Naval Facilities Engineering Systems Command Washington
Washington Navy Yard, DC

Final

Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Report

Naval Air Station Patuxent River
Webster Outlying Field
St. Inigoes, Maryland

May 2021

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St. Inigoes, Maryland

May 2021

Prepared for NAVFAC Washington
by CH2M HILL, Inc.
Herndon, Virginia
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CTO JU14

Executive Summary

Historical use of aqueous film-forming foam (AFFF) during fire and emergency response, testing, and training activities at the Webster Outlying Field annex (hereinafter referred to as Webster Field), under the command of Naval Air Station Patuxent River, has prompted the Department of the 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 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 Webster Field were identified in the *Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, Naval Air Station Patuxent River, Webster Field Annex, St. Inigoes, Maryland* (CH2M HILL, Inc. [CH2M], 2020), hereinafter referred to as the SAP:

- Determine whether PFAS (if present) exhibit concentrations that exceed the project action limits (PALs)[2] for soil and groundwater at the known or potential release areas.
- Determine the potential for PFAS (if present) to migrate offsite.

Interviews with fire department and base personnel completed for the Preliminary Assessment (PA) Report for PFAS at Webster Field (CH2M, 2019) identified two areas of interest (AOIs) at the installation (Fire Station 3, Building 8076 [hereinafter referred to as Fire Station 3], and the AFFF Crash Truck Maintenance Check Area) where AFFF was reportedly or potentially released. Based on the PA, the field investigation for the SI was conducted at the identified AOIs in July 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 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 Fire Station 3 indicated that PFAS were present in all four borings (four of four surface soil sample locations and four of four subsurface soil sample locations), with perfluorooctane sulfonic acid (PFOS) concentrations exceeding the corresponding PAL at two surface soil sample locations. There were no exceedances of the PALs for perfluorooctanoic acid (PFOA) and perfluorobutane sulfonic acid (PFBS) in soil at Fire Station 3. Laboratory analysis of soil samples collected at the AFFF Crash Truck Maintenance Check Area indicated that PFAS were present in all seven borings (seven of seven surface soil sample locations and four of seven subsurface soil sample locations), although none of the detected concentrations exceeded the corresponding PALs.

Laboratory analysis of groundwater samples collected at Fire Station 3 indicated that PFAS were present in all four temporary piezometers, with PFOA and PFOS concentrations exceeding the corresponding PALs at all four groundwater sample locations. There were three exceedances of the PAL for PFBS in groundwater at Fire Station 3. Laboratory analysis of groundwater samples collected at the AFFF Crash Truck Maintenance Check Area indicated that PFAS were present in all seven temporary piezometers, with PFOA concentrations exceeding the corresponding PAL at one groundwater sample location and PFOS concentrations exceeding the corresponding

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, screening values have been updated from those listed in the 2019 memorandum to reflect reference doses provided in "Provisional Peer-Reviewed Toxicity Values for Perfluorobutane Sulfonic Acid (CASRN 375-73-5) and Related Compound Potassium Perfluorobutane Sulfonate (CASRN 29420-49-3)" (USEPA, 2021).

PAL at three groundwater sample locations. There were no exceedances of the PAL for PFBS in groundwater at the AFFF Crash Truck Maintenance Check Area.

This investigation demonstrated that PFAS are present in environmental media at the two AOIs where AFFF was reportedly or potentially released. It is recommended that PFAS RIs are conducted at Fire Station 3 and the AFFF Crash Truck Maintenance Check Area to fully delineate the nature and extent of PFAS releases and assess potential human health and ecological risks. The RIs should comprise the collection and analysis of all environmental media at the AOIs, including the installation and sampling of permanent monitoring wells. Based on the resulting data, the conceptual site models should be refined, 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 ecological risk should be screened against literature-based values.

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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
DI	deionized
DO	dissolved oxygen
DoD	Department of Defense
ERS	ecological risk screening
HHRA	human health risk assessment
IDW	investigation-derived waste
LC MS/MS	liquid chromatography with tandem mass spectrometry
MDE	Maryland Department of the Environment
mg/L	milligram(s) per liter
mS/cm	millisiemen(s) per centimeter
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	perfluorobutane sulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonic acid
PVC	polyvinyl chloride
QA	quality assurance
QC	quality control
QSM	Quality Systems Manual
RI	Remedial Investigation
SAP	Sampling and Analysis Plan
SI	Site Inspection
SOP	standard operating procedure
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey

SECTION 1

Introduction

This report presents the data and findings obtained from a per- and polyfluoroalkyl substances (PFAS) Site Inspection (SI) conducted at the Webster Outlying Field annex (hereinafter referred to as Webster Field), under the command of Naval Air Station (NAS) Patuxent River. 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 Webster Field were identified in the *Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, Naval Air Station Patuxent River, Webster Field Annex, St. Inigoes, Maryland* (CH2M HILL, Inc. [CH2M], 2020), hereinafter referred to as the SAP:

- Determine whether PFAS (if present) exhibit concentrations that exceed the project action limits (PALs)[2] for soil and groundwater at the known or potential 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 of 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 JU14, for submittal to the Navy (NAVFAC Washington) and the Maryland Department of the Environment (MDE); USEPA Region 3 is a non-regulatory partner for Webster Field. The Navy, USEPA Region 3, 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 Profiles and Disposal Manifests
- **Appendix C** – Data Quality Assessment
- **Appendix D** – Laboratory Analytical Data

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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, screening values have been updated from those listed in the 2019 memorandum to reflect reference doses provided in "Provisional Peer-Reviewed Toxicity Values for Perfluorobutane Sulfonic Acid (CASRN 375-73-5) and Related Compound Potassium Perfluorobutane Sulfonate (CASRN 29420-49-3)" (USEPA, 2021).

SECTION 2

Site Background and Physical Setting

This section presents background information on Webster Field including applicable history and known or potential releases of PFAS, along with relevant information on the physical and hydrogeologic setting at the installation.

2.1 Site Background

Webster Field is an 857-acre Navy facility located in St. Inigoes, approximately 9 miles south of NAS Patuxent River in St. Mary's County, Maryland. The installation was originally used as a dispersal field in the event of aerial attacks during World War II and as an auxiliary landing field for NAS Patuxent River. Webster Field was also used as a training site for dive-bombing, aerial gunnery, target practice, and glider control experiments. After the war, the installation became the site of a Naval Air Reserve Training Unit for NAS Anacostia. Between the years of 1967 and 1993, NAS Patuxent River remained in control of the airspace and runways at Webster Field, but the property was run by and renamed the Naval Electronics System Test and Evaluation Facility (later the Naval In-Service Engineering-East). After Base Realignment and Closure in 1994, NAS Patuxent River took over all operations at Webster Field, except for a portion of land that was dedicated to the U.S. Coast Guard in 1976. Webster Field is currently used for test activities, such as Unmanned Aerial Vehicle operations. **Figure 2-1** provides a location map of NAS Patuxent River and Webster Field.

Interviews with fire department and base personnel completed for the Preliminary Assessment (PA) Report for PFAS at Webster Field (CH2M, 2019) identified two areas of interest (AOIs) where aqueous film-forming foam (AFFF) was reportedly or potentially released. **Figure 2-2** depicts the locations of these two AOIs (Fire Station 3, Building 8076 [hereinafter referred to as Fire Station 3], and the AFFF Crash Truck Maintenance Check Area), and available site histories are described below.

2.1.1 Fire Station 3 Background

Fire Station 3 is located in the northwestern portion of Webster Field, approximately 200 feet east of the St. Mary's River, as shown on **Figure 2-3**. Constructed in 1968, Building 8076 is a one-story permanent structure encompassing approximately 2,600 square feet at the site. The building currently serves as the Webster Field Fire Station and holds approximately 310 gallons of 3 percent AFFF. The start date for AFFF storage is unknown; although AFFF is stored in the building, there are no known releases of AFFF. The partnering team agreed to add this site to the planned SI activities after the scoping sessions based on concerns regarding AFFF storage at Fire Station 3 and the potential for a release to occur when filling the crash trucks with AFFF.

2.1.2 AFFF Crash Truck Maintenance Check Area Background

The AFFF Crash Truck Maintenance Check Area is the location where the Webster Field Fire Department conducted monthly checks of the AFFF spray equipment, as shown on **Figure 2-4**. These monthly checks confirmed proper foam consistency and verified correct AFFF spray pattern setup using the crash truck equipment from Fire Station 3. The spray of AFFF would occur approximately 100 feet to 150 feet to the right and left (northwest and southeast) from the "T" on the taxiway adjacent to the northwest runway at Webster Field. The time period over which equipment functioning testing was conducted is unknown. During the monthly checks, AFFF was allowed to infiltrate into the ground and discharge to surrounding stormwater ditches and drains. An unknown amount of AFFF was released overall. Guidance for using NoFoam Kits in lieu of the AFFF spray checks has been available since the mid-2000s, and the crash truck at Webster Field is currently tested monthly with water only at multiple locations along the abandoned runway.

2.2 Physical Setting

This section describes the physical setting of Webster Field, including geologic features relevant to this investigation.

2.2.1 Climate

St. Mary's County lies within the humid subtropical climate zone, surrounded on three sides by bodies of water, including the Potomac River and Chesapeake Bay. Summers are hot and humid, with frequent afternoon thunderstorms. Winters are mild to cool (Tetra Tech NUS, 2010).

St. Inigoes receives an average of 44 inches of rain and 19 inches of snow per year, with an annual average of 114 days of measurable precipitation. The monthly precipitation distribution is fairly uniform throughout the year, and the maximum occurs during the months of July and August. Most of the precipitation in the colder part of the year is the result of low-pressure systems moving north or northeast along the coast, and in the summer this precipitation occurs in showers or thunderstorms. Tropical storms or hurricanes affect the county about once per year, usually during August through October. Prevailing winds are from the northwest, but during the summer months they become more southerly. The average annual wind speed is 8 to 10 miles per hour; however, winds may reach 50 to 60 miles per hour or higher in severe thunderstorms, hurricanes, or general storms (Tetra Tech NUS, 2010).

On average, there are 205 sunny days per year in St. Inigoes. The July high temperature is approximately 87 degrees Fahrenheit (°F), and the January low temperature is approximately 25 °F. The comfort index, which is based on humidity during the hot months, is 43 out of 100, where higher is more comfortable. The U.S. average on the comfort index is 44 (Tetra Tech NUS, 2010).

2.2.2 Topography and Surface Drainage Features

St. Inigoes Creek borders Webster Field to the northeast and St. Mary’s River borders Webster Field to the north and west. The topography of Webster Field varies from gently rolling to flat. In general, the topography of the installation tends to slope gently from the northeast to the southwest towards St. Mary’s River, which empties into the Potomac River. The elevation at the east end of the northeast/southwest trending runway is 21 feet above mean sea level and the elevation at the west end of the runway near St. Mary’s River is approximately 12 feet above mean sea level. Surface runoff moves toward the St. Mary’s River, which is the main surface water body at Webster Field along with some ponds and streams.

2.2.3 Land Use

As stated, Webster Field is a military use landing field owned by the Navy under the operational control of NAS Patuxent River. The installation is currently used for test activities, such as Unmanned Aerial Vehicle operations. Public access is restricted, and there are no planned land use changes for the future.

2.2.4 Geologic Setting

Webster Field 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 and 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 Webster Field, the unconsolidated Coastal Plain sediments overlie crystalline rocks.

2.2.5 Hydrogeologic Setting

From shallowest to deepest, the aquifers of primary interest with respect to Webster Field 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 Webster Field, 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 and Associates, Inc., 1984).

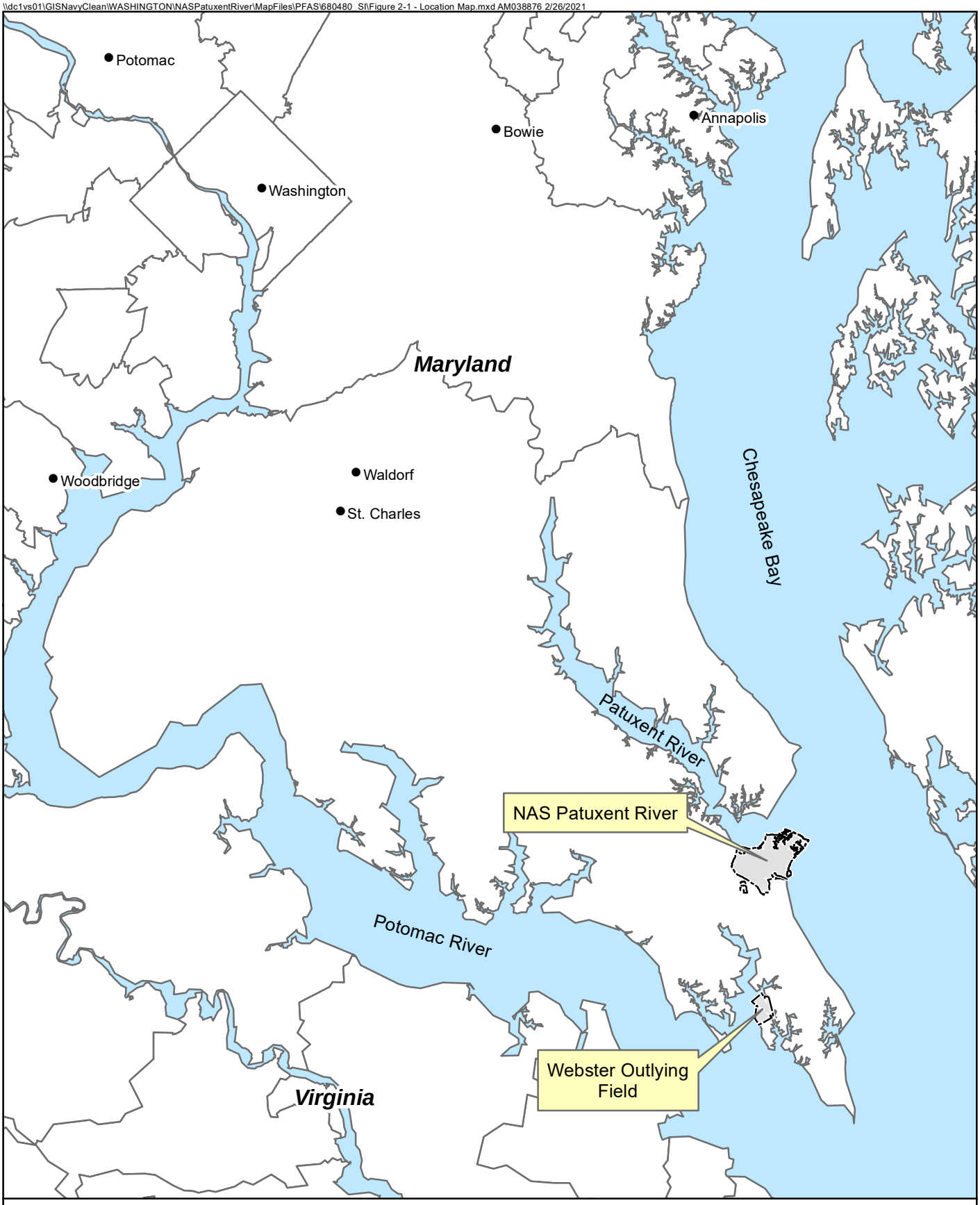
2.2.6 Groundwater Flow

Groundwater from the surficial aquifer discharges to surface water bodies at Webster Field, including ponds, streams, and the St. Mary's River. The groundwater flow direction for the surficial aquifer across the installation is predominately to the west toward the St. Mary's River. The surficial aquifer is recharged by precipitation and infiltration. The groundwater flow direction for the Piney Point-Nanjemoy and Aquia aquifers is predominately towards the north and northwest at Webster Field. Groundwater flow data collected as part of this investigation are discussed in more detail in **Section 3**.

2.2.7 Drinking Water

The Piney Point-Nanjemoy, Aquia, and Patapsco aquifers are the primary sources of potable water for NAS Patuxent River and surrounding areas (Klohe and Feehley, 2001), including Webster Field. Drinking water receptors are located within one mile of the installation boundary. The closest residential area to the installation is the St. Inigoes Shores community, near the installation entrance off Villa Road (see **Figure 2-2**). This community and other properties within one mile of Webster Field are not serviced by municipal water and are on private water wells, which are installed in the Piney Point-Nanjemoy and Aquia aquifers at depths greater than 325 feet (St. Mary's County, 2018). All properties with private drinking water wells are located upgradient of known or potential PFAS release areas at the installation. Based on the PA Report for PFAS at Webster Field (CH2M, 2019), there is no drinking water exposure from shallow groundwater at the installation.

There are three base supply wells at Webster Field. Well 2 is located at Building 8130 (Coast Guard Building), and Wells 4 and 5 are located at Building 8195 (see **Figure 2-2**). Wells 2 and 4 are screened in the Aquia aquifer at 537 feet and 539 feet, respectively; however, Well 4 is not functioning and is expected to be replaced in the future (date to be determined). Well 5 is screened in the deeper Upper Patapsco aquifer at 884 feet. These wells connect to the main water supply for Webster Field. Wells 2 and 5 were tested for six PFAS in October 2016 under the Navy's policy regarding sampling for PFAS at all Navy installations where such sampling was not previously completed under the USEPA's Third Unregulated Contaminant Monitoring Rule study; none of the six PFAS (perfluorooctanoic acid [PFOA], perfluorooctane sulfonic acid [PFOS], perfluorobutane sulfonic acid [PFBS], perfluorononanoic acid, perfluorohexane sulfonic acid, and perfluoroheptanoic acid) were detected during the sampling effort, as indicated in the PA Report for PFAS at Webster Field (CH2M, 2019). Wells 2 and 5 were sampled again in December 2020, and the samples were analyzed for 18 PFAS, including PFOA, PFOS, and PFBS; none of the 18 PFAS were detected.



Legend
- Cities
- Installation Boundary

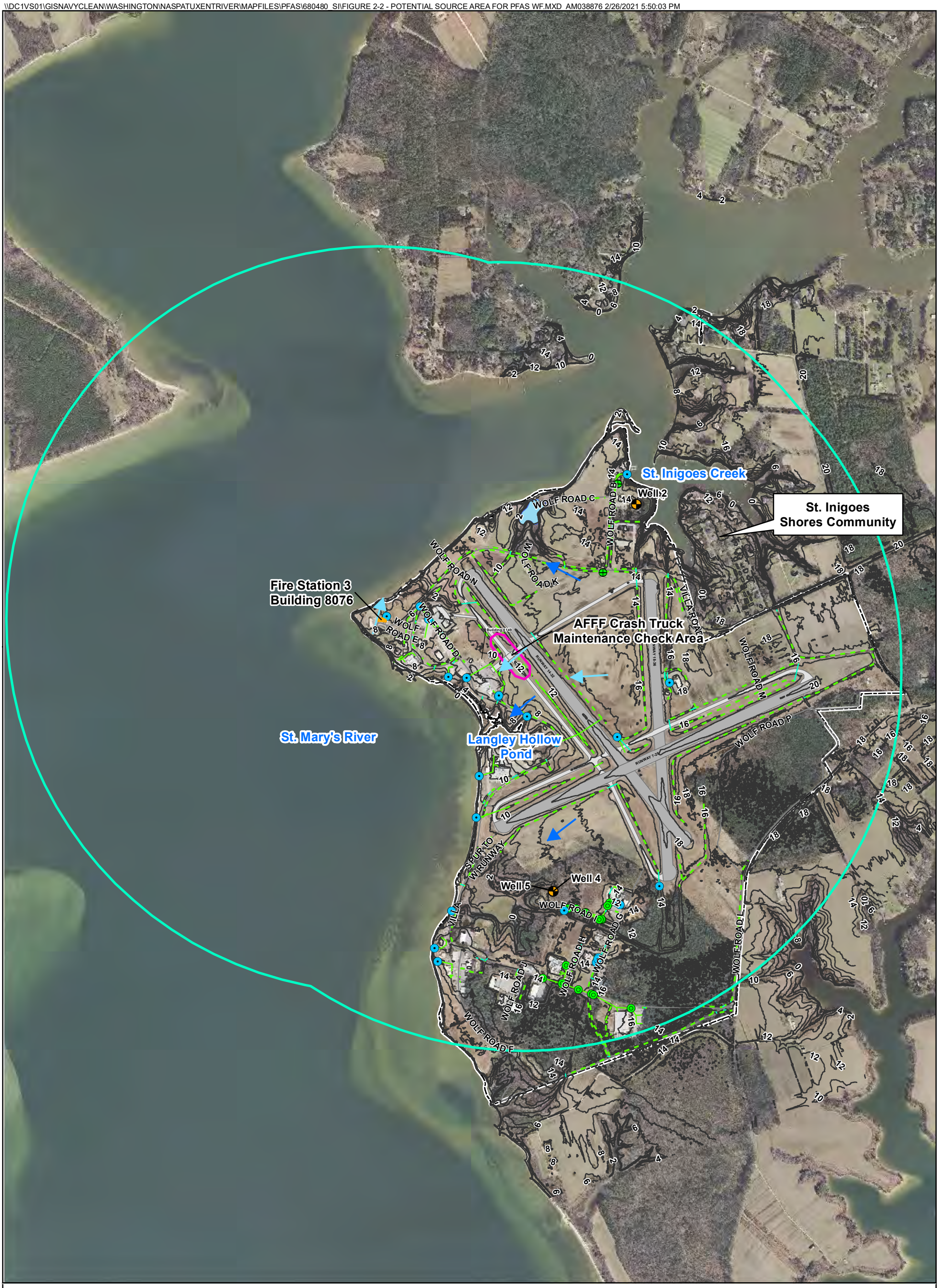
N

0 22,500 45,000
Feet

Figure 2-1
Location Map
Basewide PFAS Site Inspection Report
NAS Patuxent River, Webster Outlying Field
St. Inigoes, Maryland

ch2m

\\DC1VS01\GISNAVYCLEAN\WASHINGTON\NASPATUXENTRIVER\MAPFILES\PFAS\680480_SI\FIGURE 2-2 - POTENTIAL SOURCE AREA FOR PFAS WF.MXD AM038876 2/26/2021 5:50:03 PM



Legend

- Supply Well
- Estimated Groundwater Flow Direction
- General Surface Water Drainage Direction
- Known PFAS Release Areas
- Suspected PFAS Release Areas
- 1 mile buffer from PFAS Sites
- Installation Boundary
- Storm Sewer Discharge Point
- Storm Sewer Manhole
- Storm Sewer Valve Point
- Storm Sewer Culvert
- Storm Sewer Headwall
- Storm Sewer Line
- Storm Sewer Open Drainage Ditch
- Elevation Contour (2ft interval)

N

0 650 1,300 2,600 Feet

1 inch = 1,300 feet

Figure 2-2
Known or Potential PFAS Release Areas
Basewide PFAS Site Inspection Report
NAS Patuxent River, Webster Outlying Field
St. Inigoes, Maryland

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\\dc1vs01\GISNavyClean\WASHINGTON\NASPatuxentRiver\MapFiles\PFAS\680480_SI\Figure 2-3 - Fire Station Building 8076.mxd2/26/2021AM038876

Legend

- Storm Sewer Discharge Point
- Suspected PFAS Release Areas
- Storm Sewer Culvert
- Storm Sewer Headwall
- Storm Sewer Line
- Storm Sewer Open Drainage Ditch
- Surface Water
- Installation Boundary

N

0 50 100 Feet

Figure 2-3
Site Layout for Fire Station 3, Building 8076
Basewide PFAS Site Inspection Report
NAS Patuxent River, Webster Outlying Field
St. Inigoes, Maryland

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\\dc1vs01\GISNavyClean\WASHINGTON\NASPatuxentRiver\MapFiles\PFAS\680480_SI\Figure 2-4 - AFFF CTMA Site layout.mxd2/26/2021AM038876

Legend

- Storm Sewer Discharge Point
- Storm Sewer Culvert
- Storm Sewer Headwall
- Storm Sewer Line
- Storm Sewer Open Drainage Ditch
- Known PFAS Release Areas
- Surface Water
- Taxiway
- Runway
- Installation Boundary

Figure 2-4
Site Layout for AFFF Crash Truck Maintenance Check Area
Basewide PFAS Site Inspection Report
NAS Patuxent River, Webster Outlying Field
St. Inigoes, Maryland

N

0 100 200 Feet

ch2m.

SECTION 3

Investigation Methodology

3.1 Objectives and Approach

The field activities discussed in this report were performed in general accordance with the SAP (CH2M, 2020). The field effort, which was conducted in July 2020 at Fire Station 3 and the AFFF Crash Truck Maintenance Check Area, included the following activities:

- installation of shallow temporary piezometers and co-located soil borings
- collection of soil (surface and subsurface) and groundwater samples for PFAS analysis
- collection of depth to water measurements 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

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. No changes to the planned locations were necessary.

3.3 Soil Sampling

Four borings were advanced at Fire Station 3 and six borings were advanced at the AFFF Crash Truck Maintenance Check Area for the purpose of collecting surface and subsurface soil samples in addition to installing temporary piezometers and collecting groundwater samples. At the AFFF Crash Truck Maintenance Check Area, a seventh boring was advanced for the purpose of only collecting surface and subsurface soil samples and an eighth boring was advanced for the purpose of only installing a temporary piezometer and collecting a groundwater sample. For the investigation, surface soil was defined as 0 to 6 inches below ground surface (bgs) and subsurface soil was defined as 3 to 4 feet bgs. Soil sample locations at Fire Station 3 and the AFFF Crash Truck Maintenance Check Area are shown on **Figure 3-1** and **Figure 3-2**, respectively. Soil samples were collected in accordance with the standard operating procedures (SOPs) included in the SAP (CH2M, 2020) and analyzed for the 18 PFAS listed in USEPA Drinking Water Method 537.1. The analytical method used for the soil samples was liquid chromatography with tandem mass spectrometry (LC MS/MS) Compliant with the DoD Quality Systems Manual (QSM) 5.3 Table B-15. Soil analytical results are discussed in detail in **Section 4**.

3.4 Temporary Piezometer Installation

Four temporary piezometers were installed to depths of 20 feet bgs (two locations) and 30 feet bgs (two locations) for the purpose of groundwater sampling and groundwater elevation monitoring at Fire Station 3. One temporary piezometer was installed to a depth of 30 feet bgs and was constructed with a 20-foot screened interval (from 10 to 30 feet bgs), whereas the other three temporary piezometers were constructed with 10-foot screened intervals (from 10 to 20 feet bgs in two locations and 20 to 30 feet bgs in one location). Seven temporary piezometers were installed to a depth of 20 feet bgs for the purpose of groundwater sampling and groundwater elevation monitoring at the AFFF Crash Truck Maintenance Check Area. All seven temporary piezometers were constructed with 10-foot screened intervals (from 10 to 20 feet bgs in six locations and 9.5 to 19.5 feet bgs in one location). Groundwater sample locations at Fire Station 3 and the AFFF Crash Truck Maintenance Check Area are shown on **Figure 3-1** and **Figure 3-2**, respectively.

A-Zone Environmental Services (Charles Town, West Virginia), a Maryland-licensed driller, provided direct-push technology drilling services to install the temporary piezometers, which were constructed of 1.5-inch-diameter polyvinyl chloride (PVC) and installed to the water table in all identified locations in accordance with the SOPs

included in the SAP (CH2M, 2020), as well as the State of Maryland construction standards. Temporary piezometer construction details are summarized in **Table 3-1**.

3.5 Groundwater Elevation Measurements

Groundwater elevation measurements were taken at all temporary piezometers (four locations at Fire Station 3 and seven locations at the AFFF Crash Truck Maintenance Check Area) prior to groundwater sampling, 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 Fire Station 3 and the AFFF Crash Truck Maintenance Check Area, as presented on **Figure 3-1** and **Figure 3-2**, respectively. As shown, groundwater flow at Fire Station 3 is predominantly to the northeast, and groundwater flow at the AFFF Crash Truck Maintenance Check Area is predominantly to the southwest.

3.6 Groundwater Sampling

Groundwater samples were collected from four temporary piezometers at Fire Station 3 and seven temporary piezometers at the AFFF Crash Truck Maintenance Check Area. Prior to groundwater 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, oxidation-reduction potential (ORP), temperature, specific conductance, turbidity, and dissolved oxygen (DO), 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 until water quality readings collected 5 minutes apart stabilized to within 10 percent of one another, and groundwater samples were collected directly into laboratory-provided sample bottles. The final set of water quality parameters recorded before sample collection for each temporary piezometer is presented in **Table 3-2**. Groundwater samples were collected and analyzed for 18 PFAS in accordance with the SOPs included in the SAP (CH2M, 2020), and groundwater analytical results are discussed in detail in **Section 4**.

3.7 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 National American Vertical Datum of 1988 to remain consistent with the coordinate system and datum currently in use at Webster Field. Horizontal coordinates were referenced to the Maryland State Plane Coordinate System, North American Datum of 1983.

3.8 Quality Assurance and Quality Control

Soil and groundwater samples collected for this field investigation were analyzed for the 18 PFAS listed in USEPA Drinking Water Method 537.1 using LC MS/MS Compliant with QSM 5.3 Table B-15, as identified in the SAP (CH2M, 2020).

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 (DI) 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 DI water over or through sample collection equipment prior to the equipment's use. 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 (that is, 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 MS sample and one MSD 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.

3.9 Decontamination Procedures

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

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 DI 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).

3.10 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 Webster Field prior to transfer to NAS Patuxent River. A total of two drums of solid IDW and two drums of aqueous IDW were generated during the field activities at Webster Field.

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 ng/L. Based on the overall analytical results, all IDW was characterized as nonhazardous, PFAS-containing. As such, solid IDW was disposed of as nonhazardous with notification of the PFAS results to the receiving facility. 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.

3.11 Data Quality Assessment

The data quality assessment (data validation 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 99.89% 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 (July 2020)

Basewide PFAS Site Inspection Report

NAS Patuxent River, Webster Outlying Field

St. Inigoes, Maryland

Piezometer	Date Installed	Total Depth [a]	Ground Surface Elevation [b]	Top of Screen Elevation [a]	Bottom of Screen Elevation [a]	Top of Casing Elevation [b]	Depth to Water [c]	Groundwater Elevation [b]
Fire Station 3, Building 8076								
PX-WF-B8076-WT01	7/8/2020	30	6.88	10	30	7.30	5.95 [f]	1.35
PX-WF-B8076-WT02	7/8/2020	20	5.11	10	20	5.38	4.45 [f]	0.93
PX-WF-B8076-WT03	7/8/2020	20	6.34	10	20	6.73	5.05 [f]	1.68
PX-WF-B8076-WT04	7/8/2020	30	7.18	20	30	8.12	6.20 [f]	1.92
AFFF Crash Truck Maintenance Check Area								
PX-WF-CTMCA-WT01	7/8/2020	20	9.92	10	20	10.47	3.69 [e]	6.78
PX-WF-CTMCA-WT02	7/8/2020	20	8.78	10	20	9.29	2.45 [e]	6.84
PX-WF-CTMCA-WT03	7/8/2020	20	10.71	10	20	11.05	3.85 [f]	7.20
PX-WF-CTMCA-WT04	7/8/2020	20	10.40	10	20	10.78	8.41 [e]	2.37
PX-WF-CTMCA-WT05	7/8/2020	20	11.15	10	20	11.98	5.19 [f]	6.79
PX-WF-CTMCA-WT06	7/9/2020	20	7.24	10	20	7.58	0.90 [f]	6.68
PX-WF-CTMCA-WT07	7/6/2020	20	10.46	9.5	19.5	11.02	3.35 [d]	7.67

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 July 7, 2020

[e] depth to water measurement collected on July 8, 2020

[f] depth to water measurement collected on July 9, 2020

Table 3-2. Water Quality Parameters (July 2020)

Basewide PFAS Site Inspection Report
NAS Patuxent River, Webster Outlying Field
St. Inigoes, Maryland

Piezometer	Date Sampled	Temperature (°C)	pH (standard units)	Specific Conductance (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)
Fire Station 3, Building 8076							
PX-WF-B8076-WT01	7/9/2020	21.8	15.94 [a]	0.308	123	3.90	40.2
PX-WF-B8076-WT02	7/9/2020	20.1	3.84	0.329	403	4.10	240.0
PX-WF-B8076-WT03	7/9/2020	20.6	4.13	0.985	280	3.65	153.2
PX-WF-B8076-WT04	7/9/2020	23.3	10.48 [a]	12.544	1,073	4.47	30.9
AFFF Crash Truck Maintenance Check Area							
PX-WF-CTMCA-WT01	7/8/2020	25.4	9.22 [a]	0.005	234	3.62	-77.2
PX-WF-CTMCA-WT02	7/8/2020	17.3	5.87	0.109	402	1.53	-2.6
PX-WF-CTMCA-WT03	7/9/2020	20.7	5.08	0.049	221	4.89	141.3
PX-WF-CTMCA-WT04	7/8/2020	18.3	4.19	0.069	above range	3.14	243.6
PX-WF-CTMCA-WT05	7/9/2020	23.2	9.90 [a]	0.002	410	7.06	-2.5
PX-WF-CTMCA-WT06	7/9/2020	21.7	5.43	0.150	23	2.99	25.4
PX-WF-CTMCA-WT07	7/7/2020	18.9	5.22	0.124	22	1.46	59.0

Notes:

[a] malfunctioning YSI water quality meter yielded erroneous pH reading that was disregarded during analysis

°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

\\dc1vs01\GISNavyClean\WASHINGTON\NASPatuxentRiver\MapFiles\PFAS\680480_SI\SiteFigures\Figure 3-1 - Fire Station Building 8076 GW Contours.mxd2/26/2021AM038876

Legend

- Co-located Groundwater and Soil Sample Location
- Storm Sewer Discharge Point
- Groundwater Contour (dashed where inferred)
- Groundwater Flow Direction
- Suspected PFAS Release Areas
- Storm Sewer Headwall
- Storm Sewer Line
- Storm Sewer Open Drainage Ditch
- Installation Boundary

Figure 3-1
Sample Locations and Groundwater Contours for Fire Station 3, Building 8076
Basewide PFAS Site Inspection Report
NAS Patuxent River, Webster Outlying Field
St. Inigoes, Maryland

N

0 35 70

Feet

ch2m

\\dc1vs01\GISNavyClean\WASHINGTON\NASPatuxentRiver\MapFiles\PFAS\680480_SI\SiteFigures\Figure 3-2 - AFFF_CTMCA GW Contours.mxd2/26/2021AM038876

WF-CTMCA-WT07
7.67

WF-CTMCA-WT02/SO02
6.84

WF-CTMCA-WT01/SO01
6.78

AFFF Crash Truck
Maintenance Check Area

WF-CTMCA-WT05/SO05
6.79

WF-CTMCA-WT03/SO03
7.20

WF-CTMCA-SO07

WF-CTMCA-WT04/SO04
2.37

WF-CTMCA-WT06/SO06
6.68

WOLF ROAD D

8149

VILLA

RUNWAY 14-32

7.2
7.4
7.6
7.0
6.8

St. Mary's River

Notes:
1. Groundwater elevations are shown in feet above NAVD88.
2. Depth to water measurements were collected on July 7-9, 2020.
3. The groundwater elevation in WF-CTMCA-WT04 is a perched elevation and was not used for the contouring.

Legend

- Co-located Groundwater and Soil Sample Location
- Groundwater Sample Location
- Surface/Subsurface Soil Sample Location
- Storm Sewer Discharge Point
- Groundwater Contour (dashed where inferred)
- Estimated Shallow Groundwater Flow Direction
- Storm Sewer Culvert
- Storm Sewer Headwall
- Storm Sewer Line
- Storm Sewer Open Drainage Ditch
- Known PFAS Release Areas
- Surface Water
- Taxiway
- Runway
- Installation Boundary

N

0 75 150

Feet

Figure 3-2
Sample Locations and Groundwater Contours for
AFFF Crash Truck Maintenance Check Area
Basewide PFAS Site Inspection Report
NAS Patuxent River, Webster Outlying Field
St. Inigoes, Maryland

ch2m:

SECTION 4

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 (µg/kg) for each compound, and soil analytical data for PFBS were screened against the PAL of 1,900 µg/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 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). 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 groundwater samples collected at Fire Station 3 and the AFFF Crash Truck Maintenance Check Area are summarized in **Table 4-1** and **Table 4-2**, respectively. These two tables 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. **Figure 4-1** and **Figure 4-2** show PFOA, PFOS, and PFBS concentrations for each of the soil and groundwater sample locations at Fire Station 3 and the AFFF Crash Truck Maintenance Check Area, respectively.

4.1 Soil

4.1.1 Soil Analytical Results for Fire Station 3

As listed in **Table 4-1** and shown on **Figure 4-1**, analysis of surface and subsurface soil collected from the four soil sample locations at Fire Station 3 indicated the following:

- PFOA was detected at three surface soil sample locations (PX-WF-B8076-SS02, PX-WF-B8076-SS03, and PX-WF-B8076-SS04) and at one subsurface soil sample location (PX-WF-B8076-SB03). None of the PFOA detections exceeded the PAL of 130 µg/kg.
- PFOS was detected at all four soil sample locations, with surface and subsurface soil detections at all four locations. Two surface soil locations (PX-WF-B8076-SS03 at a concentration of 452.79 µg/kg; PX-WF-B8076-SS04 at estimated concentrations of 248.54 µg/kg and 854.07 µg/kg in the parent sample and field duplicate sample, respectively) yielded PFOS detections that exceeded the PAL of 130 µg/kg.
- PFBS was detected at two surface soil sample locations (PX-WF-B8076-SS03 and PX-WF-B8076-SS04) and at one subsurface soil sample location (PX-WF-B8076-SB04). None of the PFBS detections exceeded the PAL of 1,900 µg/kg.

4.1.2 Soil Analytical Results for AFFF Crash Truck Maintenance Check Area

As listed in **Table 4-1** and shown on **Figure 4-2**, analysis of surface and subsurface soil collected from the seven soil sample locations at the AFFF Crash Truck Maintenance Check Area indicated the following:

- PFOA was detected at two surface soil sample locations (PX-WF-CTMCA-SS02 and PX-WF-CTMCA-SS07); there were no detections in subsurface soil. None of the PFOA detections exceeded the PAL of 130 µg/kg.
- PFOS was detected in the seven surface soil sample locations and four subsurface soil sample locations (PX-WF-CTMCA-SB03, PX-WF-CTMCA-SB04, PX-WF-CTMCA-SB05, and PX-WF-CTMCA-SB07). None of the PFOS detections exceeded the PAL of 130 µg/kg.
- PFBS was not detected in site soil at the AFFF Crash Truck Maintenance Check Area.

4.2 Groundwater

4.2.1 Water Quality Parameters

Measurements of pH, ORP, temperature, specific conductance, turbidity, and DO were collected at each temporary piezometer following purging and immediately prior to sampling. The final water quality parameters recorded before sample collection at both sites (Fire Station 3 and the AFFF Crash Truck Maintenance Check Area) are presented in **Table 3-2**.

Measured pH values were generally acidic, ranging between 3.84 and 5.87. Measured ORP values, which provide an indication of the potential for redox conditions in groundwater, ranged between -77.2 millivolts (mV) and 243.6 mV; overall, the values are indicative of primarily oxidizing conditions. Temperature readings ranged between 17.3 degrees Celsius (°C) and 25.4 °C. Specific conductance values, which provide an indication of the concentration of total dissolved solids within groundwater, ranged between 0.002 millisiemens per centimeter (mS/cm) and 12.544 mS/cm; other than the maximum value (observed at PX-WF-B8076-WT04), 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 22 nephelometric turbidity units (NTU) to above the range of the instrument (typically greater than 1,000 NTU). Measured DO values, which provide an indication of the subsurface environment, ranged between 1.46 milligrams per liter (mg/L) and 7.06 mg/L; these values are indicative of aerobic conditions.

4.2.2 Groundwater Analytical Results for Fire Station 3

As listed in **Table 4-2** and shown on **Figure 4-1**, analysis of groundwater collected from the four temporary piezometers at Fire Station 3 indicated the following:

- PFOA was detected at all four groundwater sample locations, with concentrations ranging from 243.91 ng/L at PX-WF-B8076-WT01 to 2,816.04 ng/L at PX-WF-B8076-WT03. All PFOA detections exceeded the PAL of 40 ng/L.
- PFOS was detected at all four groundwater sample locations, with concentrations ranging from 1,738.14 ng/L at PX-WF-B8076-WT01 to 84,756.77 ng/L at PX-WF-B8076-WT02. All PFOS detections exceeded the PAL of 40 ng/L.
- PFBS was detected at all four groundwater sample locations, with concentrations ranging from 343.18 ng/L at PX-WF-B8076-WT01 to 4,804.83 ng/L at PX-WF-B8076-WT03. Three of the PFBS detections exceeded the PAL of 600 ng/L.

4.2.3 Groundwater Analytical Results for AFFF Crash Truck Maintenance Check Area

As listed in **Table 4-2** and shown on **Figure 4-2**, analysis of groundwater collected from the seven temporary piezometers at the AFFF Crash Truck Maintenance Check Area indicated the following:

- PFOA was detected at six groundwater sample locations, with concentrations ranging from 0.49 ng/L (estimated) at PX-WF-CTMCA-WT07 to 46.76 ng/L at PX-WF-CTMCA-WT04. The PFOA detection at PX-WF-CTMCA-WT04 exceeded the PAL of 40 ng/L.
- PFOS was detected at all seven groundwater sample locations, with concentrations ranging from 0.74 ng/L (estimated) at PX-WF-CTMCA-WT06 to 367.46 ng/L at PX-WF-CTMCA-WT04. PFOS detections at PX-WF-CTMCA-WT01, PX-WF-CTMCA-WT02, and PX-WF-CTMCA-WT04 exceeded the PAL of 40 ng/L.
- PFBS was detected at all seven groundwater sample locations, with concentrations ranging from 0.14 ng/L (estimated) at PX-WF-CTMCA-WT07 to 34.86 ng/L at PX-WF-CTMCA-WT01. None of the PFBS detections exceeded the PAL of 600 ng/L.

Table 4-1. Soil Analytical Data for PFOA, PFOS, and PFBS (July 2020)
Basewide PFAS Site Inspection Report
NAS Patuxent River, Webster Outlying Field
St. Inigoes, Maryland

Sample Location	Date Sampled	PFOA (µg/kg)	PFOS (µg/kg)	PFBS (µg/kg)
Project Action Limit (PAL):		**130** [a]	**130** [a]	**1,900** [a]
Fire Station 3, Building 8076				
SURFACE SOIL				
PX-WF-B8076-SS01	7/7/2020	2.17 U	74.19	1.09 U
PX-WF-B8076-SS02	7/7/2020	0.92 J	88.09	1.13 U
PX-WF-B8076-SS03	7/7/2020	2.63 J	**452.79**	0.62 J
PX-WF-B8076-SS04	7/7/2020	11.8 [b]	**854.07 J** [b]	9.81 [b]
SUBSURFACE SOIL				
PX-WF-B8076-SB01	7/7/2020	2.05 U	105.79	1.03 U
PX-WF-B8076-SB02	7/7/2020	2.44 U	36.72	1.22 U
PX-WF-B8076-SB03	7/7/2020	1.48 J	57.97	1.1 U
PX-WF-B8076-SB04	7/7/2020	2.44 U	49.98 J [b]	0.44 J
AFFF Crash Truck Maintenance Check Area				
SURFACE SOIL				
PX-WF-CTMCA-SS01	7/7/2020	2.33 U	0.85 J	1.16 U
PX-WF-CTMCA-SS02	7/6/2020	1.73 J	18.01	1.17 U
PX-WF-CTMCA-SS03	7/7/2020	2.42 U	1.38 J	1.21 U
PX-WF-CTMCA-SS04	7/7/2020	2.26 U	10.67	1.13 U
PX-WF-CTMCA-SS05	7/7/2020	2.56 U [b]	35.19	1.28 U [b]
PX-WF-CTMCA-SS06	7/7/2020	2.42 U	16.32	1.21 U
PX-WF-CTMCA-SS07	7/6/2020	1.71 J	123.45	1.1 U
SUBSURFACE SOIL				
PX-WF-CTMCA-SB01	7/7/2020	2.35 U [b]	2.35 U [b]	1.18 U [b]
PX-WF-CTMCA-SB02	7/6/2020	2.29 U	2.29 U	1.14 U
PX-WF-CTMCA-SB03	7/7/2020	2.41 U	1.07 J	1.2 U
PX-WF-CTMCA-SB04	7/7/2020	2.23 U	5.31 J	1.12 U
PX-WF-CTMCA-SB05	7/7/2020	2.43 U	8.42	1.1 U
PX-WF-CTMCA-SB06	7/7/2020	2.6 U	2.6 U	1.3 U
PX-WF-CTMCA-SB07	7/6/2020	2.29 U	4.67 J	1.14 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, screening values have been updated from those listed in the 2019 memorandum to reflect reference doses provided in "Provisional Peer-Reviewed Toxicity Values for Perfluorobutane Sulfonic Acid (CASRN 375-73-5) and Related Compound Potassium Perfluorobutane Sulfonate (CASRN 29420-49-3)" (USEPA, 2021).
[b] result from a field duplicate sample
Shading indicates detection.
Bolding indicates 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 (July 2020)

Basewide PFAS Site Inspection Report
NAS Patuxent River, Webster Outlying Field
St. Inigoes, Maryland

Piezometer	Date Sampled	PFOA (ng/L)	PFOS (ng/L)	PFBS (ng/L)
Project Action Limit (PAL):		**40** [a]	**40** [a]	**600** [a]
Fire Station 3, Building 8076				
GROUNDWATER				
PX-WF-B8076-WT01	7/9/2020	**243.91**	**1,738.14**	343.18
PX-WF-B8076-WT02	7/9/2020	**1,836.14**	**84,756.77**	**1,254.14**
PX-WF-B8076-WT03	7/9/2020	**2,816.04**	**42,939.38**	**4,804.83**
PX-WF-B8076-WT04	7/9/2020	**1,203.55**	**26,930.69**	**1,753.82**
AFFF Crash Truck Maintenance Check Area				
GROUNDWATER				
PX-WF-CTMCA-WT01	7/8/2020	15.98	**50.74**	34.86
PX-WF-CTMCA-WT02	7/8/2020	11.01 [b]	**62.78**	28.91 [b]
PX-WF-CTMCA-WT03	7/9/2020	1.01 J	18.25	5.59
PX-WF-CTMCA-WT04	7/8/2020	**46.76**	**367.46**	24.82
PX-WF-CTMCA-WT05	7/9/2020	5.38	22.36	21.56
PX-WF-CTMCA-WT06	7/9/2020	1.27 U	0.74 J	0.51 J
PX-WF-CTMCA-WT07	7/7/2020	0.49 J	1.71 J	0.14 J

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, screening values have been updated from those listed in the 2019 memorandum to reflect reference doses provided in "Provisional Peer-Reviewed Toxicity Values for Perfluorobutane Sulfonic Acid (CASRN 375-73-5) and Related Compound Potassium Perfluorobutane Sulfonate (CASRN 29420-49-3)" (USEPA, 2021).

[b] result from a field duplicate sample

Shading indicates detection.

Bolding indicates 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

ng/L = nanogram(s) per liter

\\dc1vs01\GISNavyClean\WASHINGTON\NASPatuxentRiver\MapFiles\PFAS\680480_SI\Results\Figure 4-1 - Fire Station Building 8076.mxd5/24/2021AM038876

Project Action Limits for Soil:
PFOA = 130 µg/kg
PFOS = 130 µg/kg
PFBS = 1,900 µg/kg

Project Action Limits for Groundwater:
PFOA = 40 ng/L
PFOS = 40 ng/L
PFBS = 600 ng/L

SOIL	
PX-WF-B8076-SS01	
PFBS	ND
PFOS	74.19
PFOA	ND
PX-WF-B8076-SB01	
PFBS	ND
PFOS	105.79
PFOA	ND

GROUNDWATER	
PX-WF-B8076-WT01	
PFBS	343.18
PFOS	**1,738.14**
PFOA	**243.91**

SOIL	
PX-WF-B8076-SS04	
PFBS	9.81
PFOS	**854.07** J
PFOA	11.8
PX-WF-B8076-SB04	
PFBS	0.44 J
PFOS	49.98 J
PFOA	ND

GROUNDWATER	
PX-WF-B8076-WT04	
PFBS	**1,753.82**
PFOS	**26,930.69**
PFOA	**1,203.55**

SOIL	
PX-WF-B8076-SS02	
PFBS	ND
PFOS	88.09
PFOA	0.92 J
PX-WF-B8076-SB02	
PFBS	ND
PFOS	36.72
PFOA	ND

GROUNDWATER	
PX-WF-B8076-WT02	
PFBS	**1,254.14**
PFOS	**84,756.77**
PFOA	**1,836.14**

GROUNDWATER	
PX-WF-B8076-WT03	
PFBS	**4,804.83**
PFOS	**42,939.38**
PFOA	**2,816.04**

SOIL	
PX-WF-B8076-SS03	
PFBS	0.62 J
PFOS	**452.79**
PFOA	2.63 J
PX-WF-B8076-SB03	
PFBS	ND
PFOS	57.97
PFOA	1.48 J

Fire Station 3
Building 8076

WOLF ROAD E

WOLF ROAD E

VILLA

St. Mary's River

Notes:
units are µg/kg (micrograms per kilogram) for soil samples
units are ng/L (nanograms per liter) for groundwater samples
surface soil sample depth = 0 to 6 inches bgs
subsurface soil sample depth = 3 to 4 feet bgs
J = analyte present, value may or may not be accurate or precise
ND = not detected

Legend

- Co-located Groundwater and Soil Sample Location
- Storm Sewer Discharge Point
- Surface Water Drainage Direction
- Estimated Shallow Groundwater Flow Direction
- Suspected PFAS Release Areas
- Storm Sewer Culvert
- Storm Sewer Headwall
- Storm Sewer Line
- Storm Sewer Open Drainage Ditch
- Surface Water
- Installation Boundary

For PFAS concentrations shown, shading indicates a detection and **bolding** indicates an exceedance of a project action limit.
All samples were collected in July 2020.

N

0 50 100 Feet

Figure 4-1
PFOA, PFOS, and PFBS Concentrations for Fire Station 3, Building 8076
Basewide PFAS Site Inspection Report
NAS Patuxent River, Webster Outlying Field
St. Inigoes, Maryland

ch2m:

\\dc1vs01\GISNavyClean\WASHINGTON\NASPatuxentRiver\MapFiles\PFAS\680480_SI\Results\Figure 4-2 - AFFF Crash Truck Maintenance Check Area.mxd5/24/2021AM038876

Project Action Limits for Soil:
PFOA = 130 µg/kg
PFOS = 130 µg/kg
PFBS = 1,900 µg/kg

Project Action Limits for Groundwater:
PFOA = 40 ng/L
PFOS = 40 ng/L
PFBS = 600 ng/L

SOIL	
PX-WF-CTMCA-SS02	
PFBS	ND
PFOS	18.01
PFOA	1.73 J
PX-WF-CTMCA-SB02	
PFBS	ND
PFOS	ND
PFOA	ND

GROUNDWATER	
PX-WF-CTMCA-WT02	
PFBS	28.91
PFOS	**62.78**
PFOA	11.01

SOIL	
PX-WF-CTMCA-SS01	
PFBS	ND
PFOS	0.85 J
PFOA	ND
PX-WF-CTMCA-SB01	
PFBS	ND
PFOS	ND
PFOA	ND

GROUNDWATER	
PX-WF-CTMCA-WT01	
PFBS	34.86
PFOS	**50.74**
PFOA	15.98

SOIL	
PX-WF-CTMCA-SS07	
PFBS	ND
PFOS	123.45
PFOA	1.71 J
PX-WF-CTMCA-SB07	
PFBS	ND
PFOS	4.67 J
PFOA	ND

SOIL	
PX-WF-CTMCA-SS06	
PFBS	ND
PFOS	16.32
PFOA	ND
PX-WF-CTMCA-SB06	
PFBS	ND
PFOS	ND
PFOA	ND

GROUNDWATER	
PX-WF-CTMCA-WT06	
PFBS	0.51 J
PFOS	0.74 J
PFOA	ND

GROUNDWATER	
PX-WF-CTMCA-WT07	
PFBS	0.14 J
PFOS	1.71 J
PFOA	0.49 J

SOIL	
PX-WF-CTMCA-SS05	
PFBS	ND
PFOS	35.19
PFOA	ND
PX-WF-CTMCA-SB05	
PFBS	ND
PFOS	8.42
PFOA	ND

GROUNDWATER	
PX-WF-CTMCA-WT05	
PFBS	21.56
PFOS	22.36
PFOA	5.38

SOIL	
PX-WF-CTMCA-SS03	
PFBS	ND
PFOS	1.38 J
PFOA	ND
PX-WF-CTMCA-SB03	
PFBS	ND
PFOS	1.07 J
PFOA	ND

GROUNDWATER	
PX-WF-CTMCA-WT03	
PFBS	5.59
PFOS	18.25
PFOA	1.01 J

SOIL	
PX-WF-CTMCA-SS04	
PFBS	ND
PFOS	10.67
PFOA	ND
PX-WF-CTMCA-SB04	
PFBS	ND
PFOS	5.31 J
PFOA	ND

GROUNDWATER	
PX-WF-CTMCA-WT04	
PFBS	24.82
PFOS	**367.46**
PFOA	**46.76**

VILLA
WOLF ROAD K
AFFF Crash Truck Maintenance Check Area
RUNWAY 14-32
VILLA
St. Mary's River
Langley Hollow Pond

Notes:
units are µg/kg (micrograms per kilogram) for soil samples
units are ng/L (nanograms per liter) for groundwater samples
surface soil sample depth = 0 to 6 inches bgs
subsurface soil sample depth = 3 to 4 feet bgs
J = analyte present, value may or may not be accurate or precise
ND = not detected

Legend

- Co-located Groundwater and Soil Sample Location
- Groundwater Sample Location
- Surface/Subsurface Soil Sample Location
- Surface Water Drainage Direction
- Estimated Shallow Groundwater Flow Direction
- Storm Sewer Discharge Point
- Storm Sewer Culvert
- Storm Sewer Headwall
- Storm Sewer Line
- Storm Sewer Open Drainage Ditch
- Known PFAS Release Area
- Surface Water
- Taxiway
- Runway
- Installation Boundary

For PFAS concentrations shown, shading indicates a detection and **bolding** indicates an exceedance of a project action limit.
All samples were collected in July 2020.

Figure 4-2
PFOA, PFOS, and PFBS Concentrations for AFFF Crash Truck Maintenance Check Area
Basewide PFAS Site Inspection Report
NAS Patuxent River, Webster Outlying Field
St. Inigoes, Maryland

N
0 100 200
Feet

ch2m:

SECTION 5

Conclusions and Recommendations

Table 5-1 summarizes the results of the PFAS SI conducted at Webster Field.

The following actions are proposed as part of the recommended PFAS RIs at Fire Station 3 and the AFFF Crash Truck Maintenance Check Area:

1. Collect additional soil samples at both sites to better define the extent of PFOA, PFOS, and PFBS in soil.
2. Install permanent monitoring wells at both sites to better define the extent of PFOA, PFOS, and PFBS in groundwater and monitor migration. New monitoring wells will also provide additional groundwater elevation data, which will help to refine the groundwater flow estimates developed following the SI field investigation.
3. Soil and groundwater samples will be analyzed for PFAS in accordance with Navy guidance and policy, which will be updated as new USEPA and DoD guidance and directives are issued.
4. Perform lysimeter testing to evaluate the potential for soil to leach to groundwater at each site.
5. Based on data collected during the RIs, refine the conceptual site model (CSM) for each site. The CSMs will incorporate information to fully define the fate and transport of PFAS at Webster Field.
6. Perform a quantitative human health risk assessment (HHRA) at both sites. The HHRA will evaluate potential risks to human health associated with exposure to PFAS detected in soil and groundwater at the sites.
7. Perform an ecological risk screening (ERS) at both sites. The ERS will be conducted using literature-based values.

Table 5-1. Conclusions of PFAS SI

Basewide PFAS Site Inspection Report
NAS Patuxent River, Webster Outlying Field
St. Inigoes, Maryland

Objectives	Results
Determine whether PFAS (if present) exhibit concentrations that exceed the PALs for soil and groundwater.	Fire Station 3: • PFOS exhibited concentrations exceeding the PAL for soil. • PFOA and PFOS exhibited concentrations exceeding the PALs for groundwater. AFFF Crash Truck Maintenance Check Area: • PFOA, PFOS, and PFBS did not exhibit concentrations exceeding the PALs for soil. • PFOA and PFOS exhibited concentrations exceeding the PALs for groundwater.
Determine the potential for PFAS (if present) to migrate offsite.	Fire Station 3: • Groundwater flow is predominantly to the northeast, and there is the potential for offsite migration of PFAS to the St. Mary's River in that direction. There is no potential drinking water exposure associated with this migration pathway because the St. Mary's River is a groundwater divide and acts as the receiving water body for the migrating groundwater. AFFF Crash Truck Maintenance Check Area: • Groundwater flow is predominantly to the southwest, and there is the potential for offsite migration of PFAS to the St. Mary's River in that direction. There is no potential drinking water exposure associated with this migration pathway because the St. Mary's River is a groundwater divide and acts as the receiving water body for the migrating groundwater.

SECTION 6

References

CH2M HILL, Inc. (CH2M). 2019. *Preliminary Assessment for Per- and Polyfluoroalkyl Substances (PFAS), Naval Air Station Patuxent River – Webster Outlying Landing Field, St. Inigoes, Maryland*. Final. April.

CH2M HILL, Inc. (CH2M). 2020. *Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, Naval Air Station Patuxent River, Webster Field Annex, St. Inigoes, Maryland*. Final. April.

Department of Defense (DoD). 2019a. *DoD Instruction 4715.18, Emerging Chemicals (ECs) of Environmental Concern*. September.

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Fred C. Hart and Associates, Inc. 1984. *Initial Assessment Study, Naval Air Station, Patuxent River, Maryland*.

Klohe, C.A. and C.E. Feehley. 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." U.S. Geological Survey Water Resources Investigation Report 01-4029.

St. Mary's County, Maryland. 2018. GIS (http://www.co.saint-marys.md.us/GIS/). October.

Tetra Tech NUS. 2010. *Preliminary Assessment for Munitions Response Program, Webster Field Annex, St. Inigoes, Maryland*. September.

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

THOTH
LAND SURVEYING
PROFESSIONALS

Survey Report Monitoring Well Locations

Naval Air Station Patuxent Webster Outlying Field

St. Inigoes, Maryland

Introduction
Thoth was hired by Jacobs/CH2M to perform a survey to locate Temporary Monitoring Wells at the Webster Field Fire Station and Crash Truck Maintenance Area at the Webster Outlying Field in St. Inigoes, Maryland.

Existing and Newly Established Control

Thoth recovered existing base control monument PAX 13 and checked existing base control PAX14 using Real-time Kinematic (RTK) GPS techniques resulting in a 3 dimensional check within 0.03'. Thoth then established 2 new onsite control points FIRE1 and AIR1 which are 2.5" Aluminum Caps on 36"x1/2" rebar. Horizontal locations were made by Real-time Kinematic GPS with 2 separate occupations of 500 epochs on each station.

Monitoring well locations were made horizontally using a combination of RTK and conventional total station locations. All Vertical locations were made by Digitial differential leveling techniques, which were subsequently evaluated with StarNet Least squares adjustment software.

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

Thomas Gregory Pendleton

Thomas Gregory Pendleton
Maryland Professional Land Surveyor 21925

Off. 202.652.0184 Fax 202.330.5311

PROJECT: Survey Services UXO1
Contract: CLEAN 9000 CTO-4304
NAVAL AIR STATION PATUXENT - WEBSTER FIELD
CALIFORNIA, MARYLAND
Date: July 14, 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.
WF-B8076-WTO1	176762.384	1473270.525	6.88	7.30	Monitoring Well
WF-B8076-WTO2	176752.846	1473445.595	5.11	5.38	Monitoring Well
WF-B8076-WTO3	176662.119	1473468.119	6.34	6.73	Monitoring Well
WF-B8076-WTO4	176635.052	1473343.163	7.18	8.12	Monitoring Well
WF-CTMA-WT01	176342.951	1474933.949	9.92	10.47	Monitoring Well
WF-CTMA-WT02	176478.368	1475084.541	8.78	9.29	
WF-CTMA-WT03	176007.692	1475456.721	10.71	11.05	Monitoring Well
WF-CTMA-WT04	175911.635	1475329.580	10.40	10.78	Monitoring Well
WF-CTMA-WT05	176175.817	1475247.525	11.15	11.98	Monitoring Well
WF-CTMA-WT06	175796.389	1475107.160	7.24	7.58	
WF-CTMA-WT07	176551.814	1475463.180	10.46	11.02	Monitoring Well

BASE CONTROL FOUND

NUMBER	NORTH	EAST	ELEV		DESC.
PAX13	176738.320	1473772.940	5.28		Brass Disk Monument
PAX24	175344.590	1475273.190	8.03		Brass Disk Monument
AIR1	176107.595	1475149.805	9.56		Rebar and Alum. Disk
FIRE3	176620.253	1473367.960	6.99		Rebar and Alum. Disk

GENERAL NOTES

1. DATUM:
   - Horizontal: Webster Field Base Datum - Maryland State Plane NAD83(2007)
   - Vertical: Webster Field Base Datum NAVD88 (U.S. Feet)
2. Monitoring Wells were located horizontally using RTK GPS and conventional total station techniques and vertically using digital differential leveling techniques.

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

Thomas Gregory Pendleton

Thomas Gregory Pendleton
Maryland Professional Land Surveyor 21925

STATE OF MARYLAND · THOMAS GREGORY PENDLETON · 21925 · PROFESSIONAL LAND SURVEYOR
Exp. 11-14-2021

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

100 0 100 200
1 inch = 100 ft.

Scale 1"=60'

SHEET 1 of 1

Webster Field Fire Station and Crash Truck Maintanance Area

Survey Services for Location of Monitoring Wells
CLEAN 9000 CTO-JU40

Naval Air Station Patuxant , Webster Field
California, Maryland

FILENAME
NASPAX_Webster.dwg

DATE: July 15, 2020

Appendix B
Investigation-Derived 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	***Additional Recipients***
Juan Acaron CH2M Hill 3011 SW Williston Rd Gainesville, FL 32608 352-384-7002	NONE

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 - % diference 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

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

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

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

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

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

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

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

Pace Analytical

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevent fields

LAB USE ONLY- Affix Wo

ALL SHAI

Client ID: 4380 - CH2M Hill Constructors

SDG: 220102866

PM: EPM

Company: CH2M / Jacobs	Billing Information:
Address:	
Report To: Ivan Acaron	Email To: Ivan.acaron@jacobs.com
Copy To:	Site Collection Info/Address: PAX River, MD
Customer Project Name/Number: CTO-4256	State: MD / County/City: Pax River / Time Zone Collected: [ ]PT [ ]MT [ ]CT [X]ET
Phone: 352-214-2814 / Email:	Site/Facility ID #: PAX Baseside PFAS
Collected By (print): Hannah Moore	Purchase Order #: / Quote #:
Collected By (signature):	Turnaround Date Required: normal
Sample Disposal: [ ] Dispose as appropriate [ ] Return [ ] Archive: _____ [ ] Hold: _____	Rush: [ ] Same Day [ ] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [ ] 5 Day (Expedite Charges Apply)
Compliance Monitoring? [ ] Yes [ ] No	DW PWS ID #: / DW Location Code:
Immediately Packed on Ice: [ ] Yes [ ] No	Field Filtered (if applicable): [ ] Yes [ ] No / Analysis: _____

Container Preservative T

** 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 _____

* 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) Date	Collected (or Composite Start) Time	Composite End Date	Composite End Time	Res Cl	# of Ctns	Analyses: Full TCL P+PCL
PAX-IDW01-102420-PA	GW	Comp	10/24/20	1325	10/24/20	1325		4	X
PAX-IDW01-102420-SO	SO	Comp	10/24/20	1330	10/24/20	1330		2	X

Lab Profile/Line:

Lab Sample Receipt Checklist:

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: _____	

LAB USE ONLY:
Lab Sample # / Comments:

1
2

Customer Remarks / Special Conditions / Possible Hazards:

Type of Ice Used: Wet Blue Dry None

Packing Material Used:

Radchem sample(s) screened (<500 cpm): Y N NA

SHORT HOLDS PRESENT (<72 hours): Y N N/A

Lab Tracking #: 2595065

Samples received via: FEDEX UPS Client Courier Pace Courier

Lab Sample Temperature Info:
Temp Blank Received: Y N NA
Therm ID#: E34
Cooler 1 Temp Upon Receipt: 1.3 oC
Cooler 1 Therm Corr. Factor: _____ oC
Cooler 1 Corrected Temp: _____ oC
Comments:
771894038300

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Kurr / Jacobs	10/28/2020 1030	Fed Ex	
Fed Ex	10/28/20 0947	Jim R. Lewis PACE	10/28/20 0947
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:

MTJL LAB USE ONLY
Table #:
Acctnum:
Template:
Prelogin:
PM:
PB:

Trip Blank Received: Y N NA
HCL MeOH TSP Other

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

BATTELLE
It can be done

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 Ellyn 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
PFTrDA	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
11Cl-PF3OUdS	763051-92-9	1.67 U	G1996-FS(3)	10.000	11/18/2020	0.58	1.67	5.56
9Cl-PF3ONS	756426-58-1	1.11 U	G1996-FS(3)	10.000	11/18/2020	0.53	1.11	5.56

Battelle

Page: 6 of 6
Project #: GTO-4256
CFA Quote #:
COC Number (1):
PO Number:

~~Cape Fear Analytical, LLC~~
Chain of Custody and Analytical Request

CFA Work Order Number:

~~Cape Fear Analytical, LLC~~
~~3306 Kitty Hawk Rd. Suite 120~~
~~Wilmington, NC 28405~~
~~Phone: (910) 795-0421~~

Client Name: Juan Acaron Phone #: 352-214-2814
Project/Site Name: PAX Biennial PFAS SI Fax #:
Address: PAX River, MD
Collected by: Hannah Grove Send Results To: juan.acaron@jacobs.com

Sample Analysis Requested (5) (Fill in the number of containers for each test)

Sample ID (* For composites - indicate start and stop date/time)	*Date Collected (mm-dd-yy)	~~*Time Collected~~ (Military) (hhmm)	~~QC Code~~ Type	Field Filtered (3)	Sample Matrix (4)	Total number of containers	none	PFAS 18	Preservative Type (6)
PX-H110-SB03-1020	10/24/20	1135	Comp	NO	SO	1	X	6 1993	
PX-H110-WT03-1020		1220	Grab		GW	2	X	6 1994	
PAX-IDW01-102420-AQ		1225	Comp		GW	2	X	6 1995	
PAX-IDW01-102420-SO		1330	Comp		SO	1	X	6 1996	

Comments
Note: extra sample is required for sample specific QC

TAT Requested: Normal: X Rush: Specify: (Subject to Surcharge) Fax Results: Yes / No

Circle Deliverable: C of A / QC Summary / Level 1 / Level 2 / Level 3 / Level 4

Remarks: *Are there any known hazards applicable to these samples? If so, please list the hazards*

Sample Collection Time Zone
(Eastern) Pacific
Central Other
Mountain

Chain of Custody Signatures

	Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1	[signature]	10/26/2020	1630	[signature]	10-27-20	930
2						
3						

Sample Shipping and Delivery Details

CFA PM:
Method of Shipment: Date Shipped:
Airbill #:
Airbill #:

1.) Chain of Custody Number = Client Determined
2.) QC Codes: **N** = Normal Sample, **TB** = Trip Blank, **FD** = Field Duplicate, **EB** = Equipment Blank, **MS** = Matrix Spike Sample, **MSD** = Matrix Spike Duplicate Sample, **G** = Grab, **C** = Composite
3.) Field Filtered: For liquid matrices, indicate with a - **Y** - for yes the sample was field filtered or- **N** - for sample was not field filtered.
4.) Matrix Codes: **DW**=Drinking Water, **GW**=Groundwater, **SW**=Surface Water, **WW**=Waste Water, **W**=Water, **MI**.=Misc Liquid, **SO**=Soil, **SD**=Sediment, **SL**=Sludge, **SS**=Solid Waste, **O**=Oil, **F**=Filter, **P**=Wipe, **U**=Urine, **F**=Fecal, **N**=Nasal
5.) Sample Analysis Requested: Analytical method requested (i.e **8290B**, **1668B**) and number of containers provided for each (i.e. ***8290B*** - **3**, **1668B** - **1**).
6.) Preservative Type: **HA** = Hydrochloric Acid, **NI** = Nitric Acid, **SH** = Sodium Hydroxide, **SA** = Sulfuric Acid, **AA** = Ascorbic Acid, **HX** = Hexane, **ST** = Sodium Thiosulfate. If no preservative is added = leave field blank

For Lab Receiving Use Only
Custody Seal Intact? YES NO
Cooler Temp: C

WHITE = LABORATORY **YELLOW = FILE** **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

BATTELLE
It can be done

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
PFTrDA	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
11Cl-PF3OUdS	763051-92-9	0.49 U	G1995-FS(0)	1.000	11/20/2020	0.23	0.49	4.90
9Cl-PF3ONS	756426-58-1	0.98 U	G1995-FS(0)	1.000	11/20/2020	0.26	0.98	4.90

Battelle

Page: 6 of 6
Project #: GTO-4256
CFA Quote #:
COC Number (1):
PO Number:

~~Cape Fear Analytical, LLC~~
Chain of Custody and Analytical Request

CFA Work Order Number:

~~Cape Fear Analytical, LLC~~
~~3306 Kitty Hawk Rd. Suite 120~~
~~Wilmington, NC 28405~~
~~Phone: (910) 795-0421~~

Client Name: Juan Acaron Phone #: 352-214-2814
Project/Site Name: PAX Biennial PFAS SI Fax #:
Address: PAX River, MD
Collected by: Hannah Grove Send Results To: juan.acaron@jacobs.com

Sample Analysis Requested (5) (Fill in the number of containers for each test)

Sample ID (* For composites - indicate start and stop date/time)	*Date Collected (mm-dd-yy)	~~*Time Collected (Military) (hhmm)~~	~~QC Code~~ Type	Field Filtered (3)	Sample Matrix (4)	Total number of containers	none	PFAS 18	Preservative Type (6)
PX-H110-SB03-1020	10/24/20	1135	Comp	NO	SO	1	X	G 1993	
PX-H110-WT03-1020		1220	Grab		GW	2	X	G 1994	
PAX-IDW01-102420-AQ		1225	Comp		GW	2	X	G 1995	
PAX-IDW01-102420-SO		1330	Comp		SO	1	X	G 1996	

Comments
Note: extra sample is required for sample specific QC

TAT Requested: Normal: X Rush: Specify: (Subject to Surcharge) Fax Results: Yes / No

Circle Deliverable: C of A / QC Summary / Level 1 / Level 2 / Level 3 / Level 4

Remarks: *Are there any known hazards applicable to these samples? If so, please list the hazards*

Sample Collection Time Zone
(Eastern) Pacific
Central Other
Mountain

Chain of Custody Signatures

	Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1	[signature]	10/26/2020	1630	[signature]	10-27-20	930
2						
3						

Sample Shipping and Delivery Details

CFA PM:
Method of Shipment: Date Shipped:
Airbill #:
Airbill #:

1.) Chain of Custody Number = Client Determined
2.) QC Codes: **N** = Normal Sample, **TB** = Trip Blank, **FD** = Field Duplicate, **EB** = Equipment Blank, **MS** = Matrix Spike Sample, **MSD** = Matrix Spike Duplicate Sample, **G** = Grab, **C** = Composite
3.) Field Filtered: For liquid matrices, indicate with a - **Y** - for yes the sample was field filtered or- **N** - for sample was not field filtered.
4.) Matrix Codes: **DW**=Drinking Water, **GW**=Groundwater, **SW**=Surface Water, **WW**=Waste Water, **W**=Water, **MI**.=Misc Liquid, **SO**=Soil, **SD**=Sediment, **SL**=Sludge, **SS**=Solid Waste, **O**=Oil, **F**=Filter, **P**=Wipe, **U**=Urine, **F**=Fecal, **N**=Nasal
5.) Sample Analysis Requested: Analytical method requested (i.e.**8290B**, **1668B**) and number of containers provided for each (i.e.***8290B*** - **3**, **1668B** - **1**).
6.) Preservative Type: **HA** = Hydrochloric Acid, **NI** = Nitric Acid, **SH** = Sodium Hydroxide, **SA** = Sulfuric Acid, **AA** = Ascorbic Acid, **HX** = Hexane, **ST** = Sodium Thiosulfate, If no preservative is added = leave field blank

For Lab Receiving Use Only
Custody Seal Intact? YES NO
Cooler Temp: C

WHITE = LABORATORY **YELLOW = FILE** **PINK = CLIENT**

Clearfield MMG
resourceful waste management

Waste Profile Form

Applicant / Agent Information

Company Name:	CH2M HILL, Inc.
Address:	2411 Dulles Corner Park, Ste. 500
City / State / Zip:	Herndon, VA 20171
Contact:	John Ledbetter
Phone:	703-376-5000
e-mail:	John.Ledbetter1@jacobs.com

Generator Information

Company Name:	NAVFAC Environmental
Address:	22445 Peary Road, Bldg. 504
City / State / Zip:	Patuxent River, MD 20760
Contact:	Heidi Morgan
Phone:	301-757-4897
e-mail:	heidi.a.morgan@navy.mil

Project Description

Site Name: NAS Patuxent River & Webster Field Annex

Site Address: NAS Patuxent River, St, Mary's County, MD

Source of Contamination: ☐ UST ☐ AST ☐ Spill ☑ Historical / Other: _____

Waste Generating Activity: IDW Groundwater & Soil Sampling Activities

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: IDW Groundwater & Soil Cuttings

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) : See Analysis

Groundwater contains PFOA & PFOS > 70 ppt and must be Solidified & Landfilled

Flash Point Range: >200 F **pH Range:** GW 7.73 & S 12.2 **Reactive:** ☐ YES ☑ NO

Quantity: 6 liquid,3 soil **Units:** 55 gallon Drums **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).

Heidi Morgan

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:

Clearfield MMG
resourceful waste management

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	Heidi A Morgan	12/15/20
Generator / Agent's Printed Name	Signature	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 Stokes	12-15-20
Transporter's Signature	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		12-15-20
Printed Name	Signature	Date

FACILITY

Appendix C
Data Quality Assessment

Data Quality Assessment: PFAS SI at Fire Station 3, Building 8076, and AFFF Crash Truck Maintenance Check Area NAS Patuxent River, Webster Outlying Field St. Inigoes, Maryland

DATE: March 2, 2021

Introduction

Historical use of aqueous film-forming foam (AFFF) during fire and emergency response, testing, and training activities at Webster Outlying Field, under the command of Naval Air Station (NAS) Patuxent River, has prompted the Department of the Navy to conduct a per- and polyfluoroalkyl substances (PFAS) Site Inspection (SI) at the installation. The purpose of this technical memorandum is to summarize the results of the data validation process for the soil and water samples collected in July 2020 during the PFAS SI at Fire Station 3, Building 8076, and the AFFF Crash Truck Maintenance Check Area.

Soil and water samples were submitted to Battelle Laboratories for PFAS analysis by analytical method LC-MS/MS Compliant with QSM v5.3 Table B-15. The sample results were validated by Environmental Data Services, Inc. (EDS) for compliance with the analytical method requirements. Data validation reports included in **Attachment 3** for the following sample delivery groups (SDGs) were reviewed and summarized:

- 20-0766
- 20-0767
- 20-0775
- 20-0776
- 20-0777
- 20-0782
- 20-0783
- 20-0784
- 20-0929
- 20-0960

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 Department of Defense (DoD) guidance document *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* (DoD, 2020), the project-specific sampling and analysis plan (SAP) for the PFAS SI (CH2M HILL, Inc. [CH2M], 2020), and professional judgement. The quality assurance/quality control (QA/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**.

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.

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 field 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 laboratory performance and possible matrix interference.
- Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/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 parent sample 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.

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:

Holding Time

All holding time requirements were met.

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:

For spiked sample PX-WF-B8076-WT04-0720, perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA) exhibited low recoveries in the MS/MSD.

Surrogates:

Various samples exhibited low recoveries in the surrogates over several SDGs.

Surrogate 13C2-PFTeDA for sample PX-WF-B8076-WT01-0720 exhibited less than 10% recovery. Associated data were rejected.

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

Field Duplicate Precision

- Parent sample PX-WF-B8076-SB04-0304 and field duplicate PX-WF-B8076-SB04P-0304 did not meet field duplicate precision criteria for perfluorooctane sulfonic acid (PFOS).
- Parent sample PX-WF-B8076-SS04-000H and field duplicate PX-WF-B8076-SS04P-000H did not meet field duplicate precision criteria for perfluorohexane sulfonic acid (PFHxS) and PFOS.

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

Analytical Blanks

- Several target analytes were detected in method blanks across various SDGs.
- Several target analytes were detected in equipment blanks and field blanks across various SDGs.

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

Calibration

All calibration acceptance criteria were met.

Serial Dilution

All serial dilution acceptance criteria were met.

Reporting Limits Evaluation

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

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 parent and field duplicate sample results were mostly within acceptable criteria, indicating possible matrix interference 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. 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 possible matrix interference. One data point was rejected due to surrogate recovery failure, 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 99.89% 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 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.

Conclusion

A review of the analytical data submitted for the July 2020 PFAS SI sampling events for Fire Station 3, Building 8076, and the AFFF Crash Truck Maintenance Check Area 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.

References

CH2M HILL, Inc. (CH2M). 2020. *Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, Naval Air Station Patuxent River, Webster Field Annex, St. Inigoes, Maryland*. Final. 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 (QSM) Table B-15*. May.

Attachment 1
Secondary Data Qualifier Codes

Attachment 1. Secondary Data Qualifier 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
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 Qualifier	Final Result	Primary Qualifier	Units	Secondary Qualifier
PX-WF-B8076-EB01-070720-SO	EB	PFAS_QSM5.3	Perfluoroheptanoic acid (PFHpA)	0.21	J	0.82	U	ng/L	EBL
PX-WF-B8076-FB01-070920	FB	PFAS_QSM5.3	Perfluorodecanoic acid (PFDA)	0.21	J	0.44	U	ng/L	MBL
PX-WF-B8076-SB01-0304	REG	PFAS_QSM5.3	Perfluorooctanoic acid (PFOA)	0.96	J	2.05	U	µg/kg	MBL
PX-WF-B8076-SB04-0304	REG	PFAS_QSM5.3	Perfluorooctane sulfonic acid (PFOS)	27.23		27.23	J	µg/kg	FD
PX-WF-B8076-SB04P-0304	FD	PFAS_QSM5.3	Perfluorooctane sulfonic acid (PFOS)	49.98		49.98	J	µg/kg	FD
PX-WF-B8076-SS01-000H	REG	PFAS_QSM5.3	Perfluorooctanoic acid (PFOA)	1.78	J	2.17	U	µg/kg	MBL
PX-WF-B8076-SS02-000H	REG	PFAS_QSM5.3	Perfluoroheptanoic acid (PFHpA)	0.67	J	1.69	U	µg/kg	EBL
PX-WF-B8076-SS04-000H	REG	PFAS_QSM5.3	Perfluorooctane sulfonic acid (PFOS)	248.54	D	248.54	J	µg/kg	FD
PX-WF-B8076-SS04-000H	REG	PFAS_QSM5.3	Perfluorohexane sulfonic acid (PFHxS)	46.56		46.56	J	µg/kg	FD
PX-WF-B8076-SS04P-000H	FD	PFAS_QSM5.3	Perfluorooctane sulfonic acid (PFOS)	854.07	D	854.07	J	µg/kg	FD
PX-WF-B8076-SS04P-000H	FD	PFAS_QSM5.3	Perfluorohexane sulfonic acid (PFHxS)	74.38		74.38	J	µg/kg	FD
PX-WF-B8076-WT01-0720	REG	PFAS_QSM5.3	Perfluoroundecanoic acid (PFUnA)	0.45	U	0.45	UJ	ng/L	SSL
PX-WF-B8076-WT01-0720	REG	PFAS_QSM5.3	N-Ethyl Perfluorooctanesulfonamidoacetic acid (EtFOSAA)	0.59	J	0.89	U	ng/L	MBL
PX-WF-B8076-WT01-0720	REG	PFAS_QSM5.3	Perfluorododecanoic acid (PFDoA)	0.45	U	0.45	UJ	ng/L	SSL
PX-WF-B8076-WT01-0720	REG	PFAS_QSM5.3	Perfluorodecanoic acid (PFDA)	0.75	J	0.75	U	ng/L	MBL
PX-WF-B8076-WT01-0720	REG	PFAS_QSM5.3	Perfluorotetradecanoic acid (PFTeDA)	1.79	U	1.79	R	ng/L	SSL
PX-WF-B8076-WT02-0720	REG	PFAS_QSM5.3	Perfluorononanoic acid (PFNA)	132.82		132.82	J	ng/L	SSL
PX-WF-B8076-WT02P-0720	FD	PFAS_QSM5.3	Perfluorononanoic acid (PFNA)	152.09		152.09	J	ng/L	SSL
PX-WF-B8076-WT03-0720	REG	PFAS_QSM5.3	Perfluorotetradecanoic acid (PFTeDA)	1.85	U	1.85	UJ	ng/L	SSL
PX-WF-B8076-WT04-0720	REG	PFAS_QSM5.3	Perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA)	0.45	U	0.45	UJ	ng/L	MSL
PX-WF-B8076-WT04-0720	REG	PFAS_QSM5.3	N-Ethyl Perfluorooctanesulfonamidoacetic acid (EtFOSAA)	0.82	J	0.89	U	ng/L	MBL
PX-WF-B8076-WT04-0720	REG	PFAS_QSM5.3	Perfluorododecanoic acid (PFDoA)	0.45	U	0.45	UJ	ng/L	SSL
PX-WF-B8076-WT04-0720	REG	PFAS_QSM5.3	Perfluorotetradecanoic acid (PFTeDA)	1.79	U	1.79	UJ	ng/L	SSL
PX-WF-CTMCA-EB01-070920	EB	PFAS_QSM5.3	Perfluoroheptanoic acid (PFHpA)	0.28	J	0.96	U	ng/L	MBL
PX-WF-CTMCA-EB02-070920	EB	PFAS_QSM5.3	Perfluoroheptanoic acid (PFHpA)	0.5	J	0.89	U	ng/L	MBL
PX-WF-CTMCA-SB03-0304	REG	PFAS_QSM5.3	Perfluorooctanoic acid (PFOA)	1.33	J	2.41	U	µg/kg	MBL
PX-WF-CTMCA-SB05-0304	REG	PFAS_QSM5.3	Perfluorooctanoic acid (PFOA)	2.43	J	2.43	U	µg/kg	MBL
PX-WF-CTMCA-SS05P-000H	FD	PFAS_QSM5.3	Perfluorooctanoic acid (PFOA)	0.96	J	2.56	U	µg/kg	MBL
PX-WF-CTMCA-WT02-0720	REG	PFAS_QSM5.3	Perfluorotetradecanoic acid (PFTeDA)	1.89	U	1.89	UJ	ng/L	SSL
PX-WF-CTMCA-WT02P-0720	FD	PFAS_QSM5.3	Perfluorotetradecanoic acid (PFTeDA)	1.75	U	1.75	UJ	ng/L	SSL
PX-WF-CTMCA-WT03-0720	REG	PFAS_QSM5.3	Perfluorotetradecanoic acid (PFTeDA)	1.85	U	1.85	UJ	ng/L	SSL
PX-WF-CTMCA-WT04-0720	REG	PFAS_QSM5.3	Perfluorotetradecanoic acid (PFTeDA)	1.75	U	1.75	UJ	ng/L	SSL
PX-WF-CTMCA-WT06-0720	REG	PFAS_QSM5.3	Perfluoroheptanoic acid (PFHpA)	0.68	J	0.85	U	ng/L	EBL
PX-WF-CTMCA-WT07-0720	REG	PFAS_QSM5.3	Perfluoroheptanoic acid (PFHpA)	0.78	J	0.86	U	ng/L	EBL
PX-WF-FB01-070720	FB	PFAS_QSM5.3	Perfluorodecanoic acid (PFDA)	0.17	J	0.42	U	ng/L	MBL

Attachment 3
Data Validation Reports

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-0766
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: September 26, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-WF-FB01-070720	H6907-FS	Water
2	PX-WF-B8076-EB01-070620-SO	H6917-FS	Water
3	PX-WF-EFF01-070720	H6918-FS	Water
4	PX-WF-EFF02-070720	H6919-FS	Water
5	PX-S09-MW36-0720	H6920-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for three water samples, one aqueous equipment blank sample, and one aqueous field blank sample collected on July 6-7, 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	*Method References*
PFAS	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
LB87 IB	PFDA	0.23	U	1, 3, 4, 5
	NEtFOSAA	0.59	None	All Samples ND

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-WF-FB01-070720	None - ND	-	-	-
PX-WF-B8076-EB01-070620-SO	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R) except for the following.

EDS Sample	Surrogate	%R	Qualifier
4	13C2-PFTeDA	31%	UJ

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 criteria were met.

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 Dated: 10/2/20

Nancy Weaver
Senior Chemist

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.

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It can be done

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

Client ID	PX-WF-FB01-070720
Battelle ID	H6907-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/14/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	WATER
Sample Size	0.295
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.27 U	H6907-FS(0)	1.000	8/4/2020	0.45	1.27	4.24
PFHpA	**375-85-9**	**0.85 U**	**H6907-FS(0)**	**1.000**	**8/4/2020**	**0.22**	**0.85**	**4.24**
PFOA	335-67-1	1.27 U	H6907-FS(0)	1.000	8/4/2020	0.43	1.27	4.24
PFNA	**375-95-1**	**0.85 U**	**H6907-FS(0)**	**1.000**	**8/4/2020**	**0.26**	**0.85**	**4.24**
PFDA	335-76-2	0.42 ~~0.17~~ U	H6907-FS(0)	1.000	8/4/2020	0.12	0.42	4.24
PFUnA	**2058-94-8**	**0.42 U**	**H6907-FS(0)**	**1.000**	**8/4/2020**	**0.19**	**0.42**	**4.24**
PFDoA	307-55-1	0.42 U	H6907-FS(0)	1.000	8/4/2020	0.16	0.42	4.24
PFTrDA	**72629-94-8**	**0.42 U**	**H6907-FS(0)**	**1.000**	**8/4/2020**	**0.13**	**0.42**	**4.24**
PFTeDA	376-06-7	1.69 U	H6907-FS(0)	1.000	8/4/2020	0.62	1.69	4.24
NMeFOSAA	**2355-31-9**	**0.85 U**	**H6907-FS(0)**	**1.000**	**8/4/2020**	**0.30**	**0.85**	**4.24**
NEtFOSAA	2991-50-6	0.85 U	H6907-FS(0)	1.000	8/4/2020	0.42	0.85	4.24
PFBS	**375-73-5**	**0.42 U**	**H6907-FS(0)**	**1.000**	**8/4/2020**	**0.12**	**0.42**	**4.24**
PFHxS	355-46-4	0.34 U	H6907-FS(0)	1.000	8/4/2020	0.09	0.34	4.24
PFOS	**1763-23-1**	**0.85 U**	**H6907-FS(0)**	**1.000**	**8/4/2020**	**0.37**	**0.85**	**4.24**
HFPO-DA	13252-13-6	0.42 U	H6907-FS(0)	1.000	8/4/2020	0.21	0.42	4.24
Adona	**919005-14-4**	**0.85 U**	**H6907-FS(0)**	**1.000**	**8/4/2020**	**0.23**	**0.85**	**4.24**
11Cl-PF3OUdS	763051-92-9	0.42 U	H6907-FS(0)	1.000	8/4/2020	0.19	0.42	4.24
9Cl-PF3ONS	**756426-58-1**	**0.85 U**	**H6907-FS(0)**	**1.000**	**8/4/2020**	**0.23**	**0.85**	**4.24**

MBL

MW 9/26/20
Analyzed by: Griffith, Lauren
Printed: 8/5/2020

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2

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

Client ID		PX-WF-B8076-EB01-070620-SO						
Battelle ID		H6917-FS						
Sample Type		SA						
Collection Date		07/06/2020						
Extraction Date		07/14/2020						
Analytical Instrument		Sciex 6500+ LC/MS/MS						
% Moisture		NA						
Matrix		WATER						
Sample Size		0.290						
Size Unit-Basis		L						
Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.29 U	H6917-FS(0)	1.000	8/4/2020	0.46	1.29	4.31
PFHpA	375-85-9	0.86 U	H6917-FS(0)	1.000	8/4/2020	0.22	0.86	4.31
PFOA	335-67-1	1.29 U	H6917-FS(0)	1.000	8/4/2020	0.44	1.29	4.31
PFNA	375-95-1	0.86 U	H6917-FS(0)	1.000	8/4/2020	0.27	0.86	4.31
PFDA	335-76-2	0.43 U	H6917-FS(0)	1.000	8/4/2020	0.12	0.43	4.31
PFUnA	2058-94-8	0.43 U	H6917-FS(0)	1.000	8/4/2020	0.19	0.43	4.31
PFDoA	307-55-1	0.43 U	H6917-FS(0)	1.000	8/4/2020	0.16	0.43	4.31
PFTrDA	72629-94-8	0.43 U	H6917-FS(0)	1.000	8/4/2020	0.13	0.43	4.31
PFTeDA	376-06-7	1.72 U	H6917-FS(0)	1.000	8/4/2020	0.63	1.72	4.31
NMeFOSAA	2355-31-9	0.86 U	H6917-FS(0)	1.000	8/4/2020	0.30	0.86	4.31
NEtFOSAA	2991-50-6	0.86 U	H6917-FS(0)	1.000	8/4/2020	0.43	0.86	4.31
PFBS	375-73-5	0.43 U	H6917-FS(0)	1.000	8/4/2020	0.12	0.43	4.31
PFHxS	355-46-4	0.34 U	H6917-FS(0)	1.000	8/4/2020	0.09	0.34	4.31
PFOS	1763-23-1	0.86 U	H6917-FS(0)	1.000	8/4/2020	0.38	0.86	4.31
HFPO-DA	13252-13-6	0.43 U	H6917-FS(0)	1.000	8/4/2020	0.22	0.43	4.31
Adona	919005-14-4	0.86 U	H6917-FS(0)	1.000	8/4/2020	0.23	0.86	4.31
11Cl-PF3OUdS	763051-92-9	0.43 U	H6917-FS(0)	1.000	8/4/2020	0.20	0.43	4.31
9Cl-PF3ONS	756426-58-1	0.86 U	H6917-FS(0)	1.000	8/4/2020	0.23	0.86	4.31

NW 9/26/20

Analyzed by: Griffith, Lauren
Printed: 8/5/2020

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3

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

Client ID		PX-WF-EFF01-070720							
Battelle ID		H6918-FS							
Sample Type		SA							
Collection Date		07/07/2020							
Extraction Date		07/14/2020							
Analytical Instrument		Sciex 6500+ LC/MS/MS							
% Moisture		NA							
Matrix		WATER							
Sample Size		0.280							
Size Unit-Basis		L							
Analyte	CAS No.	Result (ng/L)		Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	35.12	D	H6918-FS-D(3)	5.000	8/4/2020	2.37	6.70	22.32	
PFHpA	**375-85-9**	**9.55**		**H6918-FS(0)**	**1.000**	**8/4/2020**	**0.23**	**0.89**	**4.46**	
PFOA	335-67-1	20.28		H6918-FS(0)	1.000	8/4/2020	0.46	1.34	4.46	
PFNA	**375-95-1**	**4.86**		**H6918-FS(0)**	**1.000**	**8/4/2020**	**0.28**	**0.89**	**4.46**	
PFDA	335-76-2	0.51	J	H6918-FS(0)	1.000	8/4/2020	0.13	0.45	4.46	MBL
PFUnA	**2058-94-8**	**0.45**	**U**	**H6918-FS(0)**	**1.000**	**8/4/2020**	**0.20**	**0.45**	**4.46**	
PFDoA	307-55-1	0.45	U	H6918-FS(0)	1.000	8/4/2020	0.17	0.45	4.46	
PFTrDA	**72629-94-8**	**0.45**	**U**	**H6918-FS(0)**	**1.000**	**8/4/2020**	**0.13**	**0.45**	**4.46**	
PFTeDA	376-06-7	1.79	U	H6918-FS(0)	1.000	8/4/2020	0.65	1.79	4.46	
NMeFOSAA	**2355-31-9**	**0.89**	**U**	**H6918-FS(0)**	**1.000**	**8/4/2020**	**0.31**	**0.89**	**4.46**	
NEtFOSAA	2991-50-6	0.89	U	H6918-FS(0)	1.000	8/4/2020	0.45	0.89	4.46	
PFBS	**375-73-5**	**17.89**		**H6918-FS(0)**	**1.000**	**8/4/2020**	**0.13**	**0.45**	**4.46**	
PFHxS	355-46-4	158.17	D	H6918-FS-D(3)	5.000	8/4/2020	0.49	1.79	22.32	
PFOS	**1763-23-1**	**131.73**	**D**	**H6918-FS-D(3)**	**5.000**	**8/4/2020**	**1.96**	**4.46**	**22.32**	
HFPO-DA	13252-13-6	0.45	U	H6918-FS(0)	1.000	8/4/2020	0.22	0.45	4.46	
Adona	**919005-14-4**	**0.89**	**U**	**H6918-FS(0)**	**1.000**	**8/4/2020**	**0.24**	**0.89**	**4.46**	
11Cl-PF3OUdS	763051-92-9	0.45	U	H6918-FS(0)	1.000	8/4/2020	0.21	0.45	4.46	
9Cl-PF3ONS	**756426-58-1**	**0.89**	**U**	**H6918-FS(0)**	**1.000**	**8/4/2020**	**0.24**	**0.89**	**4.46**	

NW 9/26/20
Analyzed by: Griffith, Lauren
Printed: 8/5/2020

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

Client ID	PX-WF-EFF02-070720
Battelle ID	H6919-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/14/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	WATER
Sample Size	0.285
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	40.07 D	H6919-FS-D(3)	5.000	8/4/2020	2.32	6.58	21.93	
PFHpA	**375-85-9**	**10.13**	**H6919-FS(0)**	**1.000**	**8/4/2020**	**0.23**	**0.88**	**4.39**	
PFOA	335-67-1	20.17	H6919-FS(0)	1.000	8/4/2020	0.45	1.32	4.39	
PFNA	**375-95-1**	**4.04 J**	**H6919-FS(0)**	**1.000**	**8/4/2020**	**0.27**	**0.88**	**4.39**	
PFDA	335-76-2	0.48 J U	H6919-FS(0)	1.000	8/4/2020	0.12	0.44	4.39	MBL
PFUnA	**2058-94-8**	**0.44 U**	**H6919-FS(0)**	**1.000**	**8/4/2020**	**0.19**	**0.44**	**4.39**	
PFDoA	307-55-1	0.44 U	H6919-FS(0)	1.000	8/4/2020	0.17	0.44	4.39	
PFTrDA	**72629-94-8**	**0.44 U**	**H6919-FS(0)**	**1.000**	**8/4/2020**	**0.13**	**0.44**	**4.39**	
PFTeDA	376-06-7	1.75 J UJ	H6919-FS(0)	1.000	8/4/2020	0.64	1.75	4.39	SSL
NMeFOSAA	**2355-31-9**	**0.88 U**	**H6919-FS(0)**	**1.000**	**8/4/2020**	**0.31**	**0.88**	**4.39**	
NEtFOSAA	2991-50-6	0.88 U	H6919-FS(0)	1.000	8/4/2020	0.44	0.88	4.39	
PFBS	**375-73-5**	**17.92**	**H6919-FS(0)**	**1.000**	**8/4/2020**	**0.12**	**0.44**	**4.39**	
PFHxS	355-46-4	186.34 D	H6919-FS-D(3)	5.000	8/4/2020	0.48	1.75	21.93	
PFOS	**1763-23-1**	**130.27 D**	**H6919-FS-D(3)**	**5.000**	**8/4/2020**	**1.93**	**4.39**	**21.93**	
HFPO-DA	13252-13-6	0.44 U	H6919-FS(0)	1.000	8/4/2020	0.22	0.44	4.39	
Adona	**919005-14-4**	**0.88 U**	**H6919-FS(0)**	**1.000**	**8/4/2020**	**0.24**	**0.88**	**4.39**	
11Cl-PF3OUdS	763051-92-9	0.44 U	H6919-FS(0)	1.000	8/4/2020	0.20	0.44	4.39	
9Cl-PF3ONS	**756426-58-1**	**0.88 U**	**H6919-FS(0)**	**1.000**	**8/4/2020**	**0.24**	**0.88**	**4.39**	

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4

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

Client ID	PX-WF-EFF02-070720
Battelle ID	H6919-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/14/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	68 D	H6919-FS-D(3)	8/4/2020
13C4-PFHpA	51	H6919-FS(0)	8/4/2020
13C8-PFOA	62	H6919-FS(0)	8/4/2020
13C9-PFNA	80	H6919-FS(0)	8/4/2020
13C6-PFDA	83	H6919-FS(0)	8/4/2020
13C7-PFUnA	68	H6919-FS(0)	8/4/2020
13C2-PFDoA	55	H6919-FS(0)	8/4/2020
13C2-PFTeDA	31 H	H6919-FS(0)	8/4/2020
d3-MeFOSAA	76 D	H6919-FS-D(3)	8/4/2020
d5-EtFOSAA	86 D	H6919-FS-D(3)	8/4/2020
13C3-PFBS	83 D	H6919-FS-D(3)	8/4/2020
13C3-PFHxS	87 D	H6919-FS-D(3)	8/4/2020
13C8-PFOS	91 D	H6919-FS-D(3)	8/4/2020
13C3-HFPO-DA	79	H6919-FS(0)	8/4/2020

NW 9/26/20

Analyzed by: Griffith, Lauren
Printed: 8/5/2020

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5

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

Client ID	PX-S09-MW36-0720
Battelle ID	H6920-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/14/2020
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	676.51 D	H6920-FS-D(7)	31.250	8/4/2020	15.34	43.40	144.68
PFHpA	**375-85-9**	**96.69 D**	**H6920-FS-D(3)**	**5.000**	**8/4/2020**	**1.20**	**4.63**	**23.15**
PFOA	335-67-1	156.31 D	H6920-FS-D(5)	12.500	8/4/2020	5.90	17.36	57.87
PFNA	**375-95-1**	**1.35 J**	**H6920-FS(0)**	**1.000**	**8/4/2020**	**0.29**	**0.93**	**4.63**
PFDA	335-76-2	0.46 ~~0.24~~ U	H6920-FS(0)	1.000	8/4/2020	0.13	0.46	4.63
PFUnA	**2058-94-8**	**0.46 U**	**H6920-FS(0)**	**1.000**	**8/4/2020**	**0.20**	**0.46**	**4.63**
PFDoA	307-55-1	0.46 U	H6920-FS(0)	1.000	8/4/2020	0.18	0.46	4.63
PFTrDA	**72629-94-8**	**0.46 U**	**H6920-FS(0)**	**1.000**	**8/4/2020**	**0.14**	**0.46**	**4.63**
PFTeDA	376-06-7	1.85 U	H6920-FS(0)	1.000	8/4/2020	0.68	1.85	4.63
NMeFOSAA	**2355-31-9**	**0.93 U**	**H6920-FS(0)**	**1.000**	**8/4/2020**	**0.32**	**0.93**	**4.63**
NEtFOSAA	2991-50-6	0.93 U	H6920-FS(0)	1.000	8/4/2020	0.46	0.93	4.63
PFBS	**375-73-5**	**536.24 D**	**H6920-FS-D(7)**	**31.250**	**8/4/2020**	**4.05**	**14.47**	**144.68**
PFHxS	355-46-4	2966.20 D	H6920-FS-D(9)	78.125	8/4/2020	7.96	28.94	361.69
PFOS	**1763-23-1**	**1953.56 D**	**H6920-FS-D(9)**	**78.125**	**8/4/2020**	**31.83**	**72.34**	**361.69**
HFPO-DA	13252-13-6	0.46 U	H6920-FS(0)	1.000	8/4/2020	0.23	0.46	4.63
Adona	**919005-14-4**	**0.93 U**	**H6920-FS(0)**	**1.000**	**8/4/2020**	**0.25**	**0.93**	**4.63**
11Cl-PF3OUdS	763051-92-9	0.46 U	H6920-FS(0)	1.000	8/4/2020	0.21	0.46	4.63
9Cl-PF3ONS	**756426-58-1**	**0.93 U**	**H6920-FS(0)**	**1.000**	**8/4/2020**	**0.25**	**0.93**	**4.63**

MBL

NW 9/26/20

Analyzed by: Griffith, Lauren
Printed: 8/5/2020

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-0767
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: September 26, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-S09-SS19-000H	H6896-FS	Soil
2	PX-S09-SB19-0304	H6897-FS	Soil
3	PX-S09-SB19P-0304	H6898-FS	Soil
4	PX-S09-SS20-000H	H6899-FS	Soil
5	PX-S09-SB20-0203	H6900-FS	Soil
6	PX-S09-SS21-000H	H6901-FS	Soil
6MS	PX-S09-SS21-000HMS	H6902-FSMS	Soil
6MSD	PX-S09-SS21-000HMSD	H6903-FSMSD	Soil
7	PX-S09-SB21-0304	H6904-FS	Soil
8	PX-S09-SS22-000H	H6905-FS	Soil
9	PX-S09-SB22-0304	H6906-FS	Soil
10	PX-S09-SS23-000H	H6908-FS	Soil
11	PX-S09-SS23P-000H	H6909-FS	Soil
12	PX-S09-SB23-0304	H6910-FS	Soil
13	PX-S09-SS24-000H	H6911-FS	Soil
14	PX-S09-SB24-0304	H6912-FS	Soil
15	PX-WF-CTMCA-SS02-000H	H6913-FS	Soil
16	PX-WF-CTMCA-SB02-0304	H6914-FS	Soil
17	PX-WF-CTMCA-SS07-000H	H6915-FS	Soil
18	PX-WF-CTMCA-SB07-0304	H6916-FS	Soil

A Stage 2B/4 data validation was performed on the analytical data for eighteen soil samples collected on July 6-7, 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	*Method References*
PFAS	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-SS09-EB01-070720-SO	PFHxA	0.92	U	4, 5, 6
	PFHpA	0.67	None	All Samples ND
	PFBS	0.40	U	4, 5, 6, 7
	PFHxS	4.77	U	4, 5, 6, 7
	PFOS	26.66	U	7, 10, 11, 13
PX-WF-CTMCA-EB01-070720	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 except for the following.

MS/MSD Sample	Compound	MS %R/MSD %R/RPD	Qualifier	Affected Samples
6	PFOS	465%/310%/40	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.

Field Duplicate Sample Precision

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

Compound	PX-S09-SB19-0304 ng/g	PX-S09-SB19P-0304 ng/g	RPD	Qualifier
None	ND	ND	-	-

Compound	PX-S09-SS23-000H ng/g	PX-S09-SS23P-000H 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 Dated: 10/21/20

Nancy Weaver
Senior Chemist

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.

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

Client ID	PX-S09-SS19-000H
Battelle ID	H6896-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	10.12
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	H6896-FS(3)	10.000	7/22/2020	0.78	2.19	5.46
PFHpA	375-85-9	1.64 U	H6896-FS(3)	10.000	7/22/2020	0.56	1.64	5.46
PFOA	335-67-1	2.19 U	H6896-FS(3)	10.000	7/22/2020	0.67	2.19	5.46
PFNA	375-95-1	1.09 U	H6896-FS(3)	10.000	7/22/2020	0.54	1.09	5.46
PFDA	335-76-2	1.09 U	H6896-FS(3)	10.000	7/22/2020	0.50	1.09	5.46
PFUnA	2058-94-8	1.09 U	H6896-FS(3)	10.000	7/22/2020	0.50	1.09	5.46
PFDoA	307-55-1	2.19 U	H6896-FS(3)	10.000	7/22/2020	0.67	2.19	5.46
PFTrDA	72629-94-8	1.09 U	H6896-FS(3)	10.000	7/22/2020	0.31	1.09	5.46
PFTeDA	376-06-7	2.73 U	H6896-FS(3)	10.000	7/22/2020	1.18	2.73	5.46
NMeFOSAA	2355-31-9	2.73 U	H6896-FS(3)	10.000	7/22/2020	1.11	2.73	5.46
NEtFOSAA	2991-50-6	2.19 U	H6896-FS(3)	10.000	7/22/2020	0.82	2.19	5.46
PFBS	375-73-5	1.09 U	H6896-FS(3)	10.000	7/22/2020	0.38	1.09	5.46
PFHxS	355-46-4	2.19 U	H6896-FS(3)	10.000	7/22/2020	0.89	2.19	5.46
PFOS	1763-23-1	2.19 U	H6896-FS(3)	10.000	7/22/2020	0.75	2.19	5.46
HFPO-DA	13252-13-6	2.19 U	H6896-FS(3)	10.000	7/22/2020	0.70	2.19	5.46
Adona	919005-14-4	2.19 U	H6896-FS(3)	10.000	7/22/2020	0.91	2.19	5.46
11Cl-PF3OUdS	763051-92-9	1.64 U	H6896-FS(3)	10.000	7/22/2020	0.57	1.64	5.46
9Cl-PF3ONS	756426-58-1	1.09 U	H6896-FS(3)	10.000	7/22/2020	0.52	1.09	5.46

MW 9/26/20

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

Client ID	PX-S09-SB19-0304
Battelle ID	H6897-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	11.79
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	H6897-FS(3)	10.000	7/22/2020	0.85	2.38	5.95
PFHpA	375-85-9	1.79 U	H6897-FS(3)	10.000	7/22/2020	0.61	1.79	5.95
PFOA	335-67-1	2.38 U	H6897-FS(3)	10.000	7/22/2020	0.73	2.38	5.95
PFNA	375-95-1	1.19 U	H6897-FS(3)	10.000	7/22/2020	0.58	1.19	5.95
PFDA	335-76-2	1.19 U	H6897-FS(3)	10.000	7/22/2020	0.55	1.19	5.95
PFUnA	2058-94-8	1.19 U	H6897-FS(3)	10.000	7/22/2020	0.55	1.19	5.95
PFDoA	307-55-1	2.38 U	H6897-FS(3)	10.000	7/22/2020	0.73	2.38	5.95
PFTrDA	72629-94-8	1.19 U	H6897-FS(3)	10.000	7/22/2020	0.33	1.19	5.95
PFTeDA	376-06-7	2.98 U	H6897-FS(3)	10.000	7/22/2020	1.29	2.98	5.95
NMeFOSAA	2355-31-9	2.98 U	H6897-FS(3)	10.000	7/22/2020	1.21	2.98	5.95
NEtFOSAA	2991-50-6	2.38 U	H6897-FS(3)	10.000	7/22/2020	0.89	2.38	5.95
PFBS	375-73-5	1.19 U	H6897-FS(3)	10.000	7/22/2020	0.42	1.19	5.95
PFHxS	355-46-4	2.38 U	H6897-FS(3)	10.000	7/22/2020	0.96	2.38	5.95
PFOS	1763-23-1	2.38 U	H6897-FS(3)	10.000	7/22/2020	0.82	2.38	5.95
HFPO-DA	13252-13-6	2.38 U	H6897-FS(3)	10.000	7/22/2020	0.76	2.38	5.95
Adona	919005-14-4	2.38 U	H6897-FS(3)	10.000	7/22/2020	0.99	2.38	5.95
11Cl-PF3OUdS	763051-92-9	1.79 U	H6897-FS(3)	10.000	7/22/2020	0.62	1.79	5.95
9Cl-PF3ONS	756426-58-1	1.19 U	H6897-FS(3)	10.000	7/22/2020	0.57	1.19	5.95

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3

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

Client ID	PX-S09-SB19P-0304
Battelle ID	H6898-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	10.93
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	H6898-FS(3)	10.000	7/22/2020	0.82	2.30	5.75
PFHpA	375-85-9	1.72 U	H6898-FS(3)	10.000	7/22/2020	0.59	1.72	5.75
PFOA	335-67-1	2.30 U	H6898-FS(3)	10.000	7/22/2020	0.70	2.30	5.75
PFNA	375-95-1	1.15 U	H6898-FS(3)	10.000	7/22/2020	0.56	1.15	5.75
PFDA	335-76-2	1.15 U	H6898-FS(3)	10.000	7/22/2020	0.53	1.15	5.75
PFUnA	2058-94-8	1.15 U	H6898-FS(3)	10.000	7/22/2020	0.53	1.15	5.75
PFDoA	307-55-1	2.30 U	H6898-FS(3)	10.000	7/22/2020	0.70	2.30	5.75
PFTrDA	72629-94-8	1.15 U	H6898-FS(3)	10.000	7/22/2020	0.32	1.15	5.75
PFTeDA	376-06-7	2.87 U	H6898-FS(3)	10.000	7/22/2020	1.24	2.87	5.75
NMeFOSAA	2355-31-9	2.87 U	H6898-FS(3)	10.000	7/22/2020	1.17	2.87	5.75
NEtFOSAA	2991-50-6	2.30 U	H6898-FS(3)	10.000	7/22/2020	0.86	2.30	5.75
PFBS	375-73-5	1.15 U	H6898-FS(3)	10.000	7/22/2020	0.40	1.15	5.75
PFHxS	355-46-4	2.30 U	H6898-FS(3)	10.000	7/22/2020	0.93	2.30	5.75
PFOS	1763-23-1	2.30 U	H6898-FS(3)	10.000	7/22/2020	0.79	2.30	5.75
HFPO-DA	13252-13-6	2.30 U	H6898-FS(3)	10.000	7/22/2020	0.74	2.30	5.75
Adona	919005-14-4	2.30 U	H6898-FS(3)	10.000	7/22/2020	0.95	2.30	5.75
11Cl-PF3OUdS	763051-92-9	1.72 U	H6898-FS(3)	10.000	7/22/2020	0.60	1.72	5.75
9Cl-PF3ONS	756426-58-1	1.15 U	H6898-FS(3)	10.000	7/22/2020	0.55	1.15	5.75

NW 9/26/20
Analyzed by: Griffith, Lauren
Printed: 7/30/2020

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

Client ID	PX-S09-SS20-000H
Battelle ID	H6899-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	14.42
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 ~~1.70~~ J U	H6899-FS(3)	10.000	7/22/2020	0.77	2.16	5.41	EBL
PFHpA	375-85-9	1.62 U	H6899-FS(3)	10.000	7/22/2020	0.55	1.62	5.41	
PFOA	335-67-1	0.73 J	H6899-FS(3)	10.000	7/22/2020	0.66	2.16	5.41	
PFNA	375-95-1	1.08 U	H6899-FS(3)	10.000	7/22/2020	0.53	1.08	5.41	
PFDA	335-76-2	1.08 U	H6899-FS(3)	10.000	7/22/2020	0.50	1.08	5.41	
PFUnA	2058-94-8	1.08 U	H6899-FS(3)	10.000	7/22/2020	0.50	1.08	5.41	
PFDoA	307-55-1	2.16 U	H6899-FS(3)	10.000	7/22/2020	0.66	2.16	5.41	
PFTrDA	72629-94-8	1.08 U	H6899-FS(3)	10.000	7/22/2020	0.30	1.08	5.41	
PFTeDA	376-06-7	2.70 U	H6899-FS(3)	10.000	7/22/2020	1.17	2.70	5.41	
NMeFOSAA	2355-31-9	2.70 U	H6899-FS(3)	10.000	7/22/2020	1.10	2.70	5.41	
NEtFOSAA	2991-50-6	2.16 U	H6899-FS(3)	10.000	7/22/2020	0.81	2.16	5.41	
PFBS	375-73-5	1.08 ~~0.58~~ J U	H6899-FS(3)	10.000	7/22/2020	0.38	1.08	5.41	EBL
PFHxS	355-46-4	19.61 J	H6899-FS(3)	10.000	7/22/2020	0.88	2.16	5.41	EBL
PFOS	1763-23-1	354.73 D	H6899-FS-D(5)	50.000	7/22/2020	3.73	10.81	27.03	
HFPO-DA	13252-13-6	2.16 U	H6899-FS(3)	10.000	7/22/2020	0.69	2.16	5.41	
Adona	919005-14-4	2.16 U	H6899-FS(3)	10.000	7/22/2020	0.90	2.16	5.41	
11Cl-PF3OUdS	763051-92-9	1.62 U	H6899-FS(3)	10.000	7/22/2020	0.56	1.62	5.41	
9Cl-PF3ONS	756426-58-1	1.08 U	H6899-FS(3)	10.000	7/22/2020	0.52	1.08	5.41	

MW 9/26/20
Analyzed by: Griffith, Lauren
Printed: 7/30/2020

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

Client ID	PX-S09-SB20-0203
Battelle ID	H6900-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	12.66
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 ~~1.76~~ J u	H6900-FS(3)	10.000	7/22/2020	0.80	2.26	5.65	EBL
PFHpA	**375-85-9**	**1.69 U**	**H6900-FS(3)**	**10.000**	**7/22/2020**	**0.58**	**1.69**	**5.65**	
PFOA	335-67-1	2.26 U	H6900-FS(3)	10.000	7/22/2020	0.69	2.26	5.65	
PFNA	**375-95-1**	**1.13 U**	**H6900-FS(3)**	**10.000**	**7/22/2020**	**0.55**	**1.13**	**5.65**	
PFDA	335-76-2	1.13 U	H6900-FS(3)	10.000	7/22/2020	0.52	1.13	5.65	
PFUnA	**2058-94-8**	**1.13 U**	**H6900-FS(3)**	**10.000**	**7/22/2020**	**0.52**	**1.13**	**5.65**	
PFDoA	307-55-1	2.26 U	H6900-FS(3)	10.000	7/22/2020	0.69	2.26	5.65	
PFTrDA	**72629-94-8**	**1.13 U**	**H6900-FS(3)**	**10.000**	**7/22/2020**	**0.32**	**1.13**	**5.65**	
PFTeDA	376-06-7	2.82 U	H6900-FS(3)	10.000	7/22/2020	1.22	2.82	5.65	
NMeFOSAA	**2355-31-9**	**2.82 U**	**H6900-FS(3)**	**10.000**	**7/22/2020**	**1.15**	**2.82**	**5.65**	
NEtFOSAA	2991-50-6	2.26 U	H6900-FS(3)	10.000	7/22/2020	0.85	2.26	5.65	
PFBS	**375-73-5**	1.13 ~~0.63~~ J u	**H6900-FS(3)**	**10.000**	**7/22/2020**	**0.40**	**1.13**	**5.65**	EBL
PFHxS	355-46-4	17.95 u	H6900-FS(3)	10.000	7/22/2020	0.92	2.26	5.65	EBL
PFOS	**1763-23-1**	**846.55 D**	**H6900-FS-D(5)**	**250.000**	**7/22/2020**	**19.49**	**56.50**	**141.24**	
HFPO-DA	13252-13-6	2.26 U	H6900-FS(3)	10.000	7/22/2020	0.72	2.26	5.65	
Adona	**919005-14-4**	**2.26 U**	**H6900-FS(3)**	**10.000**	**7/22/2020**	**0.94**	**2.26**	**5.65**	
11Cl-PF3OUdS	763051-92-9	1.69 U	H6900-FS(3)	10.000	7/22/2020	0.59	1.69	5.65	
9Cl-PF3ONS	**756426-58-1**	**1.13 U**	**H6900-FS(3)**	**10.000**	**7/22/2020**	**0.54**	**1.13**	**5.65**	

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

Client ID	PX-S09-SS21-000H
Battelle ID	H6901-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	15.54
Matrix	SOIL
Sample Size	1.71
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	2.34 ~~1.02~~ U	H6901-FS(3)	10.000	7/22/2020	0.83	2.34	5.85	EBL
PFHpA	**375-85-9**	1.75 U	H6901-FS(3)	10.000	7/22/2020	0.60	1.75	5.85	
PFOA	335-67-1	2.34 U	H6901-FS(3)	10.000	7/22/2020	0.71	2.34	5.85	
PFNA	**375-95-1**	1.17 U	H6901-FS(3)	10.000	7/22/2020	0.57	1.17	5.85	
PFDA	335-76-2	1.17 U	H6901-FS(3)	10.000	7/22/2020	0.54	1.17	5.85	
PFUnA	**2058-94-8**	1.17 U	H6901-FS(3)	10.000	7/22/2020	0.54	1.17	5.85	
PFDoA	307-55-1	2.34 U	H6901-FS(3)	10.000	7/22/2020	0.71	2.34	5.85	
PFTrDA	**72629-94-8**	1.17 U	H6901-FS(3)	10.000	7/22/2020	0.33	1.17	5.85	
PFTeDA	376-06-7	2.92 U	H6901-FS(3)	10.000	7/22/2020	1.26	2.92	5.85	
NMeFOSAA	**2355-31-9**	2.92 U	H6901-FS(3)	10.000	7/22/2020	1.19	2.92	5.85	
NEtFOSAA	2991-50-6	2.34 U	H6901-FS(3)	10.000	7/22/2020	0.88	2.34	5.85	
PFBS	**375-73-5**	1.17 ~~0.65~~ U	H6901-FS(3)	10.000	7/22/2020	0.41	1.17	5.85	EBL
PFHxS	355-46-4	17.48 U	H6901-FS(3)	10.000	7/22/2020	0.95	2.34	5.85	EBL
PFOS	**1763-23-1**	249.68 D	H6901-FS-D(5)	50.000	7/22/2020	4.04	11.70	29.24	
HFPO-DA	13252-13-6	2.34 U	H6901-FS(3)	10.000	7/22/2020	0.75	2.34	5.85	
Adona	**919005-14-4**	2.34 U	H6901-FS(3)	10.000	7/22/2020	0.97	2.34	5.85	
11Cl-PF3OUdS	763051-92-9	1.75 U	H6901-FS(3)	10.000	7/22/2020	0.61	1.75	5.85	
9Cl-PF3ONS	**756426-58-1**	1.17 U	H6901-FS(3)	10.000	7/22/2020	0.56	1.17	5.85	

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

Client ID	PX-S09-SB21-0304
Battelle ID	H6904-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	18.21
Matrix	SOIL
Sample Size	1.59
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	2.52 U	H6904-FS(3)	10.000	7/22/2020	0.89	2.52	6.29	
PFHpA	375-85-9	1.89 U	H6904-FS(3)	10.000	7/22/2020	0.64	1.89	6.29	
PFOA	335-67-1	2.52 U	H6904-FS(3)	10.000	7/22/2020	0.77	2.52	6.29	
PFNA	375-95-1	1.26 U	H6904-FS(3)	10.000	7/22/2020	0.62	1.26	6.29	
PFDA	335-76-2	1.26 U	H6904-FS(3)	10.000	7/22/2020	0.58	1.26	6.29	
PFUnA	2058-94-8	1.26 U	H6904-FS(3)	10.000	7/22/2020	0.58	1.26	6.29	
PFDoA	307-55-1	2.52 U	H6904-FS(3)	10.000	7/22/2020	0.77	2.52	6.29	
PFTrDA	72629-94-8	1.26 U	H6904-FS(3)	10.000	7/22/2020	0.35	1.26	6.29	
PFTeDA	376-06-7	3.14 U	H6904-FS(3)	10.000	7/22/2020	1.36	3.14	6.29	
NMeFOSAA	2355-31-9	3.14 U	H6904-FS(3)	10.000	7/22/2020	1.28	3.14	6.29	
NEtFOSAA	2991-50-6	2.52 U	H6904-FS(3)	10.000	7/22/2020	0.94	2.52	6.29	
PFBS	375-73-5	1.26 ~~0.55~~ U	H6904-FS(3)	10.000	7/22/2020	0.44	1.26	6.29	EBL
PFHxS	355-46-4	9.55 U	H6904-FS(3)	10.000	7/22/2020	1.02	2.52	6.29	
PFOS	1763-23-1	108.91 U	H6904-FS(3)	10.000	7/22/2020	0.87	2.52	6.29	
HFPO-DA	13252-13-6	2.52 U	H6904-FS(3)	10.000	7/22/2020	0.81	2.52	6.29	
Adona	919005-14-4	2.52 U	H6904-FS(3)	10.000	7/22/2020	1.04	2.52	6.29	
11Cl-PF3OUdS	763051-92-9	1.89 U	H6904-FS(3)	10.000	7/22/2020	0.65	1.89	6.29	
9Cl-PF3ONS	756426-58-1	1.26 U	H6904-FS(3)	10.000	7/22/2020	0.60	1.26	6.29	

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

Client ID	PX-S09-SS22-000H
Battelle ID	H6905-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	7.27
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	H6905-FS(3)	10.000	7/22/2020	0.82	2.31	5.78
PFHpA	375-85-9	1.73 U	H6905-FS(3)	10.000	7/22/2020	0.59	1.73	5.78
PFOA	335-67-1	2.31 U	H6905-FS(3)	10.000	7/22/2020	0.71	2.31	5.78
PFNA	375-95-1	1.16 U	H6905-FS(3)	10.000	7/22/2020	0.57	1.16	5.78
PFDA	335-76-2	1.16 U	H6905-FS(3)	10.000	7/22/2020	0.53	1.16	5.78
PFUnA	2058-94-8	1.16 U	H6905-FS(3)	10.000	7/22/2020	0.53	1.16	5.78
PFDoA	307-55-1	2.31 U	H6905-FS(3)	10.000	7/22/2020	0.71	2.31	5.78
PFTrDA	72629-94-8	1.16 U	H6905-FS(3)	10.000	7/22/2020	0.32	1.16	5.78
PFTeDA	376-06-7	2.89 U	H6905-FS(3)	10.000	7/22/2020	1.25	2.89	5.78
NMeFOSAA	2355-31-9	2.89 U	H6905-FS(3)	10.000	7/22/2020	1.18	2.89	5.78
NEtFOSAA	2991-50-6	2.31 U	H6905-FS(3)	10.000	7/22/2020	0.87	2.31	5.78
PFBS	375-73-5	1.16 U	H6905-FS(3)	10.000	7/22/2020	0.40	1.16	5.78
PFHxS	355-46-4	2.31 U	H6905-FS(3)	10.000	7/22/2020	0.94	2.31	5.78
PFOS	1763-23-1	2.31 U	H6905-FS(3)	10.000	7/22/2020	0.80	2.31	5.78
HFPO-DA	13252-13-6	2.31 U	H6905-FS(3)	10.000	7/22/2020	0.74	2.31	5.78
Adona	919005-14-4	2.31 U	H6905-FS(3)	10.000	7/22/2020	0.96	2.31	5.78
11Cl-PF3OUdS	763051-92-9	1.73 U	H6905-FS(3)	10.000	7/22/2020	0.60	1.73	5.78
9Cl-PF3ONS	756426-58-1	1.16 U	H6905-FS(3)	10.000	7/22/2020	0.55	1.16	5.78

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

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Client ID		PX-S09-SB22-0304						
Battelle ID		H6906-FS						
Sample Type		SA						
Collection Date		07/07/2020						
Extraction Date		07/09/2020						
Analytical Instrument		Sciex 5500 LC/MS/MS						
% Moisture		9.27						
Matrix		SOIL						
Sample Size		1.92						
Size Unit-Basis		g						
Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.08 U	H6906-FS(3)	10.000	7/22/2020	0.74	2.08	5.21
PFHpA	375-85-9	1.56 U	H6906-FS(3)	10.000	7/22/2020	0.53	1.56	5.21
PFOA	335-67-1	2.08 U	H6906-FS(3)	10.000	7/22/2020	0.64	2.08	5.21
PFNA	375-95-1	1.04 U	H6906-FS(3)	10.000	7/22/2020	0.51	1.04	5.21
PFDA	335-76-2	1.04 U	H6906-FS(3)	10.000	7/22/2020	0.48	1.04	5.21
PFUnA	2058-94-8	1.04 U	H6906-FS(3)	10.000	7/22/2020	0.48	1.04	5.21
PFDoA	307-55-1	2.08 U	H6906-FS(3)	10.000	7/22/2020	0.64	2.08	5.21
PFTrDA	72629-94-8	1.04 U	H6906-FS(3)	10.000	7/22/2020	0.29	1.04	5.21
PFTeDA	376-06-7	2.60 U	H6906-FS(3)	10.000	7/22/2020	1.13	2.60	5.21
NMeFOSAA	2355-31-9	2.60 U	H6906-FS(3)	10.000	7/22/2020	1.06	2.60	5.21
NEtFOSAA	2991-50-6	2.08 U	H6906-FS(3)	10.000	7/22/2020	0.78	2.08	5.21
PFBS	375-73-5	1.04 U	H6906-FS(3)	10.000	7/22/2020	0.36	1.04	5.21
PFHxS	355-46-4	2.08 U	H6906-FS(3)	10.000	7/22/2020	0.84	2.08	5.21
PFOS	1763-23-1	2.08 U	H6906-FS(3)	10.000	7/22/2020	0.72	2.08	5.21
HFPO-DA	13252-13-6	2.08 U	H6906-FS(3)	10.000	7/22/2020	0.67	2.08	5.21
Adona	919005-14-4	2.08 U	H6906-FS(3)	10.000	7/22/2020	0.86	2.08	5.21
11Cl-PF3OUdS	763051-92-9	1.56 U	H6906-FS(3)	10.000	7/22/2020	0.54	1.56	5.21
9Cl-PF3ONS	756426-58-1	1.04 U	H6906-FS(3)	10.000	7/22/2020	0.50	1.04	5.21

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

Client ID	PX-S09-SS23-000H
Battelle ID	H6908-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	12.82
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	H6908-FS(3)	10.000	7/22/2020	0.78	2.19	5.46
PFHpA	**375-85-9**	**1.64 U**	**H6908-FS(3)**	**10.000**	**7/22/2020**	**0.56**	**1.64**	**5.46**
PFOA	335-67-1	2.19 U	H6908-FS(3)	10.000	7/22/2020	0.67	2.19	5.46
PFNA	**375-95-1**	**1.09 U**	**H6908-FS(3)**	**10.000**	**7/22/2020**	**0.54**	**1.09**	**5.46**
PFDA	335-76-2	1.09 U	H6908-FS(3)	10.000	7/22/2020	0.50	1.09	5.46
PFUnA	**2058-94-8**	**1.09 U**	**H6908-FS(3)**	**10.000**	**7/22/2020**	**0.50**	**1.09**	**5.46**
PFDoA	307-55-1	2.19 U	H6908-FS(3)	10.000	7/22/2020	0.67	2.19	5.46
PFTrDA	**72629-94-8**	**1.09 U**	**H6908-FS(3)**	**10.000**	**7/22/2020**	**0.31**	**1.09**	**5.46**
PFTeDA	376-06-7	2.73 U	H6908-FS(3)	10.000	7/22/2020	1.18	2.73	5.46
NMeFOSAA	**2355-31-9**	**2.73 U**	**H6908-FS(3)**	**10.000**	**7/22/2020**	**1.11**	**2.73**	**5.46**
NEtFOSAA	2991-50-6	2.19 U	H6908-FS(3)	10.000	7/22/2020	0.82	2.19	5.46
PFBS	**375-73-5**	**1.09 U**	**H6908-FS(3)**	**10.000**	**7/22/2020**	**0.38**	**1.09**	**5.46**
PFHxS	355-46-4	2.19 U	H6908-FS(3)	10.000	7/22/2020	0.89	2.19	5.46
PFOS	**1763-23-1**	**3.34 U**	**H6908-FS(3)**	**10.000**	**7/22/2020**	**0.75**	**2.19**	**5.46**
HFPO-DA	13252-13-6	2.19 U	H6908-FS(3)	10.000	7/22/2020	0.70	2.19	5.46
Adona	**919005-14-4**	**2.19 U**	**H6908-FS(3)**	**10.000**	**7/22/2020**	**0.91**	**2.19**	**5.46**
11Cl-PF3OUdS	763051-92-9	1.64 U	H6908-FS(3)	10.000	7/22/2020	0.57	1.64	5.46
9Cl-PF3ONS	**756426-58-1**	**1.09 U**	**H6908-FS(3)**	**10.000**	**7/22/2020**	**0.52**	**1.09**	**5.46**

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

Client ID	PX-S09-SS23P-000H
Battelle ID	H6909-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	16.81
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	2.23 U	H6909-FS(3)	10.000	7/22/2020	0.79	2.23	5.59
PFHpA	375-85-9	1.68 U	H6909-FS(3)	10.000	7/22/2020	0.57	1.68	5.59
PFOA	335-67-1	2.23 U	H6909-FS(3)	10.000	7/22/2020	0.68	2.23	5.59
PFNA	375-95-1	1.12 U	H6909-FS(3)	10.000	7/22/2020	0.55	1.12	5.59
PFDA	335-76-2	1.12 U	H6909-FS(3)	10.000	7/22/2020	0.51	1.12	5.59
PFUnA	2058-94-8	1.12 U	H6909-FS(3)	10.000	7/22/2020	0.51	1.12	5.59
PFDoA	307-55-1	2.23 U	H6909-FS(3)	10.000	7/22/2020	0.68	2.23	5.59
PFTrDA	72629-94-8	1.12 U	H6909-FS(3)	10.000	7/22/2020	0.31	1.12	5.59
PFTeDA	376-06-7	2.79 U	H6909-FS(3)	10.000	7/22/2020	1.21	2.79	5.59
NMeFOSAA	2355-31-9	2.79 U	H6909-FS(3)	10.000	7/22/2020	1.14	2.79	5.59
NEtFOSAA	2991-50-6	2.23 U	H6909-FS(3)	10.000	7/22/2020	0.84	2.23	5.59
PFBS	375-73-5	1.12 U	H6909-FS(3)	10.000	7/22/2020	0.39	1.12	5.59
PFHxS	355-46-4	2.23 U	H6909-FS(3)	10.000	7/22/2020	0.91	2.23	5.59
PFOS	1763-23-1	2.23 ~~2.19~~ U	H6909-FS(3)	10.000	7/22/2020	0.77	2.23	5.59
HFPO-DA	13252-13-6	2.23 U	H6909-FS(3)	10.000	7/22/2020	0.72	2.23	5.59
Adona	919005-14-4	2.23 U	H6909-FS(3)	10.000	7/22/2020	0.93	2.23	5.59
11Cl-PF3OUdS	763051-92-9	1.68 U	H6909-FS(3)	10.000	7/22/2020	0.58	1.68	5.59
9Cl-PF3ONS	756426-58-1	1.12 U	H6909-FS(3)	10.000	7/22/2020	0.54	1.12	5.59

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

Client ID	PX-S09-SB23-0304
Battelle ID	H6910-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	16.93
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	H6910-FS(3)	10.000	7/22/2020	0.83	2.33	5.81
PFHpA	375-85-9	1.74 U	H6910-FS(3)	10.000	7/22/2020	0.59	1.74	5.81
PFOA	335-67-1	2.33 U	H6910-FS(3)	10.000	7/22/2020	0.71	2.33	5.81
PFNA	375-95-1	1.16 U	H6910-FS(3)	10.000	7/22/2020	0.57	1.16	5.81
PFDA	335-76-2	1.16 U	H6910-FS(3)	10.000	7/22/2020	0.53	1.16	5.81
PFUnA	2058-94-8	1.16 U	H6910-FS(3)	10.000	7/22/2020	0.53	1.16	5.81
PFDoA	307-55-1	2.33 U	H6910-FS(3)	10.000	7/22/2020	0.71	2.33	5.81
PFTrDA	72629-94-8	1.16 U	H6910-FS(3)	10.000	7/22/2020	0.33	1.16	5.81
PFTeDA	376-06-7	2.91 U	H6910-FS(3)	10.000	7/22/2020	1.26	2.91	5.81
NMeFOSAA	2355-31-9	2.91 U	H6910-FS(3)	10.000	7/22/2020	1.19	2.91	5.81
NEtFOSAA	2991-50-6	2.33 U	H6910-FS(3)	10.000	7/22/2020	0.87	2.33	5.81
PFBS	375-73-5	1.16 U	H6910-FS(3)	10.000	7/22/2020	0.41	1.16	5.81
PFHxS	355-46-4	2.33 U	H6910-FS(3)	10.000	7/22/2020	0.94	2.33	5.81
PFOS	1763-23-1	2.33 U	H6910-FS(3)	10.000	7/22/2020	0.80	2.33	5.81
HFPO-DA	13252-13-6	2.33 U	H6910-FS(3)	10.000	7/22/2020	0.74	2.33	5.81
Adona	919005-14-4	2.33 U	H6910-FS(3)	10.000	7/22/2020	0.97	2.33	5.81
11Cl-PF3OUdS	763051-92-9	1.74 U	H6910-FS(3)	10.000	7/22/2020	0.60	1.74	5.81
9Cl-PF3ONS	756426-58-1	1.16 U	H6910-FS(3)	10.000	7/22/2020	0.56	1.16	5.81

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

Client ID	PX-S09-SS24-000H
Battelle ID	H6911-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	19.22
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	H6911-FS(3)	10.000	7/22/2020	0.86	2.41	6.02	
PFHpA	**375-85-9**	**1.81 U**	**H6911-FS(3)**	**10.000**	**7/22/2020**	**0.61**	**1.81**	**6.02**	
PFOA	335-67-1	2.41 U	H6911-FS(3)	10.000	7/22/2020	0.73	2.41	6.02	
PFNA	**375-95-1**	**1.20 U**	**H6911-FS(3)**	**10.000**	**7/22/2020**	**0.59**	**1.20**	**6.02**	
PFDA	335-76-2	1.20 U	H6911-FS(3)	10.000	7/22/2020	0.55	1.20	6.02	
PFUnA	**2058-94-8**	**1.20 U**	**H6911-FS(3)**	**10.000**	**7/22/2020**	**0.55**	**1.20**	**6.02**	
PFDoA	307-55-1	2.41 U	H6911-FS(3)	10.000	7/22/2020	0.73	2.41	6.02	
PFTrDA	**72629-94-8**	**1.20 U**	**H6911-FS(3)**	**10.000**	**7/22/2020**	**0.34**	**1.20**	**6.02**	
PFTeDA	376-06-7	3.01 U	H6911-FS(3)	10.000	7/22/2020	1.30	3.01	6.02	
NMeFOSAA	**2355-31-9**	**3.01 U**	**H6911-FS(3)**	**10.000**	**7/22/2020**	**1.23**	**3.01**	**6.02**	
NEtFOSAA	2991-50-6	2.41 U	H6911-FS(3)	10.000	7/22/2020	0.90	2.41	6.02	
PFBS	**375-73-5**	**1.20 U**	**H6911-FS(3)**	**10.000**	**7/22/2020**	**0.42**	**1.20**	**6.02**	
PFHxS	355-46-4	2.41 U	H6911-FS(3)	10.000	7/22/2020	0.98	2.41	6.02	
PFOS	**1763-23-1**	**4.49 Y U**	**H6911-FS(3)**	**10.000**	**7/22/2020**	**0.83**	**2.41**	**6.02**	EBL
HFPO-DA	13252-13-6	2.41 U	H6911-FS(3)	10.000	7/22/2020	0.77	2.41	6.02	
Adona	**919005-14-4**	**2.41 U**	**H6911-FS(3)**	**10.000**	**7/22/2020**	**1.00**	**2.41**	**6.02**	
11Cl-PF3OUdS	763051-92-9	1.81 U	H6911-FS(3)	10.000	7/22/2020	0.63	1.81	6.02	
9Cl-PF3ONS	**756426-58-1**	**1.20 U**	**H6911-FS(3)**	**10.000**	**7/22/2020**	**0.58**	**1.20**	**6.02**	

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Analyzed by: Griffith, Lauren
Printed: 7/30/2020

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

Client ID	PX-S09-SB24-0304
Battelle ID	H6912-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	11.08
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	H6912-FS(3)	10.000	7/22/2020	0.76	2.15	5.38
PFHpA	**375-85-9**	**1.61 U**	**H6912-FS(3)**	**10.000**	**7/22/2020**	**0.55**	**1.61**	**5.38**
PFOA	335-67-1	2.15 U	H6912-FS(3)	10.000	7/22/2020	0.66	2.15	5.38
PFNA	**375-95-1**	**1.08 U**	**H6912-FS(3)**	**10.000**	**7/22/2020**	**0.53**	**1.08**	**5.38**
PFDA	335-76-2	1.08 U	H6912-FS(3)	10.000	7/22/2020	0.49	1.08	5.38
PFUnA	**2058-94-8**	**1.08 U**	**H6912-FS(3)**	**10.000**	**7/22/2020**	**0.49**	**1.08**	**5.38**
PFDoA	307-55-1	2.15 U	H6912-FS(3)	10.000	7/22/2020	0.66	2.15	5.38
PFTrDA	**72629-94-8**	**1.08 U**	**H6912-FS(3)**	**10.000**	**7/22/2020**	**0.30**	**1.08**	**5.38**
PFTeDA	376-06-7	2.69 U	H6912-FS(3)	10.000	7/22/2020	1.16	2.69	5.38
NMeFOSAA	**2355-31-9**	**2.69 U**	**H6912-FS(3)**	**10.000**	**7/22/2020**	**1.10**	**2.69**	**5.38**
NEtFOSAA	2991-50-6	2.15 U	H6912-FS(3)	10.000	7/22/2020	0.81	2.15	5.38
PFBS	**375-73-5**	**1.08 U**	**H6912-FS(3)**	**10.000**	**7/22/2020**	**0.38**	**1.08**	**5.38**
PFHxS	355-46-4	2.15 U	H6912-FS(3)	10.000	7/22/2020	0.87	2.15	5.38
PFOS	**1763-23-1**	**2.15 U**	**H6912-FS(3)**	**10.000**	**7/22/2020**	**0.74**	**2.15**	**5.38**
HFPO-DA	13252-13-6	2.15 U	H6912-FS(3)	10.000	7/22/2020	0.69	2.15	5.38
Adona	**919005-14-4**	**2.15 U**	**H6912-FS(3)**	**10.000**	**7/22/2020**	**0.89**	**2.15**	**5.38**
11Cl-PF3OUdS	763051-92-9	1.61 U	H6912-FS(3)	10.000	7/22/2020	0.56	1.61	5.38
9Cl-PF3ONS	**756426-58-1**	**1.08 U**	**H6912-FS(3)**	**10.000**	**7/22/2020**	**0.52**	**1.08**	**5.38**

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

Client ID	PX-WF-CTMCA-SS02-000H
Battelle ID	H6913-FS
Sample Type	SA
Collection Date	07/06/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	11.65
Matrix	SOIL
Sample Size	1.71
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.84 J	H6913-FS(3)	10.000	7/22/2020	0.83	2.34	5.85
PFHpA	375-85-9	1.59 J	H6913-FS(3)	10.000	7/22/2020	0.60	1.75	5.85
PFOA	335-67-1	1.73 J	H6913-FS(3)	10.000	7/22/2020	0.71	2.34	5.85
PFNA	375-95-1	0.85 J	H6913-FS(3)	10.000	7/22/2020	0.57	1.17	5.85
PFDA	335-76-2	1.17 U	H6913-FS(3)	10.000	7/22/2020	0.54	1.17	5.85
PFUnA	2058-94-8	1.17 U	H6913-FS(3)	10.000	7/22/2020	0.54	1.17	5.85
PFDoA	307-55-1	2.34 U	H6913-FS(3)	10.000	7/22/2020	0.71	2.34	5.85
PFTrDA	72629-94-8	1.17 U	H6913-FS(3)	10.000	7/22/2020	0.33	1.17	5.85
PFTeDA	376-06-7	2.92 U	H6913-FS(3)	10.000	7/22/2020	1.26	2.92	5.85
NMeFOSAA	2355-31-9	2.92 U	H6913-FS(3)	10.000	7/22/2020	1.19	2.92	5.85
NEtFOSAA	2991-50-6	2.34 U	H6913-FS(3)	10.000	7/22/2020	0.88	2.34	5.85
PFBS	375-73-5	1.17 U	H6913-FS(3)	10.000	7/22/2020	0.41	1.17	5.85
PFHxS	355-46-4	19.80	H6913-FS(3)	10.000	7/22/2020	0.95	2.34	5.85
PFOS	1763-23-1	18.01	H6913-FS(3)	10.000	7/22/2020	0.81	2.34	5.85
HFPO-DA	13252-13-6	2.34 U	H6913-FS(3)	10.000	7/22/2020	0.75	2.34	5.85
Adona	919005-14-4	2.34 U	H6913-FS(3)	10.000	7/22/2020	0.97	2.34	5.85
11Cl-PF3OUdS	763051-92-9	1.75 U	H6913-FS(3)	10.000	7/22/2020	0.61	1.75	5.85
9Cl-PF3ONS	756426-58-1	1.17 U	H6913-FS(3)	10.000	7/22/2020	0.56	1.17	5.85

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

Client ID	PX-WF-CTMCA-SB02-0304
Battelle ID	H6914-FS
Sample Type	SA
Collection Date	07/06/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	16.13
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	H6914-FS(3)	10.000	7/22/2020	0.81	2.29	5.71
PFHpA	**375-85-9**	**1.71 U**	**H6914-FS(3)**	**10.000**	**7/22/2020**	**0.58**	**1.71**	**5.71**
PFOA	335-67-1	2.29 U	H6914-FS(3)	10.000	7/22/2020	0.70	2.29	5.71
PFNA	**375-95-1**	**1.14 U**	**H6914-FS(3)**	**10.000**	**7/22/2020**	**0.56**	**1.14**	**5.71**
PFDA	335-76-2	1.14 U	H6914-FS(3)	10.000	7/22/2020	0.53	1.14	5.71
PFUnA	**2058-94-8**	**1.14 U**	**H6914-FS(3)**	**10.000**	**7/22/2020**	**0.53**	**1.14**	**5.71**
PFDoA	307-55-1	2.29 U	H6914-FS(3)	10.000	7/22/2020	0.70	2.29	5.71
PFTrDA	**72629-94-8**	**1.14 U**	**H6914-FS(3)**	**10.000**	**7/22/2020**	**0.32**	**1.14**	**5.71**
PFTeDA	376-06-7	2.86 U	H6914-FS(3)	10.000	7/22/2020	1.23	2.86	5.71
NMeFOSAA	**2355-31-9**	**2.86 U**	**H6914-FS(3)**	**10.000**	**7/22/2020**	**1.17**	**2.86**	**5.71**
NEtFOSAA	2991-50-6	2.29 U	H6914-FS(3)	10.000	7/22/2020	0.86	2.29	5.71
PFBS	**375-73-5**	**1.14 U**	**H6914-FS(3)**	**10.000**	**7/22/2020**	**0.40**	**1.14**	**5.71**
PFHxS	355-46-4	2.29 U	H6914-FS(3)	10.000	7/22/2020	0.93	2.29	5.71
PFOS	**1763-23-1**	**2.29 U**	**H6914-FS(3)**	**10.000**	**7/22/2020**	**0.79**	**2.29**	**5.71**
HFPO-DA	13252-13-6	2.29 U	H6914-FS(3)	10.000	7/22/2020	0.73	2.29	5.71
Adona	**919005-14-4**	**2.29 U**	**H6914-FS(3)**	**10.000**	**7/22/2020**	**0.95**	**2.29**	**5.71**
11Cl-PF3OUdS	763051-92-9	1.71 U	H6914-FS(3)	10.000	7/22/2020	0.59	1.71	5.71
9Cl-PF3ONS	**756426-58-1**	**1.14 U**	**H6914-FS(3)**	**10.000**	**7/22/2020**	**0.55**	**1.14**	**5.71**

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

Client ID	PX-WF-CTMCA-SS07-000H
Battelle ID	H6915-FS
Sample Type	SA
Collection Date	07/06/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	8.82
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	2.10 J	H6915-FS(3)	10.000	7/22/2020	0.78	2.20	5.49
PFHpA	375-85-9	1.65 U	H6915-FS(3)	10.000	7/22/2020	0.56	1.65	5.49
PFOA	335-67-1	1.71 J	H6915-FS(3)	10.000	7/22/2020	0.67	2.20	5.49
PFNA	375-95-1	0.99 J	H6915-FS(3)	10.000	7/22/2020	0.54	1.10	5.49
PFDA	335-76-2	1.10 U	H6915-FS(3)	10.000	7/22/2020	0.51	1.10	5.49
PFUnA	2058-94-8	1.10 U	H6915-FS(3)	10.000	7/22/2020	0.51	1.10	5.49
PFDoA	307-55-1	2.20 U	H6915-FS(3)	10.000	7/22/2020	0.67	2.20	5.49
PFTrDA	72629-94-8	1.10 U	H6915-FS(3)	10.000	7/22/2020	0.31	1.10	5.49
PFTeDA	376-06-7	2.75 U	H6915-FS(3)	10.000	7/22/2020	1.19	2.75	5.49
NMeFOSAA	2355-31-9	2.75 U	H6915-FS(3)	10.000	7/22/2020	1.12	2.75	5.49
NEtFOSAA	2991-50-6	2.20 U	H6915-FS(3)	10.000	7/22/2020	0.82	2.20	5.49
PFBS	375-73-5	1.10 U	H6915-FS(3)	10.000	7/22/2020	0.38	1.10	5.49
PFHxS	355-46-4	7.52	H6915-FS(3)	10.000	7/22/2020	0.89	2.20	5.49
PFOS	1763-23-1	123.45	H6915-FS-D(5)	50.000	7/22/2020	3.79	10.99	27.47
HFPO-DA	13252-13-6	2.20 U	H6915-FS(3)	10.000	7/22/2020	0.70	2.20	5.49
Adona	919005-14-4	2.20 U	H6915-FS(3)	10.000	7/22/2020	0.91	2.20	5.49
11Cl-PF3OUdS	763051-92-9	1.65 U	H6915-FS(3)	10.000	7/22/2020	0.57	1.65	5.49
9Cl-PF3ONS	756426-58-1	1.10 U	H6915-FS(3)	10.000	7/22/2020	0.53	1.10	5.49

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Analyzed by: Griffith, Lauren
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Project Client: CH2M
Project Name: CTO-4256: PAX Basewide PFAS
Project No.: CTO-4256

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Client ID	PX-WF-CTMCA-SB07-0304
Battelle ID	H6916-FS
Sample Type	SA
Collection Date	07/06/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	17.93
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	H6916-FS(3)	10.000	7/22/2020	0.81	2.29	5.71
PFHpA	**375-85-9**	**1.71 U**	**H6916-FS(3)**	**10.000**	**7/22/2020**	**0.58**	**1.71**	**5.71**
PFOA	335-67-1	2.29 U	H6916-FS(3)	10.000	7/22/2020	0.70	2.29	5.71
PFNA	**375-95-1**	**1.14 U**	**H6916-FS(3)**	**10.000**	**7/22/2020**	**0.56**	**1.14**	**5.71**
PFDA	335-76-2	1.14 U	H6916-FS(3)	10.000	7/22/2020	0.53	1.14	5.71
PFUnA	**2058-94-8**	**1.14 U**	**H6916-FS(3)**	**10.000**	**7/22/2020**	**0.53**	**1.14**	**5.71**
PFDoA	307-55-1	2.29 U	H6916-FS(3)	10.000	7/22/2020	0.70	2.29	5.71
PFTrDA	**72629-94-8**	**1.14 U**	**H6916-FS(3)**	**10.000**	**7/22/2020**	**0.32**	**1.14**	**5.71**
PFTeDA	376-06-7	2.86 U	H6916-FS(3)	10.000	7/22/2020	1.23	2.86	5.71
NMeFOSAA	**2355-31-9**	**2.86 U**	**H6916-FS(3)**	**10.000**	**7/22/2020**	**1.17**	**2.86**	**5.71**
NEtFOSAA	2991-50-6	2.29 U	H6916-FS(3)	10.000	7/22/2020	0.86	2.29	5.71
PFBS	**375-73-5**	**1.14 U**	**H6916-FS(3)**	**10.000**	**7/22/2020**	**0.40**	**1.14**	**5.71**
PFHxS	355-46-4	3.14 J	H6916-FS(3)	10.000	7/22/2020	0.93	2.29	5.71
PFOS	**1763-23-1**	**4.67 J**	**H6916-FS(3)**	**10.000**	**7/22/2020**	**0.79**	**2.29**	**5.71**
HFPO-DA	13252-13-6	2.29 U	H6916-FS(3)	10.000	7/22/2020	0.73	2.29	5.71
Adona	**919005-14-4**	**2.29 U**	**H6916-FS(3)**	**10.000**	**7/22/2020**	**0.95**	**2.29**	**5.71**
11Cl-PF3OUdS	763051-92-9	1.71 U	H6916-FS(3)	10.000	7/22/2020	0.59	1.71	5.71
9Cl-PF3ONS	**756426-58-1**	**1.14 U**	**H6916-FS(3)**	**10.000**	**7/22/2020**	**0.55**	**1.14**	**5.71**

NLR 9/26/20
Analyzed by: Griffith, Lauren
Printed: 7/30/2020

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-0775
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: September 26, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-WF-B8076-EB01-070720-SO	H7058-FS	Water
2	PX-WF-CTMCA-WT07-0720	H7059-FS	Water
3	PX-WF-CTMCA-EB01-GW	H7060-FS	Water
4	PX-SS09-EB01-070720-SO	H7068-FS	Water
5	PX-S09-MW07-0720	H7087-FS	Water
6	PX-S09-MW07P-0720	H7088-FS	Water
7	PX-S09-MW05-0720	H7089-FS	Water
8	PX-S09-MW40-0720	H7090-FS	Water
9	PX-S09-MW42-0720	H7091-FS	Water
10	PX-S09-FB01-070820	H7092-FS	Water
11	PX-S09-EB01-070820	H7093-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for six water samples, four aqueous equipment blank samples, and one aqueous field blank sample collected on July 7-8, 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	*Method References*
PFAS	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-WF-B8076-EB01-070720-SO	PFHpA	0.21	None	Applies to other packages
	PFHxS	0.15	None	
	PFOS	2.04	None	
PX-WF-CTMCA-EB01-GW	None - ND	-	-	-
PX-SS09-EB01-070720-SO	PFHxA	0.92	None	Applies to other packages
	PFHpA	0.67	None	
	PFBS	0.40	None	
	PFHxS	4.77	None	
	PFOS	26.66	None	
PX-S09-FB01-070820	None - ND	-	-	-
PX-S09-EB01-070820	PFHpA	0.38	U	1, 2, 5, 6, 9
PX-WF-FB01-070720	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R) except for the following.

EDS Sample	Surrogate	%R	Qualifier
4	13C2-PFDoA	42%	UJ
	d3-MeFOSAA	22%	UJ

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.

Field Duplicate Sample Precision

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

Compound	PX-S09-MW07-0720 ng/L	PX-S09-MW07-P0720 ng/L	RPD	Qualifier
PFHxA	1.86	1.80	3%	None
PFOA	2.99	2.76	8%	
PFNA	0.87	0.88	1%	
PFBS	1.36	1.46	7%	
PFHxA	4.28	3.68	15%	
PFOS	11.32	11.26	1%	

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

Signed: Nancy Weaver Dated: 10/2/20

Nancy Weaver
Senior Chemist

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.

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

Client ID		PX-WF-B8076-EB01-070720-SO						
Battelle ID		H7058-FS						
Sample Type		SA						
Collection Date		07/07/2020						
Extraction Date		07/14/2020						
Analytical Instrument		Sciex 5500 LC/MS/MS						
% Moisture		NA						
Matrix		QC						
Sample Size		0.305						
Size Unit-Basis		L						
Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.23 U	H7058-FS(0)	1.000	8/3/2020	0.43	1.23	4.10
PFHpA	375-85-9	0.82 ~~0.21~~ U	H7058-FS(0)	1.000	8/3/2020	0.21	0.82	4.10
PFOA	335-67-1	1.23 U	H7058-FS(0)	1.000	8/3/2020	0.42	1.23	4.10
PFNA	375-95-1	0.82 U	H7058-FS(0)	1.000	8/3/2020	0.25	0.82	4.10
PFDA	335-76-2	0.41 U	H7058-FS(0)	1.000	8/3/2020	0.11	0.41	4.10
PFUnA	2058-94-8	0.41 U	H7058-FS(0)	1.000	8/3/2020	0.18	0.41	4.10
PFDoA	307-55-1	0.41 U	H7058-FS(0)	1.000	8/3/2020	0.16	0.41	4.10
PFTrDA	72629-94-8	0.41 U	H7058-FS(0)	1.000	8/3/2020	0.12	0.41	4.10
PFTeDA	376-06-7	1.64 U	H7058-FS(0)	1.000	8/3/2020	0.60	1.64	4.10
NMeFOSAA	2355-31-9	0.82 U	H7058-FS(0)	1.000	8/3/2020	0.29	0.82	4.10
NEtFOSAA	2991-50-6	0.82 U	H7058-FS(0)	1.000	8/3/2020	0.41	0.82	4.10
PFBS	375-73-5	0.41 U	H7058-FS(0)	1.000	8/3/2020	0.11	0.41	4.10
PFHxS	355-46-4	0.15 J	H7058-FS(0)	1.000	8/3/2020	0.09	0.33	4.10
PFOS	1763-23-1	2.04 J	H7058-FS(0)	1.000	8/3/2020	0.36	0.82	4.10
HFPO-DA	13252-13-6	0.41 U	H7058-FS(0)	1.000	8/3/2020	0.20	0.41	4.10
Adona	919005-14-4	0.82 U	H7058-FS(0)	1.000	8/3/2020	0.22	0.82	4.10
11Cl-PF3OUdS	763051-92-9	0.41 U	H7058-FS(0)	1.000	8/3/2020	0.19	0.41	4.10
9Cl-PF3ONS	756426-58-1	0.82 U	H7058-FS(0)	1.000	8/3/2020	0.22	0.82	4.10

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

Client ID	PX-WF-CTMCA-WT07-0720
Battelle ID	H7059-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/14/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	GW
Sample Size	0.290
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	0.55 J	H7059-FS(0)	1.000	8/3/2020	0.46	1.29	4.31	
PFHpA	**375-85-9**	0.86 ~~0.78 J~~ U	**H7059-FS(0)**	**1.000**	**8/3/2020**	**0.22**	**0.86**	**4.31**	EBL
PFOA	335-67-1	0.49 J	H7059-FS(0)	1.000	8/3/2020	0.44	1.29	4.31	
PFNA	**375-95-1**	**0.86 U**	**H7059-FS(0)**	**1.000**	**8/3/2020**	**0.27**	**0.86**	**4.31**	
PFDA	335-76-2	0.43 U	H7059-FS(0)	1.000	8/3/2020	0.12	0.43	4.31	
PFUnA	**2058-94-8**	**0.43 U**	**H7059-FS(0)**	**1.000**	**8/3/2020**	**0.19**	**0.43**	**4.31**	
PFDoA	307-55-1	0.43 U	H7059-FS(0)	1.000	8/3/2020	0.16	0.43	4.31	
PFTrDA	**72629-94-8**	**0.43 U**	**H7059-FS(0)**	**1.000**	**8/3/2020**	**0.13**	**0.43**	**4.31**	
PFTeDA	376-06-7	1.72 U	H7059-FS(0)	1.000	8/3/2020	0.63	1.72	4.31	
NMeFOSAA	**2355-31-9**	**0.86 U**	**H7059-FS(0)**	**1.000**	**8/3/2020**	**0.30**	**0.86**	**4.31**	
NEtFOSAA	2991-50-6	0.86 U	H7059-FS(0)	1.000	8/3/2020	0.43	0.86	4.31	
PFBS	**375-73-5**	**0.14 J**	**H7059-FS(0)**	**1.000**	**8/3/2020**	**0.12**	**0.43**	**4.31**	
PFHxS	355-46-4	0.83 J	H7059-FS(0)	1.000	8/3/2020	0.09	0.34	4.31	
PFOS	**1763-23-1**	**1.71 J**	**H7059-FS(0)**	**1.000**	**8/3/2020**	**0.38**	**0.86**	**4.31**	
HFPO-DA	13252-13-6	0.43 U	H7059-FS(0)	1.000	8/3/2020	0.22	0.43	4.31	
Adona	**919005-14-4**	**0.86 U**	**H7059-FS(0)**	**1.000**	**8/3/2020**	**0.23**	**0.86**	**4.31**	
11Cl-PF3OUdS	763051-92-9	0.43 U	H7059-FS(0)	1.000	8/3/2020	0.20	0.43	4.31	
9Cl-PF3ONS	**756426-58-1**	**0.86 U**	**H7059-FS(0)**	**1.000**	**8/3/2020**	**0.23**	**0.86**	**4.31**	

0.86 u

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

Client ID	PX-WF-CTMCA-EB01-GW
Battelle ID	H7060-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/14/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	QC
Sample Size	0.285
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.32 U	H7060-FS(0)	1.000	8/3/2020	0.46	1.32	4.39
PFHpA	375-85-9	0.88 U	H7060-FS(0)	1.000	8/3/2020	0.23	0.88	4.39
PFOA	335-67-1	1.32 U	H7060-FS(0)	1.000	8/3/2020	0.45	1.32	4.39
PFNA	375-95-1	0.88 U	H7060-FS(0)	1.000	8/3/2020	0.27	0.88	4.39
PFDA	335-76-2	0.44 U	H7060-FS(0)	1.000	8/3/2020	0.12	0.44	4.39
PFUnA	2058-94-8	0.44 U	H7060-FS(0)	1.000	8/3/2020	0.19	0.44	4.39
PFDoA	307-55-1	0.44 U	H7060-FS(0)	1.000	8/3/2020	0.17	0.44	4.39
PFTrDA	72629-94-8	0.44 U	H7060-FS(0)	1.000	8/3/2020	0.13	0.44	4.39
PFTeDA	376-06-7	1.75 U	H7060-FS(0)	1.000	8/3/2020	0.64	1.75	4.39
NMeFOSAA	2355-31-9	0.88 U	H7060-FS(0)	1.000	8/3/2020	0.31	0.88	4.39
NEtFOSAA	2991-50-6	0.88 U	H7060-FS(0)	1.000	8/3/2020	0.44	0.88	4.39
PFBS	375-73-5	0.44 U	H7060-FS(0)	1.000	8/3/2020	0.12	0.44	4.39
PFHxS	355-46-4	0.35 U	H7060-FS(0)	1.000	8/3/2020	0.10	0.35	4.39
PFOS	1763-23-1	0.88 U	H7060-FS(0)	1.000	8/3/2020	0.39	0.88	4.39
HFPO-DA	13252-13-6	0.44 U	H7060-FS(0)	1.000	8/3/2020	0.22	0.44	4.39
Adona	919005-14-4	0.88 U	H7060-FS(0)	1.000	8/3/2020	0.24	0.88	4.39
11Cl-PF3OUdS	763051-92-9	0.44 U	H7060-FS(0)	1.000	8/3/2020	0.20	0.44	4.39
9Cl-PF3ONS	756426-58-1	0.88 U	H7060-FS(0)	1.000	8/3/2020	0.24	0.88	4.39

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

Client ID	PX-SS09-EB01-070720-SO
Battelle ID	H7068-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/14/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	QC
Sample Size	0.300
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	0.92 J	H7068-FS(0)	1.000	8/4/2020	0.44	1.25	4.17	
PFHpA	**375-85-9**	**0.67 J**	**H7068-FS(0)**	**1.000**	**8/4/2020**	**0.22**	**0.83**	**4.17**	
PFOA	335-67-1	1.25 U	H7068-FS(0)	1.000	8/4/2020	0.43	1.25	4.17	
PFNA	**375-95-1**	**0.83 U**	**H7068-FS(0)**	**1.000**	**8/4/2020**	**0.26**	**0.83**	**4.17**	
PFDA	335-76-2	0.42 U	H7068-FS(0)	1.000	8/4/2020	0.12	0.42	4.17	
PFUnA	**2058-94-8**	**0.42 U**	**H7068-FS(0)**	**1.000**	**8/4/2020**	**0.18**	**0.42**	**4.17**	
PFDoA	307-55-1	0.42 ~~U~~ UJ	H7068-FS(0)	1.000	8/4/2020	0.16	0.42	4.17	SSL
PFTrDA	**72629-94-8**	**0.42 U**	**H7068-FS(0)**	**1.000**	**8/4/2020**	**0.13**	**0.42**	**4.17**	
PFTeDA	376-06-7	1.67 U	H7068-FS(0)	1.000	8/4/2020	0.61	1.67	4.17	
NMeFOSAA	**2355-31-9**	**0.83 ~~U~~ UJ**	**H7068-FS(0)**	**1.000**	**8/4/2020**	**0.29**	**0.83**	**4.17**	SSL
NEtFOSAA	2991-50-6	0.83 U	H7068-FS(0)	1.000	8/4/2020	0.42	0.83	4.17	
PFBS	**375-73-5**	**0.40 J**	**H7068-FS(0)**	**1.000**	**8/4/2020**	**0.12**	**0.42**	**4.17**	
PFHxS	355-46-4	4.77	H7068-FS(0)	1.000	8/4/2020	0.09	0.33	4.17	
PFOS	**1763-23-1**	**26.66**	**H7068-FS(0)**	**1.000**	**8/4/2020**	**0.37**	**0.83**	**4.17**	
HFPO-DA	13252-13-6	0.42 U	H7068-FS(0)	1.000	8/4/2020	0.21	0.42	4.17	
Adona	**919005-14-4**	**0.83 U**	**H7068-FS(0)**	**1.000**	**8/4/2020**	**0.23**	**0.83**	**4.17**	
11Cl-PF3OUdS	763051-92-9	0.42 U	H7068-FS(0)	1.000	8/4/2020	0.19	0.42	4.17	
9Cl-PF3ONS	**756426-58-1**	**0.83 U**	**H7068-FS(0)**	**1.000**	**8/4/2020**	**0.23**	**0.83**	**4.17**	

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

Client ID	PX-SS09-EB01-070720-SO
Battelle ID	H7068-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/14/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	83	H7068-FS(0)	8/4/2020
13C4-PFHpA	**82**	**H7068-FS(0)**	**8/4/2020**
13C8-PFOA	88	H7068-FS(0)	8/4/2020
13C9-PFNA	**88**	**H7068-FS(0)**	**8/4/2020**
13C6-PFDA	88	H7068-FS(0)	8/4/2020
13C7-PFUnA	**58**	**H7068-FS(0)**	**8/4/2020**
13C2-PFDoA	42 N	H7068-FS(0)	8/4/2020
13C2-PFTeDA	**55**	**H7068-FS(0)**	**8/4/2020**
d3-MeFOSAA	22 N	H7068-FS(0)	8/4/2020
d5-EtFOSAA	**50**	**H7068-FS(0)**	**8/4/2020**
13C3-PFBS	105	H7068-FS(0)	8/4/2020
13C3-PFHxS	**98**	**H7068-FS(0)**	**8/4/2020**
13C8-PFOS	88	H7068-FS(0)	8/4/2020
13C3-HFPO-DA	**87**	**H7068-FS(0)**	**8/4/2020**

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

Client ID	PX-S09-MW07-0720
Battelle ID	H7087-FS
Sample Type	SA
Collection Date	07/08/2020
Extraction Date	07/14/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	GW
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	1.86 J	H7087-FS(0)	1.000	8/4/2020	0.48	1.36	4.55	
PFHpA	**375-85-9**	**1.26 J U**	**H7087-FS(0)**	**1.000**	**8/4/2020**	**0.24**	**0.91**	**4.55**	EBL
PFOA	335-67-1	2.99 J	H7087-FS(0)	1.000	8/4/2020	0.46	1.36	4.55	
PFNA	**375-95-1**	**0.87 J**	**H7087-FS(0)**	**1.000**	**8/4/2020**	**0.28**	**0.91**	**4.55**	
PFDA	335-76-2	0.45 U	H7087-FS(0)	1.000	8/4/2020	0.13	0.45	4.55	
PFUnA	**2058-94-8**	**0.45 U**	**H7087-FS(0)**	**1.000**	**8/4/2020**	**0.20**	**0.45**	**4.55**	
PFDoA	307-55-1	0.45 U	H7087-FS(0)	1.000	8/4/2020	0.17	0.45	4.55	
PFTrDA	**72629-94-8**	**0.45 U**	**H7087-FS(0)**	**1.000**	**8/4/2020**	**0.14**	**0.45**	**4.55**	
PFTeDA	376-06-7	1.82 U	H7087-FS(0)	1.000	8/4/2020	0.66	1.82	4.55	
NMeFOSAA	**2355-31-9**	**0.91 U**	**H7087-FS(0)**	**1.000**	**8/4/2020**	**0.32**	**0.91**	**4.55**	
NEtFOSAA	2991-50-6	0.91 U	H7087-FS(0)	1.000	8/4/2020	0.45	0.91	4.55	
PFBS	**375-73-5**	**1.36 J**	**H7087-FS(0)**	**1.000**	**8/4/2020**	**0.13**	**0.45**	**4.55**	
PFHxS	355-46-4	4.28 J	H7087-FS(0)	1.000	8/4/2020	0.10	0.36	4.55	
PFOS	**1763-23-1**	**11.32**	**H7087-FS(0)**	**1.000**	**8/4/2020**	**0.40**	**0.91**	**4.55**	
HFPO-DA	13252-13-6	0.45 U	H7087-FS(0)	1.000	8/4/2020	0.23	0.45	4.55	
Adona	**919005-14-4**	**0.91 U**	**H7087-FS(0)**	**1.000**	**8/4/2020**	**0.25**	**0.91**	**4.55**	
11Cl-PF3OUdS	763051-92-9	0.45 U	H7087-FS(0)	1.000	8/4/2020	0.21	0.45	4.55	
9Cl-PF3ONS	**756426-58-1**	**0.91 U**	**H7087-FS(0)**	**1.000**	**8/4/2020**	**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-S09-MW07P-0720
Battelle ID	H7088-FS
Sample Type	SA
Collection Date	07/08/2020
Extraction Date	07/14/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	GW
Sample Size	0.280
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.80 J	H7088-FS(0)	1.000	8/4/2020	0.47	1.34	4.46
PFHpA	**375-85-9**	**1.43 J U**	**H7088-FS(0)**	**1.000**	**8/4/2020**	**0.23**	**0.89**	**4.46**
PFOA	335-67-1	2.76 J	H7088-FS(0)	1.000	8/4/2020	0.46	1.34	4.46
PFNA	**375-95-1**	**0.88 J**	**H7088-FS(0)**	**1.000**	**8/4/2020**	**0.28**	**0.89**	**4.46**
PFDA	335-76-2	0.45 U	H7088-FS(0)	1.000	8/4/2020	0.13	0.45	4.46
PFUnA	**2058-94-8**	**0.38 J**	**H7088-FS(0)**	**1.000**	**8/4/2020**	**0.20**	**0.45**	**4.46**
PFDoA	307-55-1	0.45 U	H7088-FS(0)	1.000	8/4/2020	0.17	0.45	4.46
PFTrDA	**72629-94-8**	**0.45 U**	**H7088-FS(0)**	**1.000**	**8/4/2020**	**0.13**	**0.45**	**4.46**
PFTeDA	376-06-7	1.79 U	H7088-FS(0)	1.000	8/4/2020	0.65	1.79	4.46
NMeFOSAA	**2355-31-9**	**0.89 U**	**H7088-FS(0)**	**1.000**	**8/4/2020**	**0.31**	**0.89**	**4.46**
NEtFOSAA	2991-50-6	0.89 U	H7088-FS(0)	1.000	8/4/2020	0.45	0.89	4.46
PFBS	**375-73-5**	**1.46 J**	**H7088-FS(0)**	**1.000**	**8/4/2020**	**0.13**	**0.45**	**4.46**
PFHxS	355-46-4	3.68 J	H7088-FS(0)	1.000	8/4/2020	0.10	0.36	4.46
PFOS	**1763-23-1**	**11.26**	**H7088-FS(0)**	**1.000**	**8/4/2020**	**0.39**	**0.89**	**4.46**
HFPO-DA	13252-13-6	0.45 U	H7088-FS(0)	1.000	8/4/2020	0.22	0.45	4.46
Adona	**919005-14-4**	**0.89 U**	**H7088-FS(0)**	**1.000**	**8/4/2020**	**0.24**	**0.89**	**4.46**
11Cl-PF3OUdS	763051-92-9	0.45 U	H7088-FS(0)	1.000	8/4/2020	0.21	0.45	4.46
9Cl-PF3ONS	**756426-58-1**	**0.89 U**	**H7088-FS(0)**	**1.000**	**8/4/2020**	**0.24**	**0.89**	**4.46**

EBL

NW 9/26/20
Analyzed by: Schultz, Stephanie
Printed: 8/28/2020

BATTELLE
It can be done

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

7

Client ID	PX-S09-MW05-0720
Battelle ID	H7089-FS
Sample Type	SA
Collection Date	07/08/2020
Extraction Date	07/14/2020
Analytical Instrument	Sciex 5500 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	178.33 D	H7089-FS-D(3)	5.000	8/4/2020	2.60	7.35	24.51
PFHpA	375-85-9	57.54	H7089-FS(0)	1.000	8/4/2020	0.25	0.98	4.90
PFOA	335-67-1	28.62	H7089-FS(0)	1.000	8/4/2020	0.50	1.47	4.90
PFNA	375-95-1	2.22 J	H7089-FS(0)	1.000	8/4/2020	0.30	0.98	4.90
PFDA	335-76-2	1.76 J	H7089-FS(0)	1.000	8/4/2020	0.14	0.49	4.90
PFUnA	2058-94-8	1.49 J	H7089-FS(0)	1.000	8/4/2020	0.22	0.49	4.90
PFDoA	307-55-1	0.61 J	H7089-FS(0)	1.000	8/4/2020	0.19	0.49	4.90
PFTrDA	72629-94-8	0.49 U	H7089-FS(0)	1.000	8/4/2020	0.15	0.49	4.90
PFTeDA	376-06-7	1.96 U	H7089-FS(0)	1.000	8/4/2020	0.72	1.96	4.90
NMeFOSAA	2355-31-9	0.98 U	H7089-FS(0)	1.000	8/4/2020	0.34	0.98	4.90
NEtFOSAA	2991-50-6	0.98 U	H7089-FS(0)	1.000	8/4/2020	0.49	0.98	4.90
PFBS	375-73-5	84.20	H7089-FS(0)	1.000	8/4/2020	0.14	0.49	4.90
PFHxS	355-46-4	514.64 D	H7089-FS-D(5)	25.000	8/4/2020	2.70	9.80	122.55
PFOS	1763-23-1	589.49 D	H7089-FS-D(5)	25.000	8/4/2020	10.78	24.51	122.55
HFPO-DA	13252-13-6	0.49 U	H7089-FS(0)	1.000	8/4/2020	0.25	0.49	4.90
Adona	919005-14-4	0.98 U	H7089-FS(0)	1.000	8/4/2020	0.26	0.98	4.90
11Cl-PF3OUdS	763051-92-9	0.49 U	H7089-FS(0)	1.000	8/4/2020	0.23	0.49	4.90
9Cl-PF3ONS	756426-58-1	0.98 U	H7089-FS(0)	1.000	8/4/2020	0.26	0.98	4.90

NW 9/26/20

Analyzed by: Schultz, Stephanie
Printed: 8/28/2020

BATTELLE
It can be done

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

8

Client ID		PX-S09-MW40-0720							
Battelle ID		H7090-FS							
Sample Type		SA							
Collection Date		07/08/2020							
Extraction Date		07/14/2020							
Analytical Instrument		Sciex 5500 LC/MS/MS							
% Moisture		NA							
Matrix		GW							
Sample Size		0.280							
Size Unit-Basis		L							
Analyte	CAS No.	Result (ng/L)		Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	158.12	D	H7090-FS-D(3)	5.000	8/4/2020	2.37	6.70	22.32
PFHpA	**375-85-9**	**14.03**		**H7090-FS(0)**	**1.000**	**8/4/2020**	**0.23**	**0.89**	**4.46**
PFOA	335-67-1	17.56		H7090-FS(0)	1.000	8/4/2020	0.46	1.34	4.46
PFNA	**375-95-1**	**3.79**	J	**H7090-FS(0)**	**1.000**	**8/4/2020**	**0.28**	**0.89**	**4.46**
PFDA	335-76-2	0.45	U	H7090-FS(0)	1.000	8/4/2020	0.13	0.45	4.46
PFUnA	**2058-94-8**	**0.45**	**U**	**H7090-FS(0)**	**1.000**	**8/4/2020**	**0.20**	**0.45**	**4.46**
PFDoA	307-55-1	0.45	U	H7090-FS(0)	1.000	8/4/2020	0.17	0.45	4.46
PFTrDA	**72629-94-8**	**0.45**	**U**	**H7090-FS(0)**	**1.000**	**8/4/2020**	**0.13**	**0.45**	**4.46**
PFTeDA	376-06-7	1.79	U	H7090-FS(0)	1.000	8/4/2020	0.65	1.79	4.46
NMeFOSAA	**2355-31-9**	**0.89**	**U**	**H7090-FS(0)**	**1.000**	**8/4/2020**	**0.31**	**0.89**	**4.46**
NEtFOSAA	2991-50-6	0.89	U	H7090-FS(0)	1.000	8/4/2020	0.45	0.89	4.46
PFBS	**375-73-5**	**144.24**	**D**	**H7090-FS-D(3)**	**5.000**	**8/4/2020**	**0.63**	**2.23**	**22.32**
PFHxS	355-46-4	323.73	D	H7090-FS-D(3)	5.000	8/4/2020	0.49	1.79	22.32
PFOS	**1763-23-1**	**230.42**	**D**	**H7090-FS-D(3)**	**5.000**	**8/4/2020**	**1.96**	**4.46**	**22.32**
HFPO-DA	13252-13-6	0.45	U	H7090-FS(0)	1.000	8/4/2020	0.22	0.45	4.46
Adona	**919005-14-4**	**0.89**	**U**	**H7090-FS(0)**	**1.000**	**8/4/2020**	**0.24**	**0.89**	**4.46**
11Cl-PF3OUdS	763051-92-9	0.45	U	H7090-FS(0)	1.000	8/4/2020	0.21	0.45	4.46
9Cl-PF3ONS	**756426-58-1**	**0.89**	**U**	**H7090-FS(0)**	**1.000**	**8/4/2020**	**0.24**	**0.89**	**4.46**

NW 9/26/20
Analyzed by: Schultz, Stephanie
Printed: 8/28/2020

BATTELLE
It can be done

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

9

Client ID	PX-S09-MW42-0720
Battelle ID	H7091-FS
Sample Type	SA
Collection Date	07/08/2020
Extraction Date	07/14/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	GW
Sample Size	0.290
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	3.31 J	H7091-FS(0)	1.000	8/4/2020	0.46	1.29	4.31	
PFHpA	**375-85-9**	**1.87 J U**	**H7091-FS(0)**	**1.000**	**8/4/2020**	**0.22**	**0.86**	**4.31**	EBL
PFOA	335-67-1	3.16 J	H7091-FS(0)	1.000	8/4/2020	0.44	1.29	4.31	
PFNA	**375-95-1**	**0.86 U**	**H7091-FS(0)**	**1.000**	**8/4/2020**	**0.27**	**0.86**	**4.31**	
PFDA	335-76-2	0.43 U	H7091-FS(0)	1.000	8/4/2020	0.12	0.43	4.31	
PFUnA	**2058-94-8**	**0.43 U**	**H7091-FS(0)**	**1.000**	**8/4/2020**	**0.19**	**0.43**	**4.31**	
PFDoA	307-55-1	0.43 U	H7091-FS(0)	1.000	8/4/2020	0.16	0.43	4.31	
PFTrDA	**72629-94-8**	**0.43 U**	**H7091-FS(0)**	**1.000**	**8/4/2020**	**0.13**	**0.43**	**4.31**	
PFTeDA	376-06-7	1.72 U	H7091-FS(0)	1.000	8/4/2020	0.63	1.72	4.31	
NMeFOSAA	**2355-31-9**	**0.86 U**	**H7091-FS(0)**	**1.000**	**8/4/2020**	**0.30**	**0.86**	**4.31**	
NEtFOSAA	2991-50-6	0.86 U	H7091-FS(0)	1.000	8/4/2020	0.43	0.86	4.31	
PFBS	**375-73-5**	**2.78 J**	**H7091-FS(0)**	**1.000**	**8/4/2020**	**0.12**	**0.43**	**4.31**	
PFHxS	355-46-4	12.59	H7091-FS(0)	1.000	8/4/2020	0.09	0.34	4.31	
PFOS	**1763-23-1**	**10.63**	**H7091-FS(0)**	**1.000**	**8/4/2020**	**0.38**	**0.86**	**4.31**	
HFPO-DA	13252-13-6	0.43 U	H7091-FS(0)	1.000	8/4/2020	0.22	0.43	4.31	
Adona	**919005-14-4**	**0.86 U**	**H7091-FS(0)**	**1.000**	**8/4/2020**	**0.23**	**0.86**	**4.31**	
11Cl-PF3OUdS	763051-92-9	0.43 U	H7091-FS(0)	1.000	8/4/2020	0.20	0.43	4.31	
9Cl-PF3ONS	**756426-58-1**	**0.86 U**	**H7091-FS(0)**	**1.000**	**8/4/2020**	**0.23**	**0.86**	**4.31**	

NW 9/26/20
Analyzed by: Schultz, Stephanie
Printed: 8/28/2020

BATTELLE
It can be done

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

10

Client ID	PX-S09-FB01-070820
Battelle ID	H7092-FS
Sample Type	SA
Collection Date	07/08/2020
Extraction Date	07/14/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	QC
Sample Size	0.280
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.34 U	H7092-FS(0)	1.000	8/4/2020	0.47	1.34	4.46
PFHpA	375-85-9	0.89 U	H7092-FS(0)	1.000	8/4/2020	0.23	0.89	4.46
PFOA	335-67-1	1.34 U	H7092-FS(0)	1.000	8/4/2020	0.46	1.34	4.46
PFNA	375-95-1	0.89 U	H7092-FS(0)	1.000	8/4/2020	0.28	0.89	4.46
PFDA	335-76-2	0.45 U	H7092-FS(0)	1.000	8/4/2020	0.13	0.45	4.46
PFUnA	2058-94-8	0.45 U	H7092-FS(0)	1.000	8/4/2020	0.20	0.45	4.46
PFDoA	307-55-1	0.45 U	H7092-FS(0)	1.000	8/4/2020	0.17	0.45	4.46
PFTrDA	72629-94-8	0.45 U	H7092-FS(0)	1.000	8/4/2020	0.13	0.45	4.46
PFTeDA	376-06-7	1.79 U	H7092-FS(0)	1.000	8/4/2020	0.65	1.79	4.46
NMeFOSAA	2355-31-9	0.89 U	H7092-FS(0)	1.000	8/4/2020	0.31	0.89	4.46
NEtFOSAA	2991-50-6	0.89 U	H7092-FS(0)	1.000	8/4/2020	0.45	0.89	4.46
PFBS	375-73-5	0.45 U	H7092-FS(0)	1.000	8/4/2020	0.13	0.45	4.46
PFHxS	355-46-4	0.36 U	H7092-FS(0)	1.000	8/4/2020	0.10	0.36	4.46
PFOS	1763-23-1	0.89 U	H7092-FS(0)	1.000	8/4/2020	0.39	0.89	4.46
HFPO-DA	13252-13-6	0.45 U	H7092-FS(0)	1.000	8/4/2020	0.22	0.45	4.46
Adona	919005-14-4	0.89 U	H7092-FS(0)	1.000	8/4/2020	0.24	0.89	4.46
11Cl-PF3OUdS	763051-92-9	0.45 U	H7092-FS(0)	1.000	8/4/2020	0.21	0.45	4.46
9Cl-PF3ONS	756426-58-1	0.89 U	H7092-FS(0)	1.000	8/4/2020	0.24	0.89	4.46

NS 9/26/20
Analyzed by: Schultz, Stephanie
Printed: 8/28/2020

BATTELLE
It can be done

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

11

Client ID	PX-S09-EB01-070820
Battelle ID	H7093-FS
Sample Type	SA
Collection Date	07/08/2020
Extraction Date	07/14/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	QC
Sample Size	0.285
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.32 U	H7093-FS(0)	1.000	8/4/2020	0.46	1.32	4.39
PFHpA	**375-85-9**	**0.38 J**	**H7093-FS(0)**	**1.000**	**8/4/2020**	**0.23**	**0.88**	**4.39**
PFOA	335-67-1	1.32 U	H7093-FS(0)	1.000	8/4/2020	0.45	1.32	4.39
PFNA	**375-95-1**	**0.88 U**	**H7093-FS(0)**	**1.000**	**8/4/2020**	**0.27**	**0.88**	**4.39**
PFDA	335-76-2	0.44 U	H7093-FS(0)	1.000	8/4/2020	0.12	0.44	4.39
PFUnA	**2058-94-8**	**0.44 U**	**H7093-FS(0)**	**1.000**	**8/4/2020**	**0.19**	**0.44**	**4.39**
PFDoA	307-55-1	0.44 U	H7093-FS(0)	1.000	8/4/2020	0.17	0.44	4.39
PFTrDA	**72629-94-8**	**0.44 U**	**H7093-FS(0)**	**1.000**	**8/4/2020**	**0.13**	**0.44**	**4.39**
PFTeDA	376-06-7	1.75 U	H7093-FS(0)	1.000	8/4/2020	0.64	1.75	4.39
NMeFOSAA	**2355-31-9**	**0.88 U**	**H7093-FS(0)**	**1.000**	**8/4/2020**	**0.31**	**0.88**	**4.39**
NEtFOSAA	2991-50-6	0.88 U	H7093-FS(0)	1.000	8/4/2020	0.44	0.88	4.39
PFBS	**375-73-5**	**0.44 U**	**H7093-FS(0)**	**1.000**	**8/4/2020**	**0.12**	**0.44**	**4.39**
PFHxS	355-46-4	0.35 U	H7093-FS(0)	1.000	8/4/2020	0.10	0.35	4.39
PFOS	**1763-23-1**	**0.88 U**	**H7093-FS(0)**	**1.000**	**8/4/2020**	**0.39**	**0.88**	**4.39**
HFPO-DA	13252-13-6	0.44 U	H7093-FS(0)	1.000	8/4/2020	0.22	0.44	4.39
Adona	**919005-14-4**	**0.88 U**	**H7093-FS(0)**	**1.000**	**8/4/2020**	**0.24**	**0.88**	**4.39**
11Cl-PF3OUdS	763051-92-9	0.44 U	H7093-FS(0)	1.000	8/4/2020	0.20	0.44	4.39
9Cl-PF3ONS	**756426-58-1**	**0.88 U**	**H7093-FS(0)**	**1.000**	**8/4/2020**	**0.24**	**0.88**	**4.39**

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-0776
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, Webster Field Annex, CTO-JU14, Maryland
Date: September 26, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-WF-B8076-SB04P-0304	H7057-FS	Soil
2	PX-WF-CTMCA-SS03-000H	H7061-FS	Soil
2MS	PX-WF-CTMCA-SS03-000HMS	H7062-FSMS	Soil
2MSD	PX-WF-CTMCA-SS03-000HMSD	H7063-FSMSD	Soil
3	PX-WF-CTMCA-SB03-0304	H7064-FS	Soil
4	PX-WF-CTMCA-SS05-000H	H7065-FS	Soil
5	PX-WF-CTMCA-SS05P-000H	H7066-FS	Soil
6	PX-WF-CTMCA-SB05-0304	H7067-FS	Soil
7	PX-WF-B8076-SS01-000H	H7069-FS	Soil
8	PX-WF-B8076-SB01-0304	H7070-FS	Soil
9	PX-WF-B8076-SS04-000H	H7071-FS	Soil
10	PX-WF-B8076-SS04P-000H	H7072-FS	Soil
11	PX-WF-B8076-SB04-0304	H7073-FS	Soil

A Stage 2B/4 data validation was performed on the analytical data for eleven soil samples collected on July 7, 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	*Method References*
PFAS	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 exhibited the following contamination.

Blank ID	Compound	Conc. ng/g	Qualifier	Affected Samples
CZ500PB-FS	PFOA	0.66	U	3, 5, 6, 7, 8

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-WF-CTMCA-EB01-070720	None - ND	-	-	-
PX-WF-B8076-EB01-070720-SO	PFHpA	0.21	None	All Associated ND or >5X
	PFHxS	0.15	None	All Associated >5X
	PFOS	2.04	None	

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 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 several compounds in two field duplicate pairs. These results were qualified as estimated (J).

Compound	PX-WF-CTMCA-SS05-0304 ng/g	PX-WF-CTMCA-SS05P-0304 ng/g	RPD	Qualifier
PFNA	1.33	1.69	24%	None
PFDA	1.26U	0.68	NC	
PFUnA	1.26U	0.66	NC	
PFHxS	1.11	1.50	30%	
PFOS	35.19	28.46	21%	

Compound	PX-WF-B8076-SB04P-0304 ng/g	PX-WF-B8076-SB04-0304 ng/g	RPD	Qualifier
PFNA	0.58	1.22U	NC	None
PFBS	1.14U	0.44	NC	None
PFHxS	2.34	3.50	40%	None - <5X LOQ
PFOS	49.98	27.23	59%	J

Compound	PX-WF-B8076-SS04-000H ng/g	PX-WF-B8076-SS04P-000H ng/g	RPD	Qualifier
PFHxA	8.00	9.96	22%	None
PFHpA	3.55	4.58	25%	
PFOA	6.36	11.80	60%	None - <5X LOQ
PFNA	3.80	3.97	4%	None
PFDA	0.92	1.24	30%	

Compound	PX-WF-B8076-SS04-000H ng/g	PX-WF-B8076-SS04P-000H ng/g	RPD	Qualifier
PFUnA	1.15	2.18	62%	None - <5X LOQ
PFBS	8.58	9.81	13%	None
PFHxS	46.56	74.38	46%	J
PFOS	248.54	854.07	110%	J

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

Signed: Nancy Weaver Dated: 10/2/20

Nancy Weaver
Senior Chemist

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.

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

Client ID	PX-WF-B8076-SB04P-0304
Battelle ID	H7057-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	15.17
Matrix	SB
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	H7057-FS(3)	10.000	7/22/2020	0.81	2.27	5.68	
PFHpA	375-85-9	1.70 U	H7057-FS(3)	10.000	7/22/2020	0.58	1.70	5.68	
PFOA	335-67-1	2.27 U	H7057-FS(3)	10.000	7/22/2020	0.69	2.27	5.68	
PFNA	375-95-1	0.58 J	H7057-FS(3)	10.000	7/22/2020	0.56	1.14	5.68	
PFDA	335-76-2	1.14 U	H7057-FS(3)	10.000	7/22/2020	0.52	1.14	5.68	
PFUnA	2058-94-8	1.14 U	H7057-FS(3)	10.000	7/22/2020	0.52	1.14	5.68	
PFDoA	307-55-1	2.27 U	H7057-FS(3)	10.000	7/22/2020	0.69	2.27	5.68	
PFTrDA	72629-94-8	1.14 U	H7057-FS(3)	10.000	7/22/2020	0.32	1.14	5.68	
PFTeDA	376-06-7	2.84 U	H7057-FS(3)	10.000	7/22/2020	1.23	2.84	5.68	
NMeFOSAA	2355-31-9	2.84 U	H7057-FS(3)	10.000	7/22/2020	1.16	2.84	5.68	
NEtFOSAA	2991-50-6	2.27 U	H7057-FS(3)	10.000	7/22/2020	0.85	2.27	5.68	
PFBS	375-73-5	1.14 U	H7057-FS(3)	10.000	7/22/2020	0.40	1.14	5.68	
PFHxS	355-46-4	2.34 J	H7057-FS(3)	10.000	7/22/2020	0.92	2.27	5.68	
PFOS	1763-23-1	49.98 J	H7057-FS(3)	10.000	7/22/2020	0.78	2.27	5.68	FD
HFPO-DA	13252-13-6	2.27 U	H7057-FS(3)	10.000	7/22/2020	0.73	2.27	5.68	
Adona	919005-14-4	2.27 U	H7057-FS(3)	10.000	7/22/2020	0.94	2.27	5.68	
11Cl-PF3OUdS	763051-92-9	1.70 U	H7057-FS(3)	10.000	7/22/2020	0.59	1.70	5.68	
9Cl-PF3ONS	756426-58-1	1.14 U	H7057-FS(3)	10.000	7/22/2020	0.55	1.14	5.68	

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Printed: 8/6/2020

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

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Client ID	PX-WF-CTMCA-SS03-000H
Battelle ID	H7061-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	16.34
Matrix	SS
Sample Size	1.65
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.42 U	H7061-FS(3)	10.000	7/22/2020	0.86	2.42	6.06
PFHpA	**375-85-9**	**1.82 U**	**H7061-FS(3)**	**10.000**	**7/22/2020**	**0.62**	**1.82**	**6.06**
PFOA	335-67-1	2.42 U	H7061-FS(3)	10.000	7/22/2020	0.74	2.42	6.06
PFNA	**375-95-1**	**1.21 U**	**H7061-FS(3)**	**10.000**	**7/22/2020**	**0.59**	**1.21**	**6.06**
PFDA	335-76-2	1.21 U	H7061-FS(3)	10.000	7/22/2020	0.56	1.21	6.06
PFUnA	**2058-94-8**	**1.21 U**	**H7061-FS(3)**	**10.000**	**7/22/2020**	**0.56**	**1.21**	**6.06**
PFDoA	307-55-1	2.42 U	H7061-FS(3)	10.000	7/22/2020	0.74	2.42	6.06
PFTrDA	**72629-94-8**	**1.21 U**	**H7061-FS(3)**	**10.000**	**7/22/2020**	**0.34**	**1.21**	**6.06**
PFTeDA	376-06-7	3.03 U	H7061-FS(3)	10.000	7/22/2020	1.31	3.03	6.06
NMeFOSAA	**2355-31-9**	**3.03 U**	**H7061-FS(3)**	**10.000**	**7/22/2020**	**1.24**	**3.03**	**6.06**
NEtFOSAA	2991-50-6	2.42 U	H7061-FS(3)	10.000	7/22/2020	0.91	2.42	6.06
PFBS	**375-73-5**	**1.21 U**	**H7061-FS(3)**	**10.000**	**7/22/2020**	**0.42**	**1.21**	**6.06**
PFHxS	355-46-4	2.42 U	H7061-FS(3)	10.000	7/22/2020	0.98	2.42	6.06
PFOS	**1763-23-1**	**1.38 J**	**H7061-FS(3)**	**10.000**	**7/22/2020**	**0.84**	**2.42**	**6.06**
HFPO-DA	13252-13-6	2.42 U	H7061-FS(3)	10.000	7/22/2020	0.78	2.42	6.06
Adona	**919005-14-4**	**2.42 U**	**H7061-FS(3)**	**10.000**	**7/22/2020**	**1.01**	**2.42**	**6.06**
11Cl-PF3OUdS	763051-92-9	1.82 U	H7061-FS(3)	10.000	7/22/2020	0.63	1.82	6.06
9Cl-PF3ONS	**756426-58-1**	**1.21 U**	**H7061-FS(3)**	**10.000**	**7/22/2020**	**0.58**	**1.21**	**6.06**

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

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Client ID	PX-WF-CTMCA-SB03-0304
Battelle ID	H7064-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	14.96
Matrix	SB
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	H7064-FS(3)	10.000	7/22/2020	0.86	2.41	6.02
PFHpA	375-85-9	1.81 U	H7064-FS(3)	10.000	7/22/2020	0.61	1.81	6.02
PFOA	335-67-1	2.41 ~~1.33 J~~ U	H7064-FS(3)	10.000	7/22/2020	0.73	2.41	6.02
PFNA	375-95-1	1.20 U	H7064-FS(3)	10.000	7/22/2020	0.59	1.20	6.02
PFDA	335-76-2	1.20 U	H7064-FS(3)	10.000	7/22/2020	0.55	1.20	6.02
PFUnA	2058-94-8	1.20 U	H7064-FS(3)	10.000	7/22/2020	0.55	1.20	6.02
PFDoA	307-55-1	2.41 U	H7064-FS(3)	10.000	7/22/2020	0.73	2.41	6.02
PFTrDA	72629-94-8	1.20 U	H7064-FS(3)	10.000	7/22/2020	0.34	1.20	6.02
PFTeDA	376-06-7	3.01 U	H7064-FS(3)	10.000	7/22/2020	1.30	3.01	6.02
NMeFOSAA	2355-31-9	3.01 U	H7064-FS(3)	10.000	7/22/2020	1.23	3.01	6.02
NEtFOSAA	2991-50-6	2.41 U	H7064-FS(3)	10.000	7/22/2020	0.90	2.41	6.02
PFBS	375-73-5	1.20 U	H7064-FS(3)	10.000	7/22/2020	0.42	1.20	6.02
PFHxS	355-46-4	2.41 U	H7064-FS(3)	10.000	7/22/2020	0.98	2.41	6.02
PFOS	1763-23-1	1.07 J	H7064-FS(3)	10.000	7/22/2020	0.83	2.41	6.02
HFPO-DA	13252-13-6	2.41 U	H7064-FS(3)	10.000	7/22/2020	0.77	2.41	6.02
Adona	919005-14-4	2.41 U	H7064-FS(3)	10.000	7/22/2020	1.00	2.41	6.02
11Cl-PF3OUdS	763051-92-9	1.81 U	H7064-FS(3)	10.000	7/22/2020	0.63	1.81	6.02
9Cl-PF3ONS	756426-58-1	1.20 U	H7064-FS(3)	10.000	7/22/2020	0.58	1.20	6.02

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

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Client ID		PX-WF-CTMCA-SS05-000H							
Battelle ID		H7065-FS							
Sample Type		SA							
Collection Date		07/07/2020							
Extraction Date		07/15/2020							
Analytical Instrument		Sciex 5500 LC/MS/MS							
% Moisture		15.24							
Matrix		SS							
Sample Size		1.59							
Size Unit-Basis		g							
Analyte	CAS No.	Result (ng/g_Dry)		Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.52	U	H7065-FS(3)	10.000	7/22/2020	0.89	2.52	6.29
PFHpA	375-85-9	1.89	U	H7065-FS(3)	10.000	7/22/2020	0.64	1.89	6.29
PFOA	335-67-1	2.52	U	H7065-FS(3)	10.000	7/22/2020	0.77	2.52	6.29
PFNA	375-95-1	1.33	J	H7065-FS(3)	10.000	7/22/2020	0.62	1.26	6.29
PFDA	335-76-2	1.26	U	H7065-FS(3)	10.000	7/22/2020	0.58	1.26	6.29
PFUnA	2058-94-8	1.26	U	H7065-FS(3)	10.000	7/22/2020	0.58	1.26	6.29
PFDoA	307-55-1	2.52	U	H7065-FS(3)	10.000	7/22/2020	0.77	2.52	6.29
PFTrDA	72629-94-8	1.26	U	H7065-FS(3)	10.000	7/22/2020	0.35	1.26	6.29
PFTeDA	376-06-7	3.14	U	H7065-FS(3)	10.000	7/22/2020	1.36	3.14	6.29
NMeFOSAA	2355-31-9	3.14	U	H7065-FS(3)	10.000	7/22/2020	1.28	3.14	6.29
NEtFOSAA	2991-50-6	2.52	U	H7065-FS(3)	10.000	7/22/2020	0.94	2.52	6.29
PFBS	375-73-5	1.26	U	H7065-FS(3)	10.000	7/22/2020	0.44	1.26	6.29
PFHxS	355-46-4	1.11	J	H7065-FS(3)	10.000	7/22/2020	1.02	2.52	6.29
PFOS	1763-23-1	35.19		H7065-FS(3)	10.000	7/22/2020	0.87	2.52	6.29
HFPO-DA	13252-13-6	2.52	U	H7065-FS(3)	10.000	7/22/2020	0.81	2.52	6.29
Adona	919005-14-4	2.52	U	H7065-FS(3)	10.000	7/22/2020	1.04	2.52	6.29
11Cl-PF3OUdS	763051-92-9	1.89	U	H7065-FS(3)	10.000	7/22/2020	0.65	1.89	6.29
9Cl-PF3ONS	756426-58-1	1.26	U	H7065-FS(3)	10.000	7/22/2020	0.60	1.26	6.29

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

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Client ID	PX-WF-CTMCA-SS05P-000H
Battelle ID	H7066-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	18.15
Matrix	SS
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	H7066-FS(3)	10.000	7/22/2020	0.91	2.56	6.41	
PFHpA	**375-85-9**	**1.92 U**	**H7066-FS(3)**	**10.000**	**7/22/2020**	**0.65**	**1.92**	**6.41**	
PFOA	335-67-1	2.56 ~~0.96 J~~ U	H7066-FS(3)	10.000	7/22/2020	0.78	2.56	6.41	MBL
PFNA	**375-95-1**	**1.69 J**	**H7066-FS(3)**	**10.000**	**7/22/2020**	**0.63**	**1.28**	**6.41**	
PFDA	335-76-2	0.68 J	H7066-FS(3)	10.000	7/22/2020	0.59	1.28	6.41	
PFUnA	**2058-94-8**	**0.66 J**	**H7066-FS(3)**	**10.000**	**7/22/2020**	**0.59**	**1.28**	**6.41**	
PFDoA	307-55-1	2.56 U	H7066-FS(3)	10.000	7/22/2020	0.78	2.56	6.41	
PFTrDA	**72629-94-8**	**1.28 U**	**H7066-FS(3)**	**10.000**	**7/22/2020**	**0.36**	**1.28**	**6.41**	
PFTeDA	376-06-7	3.21 U	H7066-FS(3)	10.000	7/22/2020	1.38	3.21	6.41	
NMeFOSAA	**2355-31-9**	**3.21 U**	**H7066-FS(3)**	**10.000**	**7/22/2020**	**1.31**	**3.21**	**6.41**	
NEtFOSAA	2991-50-6	2.56 U	H7066-FS(3)	10.000	7/22/2020	0.96	2.56	6.41	
PFBS	**375-73-5**	**1.28 U**	**H7066-FS(3)**	**10.000**	**7/22/2020**	**0.45**	**1.28**	**6.41**	
PFHxS	355-46-4	1.50 J	H7066-FS(3)	10.000	7/22/2020	1.04	2.56	6.41	
PFOS	**1763-23-1**	**28.46**	**H7066-FS(3)**	**10.000**	**7/22/2020**	**0.88**	**2.56**	**6.41**	
HFPO-DA	13252-13-6	2.56 U	H7066-FS(3)	10.000	7/22/2020	0.82	2.56	6.41	
Adona	**919005-14-4**	**2.56 U**	**H7066-FS(3)**	**10.000**	**7/22/2020**	**1.06**	**2.56**	**6.41**	
11Cl-PF3OUdS	763051-92-9	1.92 U	H7066-FS(3)	10.000	7/22/2020	0.67	1.92	6.41	
9Cl-PF3ONS	**756426-58-1**	**1.28 U**	**H7066-FS(3)**	**10.000**	**7/22/2020**	**0.62**	**1.28**	**6.41**	

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Analyzed by: Griffith, Lauren
Printed: 8/6/2020

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

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Client ID	PX-WF-CTMCA-SB05-0304
Battelle ID	H7067-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	14.45
Matrix	SB
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	0.90 J	H7067-FS(3)	10.000	7/22/2020	0.78	2.20	5.49	
PFHpA	**375-85-9**	**0.61 J**	**H7067-FS(3)**	**10.000**	**7/22/2020**	**0.56**	**1.65**	**5.49**	
PFOA	335-67-1	2.43 ~~J~~ U	H7067-FS(3)	10.000	7/22/2020	0.67	2.20	5.49	MBL
PFNA	**375-95-1**	**1.10 U**	**H7067-FS(3)**	**10.000**	**7/22/2020**	**0.54**	**1.10**	**5.49**	
PFDA	335-76-2	1.10 U	H7067-FS(3)	10.000	7/22/2020	0.51	1.10	5.49	
PFUnA	**2058-94-8**	**1.10 U**	**H7067-FS(3)**	**10.000**	**7/22/2020**	**0.51**	**1.10**	**5.49**	
PFDoA	307-55-1	2.20 U	H7067-FS(3)	10.000	7/22/2020	0.67	2.20	5.49	
PFTrDA	**72629-94-8**	**1.10 U**	**H7067-FS(3)**	**10.000**	**7/22/2020**	**0.31**	**1.10**	**5.49**	
PFTeDA	376-06-7	2.75 U	H7067-FS(3)	10.000	7/22/2020	1.19	2.75	5.49	
NMeFOSAA	**2355-31-9**	**2.75 U**	**H7067-FS(3)**	**10.000**	**7/22/2020**	**1.12**	**2.75**	**5.49**	
NEtFOSAA	2991-50-6	2.20 U	H7067-FS(3)	10.000	7/22/2020	0.82	2.20	5.49	
PFBS	**375-73-5**	**1.10 U**	**H7067-FS(3)**	**10.000**	**7/22/2020**	**0.38**	**1.10**	**5.49**	
PFHxS	355-46-4	5.40 J	H7067-FS(3)	10.000	7/22/2020	0.89	2.20	5.49	
PFOS	**1763-23-1**	**8.42**	**H7067-FS(3)**	**10.000**	**7/22/2020**	**0.76**	**2.20**	**5.49**	
HFPO-DA	13252-13-6	2.20 U	H7067-FS(3)	10.000	7/22/2020	0.70	2.20	5.49	
Adona	**919005-14-4**	**2.20 U**	**H7067-FS(3)**	**10.000**	**7/22/2020**	**0.91**	**2.20**	**5.49**	
11Cl-PF3OUdS	763051-92-9	1.65 U	H7067-FS(3)	10.000	7/22/2020	0.57	1.65	5.49	
9Cl-PF3ONS	**756426-58-1**	**1.10 U**	**H7067-FS(3)**	**10.000**	**7/22/2020**	**0.53**	**1.10**	**5.49**	

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Analyzed by: Griffith, Lauren
Printed: 8/6/2020

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

Client ID	PX-WF-B8076-SS01-000H
Battelle ID	H7069-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	12.80
Matrix	SS
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	1.53 J	H7069-FS(3)	10.000	7/22/2020	0.77	2.17	5.43	
PFHpA	375-85-9	1.52 J	H7069-FS(3)	10.000	7/22/2020	0.55	1.63	5.43	
PFOA	335-67-1	2.17 ~~1.78 J~~ U	H7069-FS(3)	10.000	7/22/2020	0.66	2.17	5.43	MBL
PFNA	375-95-1	3.17 J	H7069-FS(3)	10.000	7/22/2020	0.53	1.09	5.43	
PFDA	335-76-2	0.74 J	H7069-FS(3)	10.000	7/22/2020	0.50	1.09	5.43	
PFUnA	2058-94-8	1.09 U	H7069-FS(3)	10.000	7/22/2020	0.50	1.09	5.43	
PFDoA	307-55-1	2.17 U	H7069-FS(3)	10.000	7/22/2020	0.66	2.17	5.43	
PFTrDA	72629-94-8	1.09 U	H7069-FS(3)	10.000	7/22/2020	0.30	1.09	5.43	
PFTeDA	376-06-7	2.72 U	H7069-FS(3)	10.000	7/22/2020	1.17	2.72	5.43	
NMeFOSAA	2355-31-9	2.72 U	H7069-FS(3)	10.000	7/22/2020	1.11	2.72	5.43	
NEtFOSAA	2991-50-6	2.17 U	H7069-FS(3)	10.000	7/22/2020	0.82	2.17	5.43	
PFBS	375-73-5	1.09 U	H7069-FS(3)	10.000	7/22/2020	0.38	1.09	5.43	
PFHxS	355-46-4	1.53 J	H7069-FS(3)	10.000	7/22/2020	0.88	2.17	5.43	
PFOS	1763-23-1	74.19	H7069-FS(3)	10.000	7/22/2020	0.75	2.17	5.43	
HFPO-DA	13252-13-6	2.17 U	H7069-FS(3)	10.000	7/22/2020	0.70	2.17	5.43	
Adona	919005-14-4	2.17 U	H7069-FS(3)	10.000	7/22/2020	0.90	2.17	5.43	
11Cl-PF3OUdS	763051-92-9	1.63 U	H7069-FS(3)	10.000	7/22/2020	0.57	1.63	5.43	
9Cl-PF3ONS	756426-58-1	1.09 U	H7069-FS(3)	10.000	7/22/2020	0.52	1.09	5.43	

NW 9/26/20

Analyzed by: Griffith, Lauren
Printed: 8/6/2020

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

Client ID	PX-WF-B8076-SB01-0304
Battelle ID	H7070-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	8.63
Matrix	SB
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	H7070-FS(3)	10.000	7/22/2020	0.73	2.05	5.13
PFHpA	**375-85-9**	**1.54 U**	**H7070-FS(3)**	**10.000**	**7/22/2020**	**0.52**	**1.54**	**5.13**
PFOA	335-67-1	2.05 ~~0.96~~ U	H7070-FS(3)	10.000	7/22/2020	0.63	2.05	5.13
PFNA	**375-95-1**	**1.95 J**	**H7070-FS(3)**	**10.000**	**7/22/2020**	**0.50**	**1.03**	**5.13**
PFDA	335-76-2	1.03 U	H7070-FS(3)	10.000	7/22/2020	0.47	1.03	5.13
PFUnA	**2058-94-8**	**1.03 U**	**H7070-FS(3)**	**10.000**	**7/22/2020**	**0.47**	**1.03**	**5.13**
PFDoA	307-55-1	2.05 U	H7070-FS(3)	10.000	7/22/2020	0.63	2.05	5.13
PFTrDA	**72629-94-8**	**1.03 U**	**H7070-FS(3)**	**10.000**	**7/22/2020**	**0.29**	**1.03**	**5.13**
PFTeDA	376-06-7	2.56 U	H7070-FS(3)	10.000	7/22/2020	1.11	2.56	5.13
NMeFOSAA	**2355-31-9**	**2.56 U**	**H7070-FS(3)**	**10.000**	**7/22/2020**	**1.05**	**2.56**	**5.13**
NEtFOSAA	2991-50-6	2.05 U	H7070-FS(3)	10.000	7/22/2020	0.77	2.05	5.13
PFBS	**375-73-5**	**1.03 U**	**H7070-FS(3)**	**10.000**	**7/22/2020**	**0.36**	**1.03**	**5.13**
PFHxS	355-46-4	1.36 J	H7070-FS(3)	10.000	7/22/2020	0.83	2.05	5.13
PFOS	**1763-23-1**	**105.79**	**H7070-FS(3)**	**10.000**	**7/22/2020**	**0.71**	**2.05**	**5.13**
HFPO-DA	13252-13-6	2.05 U	H7070-FS(3)	10.000	7/22/2020	0.66	2.05	5.13
Adona	**919005-14-4**	**2.05 U**	**H7070-FS(3)**	**10.000**	**7/22/2020**	**0.85**	**2.05**	**5.13**
11Cl-PF3OUdS	763051-92-9	1.54 U	H7070-FS(3)	10.000	7/22/2020	0.53	1.54	5.13
9Cl-PF3ONS	**756426-58-1**	**1.03 U**	**H7070-FS(3)**	**10.000**	**7/22/2020**	**0.49**	**1.03**	**5.13**

2.05 U

MBL

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Analyzed by: Griffith, Lauren
Printed: 8/6/2020

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

Client ID	PX-WF-B8076-SS04-000H
Battelle ID	H7071-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	23.16
Matrix	SS
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	8.00	H7071-FS(3)	10.000	7/22/2020	0.94	2.65	6.62	
PFHpA	**375-85-9**	**3.55 J**	**H7071-FS(3)**	**10.000**	**7/22/2020**	**0.68**	**1.99**	**6.62**	
PFOA	335-67-1	6.36 J	H7071-FS(3)	10.000	7/22/2020	0.81	2.65	6.62	
PFNA	**375-95-1**	**3.80 J**	**H7071-FS(3)**	**10.000**	**7/22/2020**	**0.65**	**1.32**	**6.62**	
PFDA	335-76-2	0.92 J	H7071-FS(3)	10.000	7/22/2020	0.61	1.32	6.62	
PFUnA	**2058-94-8**	**1.15 J**	**H7071-FS(3)**	**10.000**	**7/22/2020**	**0.61**	**1.32**	**6.62**	
PFDoA	307-55-1	2.65 U	H7071-FS(3)	10.000	7/22/2020	0.81	2.65	6.62	
PFTrDA	**72629-94-8**	**1.32 U**	**H7071-FS(3)**	**10.000**	**7/22/2020**	**0.37**	**1.32**	**6.62**	
PFTeDA	376-06-7	3.31 U	H7071-FS(3)	10.000	7/22/2020	1.43	3.31	6.62	
NMeFOSAA	**2355-31-9**	**3.31 U**	**H7071-FS(3)**	**10.000**	**7/22/2020**	**1.35**	**3.31**	**6.62**	
NEtFOSAA	2991-50-6	2.65 U	H7071-FS(3)	10.000	7/22/2020	0.99	2.65	6.62	
PFBS	**375-73-5**	**8.58**	**H7071-FS(3)**	**10.000**	**7/22/2020**	**0.46**	**1.32**	**6.62**	
PFHxS	355-46-4	46.56 J	H7071-FS(3)	10.000	7/22/2020	1.07	2.65	6.62	FD
PFOS	**1763-23-1**	**248.54 J**	**H7071-FS-D(5)**	**50.000**	**7/22/2020**	**4.57**	**13.25**	**33.11**	FD
HFPO-DA	13252-13-6	2.65 U	H7071-FS(3)	10.000	7/22/2020	0.85	2.65	6.62	
Adona	**919005-14-4**	**2.65 U**	**H7071-FS(3)**	**10.000**	**7/22/2020**	**1.10**	**2.65**	**6.62**	
11Cl-PF3OUdS	763051-92-9	1.99 U	H7071-FS(3)	10.000	7/22/2020	0.69	1.99	6.62	
9Cl-PF3ONS	**756426-58-1**	**1.32 U**	**H7071-FS(3)**	**10.000**	**7/22/2020**	**0.64**	**1.32**	**6.62**	

NW 9/26/20
Analyzed by: Griffith, Lauren
Printed: 8/6/2020

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

Client ID	PX-WF-B8076-SS04P-000H
Battelle ID	H7072-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	29.70
Matrix	SS
Sample Size	1.46
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	9.96	H7072-FS(3)	10.000	7/22/2020	0.97	2.74	6.85	
PFHpA	375-85-9	4.58 J	H7072-FS(3)	10.000	7/22/2020	0.70	2.05	6.85	
PFOA	335-67-1	11.80	H7072-FS(3)	10.000	7/22/2020	0.84	2.74	6.85	
PFNA	375-95-1	3.97 J	H7072-FS(3)	10.000	7/22/2020	0.67	1.37	6.85	
PFDA	335-76-2	1.24 J	H7072-FS(3)	10.000	7/22/2020	0.63	1.37	6.85	
PFUnA	2058-94-8	2.18 J	H7072-FS(3)	10.000	7/22/2020	0.63	1.37	6.85	
PFDoA	307-55-1	2.74 U	H7072-FS(3)	10.000	7/22/2020	0.84	2.74	6.85	
PFTrDA	72629-94-8	1.37 U	H7072-FS(3)	10.000	7/22/2020	0.38	1.37	6.85	
PFTeDA	376-06-7	3.42 U	H7072-FS(3)	10.000	7/22/2020	1.48	3.42	6.85	
NMeFOSAA	2355-31-9	3.42 U	H7072-FS(3)	10.000	7/22/2020	1.40	3.42	6.85	
NEtFOSAA	2991-50-6	2.74 U	H7072-FS(3)	10.000	7/22/2020	1.03	2.74	6.85	
PFBS	375-73-5	9.81	H7072-FS(3)	10.000	7/22/2020	0.48	1.37	6.85	
PFHxS	355-46-4	74.38 J	H7072-FS(3)	10.000	7/22/2020	1.11	2.74	6.85	FD
PFOS	1763-23-1	854.07 D/J	H7072-FS-D(5)	125.000	7/22/2020	11.82	34.25	85.62	FD
HFPO-DA	13252-13-6	2.74 U	H7072-FS(3)	10.000	7/22/2020	0.88	2.74	6.85	
Adona	919005-14-4	2.74 U	H7072-FS(3)	10.000	7/22/2020	1.14	2.74	6.85	
11Cl-PF3OUdS	763051-92-9	2.05 U	H7072-FS(3)	10.000	7/22/2020	0.71	2.05	6.85	
9Cl-PF3ONS	756426-58-1	1.37 U	H7072-FS(3)	10.000	7/22/2020	0.66	1.37	6.85	

NW 9/26/20
Analyzed by: Griffith, Lauren
Printed: 8/6/2020

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

Client ID	PX-WF-B8076-SB04-0304
Battelle ID	H7073-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	16.90
Matrix	SB
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	H7073-FS(3)	10.000	7/22/2020	0.87	2.44	6.10	
PFHpA	375-85-9	1.83 U	H7073-FS(3)	10.000	7/22/2020	0.62	1.83	6.10	
PFOA	335-67-1	2.44 U	H7073-FS(3)	10.000	7/22/2020	0.74	2.44	6.10	
PFNA	375-95-1	1.22 U	H7073-FS(3)	10.000	7/22/2020	0.60	1.22	6.10	
PFDA	335-76-2	1.22 U	H7073-FS(3)	10.000	7/22/2020	0.56	1.22	6.10	
PFUnA	2058-94-8	1.22 U	H7073-FS(3)	10.000	7/22/2020	0.56	1.22	6.10	
PFDoA	307-55-1	2.44 U	H7073-FS(3)	10.000	7/22/2020	0.74	2.44	6.10	
PFTrDA	72629-94-8	1.22 U	H7073-FS(3)	10.000	7/22/2020	0.34	1.22	6.10	
PFTeDA	376-06-7	3.05 U	H7073-FS(3)	10.000	7/22/2020	1.32	3.05	6.10	
NMeFOSAA	2355-31-9	3.05 U	H7073-FS(3)	10.000	7/22/2020	1.24	3.05	6.10	
NEtFOSAA	2991-50-6	2.44 U	H7073-FS(3)	10.000	7/22/2020	0.91	2.44	6.10	
PFBS	375-73-5	0.44 J	H7073-FS(3)	10.000	7/22/2020	0.43	1.22	6.10	
PFHxS	355-46-4	3.50 J	H7073-FS(3)	10.000	7/22/2020	0.99	2.44	6.10	
PFOS	1763-23-1	27.23 J	H7073-FS(3)	10.000	7/22/2020	0.84	2.44	6.10	FD
HFPO-DA	13252-13-6	2.44 U	H7073-FS(3)	10.000	7/22/2020	0.78	2.44	6.10	
Adona	919005-14-4	2.44 U	H7073-FS(3)	10.000	7/22/2020	1.01	2.44	6.10	
11Cl-PF3OUdS	763051-92-9	1.83 U	H7073-FS(3)	10.000	7/22/2020	0.63	1.83	6.10	
9Cl-PF3ONS	756426-58-1	1.22 U	H7073-FS(3)	10.000	7/22/2020	0.59	1.22	6.10	

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-0777
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, Webster Field Annex, CTO-JU14, Maryland
Date: September 27, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-WF-B8076-SS03-000H	H7074-FS	Soil
1MS	PX-WF-B8076-SS03-000HMS	H7075-FSMS	Soil
1MSD	PX-WF-B8076-SS03-000HMSD	H7076-FSMSD	Soil
2	PX-WF-B8076-SB03-0304	H7077-FS	Soil
3	PX-WF-B8076-SS02-000H	H7078-FS	Soil
4	PX-WF-B8076-SB02-0304	H7079-FS	Soil
5	PX-WF-CTMCA-SS04-000H	H7080-FS	Soil
6	PX-WF-CTMCA-SB04-0304	H7081-FS	Soil
7	PX-WF-CTMCA-SS06-000H	H7082-FS	Soil
8	PX-WF-CTMCA-SB06-0304	H7083-FS	Soil
9	PX-WF-CTMCA-SS01-000H	H7084-FS	Soil
10	PX-WF-CTMCA-SB01-0304	H7085-FS	Soil
11	PX-WF-CTMCA-SB01P-0304	H7086-FS	Soil

A Stage 2B/4 data validation was performed on the analytical data for eleven soil samples collected on July 7, 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	*Method References*
PFAS	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 exhibited the following contamination.

Blank ID	Compound	Conc. ng/g	Qualifier	Affected Samples
LB87 IB	NEtFOSAA	0.85	None	All Associated Samples ND

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-WF-CTMCA-EB01-070720	None - ND	-	-	-
PX-WF-B8076-EB01-070720-SO	PFHpA	0.21	U	3
	PFHxS	0.15	None	All Associated >5X
	PFOS	2.04	None	

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.

EDS Sample ID	Compound	MS %R/MSD %R/RDP	Qualifier
1	PFOS	49%/426%/159	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.

Field Duplicate Sample Precision

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

Compound	PX-WF-CTMCA-SB01-0304 ng/g	PX-WF-CTMCA-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 Dated: 10/21/20

Nancy Weaver
Senior Chemist

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.

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

Client ID	PX-WF-B8076-SS03-000H
Battelle ID	H7074-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	11.00
Matrix	SS
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	3.52 J	H7074-FS(3)	10.000	8/2/2020	0.80	2.26	5.65
PFHpA	375-85-9	1.72 J	H7074-FS(3)	10.000	8/2/2020	0.58	1.69	5.65
PFOA	335-67-1	2.63 J	H7074-FS(3)	10.000	8/2/2020	0.69	2.26	5.65
PFNA	375-95-1	2.08 J	H7074-FS(3)	10.000	8/2/2020	0.55	1.13	5.65
PFDA	335-76-2	1.60 J	H7074-FS(3)	10.000	8/2/2020	0.52	1.13	5.65
PFUnA	2058-94-8	1.73 J	H7074-FS(3)	10.000	8/2/2020	0.52	1.13	5.65
PFDoA	307-55-1	2.26 U	H7074-FS(3)	10.000	8/2/2020	0.69	2.26	5.65
PFTrDA	72629-94-8	1.13 U	H7074-FS(3)	10.000	8/2/2020	0.32	1.13	5.65
PFTeDA	376-06-7	2.82 U	H7074-FS(3)	10.000	8/2/2020	1.22	2.82	5.65
NMeFOSAA	2355-31-9	2.82 U	H7074-FS(3)	10.000	8/2/2020	1.15	2.82	5.65
NEtFOSAA	2991-50-6	2.26 U	H7074-FS(3)	10.000	8/2/2020	0.85	2.26	5.65
PFBS	375-73-5	0.62 J	H7074-FS(3)	10.000	8/2/2020	0.40	1.13	5.65
PFHxS	355-46-4	36.47	H7074-FS(3)	10.000	8/2/2020	0.92	2.26	5.65
PFOS	1763-23-1	452.79 Ø	H7074-FS-D(5)	125.000	8/4/2020	9.75	28.25	70.62
HFPO-DA	13252-13-6	2.26 U	H7074-FS(3)	10.000	8/3/2020	0.72	2.26	5.65
Adona	919005-14-4	2.26 U	H7074-FS(3)	10.000	8/2/2020	0.94	2.26	5.65
11Cl-PF3OUdS	763051-92-9	1.69 U	H7074-FS(3)	10.000	8/2/2020	0.59	1.69	5.65
9Cl-PF3ONS	756426-58-1	1.13 U	H7074-FS(3)	10.000	8/2/2020	0.54	1.13	5.65

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

Client ID	PX-WF-B8076-SB03-0304
Battelle ID	H7077-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	10.61
Matrix	SB
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	1.76 J	H7077-FS(3)	10.000	8/2/2020	0.78	2.21	5.52
PFHpA	375-85-9	1.66 U	H7077-FS(3)	10.000	8/2/2020	0.56	1.66	5.52
PFOA	335-67-1	1.48 J	H7077-FS(3)	10.000	8/2/2020	0.67	2.21	5.52
PFNA	375-95-1	1.10 U	H7077-FS(3)	10.000	8/2/2020	0.54	1.10	5.52
PFDA	335-76-2	1.10 U	H7077-FS(3)	10.000	8/2/2020	0.51	1.10	5.52
PFUnA	2058-94-8	1.10 U	H7077-FS(3)	10.000	8/2/2020	0.51	1.10	5.52
PFDoA	307-55-1	2.21 U	H7077-FS(3)	10.000	8/2/2020	0.67	2.21	5.52
PFTrDA	72629-94-8	1.10 U	H7077-FS(3)	10.000	8/2/2020	0.31	1.10	5.52
PFTeDA	376-06-7	2.76 U	H7077-FS(3)	10.000	8/2/2020	1.19	2.76	5.52
NMeFOSAA	2355-31-9	2.76 U	H7077-FS(3)	10.000	8/2/2020	1.13	2.76	5.52
NEtFOSAA	2991-50-6	2.21 U	H7077-FS(3)	10.000	8/2/2020	0.83	2.21	5.52
PFBS	375-73-5	1.10 U	H7077-FS(3)	10.000	8/2/2020	0.39	1.10	5.52
PFHxS	355-46-4	18.50	H7077-FS(3)	10.000	8/2/2020	0.90	2.21	5.52
PFOS	1763-23-1	57.97	H7077-FS(3)	10.000	8/2/2020	0.76	2.21	5.52
HFPO-DA	13252-13-6	2.21 U	H7077-FS(3)	10.000	8/3/2020	0.71	2.21	5.52
Adona	919005-14-4	2.21 U	H7077-FS(3)	10.000	8/2/2020	0.92	2.21	5.52
11Cl-PF3OUdS	763051-92-9	1.66 U	H7077-FS(3)	10.000	8/2/2020	0.57	1.66	5.52
9Cl-PF3ONS	756426-58-1	1.10 U	H7077-FS(3)	10.000	8/2/2020	0.53	1.10	5.52

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

Client ID	PX-WF-B8076-SS02-000H
Battelle ID	H7078-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	14.91
Matrix	SS
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	1.39 J	H7078-FS(3)	10.000	8/2/2020	0.80	2.26	5.65	
PFHpA	**375-85-9**	1.69 ~~0.677~~ U	**H7078-FS(3)**	**10.000**	**8/2/2020**	**0.58**	**1.69**	**5.65**	EBL
PFOA	335-67-1	0.92 J	H7078-FS(3)	10.000	8/2/2020	0.69	2.26	5.65	
PFNA	**375-95-1**	**1.31 J**	**H7078-FS(3)**	**10.000**	**8/2/2020**	**0.55**	**1.13**	**5.65**	
PFDA	335-76-2	1.13 U	H7078-FS(3)	10.000	8/2/2020	0.52	1.13	5.65	
PFUnA	**2058-94-8**	**0.69 J**	**H7078-FS(3)**	**10.000**	**8/2/2020**	**0.52**	**1.13**	**5.65**	
PFDoA	307-55-1	2.26 U	H7078-FS(3)	10.000	8/2/2020	0.69	2.26	5.65	
PFTrDA	**72629-94-8**	**1.13 U**	**H7078-FS(3)**	**10.000**	**8/2/2020**	**0.32**	**1.13**	**5.65**	
PFTeDA	376-06-7	2.82 U	H7078-FS(3)	10.000	8/2/2020	1.22	2.82	5.65	
NMeFOSAA	**2355-31-9**	**2.82 U**	**H7078-FS(3)**	**10.000**	**8/2/2020**	**1.15**	**2.82**	**5.65**	
NEtFOSAA	2991-50-6	2.26 U	H7078-FS(3)	10.000	8/2/2020	0.85	2.26	5.65	
PFBS	**375-73-5**	**1.13 U**	**H7078-FS(3)**	**10.000**	**8/2/2020**	**0.40**	**1.13**	**5.65**	
PFHxS	355-46-4	5.18 J	H7078-FS(3)	10.000	8/2/2020	0.92	2.26	5.65	
PFOS	**1763-23-1**	**88.09**	**H7078-FS(3)**	**10.000**	**8/2/2020**	**0.78**	**2.26**	**5.65**	
HFPO-DA	13252-13-6	2.26 U	H7078-FS(3)	10.000	8/3/2020	0.72	2.26	5.65	
Adona	**919005-14-4**	**2.26 U**	**H7078-FS(3)**	**10.000**	**8/2/2020**	**0.94**	**2.26**	**5.65**	
11Cl-PF3OUdS	763051-92-9	1.69 U	H7078-FS(3)	10.000	8/2/2020	0.59	1.69	5.65	
9Cl-PF3ONS	**756426-58-1**	**1.13 U**	**H7078-FS(3)**	**10.000**	**8/2/2020**	**0.54**	**1.13**	**5.65**	

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

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Client ID	PX-WF-B8076-SB02-0304
Battelle ID	H7079-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	14.40
Matrix	SB
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	H7079-FS(3)	10.000	8/2/2020	0.87	2.44	6.10
PFHpA	375-85-9	1.83 U	H7079-FS(3)	10.000	8/2/2020	0.62	1.83	6.10
PFOA	335-67-1	2.44 U	H7079-FS(3)	10.000	8/2/2020	0.74	2.44	6.10
PFNA	375-95-1	1.22 U	H7079-FS(3)	10.000	8/2/2020	0.60	1.22	6.10
PFDA	335-76-2	1.22 U	H7079-FS(3)	10.000	8/2/2020	0.56	1.22	6.10
PFUnA	2058-94-8	1.22 U	H7079-FS(3)	10.000	8/2/2020	0.56	1.22	6.10
PFDoA	307-55-1	2.44 U	H7079-FS(3)	10.000	8/2/2020	0.74	2.44	6.10
PFTrDA	72629-94-8	1.22 U	H7079-FS(3)	10.000	8/2/2020	0.34	1.22	6.10
PFTeDA	376-06-7	3.05 U	H7079-FS(3)	10.000	8/2/2020	1.32	3.05	6.10
NMeFOSAA	2355-31-9	3.05 U	H7079-FS(3)	10.000	8/2/2020	1.24	3.05	6.10
NEtFOSAA	2991-50-6	2.44 U	H7079-FS(3)	10.000	8/2/2020	0.91	2.44	6.10
PFBS	375-73-5	1.22 U	H7079-FS(3)	10.000	8/2/2020	0.43	1.22	6.10
PFHxS	355-46-4	1.79 J	H7079-FS(3)	10.000	8/2/2020	0.99	2.44	6.10
PFOS	1763-23-1	36.72	H7079-FS(3)	10.000	8/2/2020	0.84	2.44	6.10
HFPO-DA	13252-13-6	2.44 U	H7079-FS(3)	10.000	8/3/2020	0.78	2.44	6.10
Adona	919005-14-4	2.44 U	H7079-FS(3)	10.000	8/2/2020	1.01	2.44	6.10
11Cl-PF3OUdS	763051-92-9	1.83 U	H7079-FS(3)	10.000	8/2/2020	0.63	1.83	6.10
9Cl-PF3ONS	756426-58-1	1.22 U	H7079-FS(3)	10.000	8/2/2020	0.59	1.22	6.10

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

Client ID	PX-WF-CTMCA-SS04-000H
Battelle ID	H7080-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	16.15
Matrix	SS
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	H7080-FS(3)	10.000	8/2/2020	0.80	2.26	5.65
PFHpA	375-85-9	1.69 U	H7080-FS(3)	10.000	8/2/2020	0.58	1.69	5.65
PFOA	335-67-1	2.26 U	H7080-FS(3)	10.000	8/2/2020	0.69	2.26	5.65
PFNA	375-95-1	1.13 U	H7080-FS(3)	10.000	8/2/2020	0.55	1.13	5.65
PFDA	335-76-2	0.66 J	H7080-FS(3)	10.000	8/2/2020	0.52	1.13	5.65
PFUnA	2058-94-8	1.13 U	H7080-FS(3)	10.000	8/2/2020	0.52	1.13	5.65
PFDoA	307-55-1	2.26 U	H7080-FS(3)	10.000	8/2/2020	0.69	2.26	5.65
PFTrDA	72629-94-8	1.13 U	H7080-FS(3)	10.000	8/2/2020	0.32	1.13	5.65
PFTeDA	376-06-7	2.82 U	H7080-FS(3)	10.000	8/2/2020	1.22	2.82	5.65
NMeFOSAA	2355-31-9	2.82 U	H7080-FS(3)	10.000	8/2/2020	1.15	2.82	5.65
NEtFOSAA	2991-50-6	2.26 U	H7080-FS(3)	10.000	8/2/2020	0.85	2.26	5.65
PFBS	375-73-5	1.13 U	H7080-FS(3)	10.000	8/2/2020	0.40	1.13	5.65
PFHxS	355-46-4	2.26 U	H7080-FS(3)	10.000	8/2/2020	0.92	2.26	5.65
PFOS	1763-23-1	10.67	H7080-FS(3)	10.000	8/2/2020	0.78	2.26	5.65
HFPO-DA	13252-13-6	2.26 U	H7080-FS(3)	10.000	8/3/2020	0.72	2.26	5.65
Adona	919005-14-4	2.26 U	H7080-FS(3)	10.000	8/2/2020	0.94	2.26	5.65
11Cl-PF3OUdS	763051-92-9	1.69 U	H7080-FS(3)	10.000	8/2/2020	0.59	1.69	5.65
9Cl-PF3ONS	756426-58-1	1.13 U	H7080-FS(3)	10.000	8/2/2020	0.54	1.13	5.65

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

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Client ID	PX-WF-CTMCA-SB04-0304
Battelle ID	H7081-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	12.39
Matrix	SB
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	2.23 U	H7081-FS(3)	10.000	8/2/2020	0.79	2.23	5.59
PFHpA	**375-85-9**	**1.68 U**	**H7081-FS(3)**	**10.000**	**8/2/2020**	**0.57**	**1.68**	**5.59**
PFOA	335-67-1	2.23 U	H7081-FS(3)	10.000	8/2/2020	0.68	2.23	5.59
PFNA	**375-95-1**	**1.12 U**	**H7081-FS(3)**	**10.000**	**8/2/2020**	**0.55**	**1.12**	**5.59**
PFDA	335-76-2	1.12 U	H7081-FS(3)	10.000	8/2/2020	0.51	1.12	5.59
PFUnA	**2058-94-8**	**1.12 U**	**H7081-FS(3)**	**10.000**	**8/2/2020**	**0.51**	**1.12**	**5.59**
PFDoA	307-55-1	2.23 U	H7081-FS(3)	10.000	8/2/2020	0.68	2.23	5.59
PFTrDA	**72629-94-8**	**1.12 U**	**H7081-FS(3)**	**10.000**	**8/2/2020**	**0.31**	**1.12**	**5.59**
PFTeDA	376-06-7	2.79 U	H7081-FS(3)	10.000	8/2/2020	1.21	2.79	5.59
NMeFOSAA	**2355-31-9**	**2.79 U**	**H7081-FS(3)**	**10.000**	**8/2/2020**	**1.14**	**2.79**	**5.59**
NEtFOSAA	2991-50-6	2.23 U	H7081-FS(3)	10.000	8/2/2020	0.84	2.23	5.59
PFBS	**375-73-5**	**1.12 U**	**H7081-FS(3)**	**10.000**	**8/2/2020**	**0.39**	**1.12**	**5.59**
PFHxS	355-46-4	2.23 U	H7081-FS(3)	10.000	8/2/2020	0.91	2.23	5.59
PFOS	**1763-23-1**	**5.31 J**	**H7081-FS(3)**	**10.000**	**8/2/2020**	**0.77**	**2.23**	**5.59**
HFPO-DA	13252-13-6	2.23 U	H7081-FS(3)	10.000	8/3/2020	0.72	2.23	5.59
Adona	**919005-14-4**	**2.23 U**	**H7081-FS(3)**	**10.000**	**8/2/2020**	**0.93**	**2.23**	**5.59**
11Cl-PF3OUdS	763051-92-9	1.68 U	H7081-FS(3)	10.000	8/2/2020	0.58	1.68	5.59
9Cl-PF3ONS	**756426-58-1**	**1.12 U**	**H7081-FS(3)**	**10.000**	**8/2/2020**	**0.54**	**1.12**	**5.59**

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

Client ID	PX-WF-CTMCA-SS06-000H
Battelle ID	H7082-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	24.20
Matrix	SS
Sample Size	1.65
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.42 U	H7082-FS(3)	10.000	8/2/2020	0.86	2.42	6.06
PFHpA	375-85-9	1.82 U	H7082-FS(3)	10.000	8/2/2020	0.62	1.82	6.06
PFOA	335-67-1	2.42 U	H7082-FS(3)	10.000	8/2/2020	0.74	2.42	6.06
PFNA	375-95-1	1.21 U	H7082-FS(3)	10.000	8/2/2020	0.59	1.21	6.06
PFDA	335-76-2	1.21 U	H7082-FS(3)	10.000	8/2/2020	0.56	1.21	6.06
PFUnA	2058-94-8	1.21 U	H7082-FS(3)	10.000	8/2/2020	0.56	1.21	6.06
PFDoA	307-55-1	2.42 U	H7082-FS(3)	10.000	8/2/2020	0.74	2.42	6.06
PFTrDA	72629-94-8	1.21 U	H7082-FS(3)	10.000	8/2/2020	0.34	1.21	6.06
PFTeDA	376-06-7	3.03 U	H7082-FS(3)	10.000	8/2/2020	1.31	3.03	6.06
NMeFOSAA	2355-31-9	3.03 U	H7082-FS(3)	10.000	8/2/2020	1.24	3.03	6.06
NEtFOSAA	2991-50-6	2.42 U	H7082-FS(3)	10.000	8/2/2020	0.91	2.42	6.06
PFBS	375-73-5	1.21 U	H7082-FS(3)	10.000	8/2/2020	0.42	1.21	6.06
PFHxS	355-46-4	4.80 J	H7082-FS(3)	10.000	8/2/2020	0.98	2.42	6.06
PFOS	1763-23-1	16.32	H7082-FS(3)	10.000	8/2/2020	0.84	2.42	6.06
HFPO-DA	13252-13-6	2.42 U	H7082-FS(3)	10.000	8/3/2020	0.78	2.42	6.06
Adona	919005-14-4	2.42 U	H7082-FS(3)	10.000	8/2/2020	1.01	2.42	6.06
11Cl-PF3OUdS	763051-92-9	1.82 U	H7082-FS(3)	10.000	8/2/2020	0.63	1.82	6.06
9Cl-PF3ONS	756426-58-1	1.21 U	H7082-FS(3)	10.000	8/2/2020	0.58	1.21	6.06

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Analyzed by: Griffith, Lauren
Printed: 8/6/2020

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

Client ID	PX-WF-CTMCA-SB06-0304
Battelle ID	H7083-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	19.25
Matrix	SB
Sample Size	1.54
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.60 U	H7083-FS(3)	10.000	8/2/2020	0.92	2.60	6.49
PFHpA	375-85-9	1.95 U	H7083-FS(3)	10.000	8/2/2020	0.66	1.95	6.49
PFOA	335-67-1	2.60 U	H7083-FS(3)	10.000	8/2/2020	0.79	2.60	6.49
PFNA	375-95-1	1.30 U	H7083-FS(3)	10.000	8/2/2020	0.64	1.30	6.49
PFDA	335-76-2	1.30 U	H7083-FS(3)	10.000	8/2/2020	0.60	1.30	6.49
PFUnA	2058-94-8	1.30 U	H7083-FS(3)	10.000	8/2/2020	0.60	1.30	6.49
PFDoA	307-55-1	2.60 U	H7083-FS(3)	10.000	8/2/2020	0.79	2.60	6.49
PFTrDA	72629-94-8	1.30 U	H7083-FS(3)	10.000	8/2/2020	0.36	1.30	6.49
PFTeDA	376-06-7	3.25 U	H7083-FS(3)	10.000	8/2/2020	1.40	3.25	6.49
NMeFOSAA	2355-31-9	3.25 U	H7083-FS(3)	10.000	8/2/2020	1.32	3.25	6.49
NEtFOSAA	2991-50-6	2.60 U	H7083-FS(3)	10.000	8/2/2020	0.97	2.60	6.49
PFBS	375-73-5	1.30 U	H7083-FS(3)	10.000	8/2/2020	0.45	1.30	6.49
PFHxS	355-46-4	2.60 U	H7083-FS(3)	10.000	8/2/2020	1.05	2.60	6.49
PFOS	1763-23-1	2.60 U	H7083-FS(3)	10.000	8/2/2020	0.90	2.60	6.49
HFPO-DA	13252-13-6	2.60 U	H7083-FS(3)	10.000	8/3/2020	0.83	2.60	6.49
Adona	919005-14-4	2.60 U	H7083-FS(3)	10.000	8/2/2020	1.08	2.60	6.49
11Cl-PF3OUdS	763051-92-9	1.95 U	H7083-FS(3)	10.000	8/2/2020	0.68	1.95	6.49
9Cl-PF3ONS	756426-58-1	1.30 U	H7083-FS(3)	10.000	8/2/2020	0.62	1.30	6.49

BATTELLE
It can be done

9

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

Client ID	PX-WF-CTMCA-SS01-000H
Battelle ID	H7084-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	16.14
Matrix	SS
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	H7084-FS(3)	10.000	8/2/2020	0.83	2.33	5.81
PFHpA	375-85-9	1.74 U	H7084-FS(3)	10.000	8/2/2020	0.59	1.74	5.81
PFOA	335-67-1	2.33 U	H7084-FS(3)	10.000	8/2/2020	0.71	2.33	5.81
PFNA	375-95-1	1.16 U	H7084-FS(3)	10.000	8/2/2020	0.57	1.16	5.81
PFDA	335-76-2	1.16 U	H7084-FS(3)	10.000	8/2/2020	0.53	1.16	5.81
PFUnA	2058-94-8	1.16 U	H7084-FS(3)	10.000	8/2/2020	0.53	1.16	5.81
PFDoA	307-55-1	2.33 U	H7084-FS(3)	10.000	8/2/2020	0.71	2.33	5.81
PFTrDA	72629-94-8	1.16 U	H7084-FS(3)	10.000	8/2/2020	0.33	1.16	5.81
PFTeDA	376-06-7	2.91 U	H7084-FS(3)	10.000	8/2/2020	1.26	2.91	5.81
NMeFOSAA	2355-31-9	2.91 U	H7084-FS(3)	10.000	8/2/2020	1.19	2.91	5.81
NEtFOSAA	2991-50-6	2.33 U	H7084-FS(3)	10.000	8/2/2020	0.87	2.33	5.81
PFBS	375-73-5	1.16 U	H7084-FS(3)	10.000	8/2/2020	0.41	1.16	5.81
PFHxS	355-46-4	2.33 U	H7084-FS(3)	10.000	8/2/2020	0.94	2.33	5.81
PFOS	1763-23-1	0.85 J	H7084-FS(3)	10.000	8/2/2020	0.80	2.33	5.81
HFPO-DA	13252-13-6	2.33 U	H7084-FS(3)	10.000	8/3/2020	0.74	2.33	5.81
Adona	919005-14-4	2.33 U	H7084-FS(3)	10.000	8/2/2020	0.97	2.33	5.81
11Cl-PF3OUdS	763051-92-9	1.74 U	H7084-FS(3)	10.000	8/2/2020	0.60	1.74	5.81
9Cl-PF3ONS	756426-58-1	1.16 U	H7084-FS(3)	10.000	8/2/2020	0.56	1.16	5.81

BATTELLE
It can be done

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

1 D

Client ID	PX-WF-CTMCA-SB01-0304
Battelle ID	H7085-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	13.37
Matrix	SB
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	H7085-FS(3)	10.000	8/2/2020	0.80	2.25	5.62
PFHpA	375-85-9	1.69 U	H7085-FS(3)	10.000	8/2/2020	0.57	1.69	5.62
PFOA	335-67-1	2.25 U	H7085-FS(3)	10.000	8/2/2020	0.69	2.25	5.62
PFNA	375-95-1	1.12 U	H7085-FS(3)	10.000	8/2/2020	0.55	1.12	5.62
PFDA	335-76-2	1.12 U	H7085-FS(3)	10.000	8/2/2020	0.52	1.12	5.62
PFUnA	2058-94-8	1.12 U	H7085-FS(3)	10.000	8/2/2020	0.52	1.12	5.62
PFDoA	307-55-1	2.25 U	H7085-FS(3)	10.000	8/2/2020	0.69	2.25	5.62
PFTrDA	72629-94-8	1.12 U	H7085-FS(3)	10.000	8/2/2020	0.31	1.12	5.62
PFTeDA	376-06-7	2.81 U	H7085-FS(3)	10.000	8/2/2020	1.21	2.81	5.62
NMeFOSAA	2355-31-9	2.81 U	H7085-FS(3)	10.000	8/2/2020	1.15	2.81	5.62
NEtFOSAA	2991-50-6	2.25 U	H7085-FS(3)	10.000	8/2/2020	0.84	2.25	5.62
PFBS	375-73-5	1.12 U	H7085-FS(3)	10.000	8/2/2020	0.39	1.12	5.62
PFHxS	355-46-4	2.25 U	H7085-FS(3)	10.000	8/2/2020	0.91	2.25	5.62
PFOS	1763-23-1	2.25 U	H7085-FS(3)	10.000	8/2/2020	0.78	2.25	5.62
HFPO-DA	13252-13-6	2.25 U	H7085-FS(3)	10.000	8/3/2020	0.72	2.25	5.62
Adona	919005-14-4	2.25 U	H7085-FS(3)	10.000	8/2/2020	0.93	2.25	5.62
11Cl-PF3OUdS	763051-92-9	1.69 U	H7085-FS(3)	10.000	8/2/2020	0.58	1.69	5.62
9Cl-PF3ONS	756426-58-1	1.12 U	H7085-FS(3)	10.000	8/2/2020	0.54	1.12	5.62

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It can be done

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

Client ID	PX-WF-CTMCA-SB01P-0304
Battelle ID	H7086-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	13.93
Matrix	SB
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	H7086-FS(3)	10.000	8/2/2020	0.84	2.35	5.88
PFHpA	**375-85-9**	**1.76 U**	**H7086-FS(3)**	**10.000**	**8/2/2020**	**0.60**	**1.76**	**5.88**
PFOA	335-67-1	2.35 U	H7086-FS(3)	10.000	8/2/2020	0.72	2.35	5.88
PFNA	**375-95-1**	**1.18 U**	**H7086-FS(3)**	**10.000**	**8/2/2020**	**0.58**	**1.18**	**5.88**
PFDA	335-76-2	1.18 U	H7086-FS(3)	10.000	8/2/2020	0.54	1.18	5.88
PFUnA	**2058-94-8**	**1.18 U**	**H7086-FS(3)**	**10.000**	**8/2/2020**	**0.54**	**1.18**	**5.88**
PFDoA	307-55-1	2.35 U	H7086-FS(3)	10.000	8/2/2020	0.72	2.35	5.88
PFTrDA	**72629-94-8**	**1.18 U**	**H7086-FS(3)**	**10.000**	**8/2/2020**	**0.33**	**1.18**	**5.88**
PFTeDA	376-06-7	2.94 U	H7086-FS(3)	10.000	8/2/2020	1.27	2.94	5.88
NMeFOSAA	**2355-31-9**	**2.94 U**	**H7086-FS(3)**	**10.000**	**8/2/2020**	**1.20**	**2.94**	**5.88**
NEtFOSAA	2991-50-6	2.35 U	H7086-FS(3)	10.000	8/2/2020	0.88	2.35	5.88
PFBS	**375-73-5**	**1.18 U**	**H7086-FS(3)**	**10.000**	**8/2/2020**	**0.41**	**1.18**	**5.88**
PFHxS	355-46-4	2.35 U	H7086-FS(3)	10.000	8/2/2020	0.95	2.35	5.88
PFOS	**1763-23-1**	**2.35 U**	**H7086-FS(3)**	**10.000**	**8/2/2020**	**0.81**	**2.35**	**5.88**
HFPO-DA	13252-13-6	2.35 U	H7086-FS(3)	10.000	8/3/2020	0.75	2.35	5.88
Adona	**919005-14-4**	**2.35 U**	**H7086-FS(3)**	**10.000**	**8/2/2020**	**0.98**	**2.35**	**5.88**
11Cl-PF3OUdS	763051-92-9	1.76 U	H7086-FS(3)	10.000	8/2/2020	0.61	1.76	5.88
9Cl-PF3ONS	**756426-58-1**	**1.18 U**	**H7086-FS(3)**	**10.000**	**8/2/2020**	**0.56**	**1.18**	**5.88**

MW 9/27/20
Analyzed by: Griffith, Lauren
Printed: 8/6/2020

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-0782
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, Webster Field Annex, CTO-JU14, Maryland
Date: September 27, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-WF-B8076-WT01-0720	H7132-FS	Water
2	PX-WF-B8076-WT02-0720	H7133-FS	Water
3	PX-WF-B8076-WT02P-0720	H7134-FS	Water
4	PX-WF-B8076-WT03-0720	H7135-FS	Water
5	PX-WF-B8076-WT04-0720	H7136-FS	Water
5MS	PX-WF-B8076-WT04-0720MS	H7137-FSMS	Water
5MSD	PX-WF-B8076-WT04-0720MSD	H7138-FSMSD	Water
6	PX-WF-B8076-FB01-070920	H7150-FS	Water
7	PX-WF-B8076-EB01-070920	H7151-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for five water samples, one aqueous equipment blank sample, and one aqueous field blank sample collected on July 9, 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	*Method References*
PFAS	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 exhibited the following contamination.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
LB87 IB	PFDA	0.23	U	1, 6
	NEtFOSAA	0.59	U	1, 5

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-WF-B8076-FB01-070920	PFHxA	2.32	None	All Associated >5X
	PFHpA	0.29	None	
	PFOA	0.74	None	
	PFBS	2.44	None	
	PFHxS	16.33	None	
	PFOS	50.34	None	
PX-WF-B8076-EB01-070920	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/X) in each sample. Please refer to the Surrogate Form 2s at the end of the DVR 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%/1468%/200.0	None - 4X Rule Applies
	PFHpA	22%/355%/176.7	None - 4X Rule Applies
	PFOA	0%/209%/200.0	None - 4X Rule Applies
	PFTrDA	257%/161%/45.9	None - Sample ND
	PFTeDA	59%/47%/OK	None - See Surrogates
	PFBS	0%/698%/200.0	None - 4X Rule Applies
	PFHxS	0%/2080%/200.0	None - 4X Rule Applies
	PFOS	0%/10807%/200.0	None - 4X Rule Applies
	HFPO-DA	52%/51%/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 various 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-WF-B8076-WT02-0720 ng/L	PX-WF-B8076-WT02P-0720 ng/L	RPD	Qualifier
PFHxA	2820.59	2641.30	7%	None
PFHpA	928.37	931.60	0%	
PFOA	1836.14	1471.09	22%	
PFNA	132.82	152.09	14%	
PFDA	19.91	22.17	11%	
PFUnA	0.28	0.30	7%	
PFBS	1254.14	1197.31	5%	
PFHxS	11989.01	11330.73	6%	
PFOS	84756.77	81500.50	4%	
HFPO-DA	0.34	0.41	19%	

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

Signed: Nancy Weaver Dated: 10/2/20

Nancy Weaver
Senior Chemist

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.

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

Client ID	PX-WF-B8076-WT01-0720
Battelle ID	H7132-FS
Sample Type	SA
Collection Date	07/09/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	GW
Sample Size	0.280
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	783.74 D	H7132-FS-D(3)	12.500	8/4/2020	5.92	16.74	55.80	
PFHpA	375-85-9	316.20 D	H7132-FS-D(3)	12.500	8/4/2020	2.90	11.16	55.80	
PFOA	335-67-1	243.91 D	H7132-FS-D(3)	12.500	8/4/2020	5.69	16.74	55.80	
PFNA	375-95-1	11.10	H7132-FS(0)	1.000	8/4/2020	0.28	0.89	4.46	
PFDA	335-76-2	0.75 ~~J~~ U	H7132-FS(0)	1.000	8/4/2020	0.13	0.45	4.46	MBL
PFUnA	2058-94-8	0.45 ~~J~~ UJ	H7132-FS(0)	1.000	8/4/2020	0.20	0.45	4.46	SSL
PFDoA	307-55-1	0.45 ~~J~~ UJ	H7132-FS(0)	1.000	8/4/2020	0.17	0.45	4.46	SSL
PFTrDA	72629-94-8	1.04 J	H7132-FS(0)	1.000	8/4/2020	0.13	0.45	4.46	
PFTeDA	376-06-7	1.79 ~~J~~ X	H7132-FS(0)	1.000	8/4/2020	0.65	1.79	4.46	SSL
NMeFOSAA	2355-31-9	0.89 U	H7132-FS(0)	1.000	8/4/2020	0.31	0.89	4.46	
NEtFOSAA	2991-50-6	0.89 ~~0.59 J~~ U	H7132-FS(0)	1.000	8/4/2020	0.45	0.89	4.46	MBL
PFBS	375-73-5	343.18 D	H7132-FS-D(3)	12.500	8/4/2020	1.56	5.58	55.80	
PFHxS	355-46-4	2509.11 D	H7132-FS-D(9)	156.250	8/5/2020	15.35	55.80	697.54	
PFOS	1763-23-1	1738.14 D	H7132-FS-D(5)	31.250	8/4/2020	12.28	27.90	139.51	
HFPO-DA	13252-13-6	0.45 U	H7132-FS(0)	1.000	8/5/2020	0.22	0.45	4.46	
Adona	919005-14-4	0.89 U	H7132-FS(0)	1.000	8/4/2020	0.24	0.89	4.46	
11Cl-PF3OUdS	763051-92-9	0.45 U	H7132-FS(0)	1.000	8/4/2020	0.21	0.45	4.46	
9Cl-PF3ONS	756426-58-1	0.89 U	H7132-FS(0)	1.000	8/4/2020	0.24	0.89	4.46	

NW 9/27/20
Analyzed by: Schultz, Stephanie
Printed: 8/7/2020

BATTELLE
It can be done

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

Client ID	PX-WF-B8076-WT01-0720
Battelle ID	H7132-FS
Sample Type	SA
Collection Date	07/09/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	96	D	H7132-FS-D(3)	8/4/2020
13C4-PFHpA	95	D	H7132-FS-D(3)	8/4/2020
13C8-PFOA	115	D	H7132-FS-D(3)	8/4/2020
13C9-PFNA	100	D	H7132-FS-D(3)	8/4/2020
13C6-PFDA	69		H7132-FS(0)	8/4/2020
13C7-PFUnA	43	N	H7132-FS(0)	8/4/2020
13C2-PFDoA	18	N	H7132-FS(0)	8/4/2020
13C2-PFTeDA	2	N	H7132-FS(0)	8/4/2020
d3-MeFOSAA	102	D	H7132-FS-D(5)	8/4/2020
d5-EtFOSAA	102	D	H7132-FS-D(5)	8/4/2020
13C3-PFBS	106	D	H7132-FS-D(5)	8/4/2020
13C3-PFHxS	104	D	H7132-FS-D(9)	8/5/2020
13C8-PFOS	105	D	H7132-FS-D(5)	8/4/2020
13C3-HFPO-DA	63	D	H7132-FS-D(3)	8/5/2020

NW 9/27/20

Analyzed by: Schultz, Stephanie
Printed: 8/7/2020

BATTELLE
It can be done

2

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

Client ID	PX-WF-B8076-WT02-0720
Battelle ID	H7133-FS
Sample Type	SA
Collection Date	07/09/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	GW
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	2820.59 D	H7133-FS-D(7)	78.125	8/4/2020	38.34	108.51	361.69	
PFHpA	375-85-9	928.37 D	H7133-FS-D(3)	12.500	8/4/2020	3.01	11.57	57.87	
PFOA	335-67-1	1836.14 D	H7133-FS-D(5)	31.250	8/4/2020	14.76	43.40	144.68	
PFNA	375-95-1	132.82 J	H7133-FS(0)	1.000	8/4/2020	0.29	0.93	4.63	SSL
PFDA	335-76-2	19.91	H7133-FS(0)	1.000	8/4/2020	0.13	0.46	4.63	
PFUnA	2058-94-8	0.28 J	H7133-FS(0)	1.000	8/4/2020	0.20	0.46	4.63	
PFDoA	307-55-1	0.46 U	H7133-FS(0)	1.000	8/4/2020	0.18	0.46	4.63	
PFTrDA	72629-94-8	0.46 U	H7133-FS(0)	1.000	8/4/2020	0.14	0.46	4.63	
PFTeDA	376-06-7	1.85 U	H7133-FS(0)	1.000	8/4/2020	0.68	1.85	4.63	
NMeFOSAA	2355-31-9	0.93 U	H7133-FS(0)	1.000	8/4/2020	0.32	0.93	4.63	
NEtFOSAA	2991-50-6	0.93 U	H7133-FS(0)	1.000	8/4/2020	0.46	0.93	4.63	
PFBS	375-73-5	1254.14 D	H7133-FS-D(5)	31.250	8/4/2020	4.05	14.47	144.68	
PFHxS	355-46-4	11989.01 D	H7133-FS-D(9)	976.563	8/4/2020	99.46	361.69	4521.13	
PFOS	1763-23-1	84756.77 D	H7133-FS-D(11)	4882.813	8/5/2020	1989.29	4521.12	22605.62	
HFPO-DA	13252-13-6	0.34 J	H7133-FS(0)	1.000	8/5/2020	0.23	0.46	4.63	
Adona	919005-14-4	0.93 U	H7133-FS(0)	1.000	8/4/2020	0.25	0.93	4.63	
11Cl-PF3OUdS	763051-92-9	0.46 U	H7133-FS(0)	1.000	8/4/2020	0.21	0.46	4.63	
9Cl-PF3ONS	756426-58-1	0.93 U	H7133-FS(0)	1.000	8/4/2020	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-WF-B8076-WT02-0720
Battelle ID	H7133-FS
Sample Type	SA
Collection Date	07/09/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	109	D	H7133-FS-D(7)	8/4/2020
13C4-PFHpA	83	D	H7133-FS-D(5)	8/4/2020
13C8-PFOA	87	D	H7133-FS-D(5)	8/4/2020
13C9-PFNA	46	Nb	H7133-FS-D(5)	8/4/2020
13C6-PFDA	79		H7133-FS(0)	8/4/2020
13C7-PFUnA	102		H7133-FS(0)	8/4/2020
13C2-PFDoA	89		H7133-FS(0)	8/4/2020
13C2-PFTeDA	54		H7133-FS(0)	8/4/2020
d3-MeFOSAA	93	D	H7133-FS-D(11)	8/5/2020
d5-EtFOSAA	95	D	H7133-FS-D(11)	8/5/2020
13C3-PFBS	98	D	H7133-FS-D(11)	8/5/2020
13C3-PFHxS	94	D	H7133-FS-D(11)	8/5/2020
13C8-PFOS	101	D	H7133-FS-D(11)	8/5/2020
13C3-HFPO-DA	83	D	H7133-FS-D(5)	8/5/2020

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

Client ID		PX-WF-B8076-WT02P-0720							
Battelle ID		H7134-FS							
Sample Type		SA							
Collection Date		07/09/2020							
Extraction Date		07/15/2020							
Analytical Instrument		Sciex 6500+ LC/MS/MS							
% Moisture		NA							
Matrix		GW							
Sample Size		0.300							
Size Unit-Basis		L							
Analyte	CAS No.	Result (ng/L)		Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2641.30	D	H7134-FS-D(7)	78.125	8/4/2020	34.51	97.66	325.52
PFHpA	**375-85-9**	**931.60**	**D**	**H7134-FS-D(3)**	**12.500**	**8/4/2020**	**2.71**	**10.42**	**52.08**
PFOA	335-67-1	1471.09	D	H7134-FS-D(5)	31.250	8/4/2020	13.28	39.06	130.21
PFNA	**375-95-1**	**152.09**	**J**	**H7134-FS(0)**	**1.000**	**8/4/2020**	**0.26**	**0.83**	**4.17**
PFDA	335-76-2	22.17		H7134-FS(0)	1.000	8/4/2020	0.12	0.42	4.17
PFUnA	**2058-94-8**	**0.30**	**J**	**H7134-FS(0)**	**1.000**	**8/4/2020**	**0.18**	**0.42**	**4.17**
PFDoA	307-55-1	0.42	U	H7134-FS(0)	1.000	8/4/2020	0.16	0.42	4.17
PFTrDA	**72629-94-8**	**0.42**	**U**	**H7134-FS(0)**	**1.000**	**8/4/2020**	**0.13**	**0.42**	**4.17**
PFTeDA	376-06-7	1.67	U	H7134-FS(0)	1.000	8/4/2020	0.61	1.67	4.17
NMeFOSAA	**2355-31-9**	**0.83**	**U**	**H7134-FS(0)**	**1.000**	**8/4/2020**	**0.29**	**0.83**	**4.17**
NEtFOSAA	2991-50-6	0.83	U	H7134-FS(0)	1.000	8/4/2020	0.42	0.83	4.17
PFBS	**375-73-5**	**1197.31**	**D**	**H7134-FS-D(5)**	**31.250**	**8/4/2020**	**3.65**	**13.02**	**130.21**
PFHxS	355-46-4	11330.73	D	H7134-FS-D(9)	976.563	8/4/2020	89.52	325.52	4069.01
PFOS	**1763-23-1**	**81500.50**	**D**	**H7134-FS-D(11)**	**4882.813**	**8/5/2020**	**1790.36**	**4069.01**	**20345.05**
HFPO-DA	13252-13-6	0.41	J	H7134-FS(0)	1.000	8/5/2020	0.21	0.42	4.17
Adona	**919005-14-4**	**0.83**	**U**	**H7134-FS(0)**	**1.000**	**8/4/2020**	**0.23**	**0.83**	**4.17**
11Cl-PF3OUdS	763051-92-9	0.42	U	H7134-FS(0)	1.000	8/4/2020	0.19	0.42	4.17
9Cl-PF3ONS	**756426-58-1**	**0.83**	**U**	**H7134-FS(0)**	**1.000**	**8/4/2020**	**0.23**	**0.83**	**4.17**

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

Client ID	PX-WF-B8076-WT02P-0720
Battelle ID	H7134-FS
Sample Type	SA
Collection Date	07/09/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	94	D	H7134-FS-D(7)	8/4/2020
13C4-PFHpA	82	D	H7134-FS-D(5)	8/4/2020
13C8-PFOA	99	D	H7134-FS-D(5)	8/4/2020
13C9-PFNA	40	ND	H7134-FS-D(5)	8/4/2020
13C6-PFDA	76		H7134-FS(0)	8/4/2020
13C7-PFUnA	112		H7134-FS(0)	8/4/2020
13C2-PFDoA	91		H7134-FS(0)	8/4/2020
13C2-PFTeDA	65		H7134-FS(0)	8/4/2020
d3-MeFOSAA	93	D	H7134-FS-D(11)	8/5/2020
d5-EtFOSAA	98	D	H7134-FS-D(11)	8/5/2020
13C3-PFBS	101	D	H7134-FS-D(11)	8/5/2020
13C3-PFHxS	102	D	H7134-FS-D(11)	8/5/2020
13C8-PFOS	101	D	H7134-FS-D(11)	8/5/2020
13C3-HFPO-DA	81	D	H7134-FS-D(5)	8/5/2020

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

Client ID		PX-WF-B8076-WT03-0720							
Battelle ID		H7135-FS							
Sample Type		SA							
Collection Date		07/09/2020							
Extraction Date		07/15/2020							
Analytical Instrument		Sciex 6500+ LC/MS/MS							
% Moisture		NA							
Matrix		GW							
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	8238.73	D	H7135-FS-D(9)	390.625	8/5/2020	191.70	542.53	1808.45
PFHpA	**375-85-9**	**2042.13**	**D**	**H7135-FS-D(3)**	**12.500**	**8/5/2020**	**3.01**	**11.57**	**57.87**
PFOA	335-67-1	2816.04	D	H7135-FS-D(7)	78.125	8/5/2020	36.89	108.51	361.69
PFNA	**375-95-1**	**649.90**		**H7135-FS(0)**	**1.000**	**8/5/2020**	**0.29**	**0.93**	**4.63**
PFDA	335-76-2	5.56		H7135-FS(0)	1.000	8/5/2020	0.13	0.46	4.63
PFUnA	**2058-94-8**	**0.61**	**J**	**H7135-FS(0)**	**1.000**	**8/5/2020**	**0.20**	**0.46**	**4.63**
PFDoA	307-55-1	0.46	U	H7135-FS(0)	1.000	8/5/2020	0.18	0.46	4.63
PFTrDA	**72629-94-8**	**0.46**	**U**	**H7135-FS(0)**	**1.000**	**8/5/2020**	**0.14**	**0.46**	**4.63**
PFTeDA	376-06-7	1.85	J UJ	H7135-FS(0)	1.000	8/5/2020	0.68	1.85	4.63
NMeFOSAA	**2355-31-9**	**0.93**	**U**	**H7135-FS(0)**	**1.000**	**8/5/2020**	**0.32**	**0.93**	**4.63**
NEtFOSAA	2991-50-6	0.93	U	H7135-FS(0)	1.000	8/5/2020	0.46	0.93	4.63
PFBS	**375-73-5**	**4804.83**	**D**	**H7135-FS-D(7)**	**78.125**	**8/5/2020**	**10.13**	**36.17**	**361.69**
PFHxS	355-46-4	55759.98	D	H7135-FS-D(11)	1953.125	8/5/2020	198.93	723.38	9042.25
PFOS	**1763-23-1**	**42939.38**	**D**	**H7135-FS-D(11)**	**1953.125**	**8/5/2020**	**795.72**	**1808.45**	**9042.25**
HFPO-DA	13252-13-6	0.65	J	H7135-FS(0)	1.000	8/5/2020	0.23	0.46	4.63
Adona	**919005-14-4**	**0.93**	**U**	**H7135-FS(0)**	**1.000**	**8/5/2020**	**0.25**	**0.93**	**4.63**
11Cl-PF3OUdS	763051-92-9	0.46	U	H7135-FS(0)	1.000	8/5/2020	0.21	0.46	4.63
9Cl-PF3ONS	**756426-58-1**	**0.93**	**U**	**H7135-FS(0)**	**1.000**	**8/5/2020**	**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-WF-B8076-WT03-0720
Battelle ID	H7135-FS
Sample Type	SA
Collection Date	07/09/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	113	D	H7135-FS-D(9)	8/5/2020
13C4-PFHpA	72	D	H7135-FS-D(7)	8/5/2020
13C8-PFOA	100	D	H7135-FS-D(7)	8/5/2020
13C9-PFNA	80	D	H7135-FS-D(7)	8/5/2020
13C6-PFDA	80		H7135-FS(0)	8/5/2020
13C7-PFUnA	85		H7135-FS(0)	8/5/2020
13C2-PFDoA	71		H7135-FS(0)	8/5/2020
13C2-PFTeDA	44	M	H7135-FS(0)	8/5/2020
d3-MeFOSAA	100	D	H7135-FS-D(11)	8/5/2020
d5-EtFOSAA	101	D	H7135-FS-D(11)	8/5/2020
13C3-PFBS	98	D	H7135-FS-D(11)	8/5/2020
13C3-PFHxS	101	D	H7135-FS-D(11)	8/5/2020
13C8-PFOS	99	D	H7135-FS-D(11)	8/5/2020
13C3-HFPO-DA	67	D	H7135-FS-D(7)	8/5/2020

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

Client ID		PX-WF-B8076-WT04-0720							
Battelle ID		H7136-FS							
Sample Type		SA							
Collection Date		07/09/2020							
Extraction Date		07/15/2020							
Analytical Instrument		Sciex 6500+ LC/MS/MS							
% Moisture		NA							
Matrix		GW							
Sample Size		0.280							
Size Unit-Basis		L							
Analyte	CAS No.	Result (ng/L)		Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	3325.00	D	H7136-FS-D(7)	62.500	8/5/2020	29.58	83.71	279.02	
PFHpA	375-85-9	903.05	D	H7136-FS-D(5)	25.000	8/5/2020	5.80	22.32	111.61	
PFOA	335-67-1	1203.55	D	H7136-FS-D(5)	25.000	8/5/2020	11.38	33.48	111.61	
PFNA	375-95-1	85.92		H7136-FS(0)	1.000	8/5/2020	0.28	0.89	4.46	
PFDA	335-76-2	6.93		H7136-FS(0)	1.000	8/5/2020	0.13	0.45	4.46	
PFUnA	2058-94-8	0.43	J	H7136-FS(0)	1.000	8/5/2020	0.20	0.45	4.46	
PFDoA	307-55-1	0.45	J UJ	H7136-FS(0)	1.000	8/5/2020	0.17	0.45	4.46	SSL
PFTrDA	72629-94-8	0.45	U	H7136-FS(0)	1.000	8/5/2020	0.13	0.45	4.46	
PFTeDA	376-06-7	1.79	J UJ	H7136-FS(0)	1.000	8/5/2020	0.65	1.79	4.46	SSL
NMeFOSAA	2355-31-9	4.03	J	H7136-FS(0)	1.000	8/5/2020	0.31	0.89	4.46	
NEtFOSAA	2991-50-6	0.89 ~~0.82~~	J U	H7136-FS(0)	1.000	8/5/2020	0.45	0.89	4.46	MBL
PFBS	375-73-5	1753.82	D	H7136-FS-D(7)	62.500	8/5/2020	7.81	27.90	279.02	
PFHxS	355-46-4	10741.62	D	H7136-FS-D(9)	312.500	8/5/2020	30.69	111.61	1395.09	
PFOS	1763-23-1	26930.69	D	H7136-FS-D(11)	1562.500	8/5/2020	613.84	1395.09	6975.45	
HFPO-DA	13252-13-6	0.45	J UJ	H7136-FS(0)	1.000	8/5/2020	0.22	0.45	4.46	MSL
Adona	919005-14-4	0.89	U	H7136-FS(0)	1.000	8/5/2020	0.24	0.89	4.46	
11Cl-PF3OUdS	763051-92-9	0.45	U	H7136-FS(0)	1.000	8/5/2020	0.21	0.45	4.46	
9Cl-PF3ONS	756426-58-1	0.89	U	H7136-FS(0)	1.000	8/5/2020	0.24	0.89	4.46	

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

Client ID	PX-WF-B8076-WT04-0720
Battelle ID	H7136-FS
Sample Type	SA
Collection Date	07/09/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	94	D	H7136-FS-D(7)	8/5/2020
13C4-PFHpA	**90**	**D**	**H7136-FS-D(5)**	**8/5/2020**
13C8-PFOA	106	D	H7136-FS-D(5)	8/5/2020
13C9-PFNA	**69**	**D**	**H7136-FS-D(5)**	**8/5/2020**
13C6-PFDA	70		H7136-FS(0)	8/5/2020
13C7-PFUnA	**67**		**H7136-FS(0)**	**8/5/2020**
13C2-PFDoA	37	N	H7136-FS(0)	8/5/2020
13C2-PFTeDA	**10**	**N**	**H7136-FS(0)**	**8/5/2020**
d3-MeFOSAA	96	D	H7136-FS-D(11)	8/5/2020
d5-EtFOSAA	**98**	**D**	**H7136-FS-D(11)**	**8/5/2020**
13C3-PFBS	92	D	H7136-FS-D(11)	8/5/2020
13C3-PFHxS	**99**	**D**	**H7136-FS-D(11)**	**8/5/2020**
13C8-PFOS	97	D	H7136-FS-D(11)	8/5/2020
13C3-HFPO-DA	**62**	**D**	**H7136-FS-D(5)**	**8/5/2020**

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

Client ID	PX-WF-B8076-FB01-070920
Battelle ID	H7150-FS
Sample Type	SA
Collection Date	07/09/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	QC
Sample Size	0.285
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	2.32 J	H7150-FS(0)	1.000	8/4/2020	0.46	1.32	4.39	
PFHpA	375-85-9	0.29 J	H7150-FS(0)	1.000	8/4/2020	0.23	0.88	4.39	
PFOA	335-67-1	0.74 J	H7150-FS(0)	1.000	8/4/2020	0.45	1.32	4.39	
PFNA	375-95-1	0.88 U	H7150-FS(0)	1.000	8/4/2020	0.27	0.88	4.39	
PFDA	335-76-2	0.44 ~~0.21~~ U	H7150-FS(0)	1.000	8/4/2020	0.12	0.44	4.39	MBL
PFUnA	2058-94-8	0.44 U	H7150-FS(0)	1.000	8/4/2020	0.19	0.44	4.39	
PFDoA	307-55-1	0.44 U	H7150-FS(0)	1.000	8/4/2020	0.17	0.44	4.39	
PFTrDA	72629-94-8	0.44 U	H7150-FS(0)	1.000	8/4/2020	0.13	0.44	4.39	
PFTeDA	376-06-7	1.75 U	H7150-FS(0)	1.000	8/4/2020	0.64	1.75	4.39	
NMeFOSAA	2355-31-9	0.88 U	H7150-FS(0)	1.000	8/4/2020	0.31	0.88	4.39	
NEtFOSAA	2991-50-6	0.88 U	H7150-FS(0)	1.000	8/4/2020	0.44	0.88	4.39	
PFBS	375-73-5	2.44 J	H7150-FS(0)	1.000	8/4/2020	0.12	0.44	4.39	
PFHxS	355-46-4	16.33	H7150-FS(0)	1.000	8/4/2020	0.10	0.35	4.39	
PFOS	1763-23-1	50.34	H7150-FS(0)	1.000	8/4/2020	0.39	0.88	4.39	
HFPO-DA	13252-13-6	0.44 U	H7150-FS(0)	1.000	8/5/2020	0.22	0.44	4.39	
Adona	919005-14-4	0.88 U	H7150-FS(0)	1.000	8/4/2020	0.24	0.88	4.39	
11Cl-PF3OUdS	763051-92-9	0.44 U	H7150-FS(0)	1.000	8/4/2020	0.20	0.44	4.39	
9Cl-PF3ONS	756426-58-1	0.88 U	H7150-FS(0)	1.000	8/4/2020	0.24	0.88	4.39	

MW 9/27/20

Analyzed by: Schultz, Stephanie
Printed: 8/7/2020

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

Client ID	PX-WF-B8076-EB01-070920
Battelle ID	H7151-FS
Sample Type	SA
Collection Date	07/09/2020
Extraction Date	07/15/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	QC
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	H7151-FS(0)	1.000	8/4/2020	0.50	1.42	4.72
PFHpA	375-85-9	0.94 U	H7151-FS(0)	1.000	8/4/2020	0.25	0.94	4.72
PFOA	335-67-1	1.42 U	H7151-FS(0)	1.000	8/4/2020	0.48	1.42	4.72
PFNA	375-95-1	0.94 U	H7151-FS(0)	1.000	8/4/2020	0.29	0.94	4.72
PFDA	335-76-2	0.47 U	H7151-FS(0)	1.000	8/4/2020	0.13	0.47	4.72
PFUnA	2058-94-8	0.47 U	H7151-FS(0)	1.000	8/4/2020	0.21	0.47	4.72
PFDoA	307-55-1	0.47 U	H7151-FS(0)	1.000	8/4/2020	0.18	0.47	4.72
PFTrDA	72629-94-8	0.47 U	H7151-FS(0)	1.000	8/4/2020	0.14	0.47	4.72
PFTeDA	376-06-7	1.89 U	H7151-FS(0)	1.000	8/4/2020	0.69	1.89	4.72
NMeFOSAA	2355-31-9	0.94 U	H7151-FS(0)	1.000	8/4/2020	0.33	0.94	4.72
NEtFOSAA	2991-50-6	0.94 U	H7151-FS(0)	1.000	8/4/2020	0.47	0.94	4.72
PFBS	375-73-5	0.47 U	H7151-FS(0)	1.000	8/4/2020	0.13	0.47	4.72
PFHxS	355-46-4	0.38 U	H7151-FS(0)	1.000	8/4/2020	0.10	0.38	4.72
PFOS	1763-23-1	0.94 U	H7151-FS(0)	1.000	8/4/2020	0.42	0.94	4.72
HFPO-DA	13252-13-6	0.47 U	H7151-FS(0)	1.000	8/5/2020	0.24	0.47	4.72
Adona	919005-14-4	0.94 U	H7151-FS(0)	1.000	8/4/2020	0.25	0.94	4.72
11Cl-PF3OUdS	763051-92-9	0.47 U	H7151-FS(0)	1.000	8/4/2020	0.22	0.47	4.72
9Cl-PF3ONS	756426-58-1	0.94 U	H7151-FS(0)	1.000	8/4/2020	0.25	0.94	4.72

NW 9/27/20

Analyzed by: Schultz, Stephanie
Printed: 8/7/2020

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-0783
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, Webster Field Annex, CTO-JU14, Maryland
Date: September 27, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-WF-CTMCA-WT04-0720	H7141-FS	Water
1MS	PX-WF-CTMCA-WT04-0720MS	H7139-FSMS	Water
1MSD	PX-WF-CTMCA-WT04-0720MSD	H7140-FSMSD	Water
2	PX-WF-CTMCA-WT02P-0720	H7146-FS	Water
3	PX-WF-CTMCA-WT01-0720	H7147-FS	Water
4	PX-WF-CTMCA-WT02-0720	H7148-FS	Water
5	PX-WF-CTMCA-EB01-070720	H7149-FS	Water
6	PX-WF-CTMCA-EB01-070920	H7152-FS	Water
7	PX-WF-CTMCA-FB01-070920	H7156-FS	Water
8	PX-WF-CTMCA-EB02-070920	H7157-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for four water samples, three aqueous equipment blank samples, and one aqueous field blank sample collected on July 7-9, 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	*Method References*
PFAS	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
CZ514PB-FS	PFHpA	0.38	U	6, 8

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-WF-CTMCA-EB01-070720	None - ND	-	-	-
PX-WF-CTMCA-EB01-070920	None - ND	-	-	-
PX-WF-CTMCA-FB01-070920	None - ND	-	-	-
PX-WF-CTMCA-EB02-070920	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 Surrogate Form 2s at the end of the DVR 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
1	PFTrDA	OK/146%/OK	None - Sample ND
	PFHxS	0%/0%/NC	None - 4X Rule Applies
	PFOS	0%/0%/NC	None - 4X Rule Applies
	11Cl-PF3OUdS	OK/OK/53	None for RPD alone

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.

Field Duplicate Sample Precision

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

Compound	PX-WF-CTMCA-WT02P-0720 ng/g	PX-WF-CTMCA-WT02-0720 ng/g	RPD	Qualifier
PFHxA	40.51	40.80	1%	None
PFHpA	14.19	14.16	0%	
PFOA	11.01	10.71	3%	
PFBS	28.91	26.96	7%	
PFHxS	174.79	165.33	6%	
PFOS	57.88	62.78	8%	

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

Signed: Nancy Weaver Dated: 10/21/20

Nancy Weaver
Senior Chemist

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.

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

Client ID		PX-WF-CTMCA-WT04-0720							
Battelle ID		H7141-FS							
Sample Type		SA							
Collection Date		07/08/2020							
Extraction Date		07/16/2020							
Analytical Instrument		Sciex 5500 LC/MS/MS							
% Moisture		NA							
Matrix		GW							
Sample Size		0.285							
Size Unit-Basis		L							
Analyte	CAS No.	Result (ng/L)		Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	88.94		H7141-FS(0)	1.000	8/4/2020	0.46	1.32	4.39
PFHpA	**375-85-9**	**30.35**		**H7141-FS(0)**	**1.000**	**8/4/2020**	**0.23**	**0.88**	**4.39**
PFOA	335-67-1	46.76		H7141-FS(0)	1.000	8/4/2020	0.45	1.32	4.39
PFNA	**375-95-1**	**1.71**	J	**H7141-FS(0)**	**1.000**	**8/4/2020**	**0.27**	**0.88**	**4.39**
PFDA	335-76-2	0.13	J	H7141-FS(0)	1.000	8/4/2020	0.12	0.44	4.39
PFUnA	**2058-94-8**	**0.44**	U	**H7141-FS(0)**	**1.000**	**8/4/2020**	**0.19**	**0.44**	**4.39**
PFDoA	307-55-1	0.44	U	H7141-FS(0)	1.000	8/4/2020	0.17	0.44	4.39
PFTrDA	**72629-94-8**	**0.44**	U	**H7141-FS(0)**	**1.000**	**8/4/2020**	**0.13**	**0.44**	**4.39**
PFTeDA	376-06-7	1.75	UJ	H7141-FS(0)	1.000	8/4/2020	0.64	1.75	4.39
NMeFOSAA	**2355-31-9**	**0.88**	U	**H7141-FS(0)**	**1.000**	**8/4/2020**	**0.31**	**0.88**	**4.39**
NEtFOSAA	2991-50-6	0.88	U	H7141-FS(0)	1.000	8/4/2020	0.44	0.88	4.39
PFBS	**375-73-5**	**24.82**		**H7141-FS(0)**	**1.000**	**8/4/2020**	**0.12**	**0.44**	**4.39**
PFHxS	355-46-4	283.45	D	H7141-FS-D(3)	5.000	8/4/2020	0.48	1.75	21.93
PFOS	**1763-23-1**	**367.46**	D	**H7141-FS-D(3)**	**5.000**	**8/4/2020**	**1.93**	**4.39**	**21.93**
HFPO-DA	13252-13-6	0.44	U	H7141-FS(0)	1.000	8/4/2020	0.22	0.44	4.39
Adona	**919005-14-4**	**0.88**	U	**H7141-FS(0)**	**1.000**	**8/4/2020**	**0.24**	**0.88**	**4.39**
11Cl-PF3OUdS	763051-92-9	0.44	U	H7141-FS(0)	1.000	8/4/2020	0.20	0.44	4.39
9Cl-PF3ONS	**756426-58-1**	**0.88**	U	**H7141-FS(0)**	**1.000**	**8/4/2020**	**0.24**	**0.88**	**4.39**

SSL

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Analyzed by: Griffith, Lauren
Printed: 8/7/2020

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

Client ID	PX-WF-CTMCA-WT04-0720
Battelle ID	H7141-FS
Sample Type	SA
Collection Date	07/08/2020
Extraction Date	07/16/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	71	H7141-FS(0)	8/4/2020
13C4-PFHpA	68	H7141-FS(0)	8/4/2020
13C8-PFOA	67	H7141-FS(0)	8/4/2020
13C9-PFNA	65	H7141-FS(0)	8/4/2020
13C6-PFDA	70	H7141-FS(0)	8/4/2020
13C7-PFUnA	69	H7141-FS(0)	8/4/2020
13C2-PFDoA	57	H7141-FS(0)	8/4/2020
13C2-PFTeDA	40 M	H7141-FS(0)	8/4/2020
d3-MeFOSAA	110 D	H7141-FS-D(3)	8/4/2020
d5-EtFOSAA	115 D	H7141-FS-D(3)	8/4/2020
13C3-PFBS	110 D	H7141-FS-D(3)	8/4/2020
13C3-PFHxS	113 D	H7141-FS-D(3)	8/4/2020
13C8-PFOS	98 D	H7141-FS-D(3)	8/4/2020
13C3-HFPO-DA	74	H7141-FS(0)	8/4/2020

NW 9/27/20

Analyzed by: Griffith, Lauren
Printed: 8/7/2020

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2

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

Client ID	PX-WF-CTMCA-WT02P-0720
Battelle ID	H7146-FS
Sample Type	SA
Collection Date	07/08/2020
Extraction Date	07/16/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	GW
Sample Size	0.285
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	40.51	H7146-FS(0)	1.000	8/4/2020	0.46	1.32	4.39	
PFHpA	375-85-9	14.19	H7146-FS(0)	1.000	8/4/2020	0.23	0.88	4.39	
PFOA	335-67-1	11.01	H7146-FS(0)	1.000	8/4/2020	0.45	1.32	4.39	
PFNA	375-95-1	0.88 U	H7146-FS(0)	1.000	8/4/2020	0.27	0.88	4.39	
PFDA	335-76-2	0.44 U	H7146-FS(0)	1.000	8/4/2020	0.12	0.44	4.39	
PFUnA	2058-94-8	0.44 U	H7146-FS(0)	1.000	8/4/2020	0.19	0.44	4.39	
PFDoA	307-55-1	0.44 U	H7146-FS(0)	1.000	8/4/2020	0.17	0.44	4.39	
PFTrDA	72629-94-8	0.44 U	H7146-FS(0)	1.000	8/4/2020	0.13	0.44	4.39	
PFTeDA	376-06-7	1.75 J UJ	H7146-FS(0)	1.000	8/4/2020	0.64	1.75	4.39	SSL
NMeFOSAA	2355-31-9	0.88 U	H7146-FS(0)	1.000	8/4/2020	0.31	0.88	4.39	
NEtFOSAA	2991-50-6	0.88 U	H7146-FS(0)	1.000	8/4/2020	0.44	0.88	4.39	
PFBS	375-73-5	28.91	H7146-FS(0)	1.000	8/4/2020	0.12	0.44	4.39	
PFHxS	355-46-4	174.79 D	H7146-FS-D(3)	5.000	8/4/2020	0.48	1.75	21.93	
PFOS	1763-23-1	57.88	H7146-FS(0)	1.000	8/4/2020	0.39	0.88	4.39	
HFPO-DA	13252-13-6	0.44 U	H7146-FS(0)	1.000	8/4/2020	0.22	0.44	4.39	
Adona	919005-14-4	0.88 U	H7146-FS(0)	1.000	8/4/2020	0.24	0.88	4.39	
11Cl-PF3OUdS	763051-92-9	0.44 U	H7146-FS(0)	1.000	8/4/2020	0.20	0.44	4.39	
9Cl-PF3ONS	756426-58-1	0.88 U	H7146-FS(0)	1.000	8/4/2020	0.24	0.88	4.39	

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Analyzed by: Griffith, Lauren
Printed: 8/7/2020

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

2

Client ID	PX-WF-CTMCA-WT02P-0720
Battelle ID	H7146-FS
Sample Type	SA
Collection Date	07/08/2020
Extraction Date	07/16/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	64	H7146-FS(0)	8/4/2020
13C4-PFHpA	**72**	**H7146-FS(0)**	**8/4/2020**
13C8-PFOA	64	H7146-FS(0)	8/4/2020
13C9-PFNA	**67**	**H7146-FS(0)**	**8/4/2020**
13C6-PFDA	61	H7146-FS(0)	8/4/2020
13C7-PFUnA	**62**	**H7146-FS(0)**	**8/4/2020**
13C2-PFDoA	54	H7146-FS(0)	8/4/2020
13C2-PFTeDA	**30** H	**H7146-FS(0)**	**8/4/2020**
d3-MeFOSAA	78	H7146-FS(0)	8/4/2020
d5-EtFOSAA	**68**	**H7146-FS(0)**	**8/4/2020**
13C3-PFBS	73	H7146-FS(0)	8/4/2020
13C3-PFHxS	**93** P	**H7146-FS-D(3)**	**8/4/2020**
13C8-PFOS	68	H7146-FS(0)	8/4/2020
13C3-HFPO-DA	**69**	**H7146-FS(0)**	**8/4/2020**

NW 9/27/20

Analyzed by: Griffith, Lauren
Printed: 8/7/2020

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3

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

Client ID		PX-WF-CTMCA-WT01-0720							
Battelle ID		H7147-FS							
Sample Type		SA							
Collection Date		07/08/2020							
Extraction Date		07/16/2020							
Analytical Instrument		Sciex 5500 LC/MS/MS							
% Moisture		NA							
Matrix		GW							
Sample Size		0.290							
Size Unit-Basis		L							
Analyte	CAS No.	Result (ng/L)		Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	50.16		H7147-FS(0)	1.000	8/4/2020	0.46	1.29	4.31
PFHpA	375-85-9	17.29		H7147-FS(0)	1.000	8/4/2020	0.22	0.86	4.31
PFOA	335-67-1	15.98		H7147-FS(0)	1.000	8/4/2020	0.44	1.29	4.31
PFNA	375-95-1	0.86	U	H7147-FS(0)	1.000	8/4/2020	0.27	0.86	4.31
PFDA	335-76-2	0.43	U	H7147-FS(0)	1.000	8/4/2020	0.12	0.43	4.31
PFUnA	2058-94-8	0.43	U	H7147-FS(0)	1.000	8/4/2020	0.19	0.43	4.31
PFDoA	307-55-1	0.43	U	H7147-FS(0)	1.000	8/4/2020	0.16	0.43	4.31
PFTrDA	72629-94-8	0.43	U	H7147-FS(0)	1.000	8/4/2020	0.13	0.43	4.31
PFTeDA	376-06-7	1.72	U	H7147-FS(0)	1.000	8/4/2020	0.63	1.72	4.31
NMeFOSAA	2355-31-9	0.86	U	H7147-FS(0)	1.000	8/4/2020	0.30	0.86	4.31
NEtFOSAA	2991-50-6	0.86	U	H7147-FS(0)	1.000	8/4/2020	0.43	0.86	4.31
PFBS	375-73-5	34.86		H7147-FS(0)	1.000	8/4/2020	0.12	0.43	4.31
PFHxS	355-46-4	166.46	ϕ	H7147-FS-D(3)	5.000	8/4/2020	0.47	1.72	21.55
PFOS	1763-23-1	50.74		H7147-FS(0)	1.000	8/4/2020	0.38	0.86	4.31
HFPO-DA	13252-13-6	0.43	U	H7147-FS(0)	1.000	8/4/2020	0.22	0.43	4.31
Adona	919005-14-4	0.86	U	H7147-FS(0)	1.000	8/4/2020	0.23	0.86	4.31
11Cl-PF3OUdS	763051-92-9	0.43	U	H7147-FS(0)	1.000	8/4/2020	0.20	0.43	4.31
9Cl-PF3ONS	756426-58-1	0.86	U	H7147-FS(0)	1.000	8/4/2020	0.23	0.86	4.31

MW 9/27/20

Analyzed by: Griffith, Lauren
Printed: 8/7/2020

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4

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

Client ID	PX-WF-CTMCA-WT02-0720
Battelle ID	H7148-FS
Sample Type	SA
Collection Date	07/08/2020
Extraction Date	07/16/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	GW
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	40.80	H7148-FS(0)	1.000	8/4/2020	0.50	1.42	4.72	
PFHpA	**375-85-9**	**14.16**	**H7148-FS(0)**	**1.000**	**8/4/2020**	**0.25**	**0.94**	**4.72**	
PFOA	335-67-1	10.71	H7148-FS(0)	1.000	8/4/2020	0.48	1.42	4.72	
PFNA	**375-95-1**	**0.94 U**	**H7148-FS(0)**	**1.000**	**8/4/2020**	**0.29**	**0.94**	**4.72**	
PFDA	335-76-2	0.47 U	H7148-FS(0)	1.000	8/4/2020	0.13	0.47	4.72	
PFUnA	**2058-94-8**	**0.47 U**	**H7148-FS(0)**	**1.000**	**8/4/2020**	**0.21**	**0.47**	**4.72**	
PFDoA	307-55-1	0.47 U	H7148-FS(0)	1.000	8/4/2020	0.18	0.47	4.72	
PFTrDA	**72629-94-8**	**0.47 U**	**H7148-FS(0)**	**1.000**	**8/4/2020**	**0.14**	**0.47**	**4.72**	
PFTeDA	376-06-7	1.89 J UJ	H7148-FS(0)	1.000	8/4/2020	0.69	1.89	4.72	SSL
NMeFOSAA	**2355-31-9**	**0.94 U**	**H7148-FS(0)**	**1.000**	**8/4/2020**	**0.33**	**0.94**	**4.72**	
NEtFOSAA	2991-50-6	0.94 U	H7148-FS(0)	1.000	8/4/2020	0.47	0.94	4.72	
PFBS	**375-73-5**	**26.96**	**H7148-FS(0)**	**1.000**	**8/4/2020**	**0.13**	**0.47**	**4.72**	
PFHxS	355-46-4	165.33 Φ	H7148-FS-D(3)	5.000	8/4/2020	0.52	1.89	23.58	
PFOS	**1763-23-1**	**62.78**	**H7148-FS(0)**	**1.000**	**8/4/2020**	**0.42**	**0.94**	**4.72**	
HFPO-DA	13252-13-6	0.47 U	H7148-FS(0)	1.000	8/4/2020	0.24	0.47	4.72	
Adona	**919005-14-4**	**0.94 U**	**H7148-FS(0)**	**1.000**	**8/4/2020**	**0.25**	**0.94**	**4.72**	
11Cl-PF3OUdS	763051-92-9	0.47 U	H7148-FS(0)	1.000	8/4/2020	0.22	0.47	4.72	
9Cl-PF3ONS	**756426-58-1**	**0.94 U**	**H7148-FS(0)**	**1.000**	**8/4/2020**	**0.25**	**0.94**	**4.72**	

MW 9/27/20

Analyzed by: Griffith, Lauren
Printed: 8/7/2020

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

Client ID	PX-WF-CTMCA-WT02-0720
Battelle ID	H7148-FS
Sample Type	SA
Collection Date	07/08/2020
Extraction Date	07/16/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	69	H7148-FS(0)	8/4/2020
13C4-PFHpA	76	H7148-FS(0)	8/4/2020
13C8-PFOA	70	H7148-FS(0)	8/4/2020
13C9-PFNA	70	H7148-FS(0)	8/4/2020
13C6-PFDA	72	H7148-FS(0)	8/4/2020
13C7-PFUnA	67	H7148-FS(0)	8/4/2020
13C2-PFDoA	64	H7148-FS(0)	8/4/2020
13C2-PFTeDA	36 M	H7148-FS(0)	8/4/2020
d3-MeFOSAA	82	H7148-FS(0)	8/4/2020
d5-EtFOSAA	80	H7148-FS(0)	8/4/2020
13C3-PFBS	85	H7148-FS(0)	8/4/2020
13C3-PFHxS	95 D	H7148-FS-D(3)	8/4/2020
13C8-PFOS	74	H7148-FS(0)	8/4/2020
13C3-HFPO-DA	72	H7148-FS(0)	8/4/2020

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

Client ID		PX-WF-CTMCA-EB01-070720
Battelle ID		H7149-FS
Sample Type		SA
Collection Date		07/07/2020
Extraction Date		07/16/2020
Analytical Instrument		Sciex 5500 LC/MS/MS
% Moisture		NA
Matrix		QC
Sample Size		0.285
Size Unit-Basis		L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.32 U	H7149-FS(0)	1.000	8/4/2020	0.46	1.32	4.39
PFHpA	375-85-9	0.88 U	H7149-FS(0)	1.000	8/4/2020	0.23	0.88	4.39
PFOA	335-67-1	1.32 U	H7149-FS(0)	1.000	8/4/2020	0.45	1.32	4.39
PFNA	375-95-1	0.88 U	H7149-FS(0)	1.000	8/4/2020	0.27	0.88	4.39
PFDA	335-76-2	0.44 U	H7149-FS(0)	1.000	8/4/2020	0.12	0.44	4.39
PFUnA	2058-94-8	0.44 U	H7149-FS(0)	1.000	8/4/2020	0.19	0.44	4.39
PFDoA	307-55-1	0.44 U	H7149-FS(0)	1.000	8/4/2020	0.17	0.44	4.39
PFTrDA	72629-94-8	0.44 U	H7149-FS(0)	1.000	8/4/2020	0.13	0.44	4.39
PFTeDA	376-06-7	1.75 U	H7149-FS(0)	1.000	8/4/2020	0.64	1.75	4.39
NMeFOSAA	2355-31-9	0.88 U	H7149-FS(0)	1.000	8/4/2020	0.31	0.88	4.39
NEtFOSAA	2991-50-6	0.88 U	H7149-FS(0)	1.000	8/4/2020	0.44	0.88	4.39
PFBS	375-73-5	0.44 U	H7149-FS(0)	1.000	8/4/2020	0.12	0.44	4.39
PFHxS	355-46-4	0.35 U	H7149-FS(0)	1.000	8/4/2020	0.10	0.35	4.39
PFOS	1763-23-1	0.88 U	H7149-FS(0)	1.000	8/4/2020	0.39	0.88	4.39
HFPO-DA	13252-13-6	0.44 U	H7149-FS(0)	1.000	8/4/2020	0.22	0.44	4.39
Adona	919005-14-4	0.88 U	H7149-FS(0)	1.000	8/4/2020	0.24	0.88	4.39
11Cl-PF3OUdS	763051-92-9	0.44 U	H7149-FS(0)	1.000	8/4/2020	0.20	0.44	4.39
9Cl-PF3ONS	756426-58-1	0.88 U	H7149-FS(0)	1.000	8/4/2020	0.24	0.88	4.39

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b

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

Client ID		PX-WF-CTMCA-EB01-070920						
Battelle ID		H7152-FS						
Sample Type		SA						
Collection Date		07/09/2020						
Extraction Date		07/16/2020						
Analytical Instrument		Sciex 5500 LC/MS/MS						
% Moisture		NA						
Matrix		QC						
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	H7152-FS(0)	1.000	8/4/2020	0.51	1.44	4.81
PFHpA	**375-85-9**	0.96 ~~0.28~~ U	**H7152-FS(0)**	**1.000**	**8/4/2020**	**0.25**	**0.96**	**4.81**
PFOA	335-67-1	1.44 U	H7152-FS(0)	1.000	8/4/2020	0.49	1.44	4.81
PFNA	**375-95-1**	**0.96 U**	**H7152-FS(0)**	**1.000**	**8/4/2020**	**0.30**	**0.96**	**4.81**
PFDA	335-76-2	0.48 U	H7152-FS(0)	1.000	8/4/2020	0.13	0.48	4.81
PFUnA	**2058-94-8**	**0.48 U**	**H7152-FS(0)**	**1.000**	**8/4/2020**	**0.21**	**0.48**	**4.81**
PFDoA	307-55-1	0.48 U	H7152-FS(0)	1.000	8/4/2020	0.18	0.48	4.81
PFTrDA	**72629-94-8**	**0.48 U**	**H7152-FS(0)**	**1.000**	**8/4/2020**	**0.14**	**0.48**	**4.81**
PFTeDA	376-06-7	1.92 U	H7152-FS(0)	1.000	8/4/2020	0.70	1.92	4.81
NMeFOSAA	**2355-31-9**	**0.96 U**	**H7152-FS(0)**	**1.000**	**8/4/2020**	**0.34**	**0.96**	**4.81**
NEtFOSAA	2991-50-6	0.96 U	H7152-FS(0)	1.000	8/4/2020	0.48	0.96	4.81
PFBS	**375-73-5**	**0.48 U**	**H7152-FS(0)**	**1.000**	**8/4/2020**	**0.13**	**0.48**	**4.81**
PFHxS	355-46-4	0.38 U	H7152-FS(0)	1.000	8/4/2020	0.11	0.38	4.81
PFOS	**1763-23-1**	**0.96 U**	**H7152-FS(0)**	**1.000**	**8/4/2020**	**0.42**	**0.96**	**4.81**
HFPO-DA	13252-13-6	0.48 U	H7152-FS(0)	1.000	8/4/2020	0.24	0.48	4.81
Adona	**919005-14-4**	**0.96 U**	**H7152-FS(0)**	**1.000**	**8/4/2020**	**0.26**	**0.96**	**4.81**
11Cl-PF3OUdS	763051-92-9	0.48 U	H7152-FS(0)	1.000	8/4/2020	0.22	0.48	4.81
9Cl-PF3ONS	**756426-58-1**	**0.96 U**	**H7152-FS(0)**	**1.000**	**8/4/2020**	**0.26**	**0.96**	**4.81**

0.96 MBL

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

Client ID		PX-WF-CTMCA-FB01-070920						
Battelle ID		H7156-FS						
Sample Type		SA						
Collection Date		07/09/2020						
Extraction Date		07/16/2020						
Analytical Instrument		Sciex 5500 LC/MS/MS						
% Moisture		NA						
Matrix		QC						
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	1.36 U	H7156-FS(0)	1.000	8/4/2020	0.48	1.36	4.55
PFHpA	**375-85-9**	**0.91 U**	**H7156-FS(0)**	**1.000**	**8/4/2020**	**0.24**	**0.91**	**4.55**
PFOA	335-67-1	1.36 U	H7156-FS(0)	1.000	8/4/2020	0.46	1.36	4.55
PFNA	**375-95-1**	**0.91 U**	**H7156-FS(0)**	**1.000**	**8/4/2020**	**0.28**	**0.91**	**4.55**
PFDA	335-76-2	0.45 U	H7156-FS(0)	1.000	8/4/2020	0.13	0.45	4.55
PFUnA	**2058-94-8**	**0.45 U**	**H7156-FS(0)**	**1.000**	**8/4/2020**	**0.20**	**0.45**	**4.55**
PFDoA	307-55-1	0.45 U	H7156-FS(0)	1.000	8/4/2020	0.17	0.45	4.55
PFTrDA	**72629-94-8**	**0.45 U**	**H7156-FS(0)**	**1.000**	**8/4/2020**	**0.14**	**0.45**	**4.55**
PFTeDA	376-06-7	1.82 U	H7156-FS(0)	1.000	8/4/2020	0.66	1.82	4.55
NMeFOSAA	**2355-31-9**	**0.91 U**	**H7156-FS(0)**	**1.000**	**8/4/2020**	**0.32**	**0.91**	**4.55**
NEtFOSAA	2991-50-6	0.91 U	H7156-FS(0)	1.000	8/4/2020	0.45	0.91	4.55
PFBS	**375-73-5**	**0.45 U**	**H7156-FS(0)**	**1.000**	**8/4/2020**	**0.13**	**0.45**	**4.55**
PFHxS	355-46-4	0.36 U	H7156-FS(0)	1.000	8/4/2020	0.10	0.36	4.55
PFOS	**1763-23-1**	**0.91 U**	**H7156-FS(0)**	**1.000**	**8/4/2020**	**0.40**	**0.91**	**4.55**
HFPO-DA	13252-13-6	0.45 U	H7156-FS(0)	1.000	8/4/2020	0.23	0.45	4.55
Adona	**919005-14-4**	**0.91 U**	**H7156-FS(0)**	**1.000**	**8/4/2020**	**0.25**	**0.91**	**4.55**
11Cl-PF3OUdS	763051-92-9	0.45 U	H7156-FS(0)	1.000	8/4/2020	0.21	0.45	4.55
9Cl-PF3ONS	**756426-58-1**	**0.91 U**	**H7156-FS(0)**	**1.000**	**8/4/2020**	**0.25**	**0.91**	**4.55**

NW 9/27/20
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Project Client: CH2M
Project Name: CTO-4256: PAX Basewide PFAS
Project No.: 100142032

Client ID		PX-WF-CTMCA-EB02-070920							
Battelle ID		H7157-FS							
Sample Type		SA							
Collection Date		07/09/2020							
Extraction Date		07/16/2020							
Analytical Instrument		Sciex 5500 LC/MS/MS							
% Moisture		NA							
Matrix		QC							
Sample Size		0.280							
Size Unit-Basis		L							
Analyte	CAS No.	Result (ng/L)		Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.34 U		H7157-FS(0)	1.000	8/4/2020	0.47	1.34	4.46
PFHpA	375-85-9	0.89	~~0.50~~ U	H7157-FS(0)	1.000	8/4/2020	0.23	0.89	4.46
PFOA	335-67-1	1.34 U		H7157-FS(0)	1.000	8/4/2020	0.46	1.34	4.46
PFNA	375-95-1	0.89 U		H7157-FS(0)	1.000	8/4/2020	0.28	0.89	4.46
PFDA	335-76-2	0.45 U		H7157-FS(0)	1.000	8/4/2020	0.13	0.45	4.46
PFUnA	2058-94-8	0.45 U		H7157-FS(0)	1.000	8/4/2020	0.20	0.45	4.46
PFDoA	307-55-1	0.45 U		H7157-FS(0)	1.000	8/4/2020	0.17	0.45	4.46
PFTrDA	72629-94-8	0.45 U		H7157-FS(0)	1.000	8/4/2020	0.13	0.45	4.46
PFTeDA	376-06-7	1.79 U		H7157-FS(0)	1.000	8/4/2020	0.65	1.79	4.46
NMeFOSAA	2355-31-9	0.89 U		H7157-FS(0)	1.000	8/4/2020	0.31	0.89	4.46
NEtFOSAA	2991-50-6	0.89 U		H7157-FS(0)	1.000	8/4/2020	0.45	0.89	4.46
PFBS	375-73-5	0.45 U		H7157-FS(0)	1.000	8/4/2020	0.13	0.45	4.46
PFHxS	355-46-4	0.36 U		H7157-FS(0)	1.000	8/4/2020	0.10	0.36	4.46
PFOS	1763-23-1	0.89 U		H7157-FS(0)	1.000	8/4/2020	0.39	0.89	4.46
HFPO-DA	13252-13-6	0.45 U		H7157-FS(0)	1.000	8/4/2020	0.22	0.45	4.46
Adona	919005-14-4	0.89 U		H7157-FS(0)	1.000	8/4/2020	0.24	0.89	4.46
11Cl-PF3OUdS	763051-92-9	0.45 U		H7157-FS(0)	1.000	8/4/2020	0.21	0.45	4.46
9Cl-PF3ONS	756426-58-1	0.89 U		H7157-FS(0)	1.000	8/4/2020	0.24	0.89	4.46

0.89 MBL

MW 9/27/20

Analyzed by: Griffith, Lauren
Printed: 8/7/2020

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-0784
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: September 27, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-S09-MW39-0720	H7142-FS	Water
2	PX-S09-MW37-0720	H7143-FS	Water
2MS	PX-S09-MW37-0720MS	H7144-FSMS	Water
2MSD	PX-S09-MW37-0720MSD	H7145-FSMSD	Water
3	PX-WF-CTMCA-WT03-0720	H7153-FS	Water
4	PX-WF-CTMCA-WT05-0720	H7154-FS	Water
5	PX-WF-CTMCA-WT06-0720	H7155-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for five water samples collected on July 8-9, 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	*Method References*
PFAS	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-S09-FB01-070820	None - ND	-	-	-
PX-S09-EB01-070820	PFHpA	0.38	U	5
PX-WF-CTMCA-FB01-070920	None - ND	-	-	-
PX-WF-CTMCA-EB02-070920	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R) except for the following.

EDS Sample	Surrogate	%R	Qualifier
3	PFTeDA	29%	UJ

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
2	PFHxA	OK/70%/37.2	None - 4X Rule Applies
	PFHxS	OK/139%/OK	None - 4X Rule Applies
	PFOS	OK/162%/85.5	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.

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 Dated: 10/2/20

Nancy Weaver
Senior Chemist

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.

BATTELLE
It can be done

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

Client ID		PX-S09-MW39-0720							
Battelle ID		H7142-FS							
Sample Type		SA							
Collection Date		07/08/2020							
Extraction Date		07/17/2020							
Analytical Instrument		Sciex 5500 LC/MS/MS							
% Moisture		NA							
Matrix		GW							
Sample Size		0.280							
Size Unit-Basis		L							
Analyte	CAS No.	Result (ng/L)		Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	118.70	D	H7142-FS-D(3)	5.000	8/4/2020	2.37	6.70	22.32
PFHpA	**375-85-9**	**12.50**		**H7142-FS(0)**	**1.000**	**8/4/2020**	**0.23**	**0.89**	**4.46**
PFOA	335-67-1	16.40		H7142-FS(0)	1.000	8/4/2020	0.46	1.34	4.46
PFNA	**375-95-1**	**4.34**	J	**H7142-FS(0)**	**1.000**	**8/4/2020**	**0.28**	**0.89**	**4.46**
PFDA	335-76-2	0.45	U	H7142-FS(0)	1.000	8/4/2020	0.13	0.45	4.46
PFUnA	**2058-94-8**	**0.45**	**U**	**H7142-FS(0)**	**1.000**	**8/4/2020**	**0.20**	**0.45**	**4.46**
PFDoA	307-55-1	0.45	U	H7142-FS(0)	1.000	8/4/2020	0.17	0.45	4.46
PFTrDA	**72629-94-8**	**0.45**	**U**	**H7142-FS(0)**	**1.000**	**8/4/2020**	**0.13**	**0.45**	**4.46**
PFTeDA	376-06-7	1.79	U	H7142-FS(0)	1.000	8/4/2020	0.65	1.79	4.46
NMeFOSAA	**2355-31-9**	**0.89**	**U**	**H7142-FS(0)**	**1.000**	**8/4/2020**	**0.31**	**0.89**	**4.46**
NEtFOSAA	2991-50-6	0.89	U	H7142-FS(0)	1.000	8/4/2020	0.45	0.89	4.46
PFBS	**375-73-5**	**104.76**	**D**	**H7142-FS-D(3)**	**5.000**	**8/4/2020**	**0.63**	**2.23**	**22.32**
PFHxS	355-46-4	225.81	D	H7142-FS-D(3)	5.000	8/4/2020	0.49	1.79	22.32
PFOS	**1763-23-1**	**122.04**	**D**	**H7142-FS-D(3)**	**5.000**	**8/4/2020**	**1.96**	**4.46**	**22.32**
HFPO-DA	13252-13-6	0.45	U	H7142-FS(0)	1.000	8/4/2020	0.22	0.45	4.46
Adona	**919005-14-4**	**0.89**	**U**	**H7142-FS(0)**	**1.000**	**8/4/2020**	**0.24**	**0.89**	**4.46**
11Cl-PF3OUdS	763051-92-9	0.45	U	H7142-FS(0)	1.000	8/4/2020	0.21	0.45	4.46
9Cl-PF3ONS	**756426-58-1**	**0.89**	**U**	**H7142-FS(0)**	**1.000**	**8/4/2020**	**0.24**	**0.89**	**4.46**

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

Client ID		PX-S09-MW37-0720							
Battelle ID		H7143-FS							
Sample Type		SA							
Collection Date		07/08/2020							
Extraction Date		07/17/2020							
Analytical Instrument		Sciex 5500 LC/MS/MS							
% Moisture		NA							
Matrix		GW							
Sample Size		0.280							
Size Unit-Basis		L							
Analyte	CAS No.	Result (ng/L)		Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	142.23	D	H7143-FS-D(3)	5.000	8/4/2020	2.37	6.70	22.32
PFHpA	**375-85-9**	**44.96**		**H7143-FS(0)**	**1.000**	**8/4/2020**	**0.23**	**0.89**	**4.46**
PFOA	335-67-1	19.01		H7143-FS(0)	1.000	8/4/2020	0.46	1.34	4.46
PFNA	**375-95-1**	**3.06**	**J**	**H7143-FS(0)**	**1.000**	**8/4/2020**	**0.28**	**0.89**	**4.46**
PFDA	335-76-2	1.93	J	H7143-FS(0)	1.000	8/4/2020	0.13	0.45	4.46
PFUnA	**2058-94-8**	**0.41**	**J**	**H7143-FS(0)**	**1.000**	**8/4/2020**	**0.20**	**0.45**	**4.46**
PFDoA	307-55-1	0.28	J	H7143-FS(0)	1.000	8/4/2020	0.17	0.45	4.46
PFTrDA	**72629-94-8**	**0.45**	**U**	**H7143-FS(0)**	**1.000**	**8/4/2020**	**0.13**	**0.45**	**4.46**
PFTeDA	376-06-7	1.79	U	H7143-FS(0)	1.000	8/4/2020	0.65	1.79	4.46
NMeFOSAA	**2355-31-9**	**0.89**	**U**	**H7143-FS(0)**	**1.000**	**8/4/2020**	**0.31**	**0.89**	**4.46**
NEtFOSAA	2991-50-6	0.89	U	H7143-FS(0)	1.000	8/4/2020	0.45	0.89	4.46
PFBS	**375-73-5**	**23.90**		**H7143-FS(0)**	**1.000**	**8/4/2020**	**0.13**	**0.45**	**4.46**
PFHxS	355-46-4	243.87	D	H7143-FS-D(3)	5.000	8/4/2020	0.49	1.79	22.32
PFOS	**1763-23-1**	**346.86**	**D**	**H7143-FS-D(3)**	**5.000**	**8/4/2020**	**1.96**	**4.46**	**22.32**
HFPO-DA	13252-13-6	0.45	U	H7143-FS(0)	1.000	8/4/2020	0.22	0.45	4.46
Adona	**919005-14-4**	**0.89**	**U**	**H7143-FS(0)**	**1.000**	**8/4/2020**	**0.24**	**0.89**	**4.46**
11Cl-PF3OUdS	763051-92-9	0.45	U	H7143-FS(0)	1.000	8/4/2020	0.21	0.45	4.46
9Cl-PF3ONS	**756426-58-1**	**0.89**	**U**	**H7143-FS(0)**	**1.000**	**8/4/2020**	**0.24**	**0.89**	**4.46**

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It can be done

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

3

Client ID		PX-WF-CTMCA-WT03-0720							
Battelle ID		H7153-FS							
Sample Type		SA							
Collection Date		07/09/2020							
Extraction Date		07/17/2020							
Analytical Instrument		Sciex 5500 LC/MS/MS							
% Moisture		NA							
Matrix		GW							
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	5.58		H7153-FS(0)	1.000	8/4/2020	0.49	1.39	4.63
PFHpA	**375-85-9**	**6.48**		**H7153-FS(0)**	**1.000**	**8/4/2020**	**0.24**	**0.93**	**4.63**
PFOA	335-67-1	1.01	J	H7153-FS(0)	1.000	8/4/2020	0.47	1.39	4.63
PFNA	**375-95-1**	**0.93**	**U**	**H7153-FS(0)**	**1.000**	**8/4/2020**	**0.29**	**0.93**	**4.63**
PFDA	335-76-2	0.46	U	H7153-FS(0)	1.000	8/4/2020	0.13	0.46	4.63
PFUnA	**2058-94-8**	**0.46**	**U**	**H7153-FS(0)**	**1.000**	**8/4/2020**	**0.20**	**0.46**	**4.63**
PFDoA	307-55-1	0.46	U	H7153-FS(0)	1.000	8/4/2020	0.18	0.46	4.63
PFTrDA	**72629-94-8**	**0.46**	**U**	**H7153-FS(0)**	**1.000**	**8/4/2020**	**0.14**	**0.46**	**4.63**
PFTeDA	376-06-7	1.85	J UJ	H7153-FS(0)	1.000	8/4/2020	0.68	1.85	4.63 SSL
NMeFOSAA	**2355-31-9**	**0.93**	**U**	**H7153-FS(0)**	**1.000**	**8/4/2020**	**0.32**	**0.93**	**4.63**
NEtFOSAA	2991-50-6	0.93	U	H7153-FS(0)	1.000	8/4/2020	0.46	0.93	4.63
PFBS	**375-73-5**	**5.59**		**H7153-FS(0)**	**1.000**	**8/4/2020**	**0.13**	**0.46**	**4.63**
PFHxS	355-46-4	87.88		H7153-FS(0)	1.000	8/4/2020	0.10	0.37	4.63
PFOS	**1763-23-1**	**18.25**		**H7153-FS(0)**	**1.000**	**8/4/2020**	**0.41**	**0.93**	**4.63**
HFPO-DA	13252-13-6	0.46	U	H7153-FS(0)	1.000	8/4/2020	0.23	0.46	4.63
Adona	**919005-14-4**	**0.93**	**U**	**H7153-FS(0)**	**1.000**	**8/4/2020**	**0.25**	**0.93**	**4.63**
11Cl-PF3OUdS	763051-92-9	0.46	U	H7153-FS(0)	1.000	8/4/2020	0.21	0.46	4.63
9Cl-PF3ONS	**756426-58-1**	**0.93**	**U**	**H7153-FS(0)**	**1.000**	**8/4/2020**	**0.25**	**0.93**	**4.63**

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It can be done

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

3

Client ID	PX-WF-CTMCA-WT03-0720
Battelle ID	H7153-FS
Sample Type	SA
Collection Date	07/09/2020
Extraction Date	07/17/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	75	H7153-FS(0)	8/4/2020
13C4-PFHpA	79	H7153-FS(0)	8/4/2020
13C8-PFOA	77	H7153-FS(0)	8/4/2020
13C9-PFNA	79	H7153-FS(0)	8/4/2020
13C6-PFDA	83	H7153-FS(0)	8/4/2020
13C7-PFUnA	76	H7153-FS(0)	8/4/2020
13C2-PFDoA	65	H7153-FS(0)	8/4/2020
13C2-PFTeDA	29	H7153-FS(0)	8/4/2020
d3-MeFOSAA	84	H7153-FS(0)	8/4/2020
d5-EtFOSAA	90	H7153-FS(0)	8/4/2020
13C3-PFBS	101	H7153-FS(0)	8/4/2020
13C3-PFHxS	93	H7153-FS(0)	8/4/2020
13C8-PFOS	91	H7153-FS(0)	8/4/2020
13C3-HFPO-DA	78	H7153-FS(0)	8/4/2020

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

4

Client ID		PX-WF-CTMCA-WT05-0720						
Battelle ID		H7154-FS						
Sample Type		SA						
Collection Date		07/09/2020						
Extraction Date		07/17/2020						
Analytical Instrument		Sciex 5500 LC/MS/MS						
% Moisture		NA						
Matrix		GW						
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	47.13	H7154-FS(0)	1.000	8/4/2020	0.49	1.39	4.63
PFHpA	375-85-9	16.35	H7154-FS(0)	1.000	8/4/2020	0.24	0.93	4.63
PFOA	335-67-1	5.38	H7154-FS(0)	1.000	8/4/2020	0.47	1.39	4.63
PFNA	375-95-1	0.41 J	H7154-FS(0)	1.000	8/4/2020	0.29	0.93	4.63
PFDA	335-76-2	0.46 U	H7154-FS(0)	1.000	8/4/2020	0.13	0.46	4.63
PFUnA	2058-94-8	0.46 U	H7154-FS(0)	1.000	8/4/2020	0.20	0.46	4.63
PFDoA	307-55-1	0.46 U	H7154-FS(0)	1.000	8/4/2020	0.18	0.46	4.63
PFTrDA	72629-94-8	0.46 U	H7154-FS(0)	1.000	8/4/2020	0.14	0.46	4.63
PFTeDA	376-06-7	1.85 U	H7154-FS(0)	1.000	8/4/2020	0.68	1.85	4.63
NMeFOSAA	2355-31-9	0.93 U	H7154-FS(0)	1.000	8/4/2020	0.32	0.93	4.63
NEtFOSAA	2991-50-6	0.93 U	H7154-FS(0)	1.000	8/4/2020	0.46	0.93	4.63
PFBS	375-73-5	21.56	H7154-FS(0)	1.000	8/4/2020	0.13	0.46	4.63
PFHxS	355-46-4	33.75	H7154-FS(0)	1.000	8/4/2020	0.10	0.37	4.63
PFOS	1763-23-1	22.36	H7154-FS(0)	1.000	8/4/2020	0.41	0.93	4.63
HFPO-DA	13252-13-6	0.46 U	H7154-FS(0)	1.000	8/4/2020	0.23	0.46	4.63
Adona	919005-14-4	0.93 U	H7154-FS(0)	1.000	8/4/2020	0.25	0.93	4.63
11Cl-PF3OUdS	763051-92-9	0.46 U	H7154-FS(0)	1.000	8/4/2020	0.21	0.46	4.63
9Cl-PF3ONS	756426-58-1	0.93 U	H7154-FS(0)	1.000	8/4/2020	0.25	0.93	4.63

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5

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

Client ID	PX-WF-CTMCA-WT06-0720
Battelle ID	H7155-FS
Sample Type	SA
Collection Date	07/09/2020
Extraction Date	07/17/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	GW
Sample Size	0.295
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	0.78 J	H7155-FS(0)	1.000	8/4/2020	0.45	1.27	4.24	
PFHpA	375-85-9	0.85 ~~0.687~~ U	H7155-FS(0)	1.000	8/4/2020	0.22	0.85	4.24	EBL
PFOA	335-67-1	1.27 U	H7155-FS(0)	1.000	8/4/2020	0.43	1.27	4.24	
PFNA	375-95-1	0.85 U	H7155-FS(0)	1.000	8/4/2020	0.26	0.85	4.24	
PFDA	335-76-2	0.42 U	H7155-FS(0)	1.000	8/4/2020	0.12	0.42	4.24	
PFUnA	2058-94-8	0.42 U	H7155-FS(0)	1.000	8/4/2020	0.19	0.42	4.24	
PFDoA	307-55-1	0.42 U	H7155-FS(0)	1.000	8/4/2020	0.16	0.42	4.24	
PFTrDA	72629-94-8	0.42 U	H7155-FS(0)	1.000	8/4/2020	0.13	0.42	4.24	
PFTeDA	376-06-7	1.69 U	H7155-FS(0)	1.000	8/4/2020	0.62	1.69	4.24	
NMeFOSAA	2355-31-9	0.85 U	H7155-FS(0)	1.000	8/4/2020	0.30	0.85	4.24	
NEtFOSAA	2991-50-6	0.85 U	H7155-FS(0)	1.000	8/4/2020	0.42	0.85	4.24	
PFBS	375-73-5	0.51 J	H7155-FS(0)	1.000	8/4/2020	0.12	0.42	4.24	
PFHxS	355-46-4	0.83 J	H7155-FS(0)	1.000	8/4/2020	0.09	0.34	4.24	
PFOS	1763-23-1	0.74 J	H7155-FS(0)	1.000	8/4/2020	0.37	0.85	4.24	
HFPO-DA	13252-13-6	0.42 U	H7155-FS(0)	1.000	8/4/2020	0.21	0.42	4.24	
Adona	919005-14-4	0.85 U	H7155-FS(0)	1.000	8/4/2020	0.23	0.85	4.24	
11Cl-PF3OUdS	763051-92-9	0.42 U	H7155-FS(0)	1.000	8/4/2020	0.19	0.42	4.24	
9Cl-PF3ONS	756426-58-1	0.85 U	H7155-FS(0)	1.000	8/4/2020	0.23	0.85	4.24	

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-0929
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, Webster Field Annex, CTO-JU14, Maryland
Date: September 29, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-WF-B8076-FB01-070920	H7150-FS1	Water

A Stage 2B/4 data validation was performed on the analytical data for one aqueous equipment blank sample collected on July 9, 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	*Method References*
PFAS	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 compounds were qualified (X) in one sample due to grossly exceeded holding times.

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

- The sample was extracted at 33 days which is grossly outside of the 14 days for water samples criteria. All results were qualified as (X).

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-WF-B8076-FB01-070920	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate %R values.

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 sample was originally analyzed in SDG 20-0782 with low surrogate recoveries. The sample was 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 Dated: 10/2/20

Nancy Weaver
Senior Chemist

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.

BATTELLE
It can be done

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

Client ID	PX-WF-B8076-FB01-070920
Battelle ID	H7150-FS1
Sample Type	SA
Collection Date	07/09/2020
Extraction Date	08/11/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	QC
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 UT	H7150-FS1(0)	1.000	8/12/2020	0.49	1.39	4.63
PFHpA	**375-85-9**	**0.93 UT**	**H7150-FS1(0)**	**1.000**	**8/12/2020**	**0.24**	**0.93**	**4.63**
PFOA	335-67-1	1.39 UT	H7150-FS1(0)	1.000	8/12/2020	0.47	1.39	4.63
PFNA	**375-95-1**	**0.93 UT**	**H7150-FS1(0)**	**1.000**	**8/12/2020**	**0.29**	**0.93**	**4.63**
PFDA	335-76-2	0.46 UT	H7150-FS1(0)	1.000	8/12/2020	0.13	0.46	4.63
PFUnA	**2058-94-8**	**0.46 UT**	**H7150-FS1(0)**	**1.000**	**8/12/2020**	**0.20**	**0.46**	**4.63**
PFDoA	307-55-1	0.46 UT	H7150-FS1(0)	1.000	8/12/2020	0.18	0.46	4.63
PFTrDA	**72629-94-8**	**0.46 UT**	**H7150-FS1(0)**	**1.000**	**8/12/2020**	**0.14**	**0.46**	**4.63**
PFTeDA	376-06-7	1.85 UT	H7150-FS1(0)	1.000	8/12/2020	0.68	1.85	4.63
NMeFOSAA	**2355-31-9**	**0.93 UT**	**H7150-FS1(0)**	**1.000**	**8/12/2020**	**0.32**	**0.93**	**4.63**
NEtFOSAA	2991-50-6	0.93 UT	H7150-FS1(0)	1.000	8/12/2020	0.46	0.93	4.63
PFBS	**375-73-5**	**0.46 UT**	**H7150-FS1(0)**	**1.000**	**8/12/2020**	**0.13**	**0.46**	**4.63**
PFHxS	355-46-4	0.37 UT	H7150-FS1(0)	1.000	8/12/2020	0.10	0.37	4.63
PFOS	**1763-23-1**	**0.93 UT**	**H7150-FS1(0)**	**1.000**	**8/12/2020**	**0.41**	**0.93**	**4.63**
HFPO-DA	13252-13-6	0.46 UT	H7150-FS1(0)	1.000	8/12/2020	0.23	0.46	4.63
Adona	**919005-14-4**	**0.93 UT**	**H7150-FS1(0)**	**1.000**	**8/12/2020**	**0.25**	**0.93**	**4.63**
11Cl-PF3OUdS	763051-92-9	0.46 UT	H7150-FS1(0)	1.000	8/12/2020	0.21	0.46	4.63
9Cl-PF3ONS	**756426-58-1**	**0.93 UT**	**H7150-FS1(0)**	**1.000**	**8/12/2020**	**0.25**	**0.93**	**4.63**

1

use original in 20-0782

X

HT

NW 9/29/20
Analyzed by: Griffith, Lauren
Printed: 8/17/2020

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-0960
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: September 29, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-WF-B8076-EB01-070920	H7151-FS1	Water

A Stage 2B/4 data validation was performed on the analytical data for one aqueous equipment blank sample collected on July 9, 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	*Method References*
PFAS	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 compounds were qualified (X) in one sample due to grossly exceeded holding times.

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

- The sample was extracted at 40 days which is grossly outside of the 14 days for water samples criteria. All results were qualified as (X).

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-WF-B8076-EB01-070920	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate %R values.

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 sample was originally analyzed in SDG 20-0782 with low surrogate recoveries. The sample was 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 Dated: 10/21/20

Nancy Weaver
Senior Chemist

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.

BATTELLE
It can be done

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

Client ID	PX-WF-B8076-EB01-070920
Battelle ID	H7151-FS1
Sample Type	SA
Collection Date	07/09/2020
Extraction Date	08/18/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	QC
Sample Size	0.280
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.34 UT	H7151-FS1(0)	1.000	8/19/2020	0.47	1.34	4.46
PFHpA	375-85-9	0.89 UT	H7151-FS1(0)	1.000	8/19/2020	0.23	0.89	4.46
PFOA	335-67-1	1.34 UT	H7151-FS1(0)	1.000	8/19/2020	0.46	1.34	4.46
PFNA	375-95-1	0.89 UT	H7151-FS1(0)	1.000	8/19/2020	0.28	0.89	4.46
PFDA	335-76-2	0.45 UT	H7151-FS1(0)	1.000	8/19/2020	0.13	0.45	4.46
PFUnA	2058-94-8	0.45 UT	H7151-FS1(0)	1.000	8/19/2020	0.20	0.45	4.46
PFDoA	307-55-1	0.45 UT	H7151-FS1(0)	1.000	8/19/2020	0.17	0.45	4.46
PFTrDA	72629-94-8	0.45 UT	H7151-FS1(0)	1.000	8/19/2020	0.13	0.45	4.46
PFTeDA	376-06-7	1.79 UT	H7151-FS1(0)	1.000	8/19/2020	0.65	1.79	4.46
NMeFOSAA	2355-31-9	0.89 UT	H7151-FS1(0)	1.000	8/19/2020	0.31	0.89	4.46
NEtFOSAA	2991-50-6	0.89 UT	H7151-FS1(0)	1.000	8/19/2020	0.45	0.89	4.46
PFBS	375-73-5	0.45 UT	H7151-FS1(0)	1.000	8/19/2020	0.13	0.45	4.46
PFHxS	355-46-4	0.36 UT	H7151-FS1(0)	1.000	8/19/2020	0.10	0.36	4.46
PFOS	1763-23-1	0.89 UT	H7151-FS1(0)	1.000	8/19/2020	0.39	0.89	4.46
HFPO-DA	13252-13-6	0.45 UT	H7151-FS1(0)	1.000	8/19/2020	0.22	0.45	4.46
Adona	919005-14-4	0.89 UT	H7151-FS1(0)	1.000	8/19/2020	0.24	0.89	4.46
11Cl-PF3OUdS	763051-92-9	0.45 UT	H7151-FS1(0)	1.000	8/19/2020	0.21	0.45	4.46
9Cl-PF3ONS	756426-58-1	0.89 UT	H7151-FS1(0)	1.000	8/19/2020	0.24	0.89	4.46

Use original in 20-0782

NW 9/29/20
Analyzed by: Schultz, Stephanie
Printed: 8/21/2020

Appendix D
Laboratory Analytical Data

Station ID	PAX PFAS SO Values	PX-WF-B8076-SO01		PX-WF-B8076-SO02		PX-WF-B8076-SO03	
Sample ID		PX-WF-B8076-SS01-000H	PX-WF-B8076-SB01-0304	PX-WF-B8076-SS02-000H	PX-WF-B8076-SB02-0304	PX-WF-B8076-SS03-000H	PX-WF-B8076-SB03-0304
Sample Date		07/07/20	07/07/20	07/07/20	07/07/20	07/07/20	07/07/20
Chemical Name							
Per- and Polyfluorinated Alkyl Substances (NG/G)							
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	2.17 U	2.05 U	2.26 U	2.44 U	2.26 U	2.21 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	1.09 U	1.03 U	1.13 U	1.22 U	1.13 U	1.1 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	1.63 U	1.54 U	1.69 U	1.83 U	1.69 U	1.66 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	2.17 U	2.05 U	2.26 U	2.44 U	2.26 U	2.21 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	2.72 U	2.56 U	2.82 U	3.05 U	2.82 U	2.76 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	2.17 U	2.05 U	2.26 U	2.44 U	2.26 U	2.21 U
Perfluorooctane sulfonic acid (PFOS)	130	**74.2**	**106**	**88.1**	**36.7**	**453**	**58.0**
Perfluoroundecanoic Acid (PFUnA)	--	1.09 U	1.03 U	**0.69 J**	1.22 U	**1.73 J**	1.1 U
Perfluorohexanoic Acid (PFHxA)	--	**1.53 J**	2.05 U	**1.39 J**	2.44 U	**3.52 J**	**1.76 J**
Perfluorododecanoic Acid (PFDoA)	--	2.17 U	2.05 U	2.26 U	2.44 U	2.26 U	2.21 U
Perfluorooctanoic acid (PFOA)	130	2.17 U	2.05 U	**0.92 J**	2.44 U	**2.63 J**	**1.48 J**
Perfluorodecanoic Acid (PFDA)	--	**0.74 J**	1.03 U	1.13 U	1.22 U	**1.6 J**	1.1 U
Perfluorohexanesulfonic acid (PFHxS)	--	**1.53 J**	**1.36 J**	**5.18 J**	**1.79 J**	**36.5**	**18.5**
Perfluorobutanesulfonic acid (PFBS)	1,900	1.09 U	1.03 U	1.13 U	1.22 U	**0.62 J**	1.1 U
Perfluoroheptanoic acid (PFHpA)	--	**1.52 J**	1.54 U	1.69 U	1.83 U	**1.72 J**	1.66 U
Perfluorononanoic acid (PFNA)	--	**3.17 J**	**1.95 J**	**1.31 J**	1.22 U	**2.08 J**	1.1 U
Perfluorotetradecanoic Acid (PFTeDA)	--	2.72 U	2.56 U	2.82 U	3.05 U	2.82 U	2.76 U
Perfluorotridecanoic Acid (PFTrDA)	--	1.09 U	1.03 U	1.13 U	1.22 U	1.13 U	1.1 U

Notes:

Exceeds one or more criteria

Bold indicates detections

NA - Not analyzed

J - Analyte present, value may or may not be accurate or precise

U - The material was analyzed for, but not detected

NG/G - Nanograms per gram

µg/kg - micrograms per kilogram

NG/G = µg/kg

Station ID	PAX PFAS SO Values	PX-WF-B8076-SO04				PX-WF-CTMCA-SO01		
Sample ID		PX-WF-B8076-SS04-000H	PX-WF-B8076-SS04P-000H	PX-WF-B8076-SB04-0304	PX-WF-B8076-SB04P-0304	PX-WF-CTMCA-SS01-000H	PX-WF-CTMCA-SB01-0304	PX-WF-CTMCA-SB01P-0304
Sample Date		07/07/20	07/07/20	07/07/20	07/07/20	07/07/20	07/07/20	07/07/20
Chemical Name								
Per- and Polyfluorinated Alkyl Substances (NG/G)								
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	2.65 U	2.74 U	2.44 U	2.27 U	2.33 U	2.25 U	2.35 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	1.32 U	1.37 U	1.22 U	1.14 U	1.16 U	1.12 U	1.18 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	1.99 U	2.05 U	1.83 U	1.7 U	1.74 U	1.69 U	1.76 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	2.65 U	2.74 U	2.44 U	2.27 U	2.33 U	2.25 U	2.35 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	3.31 U	3.42 U	3.05 U	2.84 U	2.91 U	2.81 U	2.94 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	2.65 U	2.74 U	2.44 U	2.27 U	2.33 U	2.25 U	2.35 U
Perfluorooctane sulfonic acid (PFOS)	130	**249 J**	**854 J**	**27.2 J**	**50.0 J**	**0.85 J**	2.25 U	2.35 U
Perfluoroundecanoic Acid (PFUnA)	--	**1.15 J**	**2.18 J**	1.22 U	1.14 U	1.16 U	1.12 U	1.18 U
Perfluorohexanoic Acid (PFHxA)	--	**8**	**9.96**	2.44 U	2.27 U	2.33 U	2.25 U	2.35 U
Perfluorododecanoic Acid (PFDoA)	--	2.65 U	2.74 U	2.44 U	2.27 U	2.33 U	2.25 U	2.35 U
Perfluorooctanoic acid (PFOA)	130	**6.36 J**	**11.8**	2.44 U	2.27 U	2.33 U	2.25 U	2.35 U
Perfluorodecanoic Acid (PFDA)	--	**0.92 J**	**1.24 J**	1.22 U	1.14 U	1.16 U	1.12 U	1.18 U
Perfluorohexanesulfonic acid (PFHxS)	--	**46.6 J**	**74.4 J**	**3.5 J**	**2.34 J**	2.33 U	2.25 U	2.35 U
Perfluorobutanesulfonic acid (PFBS)	1,900	**8.58**	**9.81**	**0.44 J**	1.14 U	1.16 U	1.12 U	1.18 U
Perfluoroheptanoic acid (PFHpA)	--	**3.55 J**	**4.58 J**	1.83 U	1.7 U	1.74 U	1.69 U	1.76 U
Perfluorononanoic acid (PFNA)	--	**3.8 J**	**3.97 J**	1.22 U	**0.58 J**	1.16 U	1.12 U	1.18 U
Perfluorotetradecanoic Acid (PFTeDA)	--	3.31 U	3.42 U	3.05 U	2.84 U	2.91 U	2.81 U	2.94 U
Perfluorotridecanoic Acid (PFTrDA)	--	1.32 U	1.37 U	1.22 U	1.14 U	1.16 U	1.12 U	1.18 U

Notes:

Exceeds one or more criteria

Bold indicates detections

NA - Not analyzed

J - Analyte present, value may or may not be accurate or precise

U - The material was analyzed for, but not detected

NG/G - Nanograms per gram

µg/kg - micrograms per kilogram

NG/G = µg/kg

Station ID	PAX PFAS SO Values	PX-WF-CTMCA-SO02		PX-WF-CTMCA-SO03		PX-WF-CTMCA-SO04	
Sample ID		PX-WF-CTMCA-SS02-000H	PX-WF-CTMCA-SB02-0304	PX-WF-CTMCA-SS03-000H	PX-WF-CTMCA-SB03-0304	PX-WF-CTMCA-SS04-000H	PX-WF-CTMCA-SB04-0304
Sample Date		07/06/20	07/06/20	07/07/20	07/07/20	07/07/20	07/07/20
Chemical Name							
Per- and Polyfluorinated Alkyl Substances (NG/G)							
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	2.34 U	2.29 U	2.42 U	2.41 U	2.26 U	2.23 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	1.17 U	1.14 U	1.21 U	1.2 U	1.13 U	1.12 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	1.75 U	1.71 U	1.82 U	1.81 U	1.69 U	1.68 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	2.34 U	2.29 U	2.42 U	2.41 U	2.26 U	2.23 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	2.92 U	2.86 U	3.03 U	3.01 U	2.82 U	2.79 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	2.34 U	2.29 U	2.42 U	2.41 U	2.26 U	2.23 U
Perfluorooctane sulfonic acid (PFOS)	130	**18.0**	2.29 U	**1.38 J**	**1.07 J**	**10.7**	**5.31 J**
Perfluoroundecanoic Acid (PFUnA)	--	1.17 U	1.14 U	1.21 U	1.2 U	1.13 U	1.12 U
Perfluorohexanoic Acid (PFHxA)	--	**2.84 J**	2.29 U	2.42 U	2.41 U	2.26 U	2.23 U
Perfluorododecanoic Acid (PFDoA)	--	2.34 U	2.29 U	2.42 U	2.41 U	2.26 U	2.23 U
Perfluorooctanoic acid (PFOA)	130	**1.73 J**	2.29 U	2.42 U	2.41 U	2.26 U	2.23 U
Perfluorodecanoic Acid (PFDA)	--	1.17 U	1.14 U	1.21 U	1.2 U	**0.66 J**	1.12 U
Perfluorohexanesulfonic acid (PFHxS)	--	**19.8**	2.29 U	2.42 U	2.41 U	2.26 U	2.23 U
Perfluorobutanesulfonic acid (PFBS)	1,900	1.17 U	1.14 U	1.21 U	1.2 U	1.13 U	1.12 U
Perfluoroheptanoic acid (PFHpA)	--	**1.59 J**	1.71 U	1.82 U	1.81 U	1.69 U	1.68 U
Perfluorononanoic acid (PFNA)	--	**0.85 J**	1.14 U	1.21 U	1.2 U	1.13 U	1.12 U
Perfluorotetradecanoic Acid (PFTeDA)	--	2.92 U	2.86 U	3.03 U	3.01 U	2.82 U	2.79 U
Perfluorotridecanoic Acid (PFTrDA)	--	1.17 U	1.14 U	1.21 U	1.2 U	1.13 U	1.12 U

Notes:

Exceeds one or more criteria

Bold indicates detections

NA - Not analyzed

J - Analyte present, value may or may not be accurate or precise

U - The material was analyzed for, but not detected

NG/G - Nanograms per gram

µg/kg - micrograms per kilogram

NG/G = µg/kg

Station ID	PAX PFAS SO Values	PX-WF-CTMCA-SO05			PX-WF-CTMCA-SO06		PX-WF-CTMCA-SO07	
Sample ID		PX-WF-CTMCA-SS05-000H	PX-WF-CTMCA-SS05P-000H	PX-WF-CTMCA-SB05-0304	PX-WF-CTMCA-SS06-000H	PX-WF-CTMCA-SB06-0304	PX-WF-CTMCA-SS07-000H	PX-WF-CTMCA-SB07-0304
Sample Date		07/07/20	07/07/20	07/07/20	07/07/20	07/07/20	07/06/20	07/06/20
Chemical Name								
Per- and Polyfluorinated Alkyl Substances (NG/G)								
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	2.52 U	2.56 U	2.2 U	2.42 U	2.6 U	2.2 U	2.29 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	1.26 U	1.28 U	1.1 U	1.21 U	1.3 U	1.1 U	1.14 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	1.89 U	1.92 U	1.65 U	1.82 U	1.95 U	1.65 U	1.71 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	2.52 U	2.56 U	2.2 U	2.42 U	2.6 U	2.2 U	2.29 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	3.14 U	3.21 U	2.75 U	3.03 U	3.25 U	2.75 U	2.86 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	2.52 U	2.56 U	2.2 U	2.42 U	2.6 U	2.2 U	2.29 U
Perfluorooctane sulfonic acid (PFOS)	130	**35.2**	**28.5**	**8.42**	**16.3**	2.6 U	**123**	**4.67 J**
Perfluoroundecanoic Acid (PFUnA)	--	1.26 U	**0.66 J**	1.1 U	1.21 U	1.3 U	1.1 U	1.14 U
Perfluorohexanoic Acid (PFHxA)	--	2.52 U	2.56 U	**0.9 J**	2.42 U	2.6 U	**2.1 J**	2.29 U
Perfluorododecanoic Acid (PFDoA)	--	2.52 U	2.56 U	2.2 U	2.42 U	2.6 U	2.2 U	2.29 U
Perfluorooctanoic acid (PFOA)	130	2.52 U	2.56 U	2.43 U	2.42 U	2.6 U	**1.71 J**	2.29 U
Perfluorodecanoic Acid (PFDA)	--	1.26 U	**0.68 J**	1.1 U	1.21 U	1.3 U	1.1 U	1.14 U
Perfluorohexanesulfonic acid (PFHxS)	--	**1.11 J**	**1.5 J**	**5.4 J**	**4.8 J**	2.6 U	**7.52**	**3.14 J**
Perfluorobutanesulfonic acid (PFBS)	1,900	1.26 U	1.28 U	1.1 U	1.21 U	1.3 U	1.1 U	1.14 U
Perfluoroheptanoic acid (PFHpA)	--	1.89 U	1.92 U	**0.61 J**	1.82 U	1.95 U	1.65 U	1.71 U
Perfluorononanoic acid (PFNA)	--	**1.33 J**	**1.69 J**	1.1 U	1.21 U	1.3 U	**0.99 J**	1.14 U
Perfluorotetradecanoic Acid (PFTeDA)	--	3.14 U	3.21 U	2.75 U	3.03 U	3.25 U	2.75 U	2.86 U
Perfluorotridecanoic Acid (PFTrDA)	--	1.26 U	1.28 U	1.1 U	1.21 U	1.3 U	1.1 U	1.14 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

Station ID	PAX PFAS GW Values	PX-WF-B8076-WT01	PX-WF-B8076-WT02		PX-WF-B8076-WT03	PX-WF-B8076-WT04	PX-WF-CTMCA-WT01	PX-WF-CTMCA-WT02	
Sample ID		PX-WF-B8076-WT01-0720	PX-WF-B8076-WT02-0720	PX-WF-B8076-WT02P-0720	PX-WF-B8076-WT03-0720	PX-WF-B8076-WT04-0720	PX-WF-CTMCA-WT01-0720	PX-WF-CTMCA-WT02-0720	PX-WF-CTMCA-WT02P-0720
Sample Date		07/09/20	07/09/20	07/09/20	07/09/20	07/09/20	07/08/20	07/08/20	07/08/20
Chemical Name									
Per- and Polyfluorinated Alkyl Substances (NG/L)									
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	0.89 U	0.93 U	0.83 U	0.93 U	0.89 U	0.86 U	0.94 U	0.88 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	0.89 U	0.93 U	0.83 U	0.93 U	0.89 U	0.86 U	0.94 U	0.88 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	0.45 U	0.46 U	0.42 U	0.46 U	0.45 U	0.43 U	0.47 U	0.44 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	0.89 U	0.93 U	0.83 U	0.93 U	0.89 U	0.86 U	0.94 U	0.88 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	0.89 U	0.93 U	0.83 U	0.93 U	**4.03 J**	0.86 U	0.94 U	0.88 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	0.45 U	**0.34 J**	**0.41 J**	**0.65 J**	0.45 UJ	0.43 U	0.47 U	0.44 U
Perfluorooctane sulfonic acid (PFOS)	40	**1,738**	**84,757**	**81,501**	**42,939**	**26,931**	**50.7**	**62.8**	**57.9**
Perfluoroundecanoic Acid (PFUnA)	--	0.45 UJ	**0.28 J**	**0.3 J**	**0.61 J**	**0.43 J**	0.43 U	0.47 U	0.44 U
Perfluorohexanoic Acid (PFHxA)	--	**784**	**2,821**	**2,641**	**8,239**	**3,325**	**50.2**	**40.8**	**40.5**
Perfluorododecanoic Acid (PFDoA)	--	0.45 UJ	0.46 U	0.42 U	0.46 U	0.45 UJ	0.43 U	0.47 U	0.44 U
Perfluorooctanoic acid (PFOA)	40	**244**	**1,836**	**1,471**	**2,816**	**1,204**	**16.0**	**10.7**	**11.0**
Perfluorodecanoic Acid (PFDA)	--	0.75 U	**19.9**	**22.2**	**5.56**	**6.93**	0.43 U	0.47 U	0.44 U
Perfluorohexanesulfonic acid (PFHxS)	--	**2,509**	**11,989**	**11,331**	**55,760**	**10,742**	**166**	**165**	**175**
Perfluorobutanesulfonic acid (PFBS)	600	**343**	**1,254**	**1,197**	**4,805**	**1,754**	**34.9**	**27.0**	**28.9**
Perfluoroheptanoic acid (PFHpA)	--	**316**	**928**	**932**	**2,042**	**903**	**17.3**	**14.2**	**14.2**
Perfluorononanoic acid (PFNA)	--	**11.1**	**133 J**	**152 J**	**650**	**85.9**	0.86 U	0.94 U	0.88 U
Perfluorotetradecanoic Acid (PFTeDA)	--	1.79 R	1.85 U	1.67 U	1.85 UJ	1.79 UJ	1.72 U	1.89 UJ	1.75 UJ
Perfluorotridecanoic Acid (PFTrDA)	--	**1.04 J**	0.46 U	0.42 U	0.46 U	0.45 U	0.43 U	0.47 U	0.44 U

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Station ID	PAX PFAS GW Values	PX-WF-CTMCA-WT03	PX-WF-CTMCA-WT04	PX-WF-CTMCA-WT05	PX-WF-CTMCA-WT06	PX-WF-CTMCA-WT07
Sample ID		PX-WF-CTMCA-WT03-0720	PX-WF-CTMCA-WT04-0720	PX-WF-CTMCA-WT05-0720	PX-WF-CTMCA-WT06-0720	PX-WF-CTMCA-WT07-0720
Sample Date		07/09/20	07/08/20	07/09/20	07/09/20	07/07/20
Chemical Name						
Per- and Polyfluorinated Alkyl Substances (NG/L)						
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	0.93 U	0.88 U	0.93 U	0.85 U	0.86 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	0.93 U	0.88 U	0.93 U	0.85 U	0.86 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	0.46 U	0.44 U	0.46 U	0.42 U	0.43 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	0.93 U	0.88 U	0.93 U	0.85 U	0.86 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	0.93 U	0.88 U	0.93 U	0.85 U	0.86 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	0.46 U	0.44 U	0.46 U	0.42 U	0.43 U
Perfluorooctane sulfonic acid (PFOS)	40	**18.3**	**367**	**22.4**	**0.74 J**	**1.71 J**
Perfluoroundecanoic Acid (PFUnA)	--	0.46 U	0.44 U	0.46 U	0.42 U	0.43 U
Perfluorohexanoic Acid (PFHxA)	--	**5.58**	**88.9**	**47.1**	**0.78 J**	**0.55 J**
Perfluorododecanoic Acid (PFDoA)	--	0.46 U	0.44 U	0.46 U	0.42 U	0.43 U
Perfluorooctanoic acid (PFOA)	40	**1.01 J**	**46.8**	**5.38**	1.27 U	**0.49 J**
Perfluorodecanoic Acid (PFDA)	--	0.46 U	**0.13 J**	0.46 U	0.42 U	0.43 U
Perfluorohexanesulfonic acid (PFHxS)	--	**87.9**	**283**	**33.8**	**0.83 J**	**0.83 J**
Perfluorobutanesulfonic acid (PFBS)	600	**5.59**	**24.8**	**21.6**	**0.51 J**	**0.14 J**
Perfluoroheptanoic acid (PFHpA)	--	**6.48**	**30.4**	**16.4**	0.85 U	0.86 U
Perfluorononanoic acid (PFNA)	--	0.93 U	**1.71 J**	**0.41 J**	0.85 U	0.86 U
Perfluorotetradecanoic Acid (PFTeDA)	--	1.85 UJ	1.75 UJ	1.85 U	1.69 U	1.72 U
Perfluorotridecanoic Acid (PFTrDA)	--	0.46 U	0.44 U	0.46 U	0.42 U	0.43 U

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