0.63	1.81	6.02
9CI-PF3ONS	756426-58-1	1.20 U	H9957-FS(3)	10.000	10/9/2020	0.58	1.20	6.02

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 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-CTIA-SS01-000H

Battelle ID H9958-FS
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 09/24/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 18.31
 Matrix SOIL
 Sample Size 1.53
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.61 U	H9958-FS(3)	10.000	10/9/2020	0.93	2.61	6.54
PFHpA	375-85-9	1.96 U	H9958-FS(3)	10.000	10/9/2020	0.67	1.96	6.54
PFOA	335-67-1	2.61 U	H9958-FS(3)	10.000	10/9/2020	0.80	2.61	6.54
PFNA	375-95-1	1.31 U	H9958-FS(3)	10.000	10/9/2020	0.64	1.31	6.54
PFDA	335-76-2	1.31 U	H9958-FS(3)	10.000	10/9/2020	0.60	1.31	6.54
PFUnA	2058-94-8	1.31 U	H9958-FS(3)	10.000	10/9/2020	0.60	1.31	6.54
PFDoA	307-55-1	2.61 U	H9958-FS(3)	10.000	10/9/2020	0.80	2.61	6.54
PFTTrDA	72629-94-8	1.31 U	H9958-FS(3)	10.000	10/9/2020	0.37	1.31	6.54
PFTeDA	376-06-7	3.27 U	H9958-FS(3)	10.000	10/9/2020	1.41	3.27	6.54
NMeFOSAA	2355-31-9	3.27 U	H9958-FS(3)	10.000	10/9/2020	1.33	3.27	6.54
NEtFOSAA	2991-50-6	2.61 U	H9958-FS(3)	10.000	10/9/2020	0.98	2.61	6.54
PFBS	375-73-5	1.31 U	H9958-FS(3)	10.000	10/9/2020	0.46	1.31	6.54
PFHxS	355-46-4	2.61 U	H9958-FS(3)	10.000	10/9/2020	1.06	2.61	6.54
PFOS	1763-23-1	4.90 J	H9958-FS(3)	10.000	10/9/2020	0.90	2.61	6.54
HFPO-DA	13252-13-6	2.61 U	H9958-FS(3)	10.000	10/9/2020	0.84	2.61	6.54
Adona	919005-14-4	2.61 U	H9958-FS(3)	10.000	10/9/2020	1.08	2.61	6.54
11CI-PF3OUdS	763051-92-9	1.96 U	H9958-FS(3)	10.000	10/9/2020	0.68	1.96	6.54
9CI-PF3ONS	756426-58-1	1.31 U	H9958-FS(3)	10.000	10/9/2020	0.63	1.31	6.54

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 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-CTIA-SB01-0304

Battelle ID H9959-FS
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 09/24/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 13.48
 Matrix SOIL
 Sample Size 1.67
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.40 U	H9959-FS(3)	10.000	10/9/2020	0.85	2.40	5.99
PFHpA	375-85-9	1.80 U	H9959-FS(3)	10.000	10/9/2020	0.61	1.80	5.99
PFOA	335-67-1	2.40 U	H9959-FS(3)	10.000	10/9/2020	0.73	2.40	5.99
PFNA	375-95-1	1.20 U	H9959-FS(3)	10.000	10/9/2020	0.59	1.20	5.99
PFDA	335-76-2	1.20 U	H9959-FS(3)	10.000	10/9/2020	0.55	1.20	5.99
PFUnA	2058-94-8	1.20 U	H9959-FS(3)	10.000	10/9/2020	0.55	1.20	5.99
PFDoA	307-55-1	2.40 U	H9959-FS(3)	10.000	10/9/2020	0.73	2.40	5.99
PFTTrDA	72629-94-8	1.20 U	H9959-FS(3)	10.000	10/9/2020	0.34	1.20	5.99
PFTeDA	376-06-7	2.99 U	H9959-FS(3)	10.000	10/9/2020	1.29	2.99	5.99
NMeFOSAA	2355-31-9	2.99 U	H9959-FS(3)	10.000	10/9/2020	1.22	2.99	5.99
NEtFOSAA	2991-50-6	2.40 U	H9959-FS(3)	10.000	10/9/2020	0.90	2.40	5.99
PFBS	375-73-5	1.20 U	H9959-FS(3)	10.000	10/9/2020	0.42	1.20	5.99
PFHxS	355-46-4	2.40 U	H9959-FS(3)	10.000	10/9/2020	0.97	2.40	5.99
PFOS	1763-23-1	1.00 J	H9959-FS(3)	10.000	10/9/2020	0.83	2.40	5.99
HFPO-DA	13252-13-6	2.40 U	H9959-FS(3)	10.000	10/9/2020	0.77	2.40	5.99
Adona	919005-14-4	2.40 U	H9959-FS(3)	10.000	10/9/2020	0.99	2.40	5.99
11CI-PF3OUdS	763051-92-9	1.80 U	H9959-FS(3)	10.000	10/9/2020	0.62	1.80	5.99
9CI-PF3ONS	756426-58-1	1.20 U	H9959-FS(3)	10.000	10/9/2020	0.57	1.20	5.99

10/13/20
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 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-CTIA-SB01P-0304

Battelle ID H9960-FS
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 09/24/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 16.67
 Matrix SOIL
 Sample Size 1.55
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.58 U	H9960-FS(3)	10.000	10/9/2020	0.92	2.58	6.45
PFHpA	375-85-9	1.94 U	H9960-FS(3)	10.000	10/9/2020	0.66	1.94	6.45
PFOA	335-67-1	2.58 U	H9960-FS(3)	10.000	10/9/2020	0.79	2.58	6.45
PFNA	375-95-1	1.29 U	H9960-FS(3)	10.000	10/9/2020	0.63	1.29	6.45
PFDA	335-76-2	1.29 U	H9960-FS(3)	10.000	10/9/2020	0.59	1.29	6.45
PFUnA	2058-94-8	1.29 U	H9960-FS(3)	10.000	10/9/2020	0.59	1.29	6.45
PFDoA	307-55-1	2.58 U	H9960-FS(3)	10.000	10/9/2020	0.79	2.58	6.45
PFTTrDA	72629-94-8	1.29 U	H9960-FS(3)	10.000	10/9/2020	0.36	1.29	6.45
PFTeDA	376-06-7	3.23 U	H9960-FS(3)	10.000	10/9/2020	1.39	3.23	6.45
NMeFOSAA	2355-31-9	3.23 U	H9960-FS(3)	10.000	10/9/2020	1.32	3.23	6.45
NEtFOSAA	2991-50-6	2.58 U	H9960-FS(3)	10.000	10/9/2020	0.97	2.58	6.45
PFBS	375-73-5	1.29 U	H9960-FS(3)	10.000	10/9/2020	0.45	1.29	6.45
PFHxS	355-46-4	2.58 U	H9960-FS(3)	10.000	10/9/2020	1.05	2.58	6.45
PFOS	1763-23-1	2.29 J	H9960-FS(3)	10.000	10/9/2020	0.89	2.58	6.45
HFPO-DA	13252-13-6	2.58 U	H9960-FS(3)	10.000	10/9/2020	0.83	2.58	6.45
Adona	919005-14-4	2.58 U	H9960-FS(3)	10.000	10/9/2020	1.07	2.58	6.45
11CI-PF3OUdS	763051-92-9	1.94 U	H9960-FS(3)	10.000	10/9/2020	0.67	1.94	6.45
9CI-PF3ONS	756426-58-1	1.29 U	H9960-FS(3)	10.000	10/9/2020	0.62	1.29	6.45

10/13/20
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 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-CTIA-SS04-000H

Battelle ID H9962-FS
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 09/24/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 13.43
 Matrix SOIL
 Sample Size 1.75
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.29 U	H9962-FS(3)	10.000	10/9/2020	0.81	2.29	5.71
PFHpA	375-85-9	1.71 U	H9962-FS(3)	10.000	10/9/2020	0.58	1.71	5.71
PFOA	335-67-1	2.29 U	H9962-FS(3)	10.000	10/9/2020	0.70	2.29	5.71
PFNA	375-95-1	1.00 J	H9962-FS(3)	10.000	10/9/2020	0.56	1.14	5.71
PFDA	335-76-2	1.14 U	H9962-FS(3)	10.000	10/9/2020	0.53	1.14	5.71
PFUnA	2058-94-8	1.14 U	H9962-FS(3)	10.000	10/9/2020	0.53	1.14	5.71
PFDoA	307-55-1	2.29 U	H9962-FS(3)	10.000	10/9/2020	0.70	2.29	5.71
PFTTrDA	72629-94-8	1.14 U	H9962-FS(3)	10.000	10/9/2020	0.32	1.14	5.71
PFTeDA	376-06-7	2.86 U	H9962-FS(3)	10.000	10/9/2020	1.23	2.86	5.71
NMeFOSAA	2355-31-9	2.86 U	H9962-FS(3)	10.000	10/9/2020	1.17	2.86	5.71
NEtFOSAA	2991-50-6	2.29 U	H9962-FS(3)	10.000	10/9/2020	0.86	2.29	5.71
PFBS	375-73-5	1.14 U	H9962-FS(3)	10.000	10/9/2020	0.40	1.14	5.71
PFHxS	355-46-4	2.29 U	H9962-FS(3)	10.000	10/9/2020	0.93	2.29	5.71
PFOS	1763-23-1	64.68 J	H9962-FS(3)	10.000	10/9/2020	0.79	2.29	5.71
HFPO-DA	13252-13-6	2.29 U	H9962-FS(3)	10.000	10/9/2020	0.73	2.29	5.71
Adona	919005-14-4	2.29 U	H9962-FS(3)	10.000	10/9/2020	0.95	2.29	5.71
11CI-PF3OUs	763051-92-9	1.71 U	H9962-FS(3)	10.000	10/9/2020	0.59	1.71	5.71
9CI-PF3ONS	756426-58-1	1.14 U	H9962-FS(3)	10.000	10/9/2020	0.55	1.14	5.71

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10/30/20
 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-CTIA-SS04P-000H

Battelle ID H9963-FS
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 09/24/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 9.98
 Matrix SOIL
 Sample Size 1.67
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.40 U	H9963-FS(3)	10.000	10/9/2020	0.85	2.40	5.99
PFHpA	375-85-9	1.80 U	H9963-FS(3)	10.000	10/9/2020	0.61	1.80	5.99
PFOA	335-67-1	2.40 U	H9963-FS(3)	10.000	10/9/2020	0.73	2.40	5.99
PFNA	375-95-1	1.20 U	H9963-FS(3)	10.000	10/9/2020	0.59	1.20	5.99
PFDA	335-76-2	1.20 U	H9963-FS(3)	10.000	10/9/2020	0.55	1.20	5.99
PFUnA	2058-94-8	1.20 U	H9963-FS(3)	10.000	10/9/2020	0.55	1.20	5.99
PFDoA	307-55-1	2.40 U	H9963-FS(3)	10.000	10/9/2020	0.73	2.40	5.99
PFTTrDA	72629-94-8	1.20 U	H9963-FS(3)	10.000	10/9/2020	0.34	1.20	5.99
PFTeDA	376-06-7	2.99 U	H9963-FS(3)	10.000	10/9/2020	1.29	2.99	5.99
NMeFOSAA	2355-31-9	2.99 U	H9963-FS(3)	10.000	10/9/2020	1.22	2.99	5.99
NEtFOSAA	2991-50-6	2.40 U	H9963-FS(3)	10.000	10/9/2020	0.90	2.40	5.99
PFBS	375-73-5	1.20 U	H9963-FS(3)	10.000	10/9/2020	0.42	1.20	5.99
PFHxS	355-46-4	2.40 U	H9963-FS(3)	10.000	10/9/2020	0.97	2.40	5.99
PFOS	1763-23-1	37.85 J	H9963-FS(3)	10.000	10/9/2020	0.83	2.40	5.99
HFPO-DA	13252-13-6	2.40 U	H9963-FS(3)	10.000	10/9/2020	0.77	2.40	5.99
Adona	919005-14-4	2.40 U	H9963-FS(3)	10.000	10/9/2020	0.99	2.40	5.99
11CI-PF3OUdS	763051-92-9	1.80 U	H9963-FS(3)	10.000	10/9/2020	0.62	1.80	5.99
9CI-PF3ONS	756426-58-1	1.20 U	H9963-FS(3)	10.000	10/9/2020	0.57	1.20	5.99

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10/13/2020
 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

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Client ID PX-CTIA-SB04-0304

Battelle ID H9964-FS
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 09/24/2020
 Analytical Instrument Sciex 5500 LC/MS/MS
 % Moisture 9.52
 Matrix SOIL
 Sample Size 1.74
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.30 U	H9964-FS(3)	10.000	10/9/2020	0.82	2.30	5.75
PFHpA	375-85-9	1.72 U	H9964-FS(3)	10.000	10/9/2020	0.59	1.72	5.75
PFOA	335-67-1	2.30 U	H9964-FS(3)	10.000	10/9/2020	0.70	2.30	5.75
PFNA	375-95-1	1.15 U	H9964-FS(3)	10.000	10/9/2020	0.56	1.15	5.75
PFDA	335-76-2	1.15 U	H9964-FS(3)	10.000	10/9/2020	0.53	1.15	5.75
PFUnA	2058-94-8	1.15 U	H9964-FS(3)	10.000	10/9/2020	0.53	1.15	5.75
PFDoA	307-55-1	2.30 U	H9964-FS(3)	10.000	10/9/2020	0.70	2.30	5.75
PFTTrDA	72629-94-8	1.15 U	H9964-FS(3)	10.000	10/9/2020	0.32	1.15	5.75
PFTeDA	376-06-7	2.87 U	H9964-FS(3)	10.000	10/9/2020	1.24	2.87	5.75
NMeFOSAA	2355-31-9	2.87 U	H9964-FS(3)	10.000	10/9/2020	1.17	2.87	5.75
NEtFOSAA	2991-50-6	2.30 U	H9964-FS(3)	10.000	10/9/2020	0.86	2.30	5.75
PFBS	375-73-5	1.15 U	H9964-FS(3)	10.000	10/9/2020	0.40	1.15	5.75
PFHxS	355-46-4	2.30 U	H9964-FS(3)	10.000	10/9/2020	0.93	2.30	5.75
PFOS	1763-23-1	17.80	H9964-FS(3)	10.000	10/9/2020	0.79	2.30	5.75
HFPO-DA	13252-13-6	2.30 U	H9964-FS(3)	10.000	10/9/2020	0.74	2.30	5.75
Adona	919005-14-4	2.30 U	H9964-FS(3)	10.000	10/9/2020	0.95	2.30	5.75
11CI-PF3OUdS	763051-92-9	1.72 U	H9964-FS(3)	10.000	10/9/2020	0.60	1.72	5.75
9CI-PF3ONS	756426-58-1	1.15 U	H9964-FS(3)	10.000	10/9/2020	0.55	1.15	5.75

10/10/30/20
 Analyzed by: Griffith, Lauren
 Printed: 10/13/2020

**DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND**

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-1281
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: October 29, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-FFDA-WT01-0920	H9885-FS1	Water
2	PX-FFDA-WT05-0920	H9889-FS1	Water
3	PX-FFDA-WT03-0920	H9890-FS1	Water
4	PX-S14-WT06-0920	H9897-FS1	Water
5	PX-CTIA-WT05-0920	H9947-FS1	Water
6	PX-CTIA-WT06-0920	H9951-FS1	Water

A Stage 2B/4 data validation was performed on the analytical data for six water samples collected on September 12-13, 2020 by CH2M HILL at the NAS Patuxent River site in Maryland. The samples were analyzed under the Analysis of Poly and Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-08

The data have been validated according to the protocols and quality control (QC) requirements of the analytical methods, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, Webster Field Annex, Naval Air Station Patuxent River, Maryland, April 2020, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, St. Mary's County, Naval Air Station Patuxent River, Maryland, April 2020, and the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

Organics

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A full (Stage 2B/4) data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were serious deficiencies of data. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

- All non-detected results were qualified (X) in all samples due to grossly exceeded holding times.

The remaining data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

Per- and Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted at 29-30 days which is grossly outside of the 14 days for water samples criteria. All results were qualified as estimated (J/X) in all samples.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-FFDA-FB01-091220	None - ND	-	-	-
PX-FFDA-EB01-091220-GW	None - ND	-	-	-
PX-CTIA-EB01-091320-GW	None - ND	-	-	-
PX-CTIA-FB01-091320	None - ND	-	-	-
PX-S14-FB01-091220	None - ND	-	-	-
PX-S14-EB01-091220-GW	None - ND	-	-	-

Surrogate Spike Recoveries

- Several samples exhibited low surrogate percent recoveries (%R) for several surrogate compounds, however, all results were already qualified due to holding times and no further action was required.

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

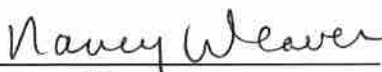
- All samples were originally analyzed in SDGs 20-1133, 20-1134, 20-1135 and 20-1136 with low surrogate recoveries. The samples were re-extracted outside of holding times and reanalyzed in this data package. The original analysis results should be used for reporting purposes.

Field Duplicate Sample Precision

- Field duplicate samples were not collected.

Please contact the undersigned at (757) 564-0090 if you have any questions or need further information.

Signed:


Nancy Weaver
Senior Chemist

Dated: 11/2/20

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-FFDA-WT01-0920

Battelle ID H9885-FS1
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 10/12/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.275
 Size Unit-Basis L

Use
original
in SDG 20-1133

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	17.73 T	H9885-FS1(0)	1.000	10/13/2020	0.48	1.36	4.55
PFHpA	375-85-9	7.69 T	H9885-FS1(0)	1.000	10/13/2020	0.24	0.91	4.55
PFOA	335-67-1	17.83 T	H9885-FS1(0)	1.000	10/13/2020	0.46	1.36	4.55
PFNA	375-95-1	2.74 JT	H9885-FS1(0)	1.000	10/13/2020	0.28	0.91	4.55
PFDA	335-76-2	0.45 UT	H9885-FS1(0)	1.000	10/13/2020	0.13	0.45	4.55
PFUnA	2058-94-8	0.45 UT	H9885-FS1(0)	1.000	10/13/2020	0.20	0.45	4.55
PFDoA	307-55-1	0.45 UT	H9885-FS1(0)	1.000	10/13/2020	0.17	0.45	4.55
PFTTrDA	72629-94-8	0.45 UT	H9885-FS1(0)	1.000	10/13/2020	0.14	0.45	4.55
PFTeDA	376-06-7	1.82 UT	H9885-FS1(0)	1.000	10/13/2020	0.66	1.82	4.55
NMeFOSAA	2355-31-9	0.91 UT	H9885-FS1(0)	1.000	10/13/2020	0.32	0.91	4.55
NEtFOSAA	2991-50-6	0.91 UT	H9885-FS1(0)	1.000	10/13/2020	0.45	0.91	4.55
PFBS	375-73-5	1.91 JT	H9885-FS1(0)	1.000	10/13/2020	0.13	0.45	4.55
PFHxS	355-46-4	27.44 T	H9885-FS1(0)	1.000	10/13/2020	0.10	0.36	4.55
PFOS	1763-23-1	93.27 TD	H9885-FS1-D(3)	5.000	10/13/2020	2.00	4.55	22.73
HFPO-DA	13252-13-6	0.45 UT	H9885-FS1(0)	1.000	10/13/2020	0.23	0.45	4.55
Adona	919005-14-4	0.91 UT	H9885-FS1(0)	1.000	10/13/2020	0.25	0.91	4.55
11CI-PF3OUdS	763051-92-9	0.45 UT	H9885-FS1(0)	1.000	10/13/2020	0.21	0.45	4.55
9CI-PF3ONS	756426-58-1	0.91 UT	H9885-FS1(0)	1.000	10/13/2020	0.25	0.91	4.55

HT

NA 10/29/20
 Analyzed by: Schumitz, Denise
 Printed: 10/14/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-FFDA-WT01-0920
 Battelle ID H9885-FS1
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 10/12/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS

Use original

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	52	H9885-FS1(0)	10/13/2020
13C4-PFHpA	63	H9885-FS1(0)	10/13/2020
13C8-PFOA	70	H9885-FS1(0)	10/13/2020
13C9-PFNA	75	H9885-FS1(0)	10/13/2020
13C6-PFDA	83	H9885-FS1(0)	10/13/2020
13C7-PFUnA	74	H9885-FS1(0)	10/13/2020
13C2-PFDoA	72	H9885-FS1(0)	10/13/2020
13C2-PFTeDA	30 M	H9885-FS1(0)	10/13/2020
d3-MeFOSAA	105 D	H9885-FS1-D(3)	10/13/2020
d5-EnFOSAA	111 D	H9885-FS1-D(3)	10/13/2020
13C3-PFBS	100 D	H9885-FS1-D(3)	10/13/2020
13C3-PFHxS	107 D	H9885-FS1-D(3)	10/13/2020
13C8-PFOS	111 D	H9885-FS1-D(3)	10/13/2020
13C3-HFPO-DA	72	H9885-FS1(0)	10/13/2020

NW 10/29/20
 Analyzed by: Schumitz, Denise
 Printed: 10/14/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-FFDA-WT05-0920

Battelle ID H9889-FS1
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 10/12/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.275
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	3.64 JT	H9889-FS1(0)	1.000	10/13/2020	0.48	1.36	4.55
PFHpA	375-85-9	1.08 JT	H9889-FS1(0)	1.000	10/13/2020	0.24	0.91	4.55
PFOA	335-67-1	9.76 T	H9889-FS1(0)	1.000	10/13/2020	0.46	1.36	4.55
PFNA	375-95-1	0.91 UT	H9889-FS1(0)	1.000	10/13/2020	0.28	0.91	4.55
PFDA	335-76-2	0.45 UT	H9889-FS1(0)	1.000	10/13/2020	0.13	0.45	4.55
PFUnA	2058-94-8	0.45 UT	H9889-FS1(0)	1.000	10/13/2020	0.20	0.45	4.55
PFDoA	307-55-1	0.45 UT	H9889-FS1(0)	1.000	10/13/2020	0.17	0.45	4.55
PFTeDA	72629-94-8	0.45 UT	H9889-FS1(0)	1.000	10/13/2020	0.14	0.45	4.55
PFTeDA	376-06-7	1.82 UT	H9889-FS1(0)	1.000	10/13/2020	0.66	1.82	4.55
NMeFOSAA	2355-31-9	0.91 UT	H9889-FS1(0)	1.000	10/13/2020	0.32	0.91	4.55
NEtFOSAA	2991-50-6	0.91 UT	H9889-FS1(0)	1.000	10/13/2020	0.45	0.91	4.55
PFBS	375-73-5	1.54 JT	H9889-FS1(0)	1.000	10/13/2020	0.13	0.45	4.55
PFHxS	355-46-4	24.54 T	H9889-FS1(0)	1.000	10/13/2020	0.10	0.36	4.55
PFOS	1763-23-1	2.75 JT	H9889-FS1(0)	1.000	10/13/2020	0.40	0.91	4.55
HFPO-DA	13252-13-6	0.45 UT	H9889-FS1(0)	1.000	10/13/2020	0.23	0.45	4.55
Adona	919005-14-4	0.91 UT	H9889-FS1(0)	1.000	10/13/2020	0.25	0.91	4.55
11CI-PF3OUdS	763051-92-9	0.45 UT	H9889-FS1(0)	1.000	10/13/2020	0.21	0.45	4.55
9CI-PF3ONS	756426-58-1	0.91 UT	H9889-FS1(0)	1.000	10/13/2020	0.25	0.91	4.55

2
 Use original
 in SOG 20-1134

HT

MW 10/29/20
 Analyzed by: Schumitz, Denise
 Printed: 10/14/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-FFDA-WT05-0920
 Battelle ID H9889-FS1
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 10/12/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS

2

use original

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	57	H9889-FS1(0)	10/13/2020
13C4-PFHxA	73	H9889-FS1(0)	10/13/2020
13C8-PFOA	87	H9889-FS1(0)	10/13/2020
13C9-PFNA	96	H9889-FS1(0)	10/13/2020
13C6-PFDA	91	H9889-FS1(0)	10/13/2020
13C7-PFUnA	77	H9889-FS1(0)	10/13/2020
13C2-PFDoA	72	H9889-FS1(0)	10/13/2020
13C2-PFTeDA	27	H9889-FS1(0)	10/13/2020
d3-MeFOSAA	75	H9889-FS1(0)	10/13/2020
d5-EtFOSAA	75	H9889-FS1(0)	10/13/2020
13C3-PFBS	61	H9889-FS1(0)	10/13/2020
13C3-PFHxS	74	H9889-FS1(0)	10/13/2020
13C8-PFOS	93	H9889-FS1(0)	10/13/2020
13C3-HFPO-DA	73	H9889-FS1(0)	10/13/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-FFDA-WT03-0920

Battelle ID H9890-FS1
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 10/12/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.265
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	31.48 T	H9890-FS1(0)	1.000	10/13/2020	0.50	1.42	4.72
PFHpA	375-85-9	7.17 T	H9890-FS1(0)	1.000	10/13/2020	0.25	0.94	4.72
PFOA	335-67-1	47.13 T	H9890-FS1(0)	1.000	10/13/2020	0.48	1.42	4.72
PFNA	375-95-1	1.16 JT	H9890-FS1(0)	1.000	10/13/2020	0.29	0.94	4.72
PFDA	335-76-2	0.47 UT	H9890-FS1(0)	1.000	10/13/2020	0.13	0.47	4.72
PFUnA	2058-94-8	0.47 UT	H9890-FS1(0)	1.000	10/13/2020	0.21	0.47	4.72
PFDaA	307-55-1	0.47 UT	H9890-FS1(0)	1.000	10/13/2020	0.18	0.47	4.72
PFTDA	72629-94-8	0.47 UT	H9890-FS1(0)	1.000	10/13/2020	0.14	0.47	4.72
PFTeDA	376-06-7	1.89 UT	H9890-FS1(0)	1.000	10/13/2020	0.69	1.89	4.72
NMeFOSAA	2355-31-9	0.94 UT	H9890-FS1(0)	1.000	10/13/2020	0.33	0.94	4.72
NEtFOSAA	2991-50-6	0.94 UT	H9890-FS1(0)	1.000	10/13/2020	0.47	0.94	4.72
PFBS	375-73-5	14.39 T	H9890-FS1(0)	1.000	10/13/2020	0.13	0.47	4.72
PFHxS	355-46-4	57.85 T	H9890-FS1(0)	1.000	10/13/2020	0.10	0.38	4.72
PFOS	1763-23-1	14.32 T	H9890-FS1(0)	1.000	10/13/2020	0.42	0.94	4.72
HFPO-DA	13252-13-6	0.47 UT	H9890-FS1(0)	1.000	10/13/2020	0.24	0.47	4.72
Adona	919005-14-4	0.94 UT	H9890-FS1(0)	1.000	10/13/2020	0.25	0.94	4.72
11CI-PF3OUdS	763051-92-9	0.47 UT	H9890-FS1(0)	1.000	10/13/2020	0.22	0.47	4.72
9CI-PF3ONS	756426-58-1	0.94 UT	H9890-FS1(0)	1.000	10/13/2020	0.25	0.94	4.72

3
 Use original in
 SDG 20-1134

HT

10/12/2020
 Analyzed by: Schumitz, Denise
 Printed: 10/14/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-FFDA-WT03-0920
 Battelle ID H9890-FS1
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 10/12/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	37 N	H9890-FS1(0)	10/13/2020
13C4-PFHpA	51	H9890-FS1(0)	10/13/2020
13C8-PFOA	56	H9890-FS1(0)	10/13/2020
13C9-PFNA	54	H9890-FS1(0)	10/13/2020
13C6-PFDA	64	H9890-FS1(0)	10/13/2020
13C7-PFUnA	52	H9890-FS1(0)	10/13/2020
13C2-PFDoA	38 N	H9890-FS1(0)	10/13/2020
13C2-PFTeDA	8 N	H9890-FS1(0)	10/13/2020
d3-MeFOSAA	46 N	H9890-FS1(0)	10/13/2020
d5-EtFOSAA	41 N	H9890-FS1(0)	10/13/2020
13C3-PFBS	66	H9890-FS1(0)	10/13/2020
13C3-PFHxS	82	H9890-FS1(0)	10/13/2020
13C8-PFOS	78	H9890-FS1(0)	10/13/2020
13C3-HFPO-DA	55	H9890-FS1(0)	10/13/2020

Use original

3

10/29/20
 Analyzed by: Schumitz, Denise
 Printed: 10/14/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-S14-WT06-0920

Battelle ID H9897-FS1
 Sample Type SA
 Collection Date 09/12/2020
 Extraction Date 10/12/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.275
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	192.61 TD J	H9897-FS1-D(3)	5.000	10/13/2020	2.41	6.82	22.73
PFHpA	375-85-9	60.82 T	H9897-FS1(0)	1.000	10/13/2020	0.24	0.91	4.55
PFOA	335-67-1	664.62 TD	H9897-FS1-D(5)	25.000	10/13/2020	11.59	34.09	113.64
PFNA	375-95-1	9.15 T	H9897-FS1(0)	1.000	10/13/2020	0.28	0.91	4.55
PFDA	335-76-2	4.53 JT	H9897-FS1(0)	1.000	10/13/2020	0.13	0.45	4.55
PFUnA	2058-94-8	0.45 UT X	H9897-FS1(0)	1.000	10/13/2020	0.20	0.45	4.55
PFDoA	307-55-1	0.45 UT	H9897-FS1(0)	1.000	10/13/2020	0.17	0.45	4.55
PFTTrDA	72629-94-8	0.45 UT	H9897-FS1(0)	1.000	10/13/2020	0.14	0.45	4.55
PFTeDA	376-06-7	1.82 UT	H9897-FS1(0)	1.000	10/13/2020	0.66	1.82	4.55
NMeFOSAA	2355-31-9	0.91 UT	H9897-FS1(0)	1.000	10/13/2020	0.32	0.91	4.55
NEtFOSAA	2991-50-6	0.91 UT	H9897-FS1(0)	1.000	10/13/2020	0.45	0.91	4.55
PFBS	375-73-5	54.84 T J	H9897-FS1(0)	1.000	10/13/2020	0.13	0.45	4.55
PFHxS	355-46-4	985.49 TD	H9897-FS1-D(5)	25.000	10/13/2020	2.50	9.09	113.64
PFOS	1763-23-1	1049.15 TD	H9897-FS1-D(5)	25.000	10/13/2020	10.00	22.73	113.64
HFPO-DA	13252-13-6	0.45 UT X	H9897-FS1(0)	1.000	10/13/2020	0.23	0.45	4.55
Adona	919005-14-4	0.91 UT	H9897-FS1(0)	1.000	10/13/2020	0.25	0.91	4.55
11CI-PF3OUdS	763051-92-9	0.45 UT	H9897-FS1(0)	1.000	10/13/2020	0.21	0.45	4.55
9CI-PF3ONS	756426-58-1	0.91 UT	H9897-FS1(0)	1.000	10/13/2020	0.25	0.91	4.55

4
 Use original in
 S26 20-1134

HT

MW 10/29/20
 Analyzed by: Schumitz, Denise
 Printed: 10/14/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-CTIA-WT05-0920

Battelle ID H9947-FS1
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 10/12/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.260
 Size Unit-Basis L

5
 Use original
 IN SDG 20-1135

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	7.21 T	H9947-FS1(0)	1.000	10/13/2020	0.51	1.44	4.81	HT
PFHpA	375-85-9	1.68 JT	H9947-FS1(0)	1.000	10/13/2020	0.25	0.96	4.81	
PFOA	335-67-1	5.12 T	H9947-FS1(0)	1.000	10/13/2020	0.49	1.44	4.81	
PFNA	375-95-1	0.98 JT	H9947-FS1(0)	1.000	10/13/2020	0.30	0.96	4.81	
PFDA	335-76-2	6.57 T	H9947-FS1(0)	1.000	10/13/2020	0.13	0.48	4.81	
PFUnA	2058-94-8	0.48 UT	H9947-FS1(0)	1.000	10/13/2020	0.21	0.48	4.81	
PFDoA	307-55-1	0.48 UT	H9947-FS1(0)	1.000	10/13/2020	0.18	0.48	4.81	
PFTTrDA	72629-94-8	0.48 UT	H9947-FS1(0)	1.000	10/13/2020	0.14	0.48	4.81	
PFTeDA	376-06-7	1.92 UT	H9947-FS1(0)	1.000	10/13/2020	0.70	1.92	4.81	
NMeFOSAA	2355-31-9	0.96 UT	H9947-FS1(0)	1.000	10/13/2020	0.34	0.96	4.81	
NEtFOSAA	2991-50-6	0.96 UT	H9947-FS1(0)	1.000	10/13/2020	0.48	0.96	4.81	
PFBS	375-73-5	0.91 JT	H9947-FS1(0)	1.000	10/13/2020	0.13	0.48	4.81	
PFHxS	355-46-4	11.36 T	H9947-FS1(0)	1.000	10/13/2020	0.11	0.38	4.81	
PFOS	1763-23-1	11.70 T	H9947-FS1(0)	1.000	10/13/2020	0.42	0.96	4.81	
HFPO-DA	13252-13-6	0.48 UT	H9947-FS1(0)	1.000	10/13/2020	0.24	0.48	4.81	
Adona	919005-14-4	0.96 UT	H9947-FS1(0)	1.000	10/13/2020	0.26	0.96	4.81	
11CI-PF3OUdS	763051-92-9	0.48 UT	H9947-FS1(0)	1.000	10/13/2020	0.22	0.48	4.81	
9CI-PF3ONS	756426-58-1	0.96 UT	H9947-FS1(0)	1.000	10/13/2020	0.26	0.96	4.81	

10/14/2020
 Analyzed by: Schumitz, Denise
 Printed: 10/14/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-CTIA-WT05-0920
 Battelle ID H9947-FS1
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 10/12/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	58	H9947-FS1(0)	10/13/2020
13C4-PFHxA	64	H9947-FS1(0)	10/13/2020
13C8-PFOA	75	H9947-FS1(0)	10/13/2020
13C9-PFNA	79	H9947-FS1(0)	10/13/2020
13C6-PFDA	75	H9947-FS1(0)	10/13/2020
13C7-PFUnA	77	H9947-FS1(0)	10/13/2020
13C2-PFDoA	76	H9947-FS1(0)	10/13/2020
13C2-PFTeDA	42 N	H9947-FS1(0)	10/13/2020
d3-MeFOSAA	79	H9947-FS1(0)	10/13/2020
d5-EtFOSAA	84	H9947-FS1(0)	10/13/2020
13C3-PFBS	70	H9947-FS1(0)	10/13/2020
13C3-PFHxS	75	H9947-FS1(0)	10/13/2020
13C8-PFOS	82	H9947-FS1(0)	10/13/2020
13C3-HFPO-DA	60	H9947-FS1(0)	10/13/2020

5
 Use original



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-CTIA-WT06-0920

Battelle ID H9951-FS1
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 10/12/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.275
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	48.06 T	H9951-FS1(0)	1.000	10/13/2020	0.48	1.36	4.55
PFHpA	375-85-9	51.09 T	H9951-FS1(0)	1.000	10/13/2020	0.24	0.91	4.55
PFOA	335-67-1	66.77 T	H9951-FS1(0)	1.000	10/13/2020	0.46	1.36	4.55
PFNA	375-95-1	50.95 T	H9951-FS1(0)	1.000	10/13/2020	0.28	0.91	4.55
PFDA	335-76-2	8.40 T	H9951-FS1(0)	1.000	10/13/2020	0.13	0.45	4.55
PFUnA	2058-94-8	2.40 IT	H9951-FS1(0)	1.000	10/13/2020	0.20	0.45	4.55
PFDoA	307-55-1	0.45 UT	H9951-FS1(0)	1.000	10/13/2020	0.17	0.45	4.55
PFTeDA	72629-94-8	0.45 UT	H9951-FS1(0)	1.000	10/13/2020	0.14	0.45	4.55
PFTeDA	376-06-7	1.82 UT	H9951-FS1(0)	1.000	10/13/2020	0.66	1.82	4.55
NMeFOSAA	2355-31-9	0.91 UT	H9951-FS1(0)	1.000	10/13/2020	0.32	0.91	4.55
NEtFOSAA	2991-50-6	0.91 UT	H9951-FS1(0)	1.000	10/13/2020	0.45	0.91	4.55
PFBS	375-73-5	6.13 T	H9951-FS1(0)	1.000	10/13/2020	0.13	0.45	4.55
PFHxS	355-46-4	182.43 TD	H9951-FS1-D(3)	5.000	10/13/2020	0.50	1.82	22.73
PFOS	1763-23-1	1735.34 TD	H9951-FS1-D(5)	62.500	10/13/2020	25.00	56.82	284.09
HFPO-DA	13252-13-6	0.45 UT	H9951-FS1(0)	1.000	10/13/2020	0.23	0.45	4.55
Adona	919005-14-4	0.91 UT	H9951-FS1(0)	1.000	10/13/2020	0.25	0.91	4.55
11CI-PF3OUdS	763051-92-9	0.45 UT	H9951-FS1(0)	1.000	10/13/2020	0.21	0.45	4.55
9CI-PF3ONS	756426-58-1	0.91 UT	H9951-FS1(0)	1.000	10/13/2020	0.25	0.91	4.55

6
 Use original
 in SD 9 20-1136

HT

10/29/20
 Analyzed by: Schumitz, Denise
 Printed: 10/14/2020



Project Client: CH2M
 Project Name: CTO-4256: PAX Basewide PFAS
 Project No.: 100142032

Client ID PX-CTIA-WT06-0920
 Battelle ID H9951-FS1
 Sample Type SA
 Collection Date 09/13/2020
 Extraction Date 10/12/2020
 Analytical Instrument Sciex 6500+ LC/MS/MS

6

Use original

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	47 N	H9951-FS1(0)	10/13/2020
13C4-PFHpA	50	H9951-FS1(0)	10/13/2020
13C8-PFOA	71	H9951-FS1(0)	10/13/2020
13C9-PFNA	32	H9951-FS1(0)	10/13/2020
13C6-PFDA	80	H9951-FS1(0)	10/13/2020
13C7-PFUnA	85	H9951-FS1(0)	10/13/2020
13C2-PFDoA	71	H9951-FS1(0)	10/13/2020
13C2-PFTeDA	38 N	H9951-FS1(0)	10/13/2020
d3-MeFOSAA	114 D	H9951-FS1-D(5)	10/13/2020
d5-EtFOSAA	118 D	H9951-FS1-D(5)	10/13/2020
13C3-PFBS	107 D	H9951-FS1-D(5)	10/13/2020
13C3-PFHxS	115 D	H9951-FS1-D(5)	10/13/2020
13C8-PFOS	106 D	H9951-FS1-D(5)	10/13/2020
13C3-HFRQ-DA	65	H9951-FS1(0)	10/13/2020

Appendix D

Laboratory Analytical Data

Table D-1. Soil PFAS Analytical Data
Site 14, FFDA, Site 41, and CTIA
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	PAX PFAS SO Values	PX-CTIA-SO01			PX-CTIA-SO02		PX-CTIA-SO03	
Sample ID		PX-CTIA-SS01-000H	PX-CTIA-SB01-0304	PX-CTIA-SB01P-0304	PX-CTIA-SS02-000H	PX-CTIA-SB02-0304	PX-CTIA-SS03-000H	PX-CTIA-SB03-0304
Sample Date		09/13/20	09/13/20	09/13/20	09/13/20	09/13/20	09/13/20	09/13/20
Chemical Name								
Per- and Polyfluoroalkyl Substances (ng/g)								
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	2.61 U	2.4 U	2.58 U	2.45 U	2.41 U	2.33 U	2.29 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CI-PF3ONS)	--	1.31 U	1.2 U	1.29 U	1.23 U	1.2 U	1.16 U	1.14 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CI-PF3OUdS)	--	1.96 U	1.8 U	1.94 U	1.84 U	1.81 U	1.74 U	1.71 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	2.61 U	2.4 U	2.58 U	2.45 U	2.41 U	2.33 U	2.29 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	3.27 U	2.99 U	3.23 U	3.07 U	3.01 U	2.91 U	2.86 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	2.61 U	2.4 U	2.58 U	2.45 U	2.41 U	2.33 U	2.29 U
Perfluorooctanesulfonic Acid (PFOS)	130	4.9 J	1 J	2.29 J	58.51	376.4	471.93	88.06
Perfluoroundecanoic Acid (PFUnA)	--	1.31 U	1.2 U	1.29 U	0.9 J	1.2 U	1.16 U	1.14 U
Perfluorohexanoic Acid (PFHxA)	--	2.61 U	2.4 U	2.58 U	1.35 J	2.41 U	2.53 J	2.29 U
Perfluorododecanoic Acid (PFDoA)	--	2.61 U	2.4 U	2.58 U	2.45 U	2.41 U	2.33 U	2.29 U
Perfluorooctanoic Acid (PFOA)	130	2.61 U	2.4 U	2.58 U	0.88 J	1.03 J	1.86 J	1.95 J
Perfluorodecanoic Acid (PFDA)	--	1.31 U	1.2 U	1.29 U	1.23 U	1.2 U	1.16 U	1.14 U
Perfluorohexanesulfonic Acid (PFHxS)	--	2.61 U	2.4 U	2.58 U	6.8	9.11	30.12 J	16.44
Perfluorobutanesulfonic Acid (PFBS)	1,900	1.31 U	1.2 U	1.29 U	1.23 U	1.2 U	1.16 U	1.14 U
Perfluoroheptanoic Acid (PFHpA)	--	1.96 U	1.8 U	1.94 U	0.68 J	1.81 U	1.74 U	1.71 U
Perfluorononanoic Acid (PFNA)	--	1.31 U	1.2 U	1.29 U	0.74 J	2.44 J	3.6 J	0.65 J
Perfluorotetradecanoic Acid (PFTeDA)	--	3.27 U	2.99 U	3.23 U	3.07 U	3.01 U	2.91 U	2.86 U
Perfluorotridecanoic Acid (PFTrDA)	--	1.31 U	1.2 U	1.29 U	1.23 U	1.2 U	1.16 U	1.14 U

Notes:

Exceeds one or more criteria

Bold indicates detections
J - Analyte present, value may or may not be accurate or precise
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
ng/g - nanograms per gram
µg/kg - micrograms per kilogram
ng/g = µg/kg

Table D-1. Soil PFAS Analytical Data
Site 14, FFDA, Site 41, and CTIA
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	PAX PFAS SO Values	PX-CTIA-SO04			PX-FFDA-SO01			PX-FFDA-SO02	
Sample ID		PX-CTIA-SS04-000H	PX-CTIA-SS04P-000H	PX-CTIA-SB04-0304	PX-FFDA-SS01-000H	PX-FFDA-SB01-0304	PX-FFDA-SB01P-0304	PX-FFDA-SS02-000H	PX-FFDA-SB02-0304
Sample Date		09/13/20	09/13/20	09/13/20	09/12/20	09/12/20	09/12/20	09/12/20	09/12/20
Chemical Name									
Per- and Polyfluoroalkyl Substances (ng/g)									
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	2.29 U	2.4 U	2.3 U	2.37 U	2.78 U	2.44 U	2.26 U	2.37 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	1.14 U	1.2 U	1.15 U	1.18 U	1.39 U	1.22 U	1.13 U	1.18 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	1.71 U	1.8 U	1.72 U	1.78 U	2.08 U	1.83 U	1.69 U	1.78 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	2.29 U	2.4 U	2.3 U	2.37 U	2.78 U	2.44 U	2.26 U	2.37 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	2.86 U	2.99 U	2.87 U	2.96 U	3.47 U	3.05 U	2.82 U	2.96 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	2.29 U	2.4 U	2.3 U	2.37 U	2.78 U	2.44 U	2.26 U	2.37 U
Perfluorooctanesulfonic Acid (PFOS)	130	64.68 J	37.85 J	17.8	1.38 J	2.78 U	2.44 U	3.81 J	2.37 U
Perfluoroundecanoic Acid (PFUnA)	--	1.14 U	1.2 U	1.15 U	1.18 U	1.39 U	1.22 U	1.13 U	1.18 U
Perfluorohexanoic Acid (PFHxA)	--	2.29 U	2.4 U	2.3 U	2.37 U	2.78 U	2.44 U	2.26 U	2.37 U
Perfluorododecanoic Acid (PFDoA)	--	2.29 U	2.4 U	2.3 U	2.37 U	2.78 U	2.44 U	2.26 U	2.37 U
Perfluorooctanoic Acid (PFOA)	130	2.29 U	2.4 U	2.3 U	2.37 U	2.78 U	2.44 U	2.26 U	2.37 U
Perfluorodecanoic Acid (PFDA)	--	1.14 U	1.2 U	1.15 U	1.18 U	1.39 U	1.22 U	1.13 U	1.18 U
Perfluorohexanesulfonic Acid (PFHxS)	--	2.29 U	2.4 U	2.3 U	2.37 U	2.78 U	2.44 U	1.12 J	2.37 U
Perfluorobutanesulfonic Acid (PFBS)	1,900	1.14 U	1.2 U	1.15 U	1.18 U	1.39 U	1.22 U	1.13 U	1.18 U
Perfluoroheptanoic Acid (PFHpA)	--	1.71 U	1.8 U	1.72 U	1.78 U	2.08 U	1.83 U	1.69 U	1.78 U
Perfluorononanoic Acid (PFNA)	--	1 J	1.2 U	1.15 U	1.18 U	1.39 U	1.22 U	1.13 U	1.18 U
Perfluorotetradecanoic Acid (PFTeDA)	--	2.86 U	2.99 U	2.87 U	2.96 U	3.47 U	3.05 U	2.82 U	2.96 U
Perfluorotridecanoic Acid (PFTrDA)	--	1.14 U	1.2 U	1.15 U	1.18 U	1.39 U	1.22 U	1.13 U	1.18 U

Notes:

Exceeds one or more criteria

Bold indicates detections
J - Analyte present, value may or may not be accurate or precise
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
ng/g - nanograms per gram
µg/kg - micrograms per kilogram
ng/g = µg/kg

Table D-1. Soil PFAS Analytical Data
Site 14, FFDA, Site 41, and CTIA
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	PAX PFAS SO Values	PX-FFDA-SO03		PX-FFDA-SO04		PX-FFDA-SO05		
Sample ID		PX-FFDA-SS03-000H	PX-FFDA-SB03-0304	PX-FFDA-SS04-000H	PX-FFDA-SB04-0304	PX-FFDA-SS05-000H	PX-FFDA-SS05P-000H	PX-FFDA-SB05-0304
Sample Date		09/12/20	09/12/20	09/12/20	09/12/20	09/12/20	09/12/20	09/12/20
Chemical Name								
Per- and Polyfluoroalkyl Substances (ng/g)								
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	2.26 U	2.11 U	2.65 U	2.2 U	2.56 U	2.26 U	2.16 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	1.13 U	1.05 U	1.32 U	1.1 U	1.28 U	1.13 U	1.08 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	1.69 U	1.58 U	1.99 U	1.65 U	1.92 U	1.69 U	1.62 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	2.26 U	2.11 U	2.65 U	2.2 U	2.56 U	2.26 U	2.16 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	2.82 U	2.63 U	3.31 U	2.75 U	3.21 U	2.82 U	2.7 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	2.26 U	2.11 U	2.65 U	2.2 U	2.56 U	2.26 U	2.16 U
Perfluorooctanesulfonic Acid (PFOS)	130	2.26 U	2.11 U	2.18 J	2.2 U	1.07 J	0.9 J	2.16 U
Perfluoroundecanoic Acid (PFUnA)	--	1.13 U	1.05 U	1.32 U	1.1 U	1.28 U	1.13 U	1.08 U
Perfluorohexanoic Acid (PFHxA)	--	2.26 U	2.11 U	2.65 U	2.2 U	2.56 U	2.26 U	2.16 U
Perfluorododecanoic Acid (PFDoA)	--	2.26 U	2.11 U	2.65 U	2.2 U	2.56 U	2.26 U	2.16 U
Perfluorooctanoic Acid (PFOA)	130	2.26 U	2.11 U	1.04 J	2.2 U	2.56 U	2.26 U	2.16 U
Perfluorodecanoic Acid (PFDA)	--	1.13 U	1.05 U	1.32 U	1.1 U	1.28 U	1.13 U	1.08 U
Perfluorohexanesulfonic Acid (PFHxS)	--	2.26 U	2.11 U	1.4 J	2.2 U	2.56 U	2.26 U	2.16 U
Perfluorobutanesulfonic Acid (PFBS)	1,900	1.13 U	1.05 U	1.32 U	1.1 U	1.28 U	1.13 U	1.08 U
Perfluoroheptanoic Acid (PFHpA)	--	1.69 U	1.58 U	1.99 U	1.65 U	1.92 U	1.69 U	1.62 U
Perfluorononanoic Acid (PFNA)	--	1.13 U	1.05 U	1.32 U	1.1 U	1.28 U	1.13 U	1.08 U
Perfluorotetradecanoic Acid (PFTeDA)	--	2.82 U	2.63 U	3.31 U	2.75 U	3.21 U	2.82 U	2.7 U
Perfluorotridecanoic Acid (PFTrDA)	--	1.13 U	1.05 U	1.32 U	1.1 U	1.28 U	1.13 U	1.08 U

Notes:

Exceeds one or more criteria

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U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
ng/g - nanograms per gram
µg/kg - micrograms per kilogram
ng/g = µg/kg

Table D-1. Soil PFAS Analytical Data
Site 14, FFDA, Site 41, and CTIA
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	PAX PFAS SO Values	PX-FFDA-SO06		PX-FFDA-SO07		PX-S14-SO58	
Sample ID		PX-FFDA-SS06-000H	PX-FFDA-SB06-0304	PX-FFDA-SS07-000H	PX-FFDA-SB07-0304	PX-S14-SS58-000H	PX-S14-SB58-0304
Sample Date		09/12/20	09/12/20	09/12/20	09/12/20	09/12/20	09/12/20
Chemical Name							
Per- and Polyfluoroalkyl Substances (ng/g)							
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	2.35 U	1.96 U	2.33 U	2.15 U	2.35 U	2.19 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	1.18 U	0.98 U	1.16 U	1.08 U	1.18 U	1.09 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	1.76 U	1.47 U	1.74 U	1.61 U	1.76 U	1.64 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	2.35 U	1.96 U	2.33 U	2.15 U	2.35 U	2.19 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	2.94 U	2.45 U	2.91 U	2.69 U	2.94 U	2.73 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	2.35 U	1.96 U	2.33 U	2.15 U	2.35 U	2.19 U
Perfluorooctanesulfonic Acid (PFOS)	130	2.35 U	1.96 U	3.14 J	2.15 U	11.14	2.19 U
Perfluoroundecanoic Acid (PFUnA)	--	1.18 U	0.98 U	1.16 U	1.08 U	1.18 U	1.09 U
Perfluorohexanoic Acid (PFHxA)	--	2.35 U	1.96 U	2.33 U	2.15 U	1.07 J	2.19 U
Perfluorododecanoic Acid (PFDoA)	--	2.35 U	1.96 U	2.33 U	2.15 U	2.35 U	2.19 U
Perfluorooctanoic Acid (PFOA)	130	2.35 U	1.96 U	2.33 U	2.15 U	0.89 J	2.19 U
Perfluorodecanoic Acid (PFDA)	--	1.18 U	0.98 U	1.16 U	1.08 U	1.18 U	1.09 U
Perfluorohexanesulfonic Acid (PFHxS)	--	2.35 U	1.96 U	2.33 U	2.15 U	4.92 J	2.19 U
Perfluorobutanesulfonic Acid (PFBS)	1,900	1.18 U	0.98 U	1.16 U	1.08 U	1.18 U	1.09 U
Perfluoroheptanoic Acid (PFHpA)	--	1.76 U	1.47 U	1.74 U	1.61 U	1.76 U	1.64 U
Perfluorononanoic Acid (PFNA)	--	1.18 U	0.98 U	1.16 U	1.08 U	1.18 U	1.09 U
Perfluorotetradecanoic Acid (PFTeDA)	--	2.94 U	2.45 U	2.91 U	2.69 U	2.94 U	2.73 U
Perfluorotridecanoic Acid (PFTrDA)	--	1.18 U	0.98 U	1.16 U	1.08 U	1.18 U	1.09 U

Notes:

Exceeds one or more criteria

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 J - Analyte present, value may or may not be accurate or precise
 U - The material was analyzed for, but not detected
 UJ - Analyte not detected, quantitation limit may be inaccurate
 ng/g - nanograms per gram
 µg/kg - micrograms per kilogram
 ng/g = µg/kg

Table D-1. Soil PFAS Analytical Data
Site 14, FFDA, Site 41, and CTIA
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	PAX PFAS SO Values	PX-S14-SO59			PX-S14-SO60		PX-S14-SO61	
Sample ID		PX-S14-SS59-000H	PX-S14-SB59-0304	PX-S14-SB59P-0304	PX-S14-SS60-000H	PX-S14-SB60-0304	PX-S14-SS61-000H	PX-S14-SB61-0304
Sample Date		09/12/20	09/12/20	09/12/20	09/12/20	09/12/20	09/12/20	09/12/20
Chemical Name								
Per- and Polyfluoroalkyl Substances (ng/g)								
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	2.55 U	2.3 U	2.14 U	2.14 U	2.27 U	2.41 U	2.02 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	1.27 U	1.15 U	1.07 U	1.07 U	1.14 U	1.2 U	1.01 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	1.91 U	1.72 U	1.6 U	1.6 U	1.7 U	1.81 U	1.52 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	2.55 U	2.3 U	2.14 U	2.14 U	2.27 U	2.41 U	2.02 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	3.18 U	2.87 U	2.67 U	2.67 U	2.84 U	3.01 U	2.53 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	2.55 U	2.3 U	2.14 U	2.14 UJ	2.27 U	2.41 U	2.02 U
Perfluorooctanesulfonic Acid (PFOS)	130	1.52 J	2.3 U	2.14 U	2.14 U	2.27 U	1.43 J	2.02 U
Perfluoroundecanoic Acid (PFUnA)	--	1.27 U	1.15 U	1.07 U	1.07 U	1.14 U	1.2 U	1.01 U
Perfluorohexanoic Acid (PFHxA)	--	2.55 U	2.3 U	2.14 U	2.14 U	2.27 U	2.41 U	2.02 U
Perfluorododecanoic Acid (PFDoA)	--	2.55 U	2.3 U	2.14 U	2.14 U	2.27 U	2.41 U	2.02 U
Perfluorooctanoic Acid (PFOA)	130	2.55 U	2.3 U	2.14 U	2.14 U	2.27 U	2.41 U	2.02 U
Perfluorodecanoic Acid (PFDA)	--	1.27 U	1.15 U	1.07 U	1.07 U	1.14 U	1.2 U	1.01 U
Perfluorohexanesulfonic Acid (PFHxS)	--	2.55 U	2.3 U	2.14 U	2.14 U	2.27 U	2.41 U	2.02 U
Perfluorobutanesulfonic Acid (PFBS)	1,900	1.27 U	1.15 U	1.07 U	1.07 U	1.14 U	1.2 U	1.01 U
Perfluoroheptanoic Acid (PFHpA)	--	1.91 U	1.72 U	1.6 U	1.6 U	1.7 U	1.81 U	1.52 U
Perfluorononanoic Acid (PFNA)	--	1.27 U	1.15 U	1.07 U	1.07 U	1.14 U	1.2 U	1.01 U
Perfluorotetradecanoic Acid (PFTeDA)	--	3.18 U	2.87 U	2.67 U	2.67 U	2.84 U	3.01 U	2.53 U
Perfluorotridecanoic Acid (PFTTrDA)	--	1.27 U	1.15 U	1.07 U	1.07 U	1.14 U	1.2 U	1.01 U

Notes:

Exceeds one or more criteria

Bold indicates detections
J - Analyte present, value may or may not be accurate or precise
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
ng/g - nanograms per gram
µg/kg - micrograms per kilogram
ng/g = µg/kg

Table D-1. Soil PFAS Analytical Data
Site 14, FFDA, Site 41, and CTIA
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	PAX PFAS SO Values	PX-S14-SO62			PX-S41-SO25			PX-S41-SO26	
Sample ID		PX-S14-SS62-000H	PX-S14-SS62P-000H	PX-S14-SB62-0304	PX-S41-SS25-000H	PX-S41-SB25-0304	PX-S41-SB25P-0304	PX-S41-SS26-000H	PX-S41-SB26-0304
Sample Date		09/12/20	09/12/20	09/12/20	08/19/20	08/19/20	08/19/20	08/19/20	08/19/20
Chemical Name									
Per- and Polyfluoroalkyl Substances (ng/g)									
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	2.17 U	2.14 U	2.13 U	2.05 U	2.14 U	2.06 U	2.21 U	2.13 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CI-PF3ONS)	--	1.09 U	1.07 U	1.06 U	1.03 U	1.07 U	1.03 U	1.1 U	1.06 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CI-PF3OUdS)	--	1.63 U	1.6 U	1.6 U	1.54 U	1.6 U	1.55 U	1.66 U	1.6 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	2.17 U	2.14 U	2.13 U	2.05 U	2.14 U	2.06 U	2.21 U	2.13 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	2.72 U	2.67 U	2.66 U	2.56 U	2.67 U	2.58 U	2.76 U	2.66 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	2.17 U	2.14 U	2.13 U	2.05 U	2.14 U	2.06 U	2.21 U	2.13 U
Perfluorooctanesulfonic Acid (PFOS)	130	1.39 J	1.9 J	2.13 U	2.53 U	2.14 U	2.06 U	50.45	111.98
Perfluoroundecanoic Acid (PFUnA)	--	1.09 U	1.07 U	1.06 U	1.03 U	1.07 U	1.03 U	1.1 U	1.06 U
Perfluorohexanoic Acid (PFHxA)	--	2.17 U	2.14 U	2.13 U	2.05 U	2.14 U	2.06 U	2.21 U	2.13 U
Perfluorododecanoic Acid (PFDoA)	--	2.17 U	2.14 U	2.13 U	2.05 U	2.14 U	2.06 U	2.21 U	2.13 U
Perfluorooctanoic Acid (PFOA)	130	2.17 U	2.14 U	2.13 U	2.05 U	2.14 U	2.06 U	0.79 J	1.3 J
Perfluorodecanoic Acid (PFDA)	--	1.09 U	1.07 U	1.06 U	1.03 U	1.07 U	1.03 U	1.1 U	1.06 U
Perfluorohexanesulfonic Acid (PFHxS)	--	2.17 U	2.14 U	2.13 U	2.05 U	2.14 U	2.06 U	2.21 U	1.38 J
Perfluorobutanesulfonic Acid (PFBS)	1,900	1.09 U	1.07 U	1.06 U	1.03 U	1.07 U	1.03 U	1.1 U	1.06 U
Perfluoroheptanoic Acid (PFHpA)	--	1.63 U	1.6 U	1.6 U	1.54 U	1.6 U	1.55 U	1.66 U	1.6 U
Perfluorononanoic Acid (PFNA)	--	1.09 U	1.07 U	1.06 U	1.03 U	1.07 U	1.03 U	1.07 J	0.82 J
Perfluorotetradecanoic Acid (PFTeDA)	--	2.72 U	2.67 U	2.66 U	2.56 U	2.67 U	2.58 U	2.76 U	2.66 U
Perfluorotridecanoic Acid (PFTrDA)	--	1.09 U	1.07 U	1.06 U	1.03 U	1.07 U	1.03 U	1.1 U	1.06 U

Notes:

Exceeds one or more criteria

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Table D-1. Soil PFAS Analytical Data
Site 14, FFDA, Site 41, and CTIA
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	PAX PFAS SO Values	PX-S41-SO27		PX-S41-SO28		PX-S41-SO29		
Sample ID		PX-S41-SS27-000H	PX-S41-SB27-0304	PX-S41-SS28-000H	PX-S41-SB28-0304	PX-S41-SS29-000H	PX-S41-SS29P-000H	PX-S41-SB29-0304
Sample Date		08/19/20	08/19/20	08/19/20	08/19/20	08/19/20	08/19/20	08/19/20
Chemical Name								
Per- and Polyfluoroalkyl Substances (ng/g)								
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	2.14 U	2.06 U	2.25 U	2.37 U	2.56 U	2.31 U	2.06 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CI-PF3ONS)	--	1.07 U	1.03 U	1.12 U	1.18 U	1.28 U	1.16 U	1.03 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CI-PF3OUdS)	--	1.6 U	1.55 U	1.69 U	1.78 U	1.92 U	1.73 U	1.55 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	2.14 U	2.06 U	2.25 U	2.37 U	2.56 U	2.31 U	2.06 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	2.67 U	2.58 U	2.81 U	2.96 U	3.21 U	2.89 U	2.58 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	2.14 U	2.06 U	2.25 U	2.37 U	2.56 U	2.31 U	2.06 U
Perfluorooctanesulfonic Acid (PFOS)	130	3.18 U	2.06 U	172.54	2.37 U	74.3	84.67	4.86 U
Perfluoroundecanoic Acid (PFUnA)	--	1.07 U	1.03 U	0.92 J	1.18 U	0.76 J	0.82 J	1.03 U
Perfluorohexanoic Acid (PFHxA)	--	2.14 U	2.06 U	1.06 J	2.37 U	1.15 J	1.31 J	2.06 U
Perfluorododecanoic Acid (PFDoA)	--	2.14 U	2.06 U	2.25 U	2.37 U	2.56 U	2.31 U	2.06 U
Perfluorooctanoic Acid (PFOA)	130	2.14 U	2.06 U	1.14 J	2.37 U	1.32 J	1.42 J	2.06 U
Perfluorodecanoic Acid (PFDA)	--	1.07 U	1.03 U	1.1 J	1.18 U	0.96 J	1.06 J	1.03 U
Perfluorohexanesulfonic Acid (PFHxS)	--	2.14 U	2.06 U	5.43 J	2.37 U	2.38 J	2.54 J	2.06 U
Perfluorobutanesulfonic Acid (PFBS)	1,900	1.07 U	1.03 U	1.12 U	1.18 U	1.28 U	1.16 U	1.03 U
Perfluoroheptanoic Acid (PFHpA)	--	1.6 U	1.55 U	1.69 U	1.78 U	0.75 J	0.79 J	1.55 U
Perfluorononanoic Acid (PFNA)	--	1.07 U	1.03 U	1.08 J	1.18 U	1.69 J	1.85 J	1.03 U
Perfluorotetradecanoic Acid (PFTeDA)	--	2.67 U	2.58 U	2.81 U	2.96 U	3.21 U	2.89 U	2.58 U
Perfluorotridecanoic Acid (PFTrDA)	--	1.07 U	1.03 U	0.4 J	1.18 U	1.28 U	1.16 U	1.03 U

Notes:

Exceeds one or more criteria

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ng/g - nanograms per gram
µg/kg - micrograms per kilogram
ng/g = µg/kg

Table D-1. Soil PFAS Analytical Data
Site 14, FFDA, Site 41, and CTIA
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	PAX PFAS SO Values	PX-S41-SO30	
Sample ID		PX-S41-SS30-000H	PX-S41-SB30-0304
Sample Date		08/19/20	08/19/20
Chemical Name			
Per- and Polyfluoroalkyl Substances (ng/g)			
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	2.06 U	2.23 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	1.03 U	1.12 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	1.55 U	1.68 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	2.06 U	2.23 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	2.58 U	6.07 J
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	2.06 U	2.23 U
Perfluorooctanesulfonic Acid (PFOS)	130	30.02	56.26
Perfluoroundecanoic Acid (PFUnA)	--	1.46 J	1.12 U
Perfluorohexanoic Acid (PFHxA)	--	2.98 J	0.82 J
Perfluorododecanoic Acid (PFDoA)	--	2.06 U	2.23 U
Perfluorooctanoic Acid (PFOA)	130	3.36 J	1.76 J
Perfluorodecanoic Acid (PFDA)	--	1.72 J	3.5 J
Perfluorohexanesulfonic Acid (PFHxS)	--	14.7	4.18 J
Perfluorobutanesulfonic Acid (PFBS)	1,900	1.03 U	1.12 U
Perfluoroheptanoic Acid (PFHpA)	--	1.79 J	1.68 U
Perfluorononanoic Acid (PFNA)	--	1.01 J	0.63 J
Perfluorotetradecanoic Acid (PFTeDA)	--	2.58 U	2.79 U
Perfluorotridecanoic Acid (PFTTrDA)	--	7.58 J	3.87 J

Notes:

Exceeds one or more criteria

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UJ - Analyte not detected, quantitation limit may be inaccurate
ng/g - nanograms per gram
µg/kg - micrograms per kilogram
ng/g = µg/kg

Table D-2. Groundwater PFAS Analytical Data
Site 14, FFDA, Site 41, and CTIA
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	PAX PFAS GW Values	PX-CTIA-WT01	PX-CTIA-WT02		PX-CTIA-WT03	PX-CTIA-WT04	PX-CTIA-WT05	PX-CTIA-WT06	PX-FFDA-WT01
Sample ID		PX-CTIA-WT01-0920	PX-CTIA-WT02-0920	PX-CTIA-WT02P-0920	PX-CTIA-WT03-0920	PX-CTIA-WT04-0920	PX-CTIA-WT05-0920	PX-CTIA-WT06-0920	PX-FFDA-WT01-0920
Sample Date		09/13/20	09/13/20	09/13/20	09/13/20	09/13/20	09/13/20	09/13/20	09/12/20
Chemical Name									
Per- and Polyfluoroalkyl Substances (ng/L)									
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	0.96 U	0.98 U	0.96 U	0.98 U	1 U	0.96 U	0.96 U	0.93 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CI-PF3ONS)	--	0.96 U	0.98 U	0.96 U	0.98 U	1 U	0.96 U	0.96 U	0.93 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CI-PF3OUdS)	--	0.48 U	0.49 U	0.48 U	0.49 U	0.5 U	0.48 U	0.48 U	0.46 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	0.96 U	1.09 J	0.96 J	1.72 J	1.48 J	0.96 U	0.96 U	0.93 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	0.96 U	0.4 J	0.38 J	6.71	1 U	0.96 U	0.96 U	0.93 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	0.48 U	0.49 U	0.48 U	0.49 U	0.5 U	0.48 U	0.48 U	0.46 U
Perfluorooctanesulfonic Acid (PFOS)	40	33.91	3,205.21	2,676.26	35,787.16	3,865.70	13.13	1,831.53	104.52
Perfluoroundecanoic Acid (PFUnA)	--	0.48 U	7.66	6.47	4.34 J	3.85 J	0.48 U	2.65 J	0.46 U
Perfluorohexanoic Acid (PFHxA)	--	7.79 J	248.24	206.53	1,072.22	317	7.51 J	49.25 J	16.74 J
Perfluorododecanoic Acid (PFDoA)	--	0.48 U	0.73 J	0.64 J	0.49 U	2.75 J	0.48 U	0.48 U	0.46 U
Perfluorooctanoic Acid (PFOA)	40	8.69	135.59	117.21	1,348.08	234.78	5.09	73.35	18.09
Perfluorodecanoic Acid (PFDA)	--	0.48 U	9.7	8.33	24.34	7.74	5.75	8.83	0.46 U
Perfluorohexanesulfonic Acid (PFHxS)	--	41.37	1,625.09	1,407.56	14,344.09	1,910.79	9.72	197.03	28.88
Perfluorobutanesulfonic Acid (PFBS)	600	2.81 J	35.94	34.76	127.2	40.28	0.89 J	5.94	2 J
Perfluoroheptanoic Acid (PFHpA)	--	2.57 J	167.86	130.1	539.63	226.82	1.77 J	48.89 J	8.27
Perfluorononanoic Acid (PFNA)	--	0.42 J	43.98	37.8	204.09	104.43	0.95 J	55.13 J	2.89 J
Perfluorotetradecanoic Acid (PFTeDA)	--	1.92 UJ	1.96 U	1.92 UJ	1.96 U	2 UJ	1.92 UJ	1.92 UJ	1.85 UJ
Perfluorotridecanoic Acid (PFTTrDA)	--	0.48 U	1.52 J	1.14 J	0.49 U	0.5 U	0.48 U	0.48 U	0.46 U

Notes:

Exceeds one or more criteria

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J - Analyte present, value may or may not be accurate or precise
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
ng/L - nanograms per liter

Table D-2. Groundwater PFAS Analytical Data
Site 14, FFDA, Site 41, and CTIA
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	PAX PFAS GW Values	PX-FFDA-WT02		PX-FFDA-WT03	PX-FFDA-WT04	PX-FFDA-WT05	PX-S14-WT02		PX-S14-WT03
Sample ID		PX-FFDA-WT02-0920	PX-FFDA-WT02P-0920	PX-FFDA-WT03-0920	PX-FFDA-WT04-0920	PX-FFDA-WT05-0920	PX-S14-WT02-0920	PX-S14-WT02P-0920	PX-S14-WT03-0920
Sample Date		09/12/20	09/12/20	09/12/20	09/12/20	09/12/20	09/12/20	09/12/20	09/12/20
Chemical Name									
Per- and Polyfluoroalkyl Substances (ng/L)									
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	0.98 U	0.98 U	0.96 U	1.11 J	0.94 U	0.94 U	0.94 U	0.94 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CI-PF3ONS)	--	0.98 U	0.98 U	0.96 U	1.04 J	0.94 U	0.94 U	0.94 U	0.94 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CI-PF3OUdS)	--	0.49 U	0.49 U	0.48 U	0.94 J	0.47 U	0.47 U	0.47 U	0.47 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	0.98 U	0.98 U	0.96 UJ	1.06 J	0.94 U	0.94 U	0.94 U	0.94 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	0.98 U	0.98 U	0.96 UJ	1.12 J	0.94 U	2.34 J	1.69 J	0.94 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	0.49 U	0.49 U	0.48 U	0.83 J	0.47 U	0.47 U	0.47 U	0.47 U
Perfluorooctanesulfonic Acid (PFOS)	40	75.64	88.9	9.8	3.62 J	3.51 J	752.11	585.61	181.64
Perfluoroundecanoic Acid (PFUnA)	--	0.49 U	0.49 U	0.48 U	1.01 J	0.47 U	0.38 J	0.43 J	0.47 U
Perfluorohexanoic Acid (PFHxA)	--	13.77 J	13.8	30.1 J	27.1	3.33 J	1,110.21	813.66	53.24
Perfluorododecanoic Acid (PFDoA)	--	0.49 U	0.49 U	0.48 UJ	1.07 J	0.47 U	0.47 UJ	0.47 UJ	0.47 U
Perfluorooctanoic Acid (PFOA)	40	21.2	19.88	55	11.17	10.54	570.91 J	398.02 J	129.41
Perfluorodecanoic Acid (PFDA)	--	0.49 U	0.49 U	0.48 U	1.28 J	0.47 U	5.01	4.12 J	1.91 J
Perfluorohexanesulfonic Acid (PFHxS)	--	62.59	57.88	66.01	42.19	21.97	3,618.06	2,570.93	298.2
Perfluorobutanesulfonic Acid (PFBS)	600	6.09	5.77	17.2	12.15	1.97 J	160.99	163.86	17.49
Perfluoroheptanoic Acid (PFHpA)	--	3.32 J	3.51 J	6.94	9.27	1.53 J	133.76	119.55	10.06
Perfluorononanoic Acid (PFNA)	--	0.96 J	0.93 J	0.61 J	1.21 J	0.94 U	4.42 J	6.5	2.22 J
Perfluorotetradecanoic Acid (PFTeDA)	--	1.96 U	1.96 U	1.92 UJ	1.13 J	1.89 UJ	1.89 R	1.89 UJ	1.89 U
Perfluorotridecanoic Acid (PFTTrDA)	--	0.49 U	0.49 U	0.48 U	1.09 J	0.47 U	0.47 U	0.47 U	0.47 U

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Table D-2. Groundwater PFAS Analytical Data
Site 14, FFDA, Site 41, and CTIA
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID		PX-S14-WT04	PX-S14-WT05	PX-S14-WT06	PX-S14-WT07	PX-S41-WT01	PX-S41-WT02		PX-S41-WT03
Sample ID	PAX PFAS GW Values	PX-S14-WT04-0920	PX-S14-WT05-0920	PX-S14-WT06-0920	PX-S14-WT07-0920	PX-S41-WT01-0820	PX-S41-WT02-0820	PX-S41-WT02P-0820	PX-S41-WT03-0820
Sample Date		09/12/20	09/12/20	09/12/20	09/12/20	08/19/20	08/19/20	08/19/20	08/19/20
Chemical Name									
Per- and Polyfluoroalkyl Substances (ng/L)									
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	0.93 U	0.96 U	0.98 U	0.96 U	0.96 U	1.06 U	1 U	1 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CI-PF3ONS)	--	0.93 U	0.96 U	0.98 U	0.96 U	0.96 U	1.06 U	1 U	1 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CI-PF3OUdS)	--	0.46 U	0.48 U	0.49 U	0.48 U	0.48 U	0.53 U	0.5 U	0.5 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	0.93 U	0.96 U	0.98 U	0.96 U	0.96 U	1.06 U	1 U	1 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	0.93 U	0.96 U	0.98 U	0.96 U	0.96 U	1.06 U	1 U	1 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	0.46 U	0.48 U	0.49 U	0.48 U	0.48 U	0.53 U	0.5 U	0.5 U
Perfluorooctanesulfonic Acid (PFOS)	40	15.46	6,489.84	1,350.45	65.77	33.94	926.81	874.37	2,127.67
Perfluoroundecanoic Acid (PFUnA)	--	0.46 U	0.48 U	0.49 U	0.48 U	0.48 U	0.31 J	0.69 J	0.5 U
Perfluorohexanoic Acid (PFHxA)	--	13.04 J	374.55	205.22	16.34	2.39 J	35.5	33.02	77.15
Perfluorododecanoic Acid (PFDoA)	--	0.46 U	0.48 U	0.49 U	0.48 U	0.48 U	0.53 U	0.5 U	0.5 U
Perfluorooctanoic Acid (PFOA)	40	66.8	287.43	745.57	63.77	10.83	51.44	42.43	98.57
Perfluorodecanoic Acid (PFDA)	--	0.46 U	1.99 J	5.46	0.86 J	0.2 J	2.77 J	2.9 J	0.27 J
Perfluorohexanesulfonic Acid (PFHxS)	--	39.73	3,244.30	1,178.74	193.35	9.25	534.53 J	399.74 J	874.55
Perfluorobutanesulfonic Acid (PFBS)	600	2.46 J	177.98	58.49	8.97	0.86 U	3.77 J	3.63 J	13.04
Perfluoroheptanoic Acid (PFHpA)	--	7.57	97.19	62.24	4.36 J	3.04 J	7.66	6.97	35.68
Perfluorononanoic Acid (PFNA)	--	0.73 J	20.07	9.6	1.91 J	2.32 J	14.12	13.42	47.16
Perfluorotetradecanoic Acid (PFTeDA)	--	1.85 U	1.92 UJ	1.96 UJ	1.92 U	1.92 U	2.13 UJ	2 UJ	2 UJ
Perfluorotridecanoic Acid (PFTTrDA)	--	0.46 U	0.48 U	0.49 U	0.48 U	0.48 U	0.53 U	0.5 U	0.5 U

Notes:

Exceeds one or more criteria

Bold indicates detections
J - Analyte present, value may or may not be accurate or precise
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
ng/L - nanograms per liter

Table D-2. Groundwater PFAS Analytical Data
Site 14, FFDA, Site 41, and CTIA
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID		PX-S41-WT04	PX-S41-WT05	PX-S41-WT06	PX-S41-WT07
Sample ID	PAX PFAS GW Values	PX-S41-WT04-0820	PX-S41-WT05-0820	PX-S41-WT06-0820	PX-S41-WT07-0820
Sample Date		08/19/20	08/19/20	08/19/20	08/19/20
Chemical Name					
Per- and Polyfluoroalkyl Substances (ng/L)					
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	0.94 U	1 U	1 U	0.96 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9CI-PF3ONS)	--	0.94 U	1 U	1 U	0.96 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CI-PF3OUdS)	--	0.47 U	0.5 U	0.5 U	0.48 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	0.94 U	0.97 J	6.73	0.96 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	0.94 U	1 U	1 U	0.96 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	0.47 U	0.5 U	0.5 U	0.48 U
Perfluorooctanesulfonic Acid (PFOS)	40	630.54	23,765.25	9,473.12	556.52
Perfluoroundecanoic Acid (PFUnA)	--	0.47 U	8.79	112.75	0.48 U
Perfluorohexanoic Acid (PFHxA)	--	14.2	2,944.68	1,631.66	6.31
Perfluorododecanoic Acid (PFDoA)	--	0.47 U	0.5 U	4.41 J	0.48 U
Perfluorooctanoic Acid (PFOA)	40	74.6	1,169.18	768.09	7.79
Perfluorodecanoic Acid (PFDA)	--	9.11	17.62	27.11	1.38 J
Perfluorohexanesulfonic Acid (PFHxS)	--	104.14	6,024.88	3,812.33	46.99
Perfluorobutanesulfonic Acid (PFBS)	600	1.43 J	220.04	73.76	1.29 J
Perfluoroheptanoic Acid (PFHpA)	--	36.7	680.75	661.4	5.18
Perfluorononanoic Acid (PFNA)	--	31.3	114.11	92.03	10.22
Perfluorotetradecanoic Acid (PFTeDA)	--	1.89 U	2 U	2 U	1.92 U
Perfluorotridecanoic Acid (PFTrDA)	--	0.47 U	0.27 J	8.62	0.48 U

Notes:

Exceeds one or more criteria

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