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

Final

Basewide Site Inspection Report
Per- and Polyfluoroalkyl Substances
Building 103 – Air Operations Fire Station
Hangar 110 – Test Pilot School Aircraft Hangar
Hangar 2835 – Air Test & Evaluation Squadron 20 Hangar
Hangar 2805 – Presidential Helicopter Hangar
Building 840: Skeet Range – Aircraft Crash Site

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

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St. Mary's County, Maryland

April 2022

Prepared for NAVFAC Washington
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Herndon, Virginia
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Executive Summary

Historical use of aqueous film-forming foam (AFFF) during fire and emergency response, testing, and training activities at Naval Air Station (NAS) Patuxent River has prompted the Department of the Navy (Navy) to conduct a per- and polyfluoroalkyl substances (PFAS) Site Inspection (SI) at the installation. PFAS are considered "emerging chemicals of environmental concern" by the U.S. Environmental Protection Agency (USEPA) and the Department of Defense (DoD).[1] There are currently no legally enforceable federal or Maryland standards for PFAS.[2]

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

- Determine whether PFAS (if present) were detected at concentrations that exceed the project action limits (PALs)[3] for soil, groundwater, surface water, and sediment at the confirmed or suspected release areas.
- Determine the potential for PFAS (if present) to migrate offsite.

Historical research and interviews with fire department and installation personnel completed for the Preliminary Assessment (PA) report for PFAS at NAS Patuxent River (CH2M, 2018) identified 16 areas of interest (AOIs) at the installation requiring additional investigation for PFAS. This PFAS SI report is focused on five of these AOIs: Building 103 – Air Operations Fire Station (Building 103); Hangar 110 – Test Pilot School Aircraft Hangar (Hangar 110); Hangar 2835 – Air Test & Evaluation Squadron 20 Hangar (Hangar 2835); Hangar 2805 – Presidential Helicopter Hangar (Hangar 2805); and Building 840: Skeet Range – Aircraft Crash Site (Building 840). Based on the PA and subsequent SAP, the field investigation for the SI at these five AOIs was conducted in August, September, and October 2020. This effort consisted of the installation of shallow temporary piezometers and co-located soil borings at locations where AFFF may have been used or released, collection of soil (surface and subsurface) and grab groundwater samples to determine whether PFAS releases occurred, collection of depth to water measurements at the newly installed temporary piezometers to estimate the direction of groundwater flow in the surficial aquifer, and collection of co-located surface water and sediment samples at one of the sites (Hangar 110). The field investigation for the SI was performed in general accordance with the SAP (CH2M, 2020).

Laboratory analysis of soil samples collected at Building 103 indicated that perfluorooctanoic acid (PFOA) and/or perfluorooctanesulfonic acid (PFOS) were present in samples from five soil borings. PFOA was detected at four surface soil sample locations and one subsurface soil sample location, although none of the detected PFOA concentrations exceeded the corresponding PAL. PFOS was detected at five surface soil sample locations and five subsurface soil sample locations, with detected PFOS concentrations exceeding the corresponding PAL at one surface soil sample location and one subsurface soil sample location. Perfluorobutanesulfonic acid (PFBS) was not detected in soil samples at Building 103. Laboratory analysis of grab groundwater samples collected at Building 103 indicated that PFOA, PFOS, and PFBS were each present in samples from seven temporary piezometers, with detected PFOA concentrations exceeding the corresponding PAL at six grab groundwater sample locations and detected PFOS concentrations exceeding the corresponding PAL at all seven grab groundwater sample locations. None of the detected PFBS concentrations exceeded the corresponding PAL at Building 103.

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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 USEPA issued drinking water health advisories for PFOA (70 ng/L) and PFOS (70 ng/L) in May 2016; MDE recently issued a drinking water health advisory for PFHxS (140 ng/L) in November 2021. Health advisories are not considered for this SI because there is no current exposure to PFAS in groundwater used as drinking water at or surrounding NAS Patuxent River.

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

Laboratory analysis of soil samples collected at Hangar 110 indicated that PFOA and PFOS were present in a sample from one soil boring. PFOA and PFOS were each detected in the surface soil sample from this location but were not detected in the subsurface soil sample, although the detected PFOA and PFOS concentrations did not exceed the corresponding PALs. PFBS was not detected in soil samples at Hangar 110. Laboratory analysis of grab groundwater samples collected at Hangar 110 indicated that PFOA, PFOS, and PFBS were each present in samples from five temporary piezometers, with detected PFOA concentrations exceeding the corresponding PAL at one grab groundwater sample location and detected PFOS concentrations exceeding the corresponding PAL at four grab groundwater sample locations. None of the detected PFBS concentrations exceeded the corresponding PAL at Hangar 110. Laboratory analysis of one surface water sample and two sediment samples collected at Hangar 110 indicated that PFOA, PFOS, and PFBS were each present in surface water but not sediment, although the surface water detections were all low-level estimated concentrations that did not exceed the corresponding PALs.

Laboratory analysis of soil samples collected at Hangar 2835 indicated that PFOA and/or PFOS were present in samples from four soil borings. PFOA was detected at two surface soil sample locations and one subsurface soil sample location. PFOS was detected at three surface soil sample locations but no subsurface soil sample locations. None of the detected PFOA and PFOS concentrations exceeded the corresponding PALs. PFBS was not detected in soil samples at Hangar 2835. Laboratory analysis of grab groundwater samples collected at Hangar 2835 indicated that PFOA, PFOS, and PFBS were each present in samples from six temporary piezometers, with detected PFOA and PFOS concentrations exceeding the corresponding PALs at two grab groundwater sample locations each. None of the detected PFBS concentrations exceeded the corresponding PAL at Hangar 2835.

Laboratory analysis of soil samples collected at Hangar 2805 indicated that PFOS was present in samples from four soil borings (four of seven surface soil sample locations but no subsurface soil sample locations), although none of the detected PFOS concentrations exceeded the corresponding PAL. PFOA and PFBS were not detected in soil samples at Hangar 2805. Laboratory analysis of grab groundwater samples collected at Hangar 2805 indicated that PFOA, PFOS, and PFBS were each present in samples from seven temporary piezometers, with detected PFOA concentrations exceeding the corresponding PAL at three grab groundwater sample locations. None of the detected PFOS and PFBS concentrations exceeded the corresponding PALs at Hangar 2805.

Laboratory analysis of soil samples collected at Building 840 indicated that PFOA and/or PFOS were present in samples from seven soil borings. PFOA was detected at two surface soil sample locations but no subsurface soil sample locations. PFOS was detected at seven surface soil sample locations and four subsurface soil sample locations. None of the detected PFOA and PFOS concentrations exceeded the corresponding PALs. PFBS was not detected in soil samples at Building 840. Laboratory analysis of grab groundwater samples collected at Building 840 indicated that PFOA, PFOS, and PFBS were each present in samples from four temporary piezometers, with detected PFOA and PFOS concentrations exceeding the corresponding PALs at two grab groundwater sample locations each. None of the detected PFBS concentrations exceeded the corresponding PAL at Building 840.

Groundwater flow is predominantly to the northeast at Building 103 in the direction of Harper's Creek, to the north-northwest at Hangar 110 in the direction of the Patuxent River, to the southwest at Hangar 2835 in the direction of a tributary to Gardiner's Pond, to the north-northwest at Hangar 2805 in the direction of Harper's Creek, and to the south-southeast at Building 840 in the direction of Holton Pond. At each site, there is the potential for migration of PFAS in the direction of groundwater flow. However, because all the sites included in this report are not located in proximity to the installation boundaries, migration off-installation in groundwater is not of concern at this time. There is no potential drinking water exposure because groundwater flow is not toward off-installation wells, the surficial aquifer at the installation is not used for drinking water on- or off-installation, and there are confining units isolating the aquifers used for drinking water.

This investigation demonstrated that PFAS are present in environmental media at levels exceeding screening values at the five identified AOIs where AFFF was reportedly released. It is recommended that Remedial Investigations (RIs) are conducted at Building 103, Hangar 110, Hangar 2835, Hangar 2805, and Building 840 to fully delineate the nature and extent of PFAS releases and assess potential human health and ecological risks. The RIs should include the collection and analysis of representative environmental media at each AOI, including the

installation and sampling of permanent monitoring wells. Based on the resulting data, conceptual site models should be developed, including discussions of the fate and transport of PFAS at the AOIs. Further, as part of the RI process, quantitative human health risk assessments should be performed to evaluate potential risks to human health associated with exposure to PFAS detected in environmental media at each respective AOI, and an initial screening ecological risk assessment (SERA) should be performed. Potential human health and ecological risks associated with PFAS should be evaluated within the applicable DoD, Navy, and/or USEPA policy, guidance, or directives using the state-of-the-science toxicological information available and current at the time the RI report is prepared.

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Acronyms and Abbreviations

°C	degree(s) Celsius
°F	degree(s) Fahrenheit
µg/kg	microgram(s) per kilogram
AFFF	aqueous film-forming foam
AOI	area of interest
bgs	below ground surface
Building 103	Building 103 – Air Operations Fire Station
Building 840	Building 840: Skeet Range – Aircraft Crash Site
CH2M	CH2M HILL, Inc.
CSM	conceptual site model
DoD	Department of Defense
DPT	direct-push technology
ER	Environmental Restoration
ERS	ecological risk screening
Hangar 110	Hangar 110 – Test Pilot School Aircraft Hangar
Hangar 2805	Hangar 2805 – Presidential Helicopter Hangar
Hangar 2835	Hangar 2835 – Air Test & Evaluation Squadron 20 Hangar
HHRA	human health risk assessment
IDW	investigation-derived waste
LC-MS/MS	Liquid Chromatography Tandem Mass Spectrometry
MDE	Maryland Department of the Environment
mg/L	milligram(s) per liter
mS/cm	millisiemen(s) per centimeter
msl	mean sea level
mV	millivolt(s)
NAS	Naval Air Station
NAVFAC	Naval Facilities Engineering Systems Command
Navy	Department of the Navy
ng/L	nanogram(s) per liter
NTU	nephelometric turbidity unit(s)
ORP	oxidation-reduction potential
PA	Preliminary Assessment
PAL	project action limit
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFHxS	perfluorohexanesulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
QSM	Quality Systems Manual

RI	Remedial Investigation
SAP	Sampling and Analysis Plan
SERA	screening ecological risk assessment
SI	Site Inspection
SOP	standard operating procedure
UCMR3	Third Unregulated Contaminant Monitoring Rule
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 Naval Air Station (NAS) Patuxent River (also referred to as installation). PFAS are considered "emerging chemicals of environmental concern" by the U.S. Environmental Protection Agency (USEPA) and the Department of Defense (DoD).[1] There are currently no legally enforceable federal or Maryland standards for PFAS.[2]

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

- Determine whether PFAS (if present) were detected at concentrations that exceed the project action limits (PALs)[3] for soil, groundwater, surface water, and sediment at the confirmed or suspected release areas.
- Determine the potential for PFAS (if present) to migrate offsite.

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

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

- **Section 1** – Introduction
- **Section 2** – Site Background and Physical Setting
- **Section 3** – Investigation Methodology
- **Section 4** – Investigation Results
- **Section 5** – Conclusions and Recommendations
- **Section 6** – References

- **Appendix A** – Survey Data
- **Appendix B** – Investigation-Derived Waste Analytical Data, Waste Profiles, and Disposal Manifests
- **Appendix C** – Data Quality Assessment
- **Appendix D** – Laboratory Analytical Data
- **Appendix E** – 2020 Drinking Water Consumer Confidence Report

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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 USEPA issued drinking water health advisories for PFOA (70 ng/L) and PFOS (70 ng/L) in May 2016; MDE recently issued a drinking water health advisory for PFHxS (140 ng/L) in November 2021. Health advisories are not considered for this SI because there is no current exposure to PFAS in groundwater used as drinking water at or surrounding NAS Patuxent River.

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

SECTION 2

Site Background and Physical Setting

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

2.1 Site Background

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

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

Interviews with fire department and installation personnel completed for the Preliminary Assessment (PA) report for PFAS at NAS Patuxent River (CH2M, 2018) identified 16 areas of interest (AOIs) requiring investigation as part of an SI due to confirmed or suspected releases of aqueous film-forming foam (AFFF). This PFAS SI report summarizes the outcome of SI activities at five of these AOIs (**Figure 2-2**): Building 103 – Air Operations Fire Station (Building 103); Hangar 110 – Test Pilot School Aircraft Hangar (Hangar 110); Hangar 2835 – Air Test & Evaluation Squadron 20 Hangar (Hangar 2835); Hangar 2805 – Presidential Helicopter Hangar (Hangar 2805); and Building 840: Skeet Range – Aircraft Crash Site (Building 840). PFAS AOIs recommended for an SI in the PA but not included in this report are the subject of separate SI reports, which are being submitted in phases as per Partnering Team agreement for ease of review.

2.1.1 Building 103 Background

Building 103 is located on the west side of the airfield, adjacent to Taxiway Bravo (**Figures 2-2** and **2-3**). The site sits at approximately 35 feet above mean sea level (msl), with little topographic relief (CH2M, 2018).

Building 103 has been in use since the 1940s for response to any incidents involving air operations. Crash trucks are parked and maintained in this area. Approximately 1,700 gallons of AFFF concentrate are stored in the tanks and crash trucks. Daily equipment checks and foam spray testing occur in this area. Additionally, potential spills/leaks of AFFF concentrate may have occurred during transfer. An unknown amount of AFFF has been released (CH2M, 2018).

2.1.2 Hangar 110 Background

Hangar 110 is located in the north-central portion of the installation, adjacent to the East Patuxent Basin (**Figures 2-2** and **2-4**). As shown on **Figure 2-4**, East Patuxent Basin is located immediately north of the hangar and a wetland area is located immediately south of the hangar. The site sits at approximately 10 feet above msl, with little topographic relief (CH2M, 2018).

Hangar 110 experienced a release of the contents of the 2,200-gallon tank of AFFF concentrate used for the suppression system due to mechanical failure in April 2015. This release was not observed; however, AFFF concentrate was visibly seeping through the concrete and ponding in the adjacent stairwell and walkway area in between the hangar bays. One other small spill was reported in December 2014 and cleaned up (approximately 5 gallons). The AFFF suppression system is currently not operational (CH2M, 2018).

2.1.3 Hangar 2835 Background

Hangar 2835, built in 2007, occupies the area of closed Environmental Restoration (ER) Program Site 29 in the southwest portion of the installation (**Figures 2-2** and **2-5**). The site sits at approximately 45 feet above msl, with little topographic relief. Historical disposal of waste oils and solvents from Buildings 305 and 306 reportedly occurred at Site 29 during the late 1940s (CH2M, 2018).

Hangar 2835 is a temporary hangar with an AFFF suppression system. Several releases of AFFF occurred in 2012 through 2015 due to spills, a mechanical rupture in cold weather, and inadvertent activation of the suppression system. Dates and quantities of the spills are January 2014 – 40 gallons, February 2015 – 15 gallons, and October 2015 – 80 gallons. Site 29 was closed due to lack of human health/ecological risk and removed from the ER Program in 2007, but the potential presence of PFAS was not investigated (CH2M, 2018).

2.1.4 Hangar 2805 Background

Hangar 2805 is located in the northeast portion of the installation and bound on the north and east by Harper's Creek (**Figures 2-2** and **2-6**). The site sits at approximately 15 feet above msl, with little topographic relief (CH2M, 2018).

Hangar 2805 experienced a release of 400 gallons of AFFF concentrate due to mechanical failure of the suppression system in November 2009. The recovery system did not work properly, so the 2009 release had to be manually contained; the faulty recovery system was subsequently repaired. Two other spills reported in 2014 (40 gallons) and 2015 (15 gallons) were successfully diverted to the recovery system consisting of a 900-foot-long by 4-foot-diameter cylindrical concrete underground storage tank (CH2M, 2018).

2.1.5 Building 840 Background

Building 840 was the original structure at the skeet range, which is located in the south-central portion of the installation near Holton Pond (**Figures 2-2** and **2-7**). As such, this AOI was named accordingly during the PA. The site sits at approximately 35 feet above msl, with little topographic relief (CH2M, 2018).

The skeet range is the location of a T-38A Talon aircraft crash in July 2000. Fire-fighters responded to the crash using AFFF to extinguish the fire. An A-37 aircraft crashed on the skeet range before 1991 (exact date unknown), and AFFF was used on the crash. Unknown amounts of AFFF were used during both crash incidents (CH2M, 2018).

2.2 Physical Setting

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

2.2.1 Climate

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

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

2.2.2 Topography and Surface Drainage Features

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

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

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

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

Surface water drainage features are shown on the site layouts for Building 103, Hangar 110, Hangar 2835, Hangar 2805, and Building 840. As shown on **Figures 2-3** through **2-7**, the approximate surface water flow is generally to the east and south away from Building 103, to the east at Hangar 110, radially away from Hangar 2835 except on the western side, radially away from Hangar 2805, and to the south and southeast at Building 840.

2.2.3 Land Use

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

2.2.4 Geologic Setting

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

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

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

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

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

- The Upland deposits consist of tan to orange clay, silt, and sand. Included in the Upland deposits are the Chickamuxen Church Formation (tan to yellow-orange gravel and sand), the Park Hall Formation (silty sand and clay, interbedded with pebbles, cobbles, and boulders), and the Upland gravel unit (muddy sand grading to medium gravel, overlying well-sorted gravel and clean coarse sand). The thickness of the Upland deposits ranges from 10 to 60 feet near NAS Patuxent River (McCartan, 1989).

- Beneath the Upland and Lowland deposits is the Tertiary Chesapeake Group, which consists of three formations: the St. Mary's Formation, the Choptank Formation, and the Calvert Formation. The uppermost is the St. Mary's Formation, which consists of greenish-blue to yellowish-gray sandy clay and fine-grained clayey sand. The thickness of this unit ranges from 0 to 80 feet (Chappelle and Drummond, 1983). The predominant feature of the St. Mary's Formation is the presence of abundant oyster shells and shell hash.

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

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

- Beneath the Chesapeake Group is the Piney Point Formation, a gray to brownish-yellow, slightly glauconitic, medium- to coarse-grained sand. Near NAS Patuxent River, the top of the Piney Point Formation is approximately 240 to 250 feet below msl, and the unit ranges in thickness from 20 to 60 feet.

- Below the Piney Point Formation is the Nanjemoy Formation, a dark-green to gray, fine- to medium-grained glauconitic sand containing layers of shell fragments. Near NAS Patuxent River, the thickness ranges from 130 to 170 feet. The top of the Nanjemoy Formation is found at approximately 270 feet below msl. The lower part of the Nanjemoy is olive-green silty clay.

- Between the Nanjemoy Formation and the deeper Aquia Formation lies the Marlboro Clay Formation, described as pink to silver-gray and plastic. The thickness of the Marlboro Clay ranges from 5 to 35 feet, thinning to the southeast.

- The Aquia Formation is located beneath the Nanjemoy Formation. It is described as a greenish- to yellow-brown, well-sorted glauconitic quartz sand containing localized carbonate shell beds. In the area of NAS Patuxent River, the Aquia Formation is approximately 125 to 150 feet thick. The top of the Aquia Formation is approximately 425 to 450 feet below msl near NAS Patuxent River (Chappelle and Drummond, 1983).

2.2.5 Hydrogeologic Setting

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

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

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

2.2.6 Groundwater Flow

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

2.2.7 Drinking Water

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

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

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

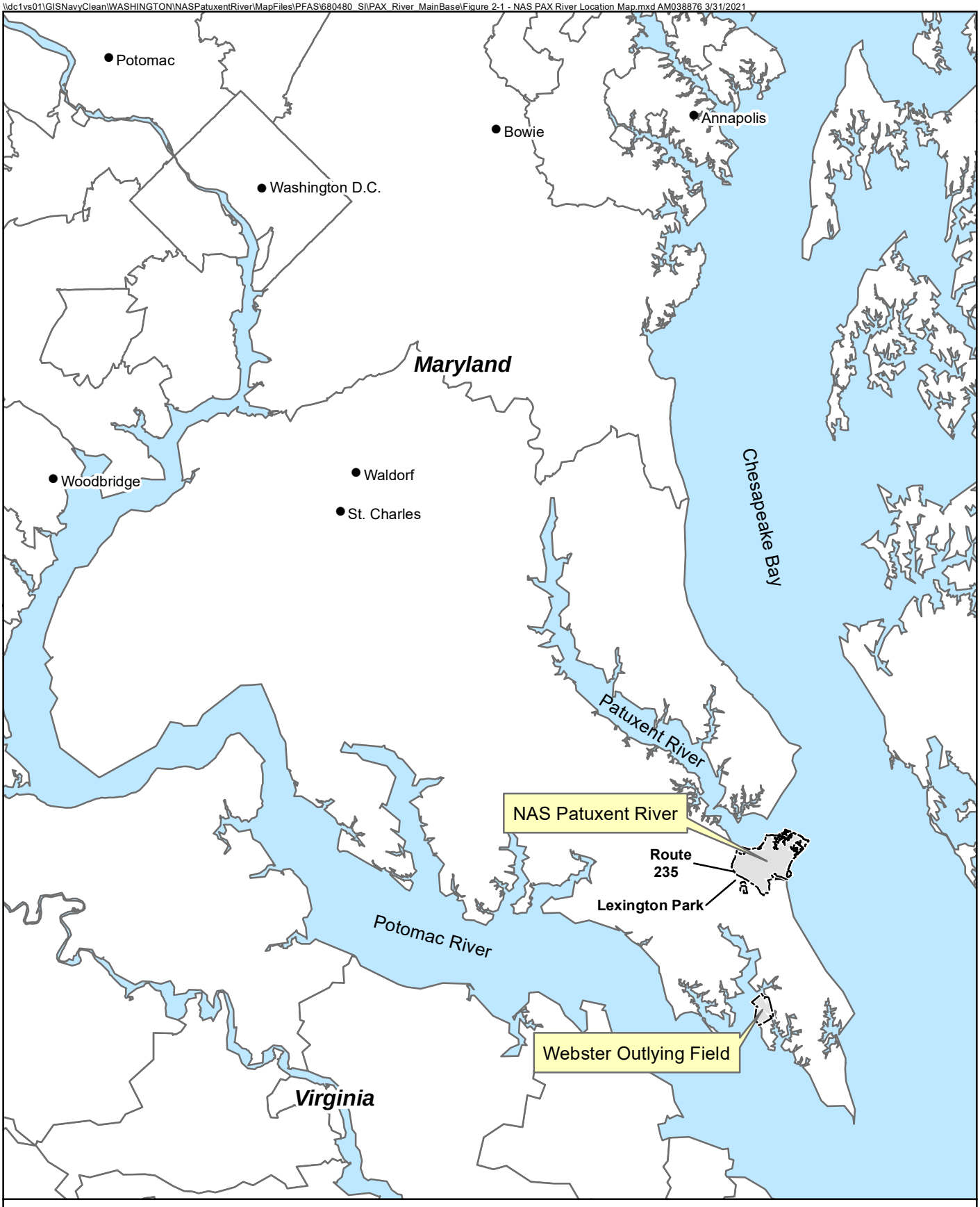


Figure 2-1
Naval Air Station Patuxent River Location Map
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

ch2m

\\dc1vs01\GISNavyClean\WASHINGTON\NASPatuxentRiver\MapFiles\PFAS\680480_SI\PAX_River_MainBase\Phase4_Sites\Figure 2-2 - Priority Sites Report4.mxd AM038876 10/25/2021

Legend

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

N

0 1,500 3,000 Feet

Imagery Source: Esri 2019

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

ch2m.

\\DC1VS01\GISNAVYCLEAN\WASHINGTON\NASPATUXENTRIVER\MAPFILES\PFAS\680480_SI\PAX_RIVER_MAINBASE\PHASE4_SITES\FIGURE_2-3_SITELAYOUT_BUILDING103.MXD AM038876 8/26/2021 4:11:27 PM

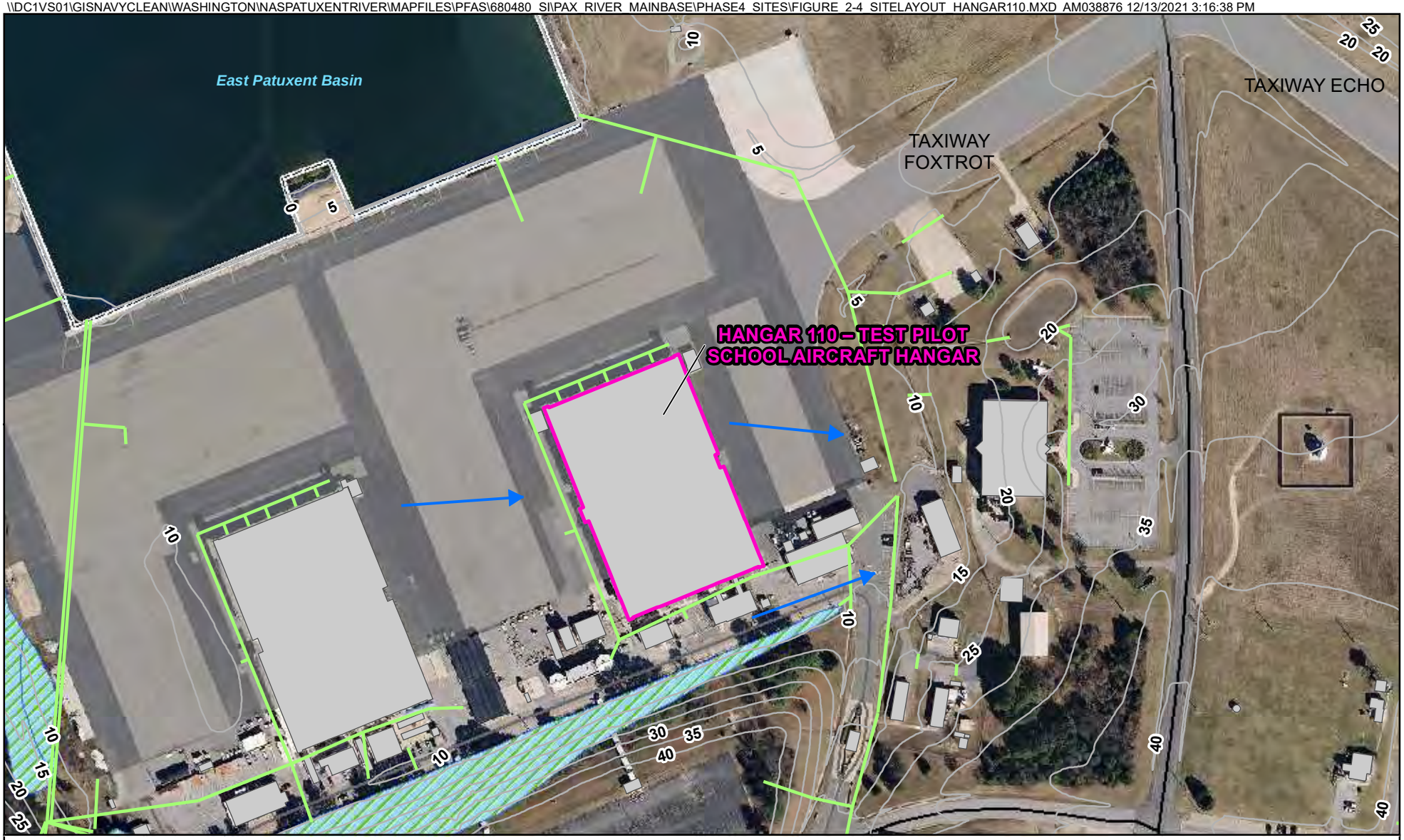
Legend

- Confirmed PFAS Release Area
- Approximate Areas of Equipment Checks
- Approximate Surface Water Flow Direction
- Stormwater
- Elevation Contour 5 ft
- Building

Figure 2-3
Site Layout for Building 103 – Air Operations Fire Station
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

ch2m.

\\DC1VS01\GISNAVYCLEAN\WASHINGTON\NASPATUXENTRIVER\MAPFILES\PFAS\680480_SI\PAX_RIVER_MAINBASE\PHASE4_SITES\FIGURE_2-4_SITELAYOUT_HANGAR110.MXD AM038876 12/13/2021 3:16:38 PM



Legend

- Confirmed PFAS Release Area
- Stormwater Line
- Approximate Surface Water Flow Direction
- Elevation Contour 5 ft
- Building
- Wetland Area
- Installation Boundary

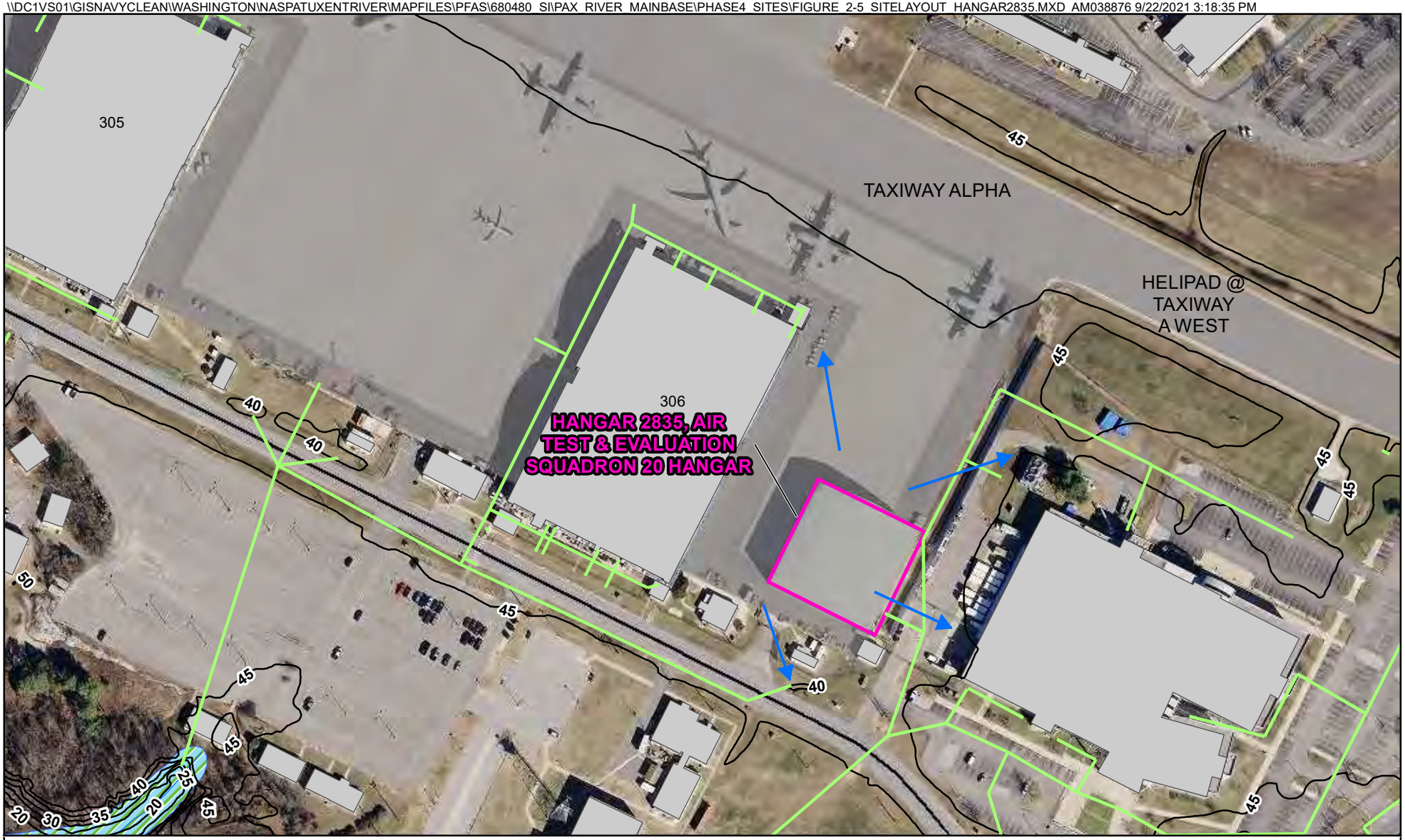
N

0 125 250 Feet

Figure 2-4
Site Layout for Hangar 110 – Test Pilot School Aircraft Hangar
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

ch2m.

\\DC1VS01\GISNAVYCLEAN\WASHINGTON\NASPATUXENTRIVER\MAPFILES\PFAS\680480_SI\PAX_RIVER_MAINBASE\PHASE4_SITES\FIGURE_2-5_SITELAYOUT_HANGAR2835.MXD AM038876 9/22/2021 3:18:35 PM



Legend

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

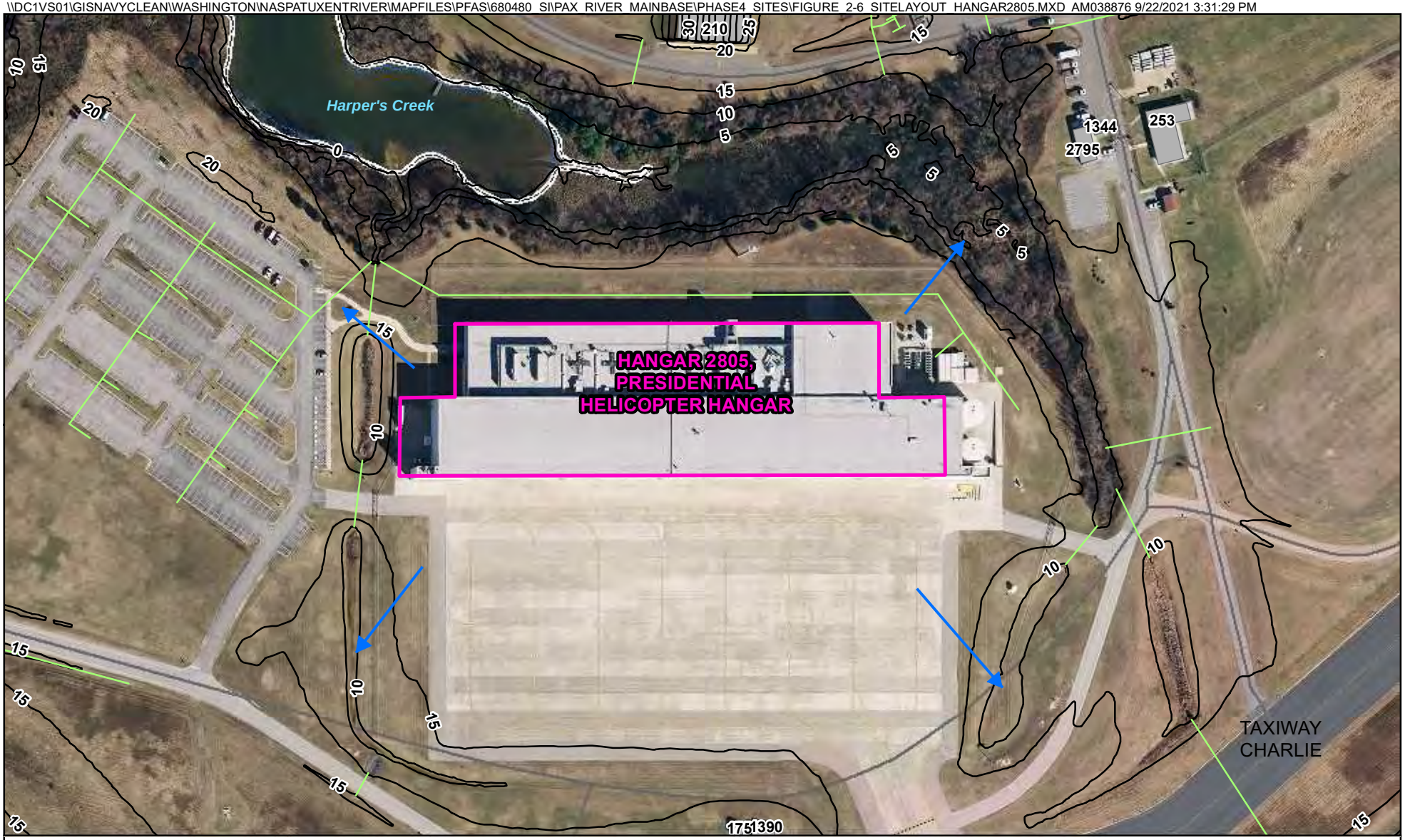
N

0 100 200 Feet

Figure 2-5
Site Layout for Hangar 2835 – Air Test & Evaluation Squadron 20 Hangar
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

ch2m.

\\DC1VS01\GISNAVYCLEAN\WASHINGTON\NASPATUXENTRIVER\MAPFILES\PFAS\680480_SI\PAX_RIVER_MAINBASE\PHASE4_SITES\FIGURE_2-6_SITELAYOUT_HANGAR2805.MXD AM038876 9/22/2021 3:31:29 PM



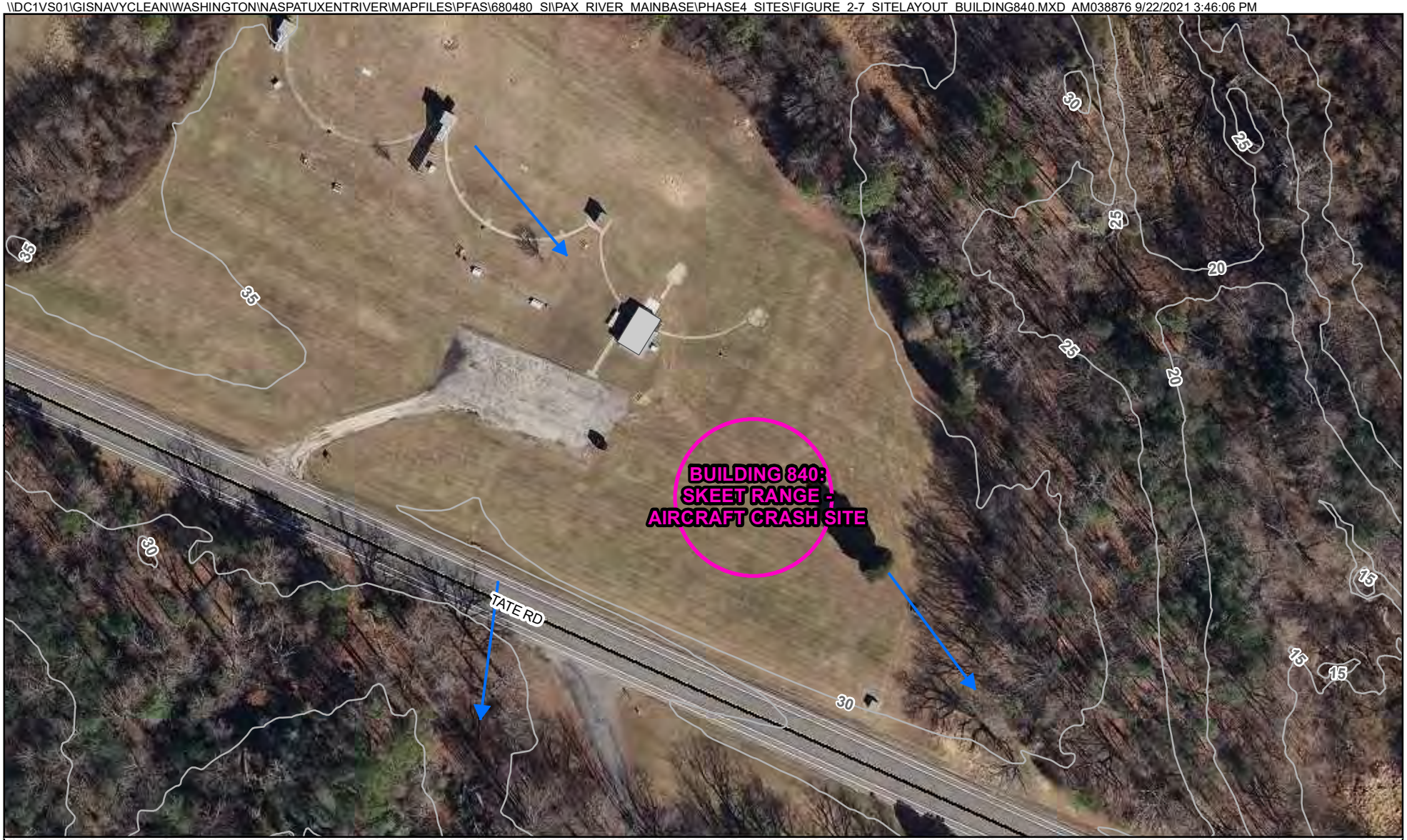
Legend

- Confirmed PFAS Release Area
- Stormwater Utility line
- Elevation Contour 5 ft
- Approximate Surface Water Flow Direction
- Installation Boundary

Figure 2-6
Site Layout for Hangar 2805 – Presidential Helicopter Hangar
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

ch2m

\\DC1VS01\GISNAVYCLEAN\WASHINGTON\NASPATUXENTRIVER\MAPFILES\PFAS\680480_SI\PAX_RIVER_MAINBASE\PHASE4_SITES\FIGURE_2-7_SITELAYOUT_BUILDING840.MXD AM038876 9/22/2021 3:46:06 PM



Legend

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

N

0 50 100

Feet

Figure 2-7
Site Layout for Building 840: Skeet Range – Aircraft Crash Site
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

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). These activities were conducted in August, September, and October 2020 at Building 103, Hangar 110, Hangar 2835, Hangar 2805, and Building 840. The field investigation included the following activities:

- Installation of shallow temporary piezometers and co-located soil borings
- Co-located soil sampling (surface and subsurface)
- Grab groundwater sampling from temporary piezometers
- Water level surveys at the newly installed temporary piezometers
- Co-located surface water and sediment sampling at Hangar 110

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

3.2 Site Preparation and Utility Location

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

3.3 Soil Boring Advancement

For the purpose of collecting co-located surface and subsurface soil samples in addition to installing temporary piezometers for grab groundwater sampling, four borings were advanced at Building 103 on October 22 and 23, 2020, four borings were advanced at Hangar 110 on October 24, 2020, four borings were advanced at Hangar 2835 on August 20 and 21, 2020, seven borings were advanced at Hangar 2805 on October 20, 2020, and four borings were advanced at Building 840 on October 21, 2020. For the purpose of only collecting co-located surface and subsurface soil samples, one additional boring was advanced at Building 103 on October 22, 2020, one additional boring was advanced at Hangar 110 on October 23, 2020, and three additional borings were advanced at Building 840 on October 21, 2020. For the purpose of only installing temporary piezometers for grab groundwater sampling, four additional borings were advanced at Building 103 on October 22 and 23, 2020, one additional boring was advanced at Hangar 110 on October 23, 2020, and two additional borings were advanced at Hangar 2835 on August 20 and 21, 2020. Soil boring locations at Building 103, Hangar 110, Hangar 2835, Hangar 2805, and Building 840 are shown on **Figures 3-1** through **3-5**, respectively.

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

3.4 Soil Sampling

In September and October 2020, surface and subsurface soil samples were collected from five borings at Building 103, five borings at Hangar 110, four borings at Hangar 2835, seven borings at Hangar 2805, and seven borings at Building 840. All soil samples were collected in accordance with the SOPs included in the SAP (CH2M, 2020). For the investigation, surface soil samples were defined as 0 to 6 inches below ground surface (bgs) and subsurface soil samples were defined as 3 to 4 feet bgs. After collection in sampling containers, and at the end of each day, the samples were packed on ice and shipped via overnight service to the laboratory for analysis. Soil samples were analyzed for the 18 PFAS listed in USEPA Drinking Water Method 537.1 using Liquid Chromatography Tandem

Mass Spectrometry (LC-MS/MS) compliant with the DoD Quality Systems Manual (QSM) Version 5.3 Table B-15. Soil analytical results are discussed in detail in **Section 4**.

3.5 Temporary Piezometer Installation

For the purposes of grab groundwater sampling and groundwater elevation monitoring, eight temporary piezometers were installed to depths between 15 feet bgs and 20 feet bgs at Building 103, five temporary piezometers were installed to depths between 6 feet bgs and 15 feet bgs at Hangar 110, six temporary piezometers were installed to depths between 13 feet bgs and 24 feet bgs at Hangar 2835, seven temporary piezometers were installed to a depth of 15 feet bgs at Hangar 2805, and four temporary piezometers were installed to a depth of 15 feet bgs at Building 840. All temporary piezometers were constructed with a 10-foot screened interval to the total depth except for one temporary piezometer at Building 103 (PX-B103-WT03 with a 15-foot screened interval) and three temporary piezometers at Hangar 110 (PX-H110-WT01, PX-H110-WT02, and PX-H110-WT03, each with a 5-foot screened interval). Grab groundwater sample locations at Building 103, Hangar 110, Hangar 2835, Hangar 2805, and Building 840 are shown on **Figures 3-1** through **3-5**, respectively.

A-Zone Environmental Services (Charles Town, West Virginia), a Maryland-licensed driller, provided DPT drilling services to install the temporary piezometers, which were constructed of 1.5-inch-diameter polyvinyl chloride (PVC) and installed across the water table in all identified locations in accordance with the SOPs included in the SAP (CH2M, 2020) and State of Maryland construction standards. Temporary piezometer construction details are summarized in **Table 3-1**. After the completion of grab groundwater sampling and groundwater elevation monitoring efforts, the temporary piezometers were abandoned at Building 103 (November 17 and December 7, 2020), Hangar 110 (December 7, 2020), Hangar 2835 (September 11, 2020), Hangar 2805 (December 7, 2020), and Building 840 (December 7, 2020).

3.6 Groundwater Elevation Measurement

In September and October 2020, groundwater elevation measurements were taken at seven temporary piezometers prior to grab groundwater sampling at Building 103 (PX-B103-WT07 was dry), five temporary piezometers prior to grab groundwater sampling at Hangar 110, six temporary piezometers prior to grab groundwater sampling at Hangar 2835, six temporary piezometers prior to grab groundwater sampling at Hangar 2805 (not measured at PX-H2805-WT07), and four temporary piezometers prior to grab groundwater sampling at Building 840. 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 provided in **Table 3-1**, groundwater contour maps were prepared for Building 103, Hangar 110, Hangar 2835, Hangar 2805, and Building 840, as presented on **Figures 3-1** through **3-5**. As shown, groundwater flow at Building 103 is predominantly to the northeast in the direction of Harper's Creek, groundwater flow at Hangar 110 is predominantly to the north-northwest in the direction of the Patuxent River, groundwater flow at Hangar 2835 is predominantly to the southwest in the direction of a tributary to Gardiner's Pond, groundwater flow at Hangar 2805 is predominantly to the north-northwest in the direction of Harper's Creek, and groundwater flow at Building 840 is predominantly to the south-southeast in the direction of Holton Pond.

3.7 Groundwater Sampling

In September and October 2020, grab groundwater samples were collected from seven temporary piezometers at Building 103, five temporary piezometers at Hangar 110, six temporary piezometers at Hangar 2835, seven temporary piezometers at Hangar 2805, and four temporary piezometers at Building 840. It should be noted that analytical results for grab groundwater samples collected from temporary piezometers exhibit uncertainty and variability as compared to analytical results for groundwater samples collected from permanent monitoring wells. Prior to sample collection, the temporary piezometers were purged to remove any stagnant water and to collect a representative sample from the aquifer using a peristaltic pump and disposable tubing. Water quality parameters, including pH in standard units, oxidation-reduction potential (ORP) in millivolts (mV), temperature in degrees

Celsius (°C), specific conductance in millisiemens per centimeter (mS/cm), turbidity in nephelometric turbidity units (NTU), and dissolved oxygen in milligrams per liter (mg/L), were measured during the purging of each temporary piezometer using a YSI water quality meter and flow-through cell to prevent the purged groundwater from contacting the atmosphere during parameter measurement, although ORP measurements were inadvertently not collected at Hangar 2805. Purging continued for approximately 20 minutes with two sets of water quality readings collected 5 minutes apart, after which grab groundwater samples were collected directly into laboratory-provided sample bottles. The final set of water quality parameters recorded before sample collection at each temporary piezometer is presented in **Table 3-2**. Grab groundwater samples were collected in accordance with the SOPs included in the SAP (CH2M, 2020) and analyzed for the 18 PFAS listed in USEPA Drinking Water Method 537.1 using LC-MS/MS compliant with the DoD QSM Version 5.3 Table B-15. Groundwater analytical results are discussed in detail in **Section 4**.

3.8 Surface Water Sampling

In October 2020, one surface water sample (PX-H110-SW01) was collected at Hangar 110 from the location shown on **Figure 3-2**. Two co-located surface water and sediment sample locations (PX-H110-SDSW01, at the edge of East Patuxent Basin, which is approximately 10 feet deep; PX-H110-SDSW02, in a wetland area immediately south of Hangar 110, which was an area potentially impacted by a past release from the AFFF system at the southwest corner of the hangar) were proposed for sampling in the SAP; however, water was only present at one of the locations (PX-H110-SDSW01). At the lone surface water sample location, a high-density polyethylene bottle was secured to an extendable pole and lowered to a depth of approximately 1 foot below the water surface to collect a representative surface water sample that was then transferred to a laboratory-prepared sample bottle. The surface water sample was analyzed for the 18 PFAS listed in USEPA Drinking Water Method 537.1 using LC-MS/MS compliant with the DoD QSM Version 5.3 Table B-15. Surface water analytical results are discussed in detail in **Section 4**.

3.9 Sediment Sampling

In October 2020, two sediment samples (PX-H110-SD01 and PX-H110-SD02) were collected at Hangar 110 from the locations shown on **Figure 3-2**. As stated, two co-located surface water and sediment sample locations (PX-H110-SDSW01, at the edge of East Patuxent Basin; PX-H110-SDSW02, in a wetland area immediately south of Hangar 110) were proposed for sampling in the SAP; however, water was only present at one of the locations (PX-H110-SDSW01). At PX-H110-SD01, a high density polyethylene bottle was secured to an extendable pole and lowered into the water to collect a representative sediment sample that was then transferred to a laboratory-prepared sample bottle. At PX-H110-SD02, a representative sediment sample was collected with a trowel directly into a laboratory-prepared sample bottle. The sediment samples were analyzed for the 18 PFAS listed in USEPA Drinking Water Method 537.1 using LC-MS/MS compliant with the DoD QSM Version 5.3 Table B-15. Sediment analytical results are discussed in detail in **Section 4**.

3.10 Surveying

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

For surface water/sediment sample locations (Hangar 110) and soil borings advanced for the purpose of only collecting co-located surface and subsurface soil samples (Building 103, Hangar 110, and Building 840), horizontal coordinates were obtained using a Trimble® R1 global positioning system receiver and connected tablet.

3.11 Quality Assurance and Quality Control

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

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

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

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

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

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

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

3.12 Decontamination Procedures

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

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

1. Distilled water (laboratory-certified PFAS-free) and Liquinox solution

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

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

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

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

3.13 Investigation-Derived Waste Management

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

Prior to disposal, CH2M field staff collected one composite sample from the aqueous IDW drums and one composite sample from the solid IDW drums. The IDW samples were analyzed for full Toxicity Characteristic Leaching Procedure analyses (volatile organic compounds, semivolatile organic compounds, pesticides, and inorganic constituents), ignitability, reactive cyanide, reactive sulfide, corrosivity, and PFAS. For the aqueous sample, PFAS analytical results for PFOA and PFOS were greater than the groundwater PAL of 40 nanograms per liter (ng/L) for each compound. Based on the overall analytical results, all IDW was characterized as nonhazardous, PFAS-containing, with notification of the PFAS results to the receiving facility. As such, solid IDW was disposed of as nonhazardous; aqueous IDW was first solidified and then disposed of with the solid IDW by Clearfield MMG at the Navy's approved disposal facility in Chesapeake, Virginia.

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

3.14 Data Quality Assessment

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

As shown in **Appendix C**, the data set was deemed to be 100 percent complete. Therefore, the validation review demonstrated PFOA, PFOS, and PFBS data are suitable for use in the project decision-making process.

Table 3-1. Temporary Piezometer Construction Details and Groundwater Elevations (August/September/October 2020)
Basewide PFAS Site Inspection Report
NAS Patuxent River, St. Mary's County, Maryland

Piezometer	Date Installed	Total Depth [a]	Ground Surface Elevation [b]	Top of Screen Depth [a]	Bottom of Screen Depth [a]	Top of Casing Elevation [b]	Depth to Water [c]	Groundwater Elevation [b]
Building 103 – Air Operations Fire Station								
PX-B103-WT01	10/22/2020	15	29.69	5	15	30.09	12.04 [g]	18.05
PX-B103-WT02	10/22/2020	15	27.02	5	15	27.22	9.98 [g]	17.24
PX-B103-WT03	10/22/2020	20	34.68	5	20	35.08	13.45 [g]	21.63
PX-B103-WT04	10/23/2020	15	28.20	5	15	28.55	11.97 [h]	16.58
PX-B103-WT05	10/23/2020	15	30.65	5	15	31.05	13.00 [h]	18.05
PX-B103-WT06	10/22/2020	15	26.56	5	15	26.76	10.46 [g]	16.30
PX-B103-WT07	10/22/2020	18	36.80	8	18	38.95	piezometer was dry	
PX-B103-WT08	10/23/2020	15	32.92	5	15	33.22	14.41 [h]	18.81
Hangar 110 – Test Pilot School Aircraft Hangar								
PX-H110-WT01	10/24/2020	10.5	8.98	5	10	8.98	4.31 [i]	4.67
PX-H110-WT02	10/24/2020	10	9.02	5	10	9.02	5.24 [i]	3.78
PX-H110-WT03	10/24/2020	6	9.82	1	6	9.82	3.41 [i]	6.41
PX-H110-WT04	10/24/2020	15	9.42	5	15	9.42	3.07 [i]	6.35
PX-H110-WT05	10/23/2020	13.5	9.76	3.5	13.5	9.76	4.65 [h]	5.11
Hangar 2835 – Air Test & Evaluation Squadron 20 Hangar								
PX-H2835-WT01	8/20/2020	15	45.28	5	15	45.68	9.32 [d]	36.36
PX-H2835-WT02	8/21/2020	15	42.33	5	15	42.78	8.53 [d]	34.25
PX-H2835-WT03	8/21/2020	15	40.65	5	15	40.95	6.44 [d]	34.51
PX-H2835-WT04	8/21/2020	15	40.67	5	15	41.17	6.18 [d]	34.99
PX-H2835-WT05	8/20/2020	13	44.50	3	13	44.85	10.35 [d]	34.50
PX-H2835-WT06	8/21/2020	24	47.28	14	24	47.48	15.82 [d]	31.66
Hangar 2805 – Presidential Helicopter Hangar								
PX-H2805-WT01	10/20/2020	15	15.37	5	15	15.77	6.94 [e]	8.83
PX-H2805-WT02	10/20/2020	15	17.13	5	15	17.33	9.23 [e]	8.10
PX-H2805-WT03	10/20/2020	15	14.00	5	15	14.20	9.21 [e]	4.99
PX-H2805-WT04	10/20/2020	15	16.85	5	15	17.05	9.76 [e]	7.29
PX-H2805-WT05	10/20/2020	15	16.48	5	15	16.88	9.11 [e]	7.77
PX-H2805-WT06	10/20/2020	15	16.47	5	15	16.82	7.23 [e]	9.59

Table 3-1. Temporary Piezometer Construction Details and Groundwater Elevations (August/September/October 2020)
Basewide PFAS Site Inspection Report
NAS Patuxent River, St. Mary's County, Maryland

Piezometer	Date Installed	Total Depth [a]	Ground Surface Elevation [b]	Top of Screen Depth [a]	Bottom of Screen Depth [a]	Top of Casing Elevation [b]	Depth to Water [c]	Groundwater Elevation [b]
PX-H2805-WT07	10/20/2020	15	15.64	5	15	16.14	no measurement taken	
Building 840: Skeet Range – Aircraft Crash Site								
PX-B840-WT01	10/21/2020	15	32.45	5	15	33.05	10.23 [f]	22.82
PX-B840-WT02	10/21/2020	15	30.05	5	15	30.25	7.32 [f]	22.93
PX-B840-WT03	10/21/2020	15	29.42	5	15	29.82	6.36 [f]	23.46
PX-B840-WT04	10/21/2020	15	30.22	5	15	30.52	12.39 [f]	18.13

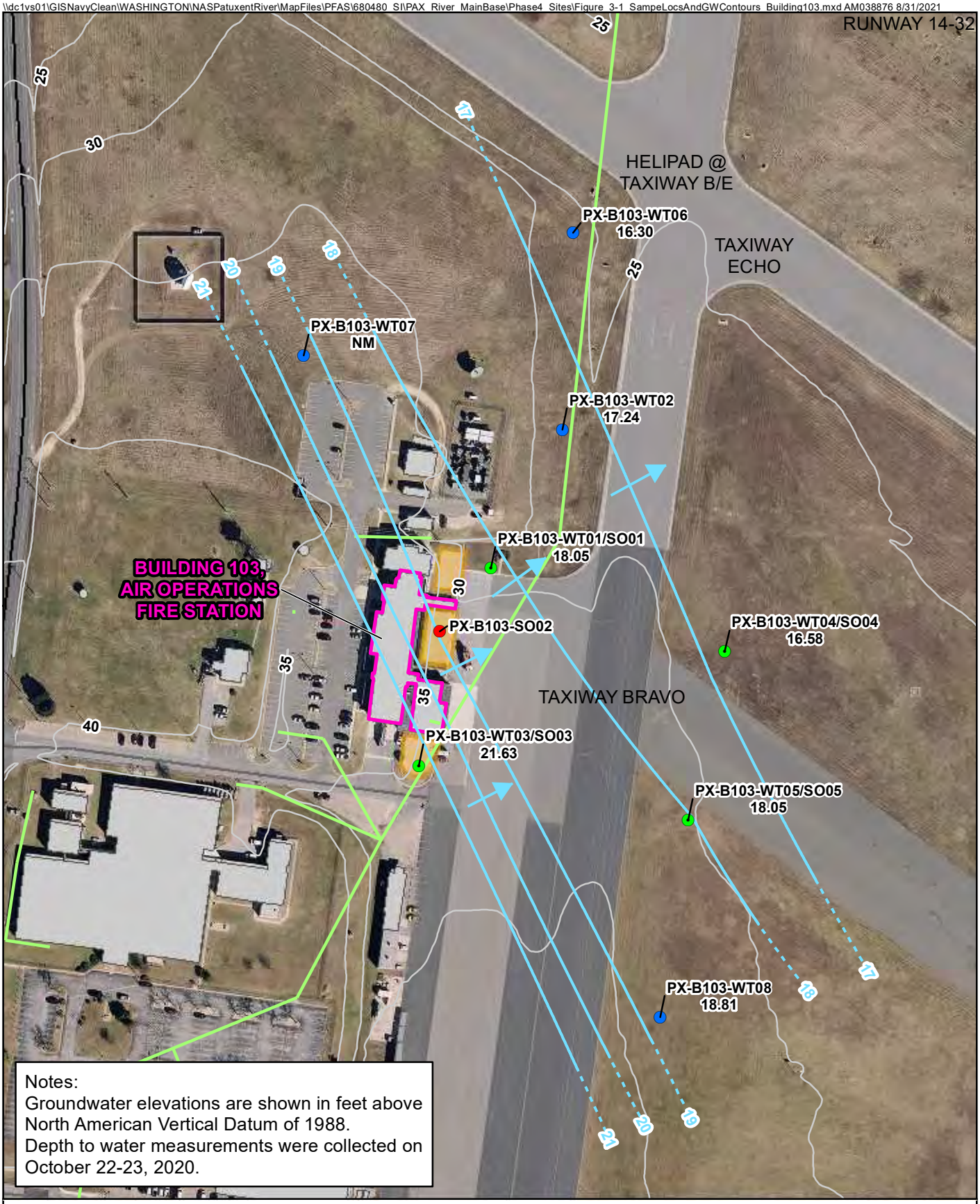
Notes:

[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 September 11, 2020
[e] depth to water measurement collected on October 20, 2020
[f] depth to water measurement collected on October 21, 2020
[g] depth to water measurement collected on October 22, 2020
[h] depth to water measurement collected on October 23, 2020
[i] depth to water measurement collected on October 24, 2020

Table 3-2. Water Quality Parameters (September/October 2020)
Basewide PFAS Site Inspection Report
NAS Patuxent River, St. Mary's County, Maryland

Piezometer	Date Sampled	Temperature (°C)	pH (standard units)	Specific Conductance (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)
Building 103 – Air Operations Fire Station							
PX-B103-WT01	10/22/2020	24.91	6.03	0.121	82.3	7.39	66.8
PX-B103-WT02	10/22/2020	21.17	5.75	0.086	240	7.74	75.7
PX-B103-WT03	10/22/2020	22.72	6.56	0.266	912.2	6.47	32.4
PX-B103-WT04	10/23/2020	20.90	7.47	0.004	90.5	8.70	138.6
PX-B103-WT05	10/23/2020	21.35	7.23	0.185	34.1	7.89	87.6
PX-B103-WT06	10/22/2020	23.12	6.08	0.090	88	6.71	70.7
PX-B103-WT07	water quality parameters not collected at PX-B103-WT07 (piezometer was dry)						
PX-B103-WT08	10/23/2020	21.27	6.49	0.002	84.7	7.48	52.3
Hangar 110 – Test Pilot School Aircraft Hangar							
PX-H110-WT01	10/24/2020	23.28	8.56	0.003	above range	8.11	79.9
PX-H110-WT02	10/24/2020	24.63	7.34	0.004	above range	5.23	-56.5
PX-H110-WT03	10/24/2020	30.36	8.42	0.003	above range	4.96	47.2
PX-H110-WT04	10/24/2020	23.97	10.45	0.195	above range	3.92	123.6
PX-H110-WT05	10/23/2020	21.66	5.92	0.244	above range	5.74	-5.8
Hangar 2835 – Air Test & Evaluation Squadron 20 Hangar							
PX-H2835-WT01	9/11/2020	22.00	6.98	0.069	20.3	5.40	76.3
PX-H2835-WT02	9/11/2020	25.00	6.81	0.069	605	6.60	120.2
PX-H2835-WT03	9/11/2020	24.80	7.35	0.104	194	6.40	121.0
PX-H2835-WT04	9/11/2020	24.60	6.42	0.080	156	5.50	86.9
PX-H2835-WT05	9/11/2020	25.10	6.31	0.044	684	6.80	99.3
PX-H2835-WT06	9/11/2020	22.20	6.11	0.244	12.3	6.70	135.0
Hangar 2805 – Presidential Helicopter Hangar							
PX-H2805-WT01	10/20/2020	21.10	5.68	0.325	231	3.74	NM
PX-H2805-WT02	10/20/2020	22.09	5.88	0.119	139	3.73	NM
PX-H2805-WT03	10/20/2020	21.67	6.50	0.245	above range	4.82	NM
PX-H2805-WT04	10/20/2020	24.22	5.50	0.003	above range	5.29	NM
PX-H2805-WT05	10/20/2020	23.72	5.91	0.004	125	4.84	NM
PX-H2805-WT06	10/20/2020	22.27	6.20	0.003	428	5.74	NM
PX-H2805-WT07	10/20/2020	22.83	6.84	0.185	above range	2.90	NM
Building 840: Skeet Range – Aircraft Crash Site							
PX-B840-WT01	10/21/2020	21.00	5.69	0.085	above range	6.72	78.4
PX-B840-WT02	10/21/2020	23.49	4.75	0.205	97.2	5.19	112.4
PX-B840-WT03	10/21/2020	21.85	4.27	0.104	above range	5.23	107.4
PX-B840-WT04	10/21/2020	20.91	5.11	0.086	above range	4.24	82.4

Notes:
°C = degree(s) Celsius
mg/L = milligram(s) per liter
mS/cm = millisiemen(s) per centimeter
mV = millivolt(s)
NM = not measured
NTU = nephelometric turbidity unit(s)
ORP = oxidation-reduction potential



Notes:
Groundwater elevations are shown in feet above North American Vertical Datum of 1988.
Depth to water measurements were collected on October 22-23, 2020.

Legend

- Co-located Groundwater and Soil Sample Location
- Groundwater Sample Location
- Surface/Subsurface Soil Sample Location
- Groundwater Contour (dashed where inferred)
- Groundwater Flow Direction
- Confirmed PFAS Release Area
- Approximate Areas of Equipment Checks
- Stormwater
- Elevation Contour 5 ft
- Building

N

0 100 200 Feet

Figure 3-1
Sample Locations and Groundwater Contours for
Building 103 – Air Operations Fire Station
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

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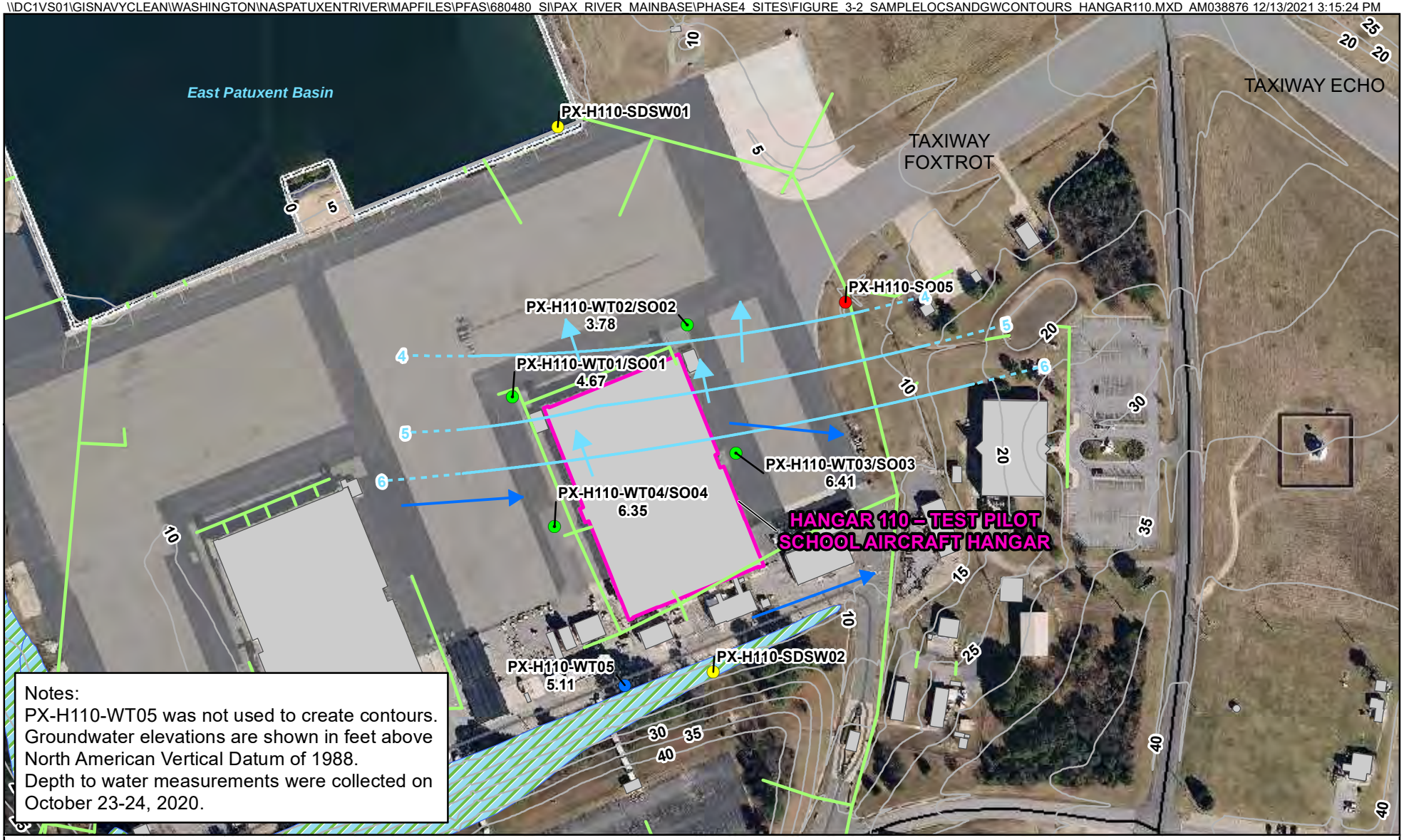
\\DC1VS01\GISNAVYCLEAN\WASHINGTON\NASPATUXENTRIVER\MAPFILES\PFAS\680480_SI\PAX_RIVER_MAINBASE\PHASE4_SITES\FIGURE_3-2_SAMPLELOCSANDGWCONTOURS_HANGAR110.MXD AM038876 12/13/2021 3:15:24 PM



Legend

- Co-located Groundwater and Soil Sample Location
- Groundwater Sample Location
- Surface Water/Sediment Sample Location
- Surface/Subsurface Soil Sample Location
- Confirmed PFAS Release Area
- Stormwater Line
- Groundwater Contour (dashed where inferred)
- Groundwater Flow Direction
- Approximate Surface Water Flow Direction
- Elevation Contour 5 ft
- Building
- Wetland Area
- Installation Boundary

N

0 125 250 Feet

Figure 3-2
Sample Locations and Groundwater Contours for
Hangar 110 – Test Pilot School Aircraft Hangar
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

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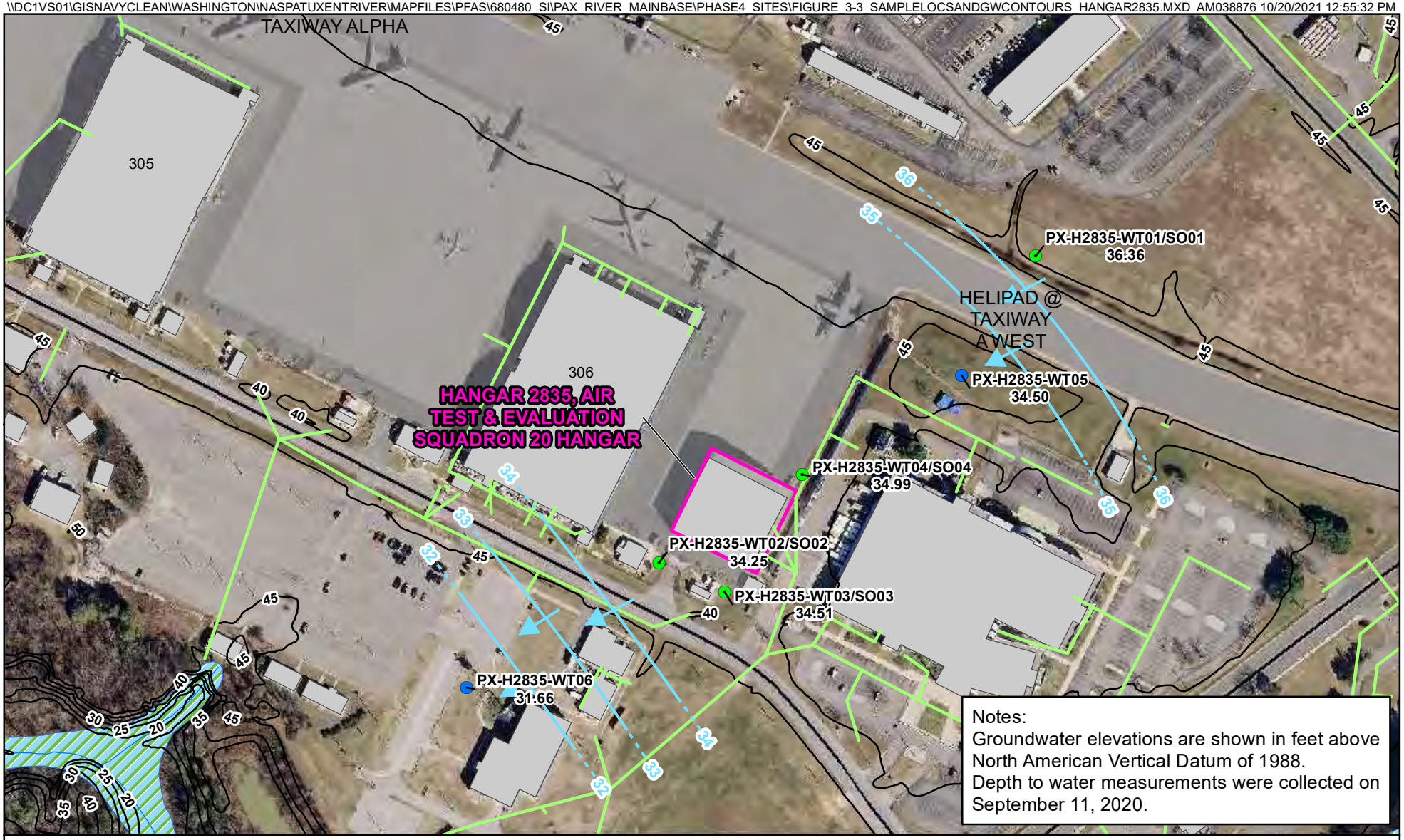
\\DC1VS01\GISNAVYCLEAN\WASHINGTON\NASPATUXENTRIVER\MAPFILES\PFAS\680480_SI\PAX_RIVER_MAINBASE\PHASE4_SITES\FIGURE_3-3_SAMPLELOCSANDGWCONTOURS_HANGAR2835.MXD AM038876 10/20/2021 12:55:32 PM



Legend

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

N

0 125 250 Feet

Figure 3-3
Sample Locations and Groundwater Contours for
Hangar 2835 – Air Test & Evaluation Squadron 20 Hangar
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

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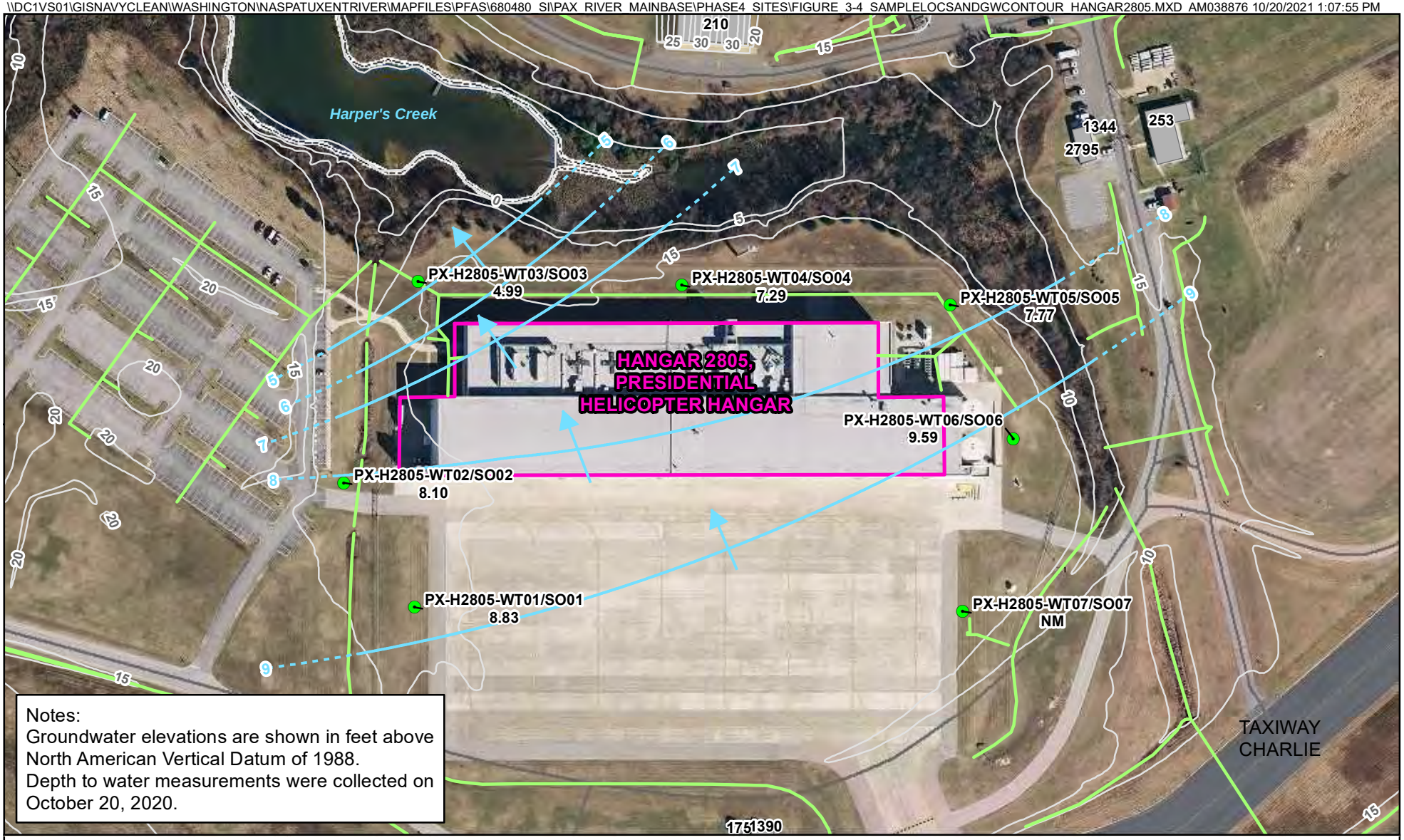
\\DC1VS01\GISNAVYCLEAN\WASHINGTON\NASPATUXENTRIVER\MAPFILES\PFAS\680480_SI\PAX_RIVER_MAINBASE\PHASE4_SITES\FIGURE_3-4_SAMPLELOCSANDGWCONTOUR_HANGAR2805.MXD AM038876 10/20/2021 1:07:55 PM



Legend

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

N

0 100 200 Feet

Figure 3-4
Sample Locations and Groundwater Contours for
Hangar 2805 – Presidential Helicopter Hangar
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

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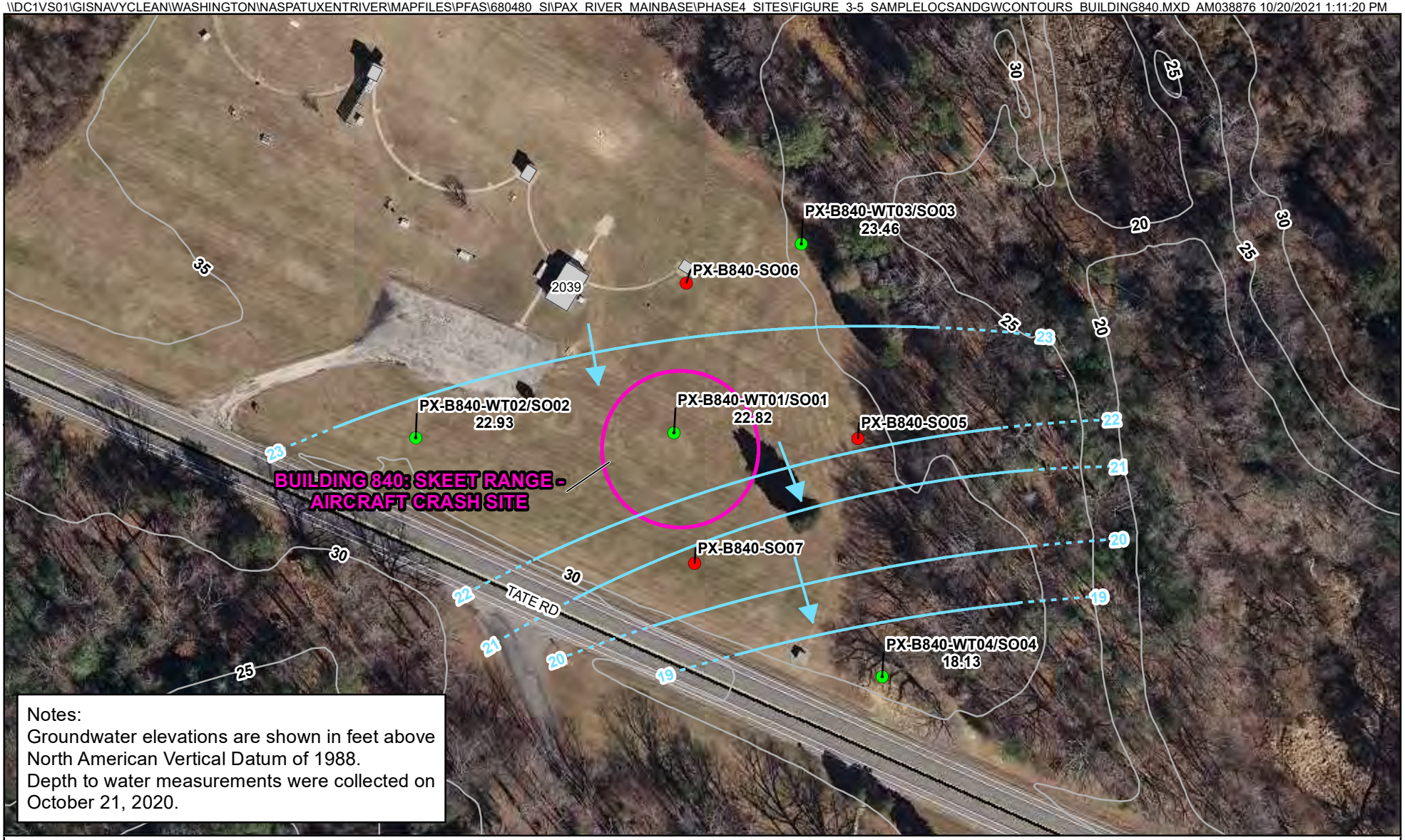
\\DC1VS01\GISNAVYCLEAN\WASHINGTON\NASPATUXENTRIVER\MAPFILES\PFAS\680480_SI\PAX_RIVER_MAINBASE\PHASE4_SITES\FIGURE_3-5_SAMPLELOCSANDGWCONTOURS_BUILDING840.MXD AM038876 10/20/2021 1:11:20 PM



Legend

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

N

0 50 100 Feet

Figure 3-5
Sample Locations and Groundwater Contours for Building 840: Skeet Range – Aircraft Crash Site
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

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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. Surface water analytical data for PFOA and PFOS were screened against the PAL of 400 ng/L for each compound, and surface water analytical data for PFBS were screened against the PAL of 6,000 ng/L; for surface water, the groundwater PALs were multiplied by 10 to account for exposure to surface water, which would be much less than exposure to groundwater. Sediment analytical data for PFOA and PFOS were screened against the PAL of 1,300 µg/kg for each compound, and sediment analytical data for PFBS were screened against the PAL of 19,000 µg/kg; for sediment, the soil PALs were multiplied by 10 to account for exposure to sediment, which would be much less than exposure to soil. The PALs for PFOA and PFOS for this investigation align with screening values for moving a site from the SI phase to the RI phase included in the Assistant Secretary of Defense Memorandum issued on October 15, 2019 (DoD, 2019b). For PFBS, the PALs are based on the May 2021 USEPA Regional Screening Levels (USEPA, 2021). Where present, exceedances were identified for PFAS with PALs only (PFOA, PFOS, and PFBS). Soil, groundwater, surface water, and sediment analytical data were also obtained for 15 other PFAS that do not have screening criteria, and these results may be screened in the future if criteria are established.

Laboratory analytical results for soil and grab groundwater samples collected at Building 103, Hangar 110, Hangar 2835, Hangar 2805, and Building 840 are summarized in **Tables 4-1** and **4-2**, respectively. Laboratory analytical results for surface water and sediment samples collected at Hangar 110 are summarized in **Tables 4-3** and **4-4**, respectively. **Tables 4-1** through **4-4** present data screened against the PALs for PFOA, PFOS, and PFBS; **Appendix D** presents data for all 18 PFAS analyzed, including PFOA, PFOS, and PFBS. **Figures 4-1** through **4-5** show PFOA, PFOS, and PFBS concentrations for each of the environmental sample locations at Building 103, Hangar 110, Hangar 2835, Hangar 2805, and Building 840.

4.1 Soil

4.1.1 Soil Analytical Results for Building 103

Results of surface and subsurface soil samples collected from the five soil borings at Building 103 are presented on **Figure 4-1** and in **Table 4-1**. Analysis indicated the following:

- PFOA and PFOS were detected in site soil. PFBS was not detected in site soil.
- PFOA was detected at four surface soil sample locations, with estimated concentrations ranging from 0.91 J µg/kg at PX-B103-SS02 to 2.57 J µg/kg at PX-B103-SS03. PFOA was detected at one subsurface soil sample location (PX-B103-SB03) at an estimated concentration of 2.26 J µg/kg. None of the PFOA detections exceeded the PAL of 130 µg/kg.
- PFOS was detected at all five surface soil sample locations, with concentrations ranging from 30.58 µg/kg at PX-B103-SS02 to 154.98 J µg/kg (estimated) at PX-B103-SS05. PFOS was detected at all five subsurface soil sample locations, with concentrations ranging from 6.76 µg/kg at PX-B103-SB05 to 229.53 µg/kg at PX-B103-SB03. The surface soil PFOS detection at PX-B103-SS05 and subsurface soil PFOS detection at PX-B103-SB03 exceeded the PAL of 130 µg/kg.

4.1.2 Soil Analytical Results for Hangar 110

Results of surface and subsurface soil samples collected from the five soil borings at Hangar 110 are presented on **Figure 4-2** and in **Table 4-1**. Analysis indicated the following:

- PFOA and PFOS were detected in site soil. PFBS was not detected in site soil.
- PFOA was detected at one surface soil sample location (PX-H110-SS05) at an estimated concentration of 0.85 J µg/kg; there were no PFOA detections in subsurface soil. The lone PFOA detection did not exceed the PAL of 130 µg/kg.
- PFOS was detected at one surface soil sample location (PX-H110-SS05) at an estimated concentration of 5.3 J µg/kg; there were no PFOS detections in subsurface soil. The lone PFOS detection did not exceed the PAL of 130 µg/kg.

4.1.3 Soil Analytical Results for Hangar 2835

Results of surface and subsurface soil samples collected from the four soil borings at Hangar 2835 are presented on **Figure 4-3** and in **Table 4-1**. Analysis indicated the following:

- PFOA and PFOS were detected in site soil. PFBS was not detected in site soil.
- PFOA was detected at two surface soil sample locations, with estimated concentrations ranging from 0.97 J µg/kg at PX-H2835-SS03 to 2.35 J µg/kg at PX-H2835-SS04. PFOA was detected at one subsurface soil sample location (PX-H2835-SB04) at an estimated concentration of 0.88 J µg/kg. None of the PFOA detections exceeded the PAL of 130 µg/kg.
- PFOS was detected at three surface soil sample locations, with estimated concentrations ranging from 1.01 J µg/kg at PX-H2835-SS01 to 3.53 J µg/kg at PX-H2835-SS03; there were no PFOS detections in subsurface soil. None of the PFOS detections exceeded the PAL of 130 µg/kg.

4.1.4 Soil Analytical Results for Hangar 2805

Results of surface and subsurface soil samples collected from the seven soil borings at Hangar 2805 are presented on **Figure 4-4** and in **Table 4-1**. Analysis indicated the following:

- PFOS was detected in site soil. PFOA and PFBS were not detected in site soil.
- PFOS was detected at four surface soil sample locations, with estimated concentrations ranging from 0.82 J µg/kg at PX-H2805-SS02 to 1.99 J µg/kg at PX-H2805-SS07; there were no PFOS detections in subsurface soil. None of the PFOS detections exceeded the PAL of 130 µg/kg.

4.1.5 Soil Analytical Results for Building 840

Results of surface and subsurface soil samples collected from the seven soil borings at Building 840 are presented on **Figure 4-5** and in **Table 4-1**. Analysis indicated the following:

- PFOA and PFOS were detected in site soil. PFBS was not detected in site soil.
- PFOA was detected at two surface soil sample locations, with estimated concentrations ranging from 0.88 J µg/kg at PX-B840-SS04 to 3.88 J µg/kg at PX-B840-SS05; there were no PFOA detections in subsurface soil. None of the PFOA detections exceeded the PAL of 130 µg/kg.
- PFOS was detected at all seven surface soil sample locations, with concentrations ranging from 1.13 J µg/kg (estimated) at PX-B840-SS02 to 23.14 µg/kg at PX-B840-SS07. PFOS was detected at four subsurface soil sample locations, with concentrations ranging from 0.82 J µg/kg (estimated) at PX-B840-SB04 to 37.48 µg/kg at PX-B840-SB03. None of the PFOS detections exceeded the PAL of 130 µg/kg.

4.2 Groundwater

4.2.1 Water Quality Parameters

Measurements of pH, ORP, temperature, specific conductance, turbidity, and dissolved oxygen were collected at each temporary piezometer following purging and immediately prior to sampling. The final water quality parameters recorded before sample collection at all five AOIs (Building 103, Hangar 110, Hangar 2835, Hangar 2805, and Building 840) are presented in **Table 3-2**.

Measured pH values were generally acidic at four of the five sites, with generally basic pH values at Hangar 110. Overall, pH values ranged between 4.27 (PX-B840-WT03) and 10.45 (PX-H110-WT04). Measured ORP values, which provide an indication of the potential for redox conditions in groundwater, ranged between -56.5 mV (PX-H110-WT02) and 159.8 mV (PX-B103-WT04); overall, these values are indicative of primarily oxidizing conditions. Temperature readings ranged between 20.90°C (PX-B103-WT04) and 30.36°C (PX-H110-WT03). Specific conductance values, which provide an indication of the concentration of total dissolved solids within groundwater, ranged between 0.002 mS/cm (PX-B103-WT08) and 0.325 mS/cm (PX-H2805-WT01); 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 12.3 NTU (PX-H2835-WT06) to above the range of the instrument (greater than 1,000 NTU) at multiple sample locations. Measured dissolved oxygen values, which provide an indication of the oxidative state of the subsurface environment, ranged between 2.90 mg/L (PX-H2805-WT07) and 8.70 mg/L (PX-B103-WT04); these values are indicative of aerobic conditions.

4.2.2 Groundwater Analytical Results for Building 103

Results of groundwater samples collected from seven of the eight temporary piezometers at Building 103 (PX-B103-WT07 was dry) are presented on **Figure 4-1** and in **Table 4-2**. Analysis indicated the following:

- PFOA, PFOS, and PFBS were detected in site groundwater.
- PFOA was detected at all seven grab groundwater sample locations, with concentrations ranging from 34.94 J ng/L (estimated) at PX-B103-WT04 to 1,379.76 ng/L at PX-B103-WT03. PFOA detections exceeded the PAL of 40 ng/L at six of the seven grab groundwater sample locations.
- PFOS was detected at all seven grab groundwater sample locations, with concentrations ranging from 2,012.72 ng/L at PX-B103-WT02 to 30,405.99 ng/L at PX-B103-WT01. PFOS detections exceeded the PAL of 40 ng/L at all seven grab groundwater sample locations.
- PFBS was detected at all seven grab groundwater sample locations, with concentrations ranging from 7.59 ng/L at PX-B103-WT08 to 159.09 ng/L at PX-B103-WT03. None of the PFBS detections exceeded the PAL of 600 ng/L.

4.2.3 Groundwater Analytical Results for Hangar 110

Results of groundwater samples collected from the five temporary piezometers at Hangar 110 are presented on **Figure 4-2** and in **Table 4-2**. Analysis indicated the following:

- PFOA, PFOS, and PFBS were detected in site groundwater.
- PFOA was detected at all five grab groundwater sample locations, with concentrations ranging from 0.91 J ng/L (estimated) at PX-H110-WT04 to 54.41 ng/L at PX-H110-WT02. PFOA detections exceeded the PAL of 40 ng/L at one of the five grab groundwater sample locations (PX-H110-WT02).
- PFOS was detected at all five grab groundwater sample locations, with concentrations ranging from 22.14 ng/L at PX-H110-WT04 to 175.58 ng/L at PX-H110-WT03. PFOS detections exceeded the PAL of 40 ng/L at four of the five grab groundwater sample locations.

- PFBS was detected at all five grab groundwater sample locations, with concentrations ranging from 1.16 J ng/L (estimated) at PX-H110-WT04 to 12.96 ng/L at PX-H110-WT02. None of the PFBS detections exceeded the PAL of 600 ng/L.

4.2.4 Groundwater Analytical Results for Hangar 2835

Results of groundwater samples collected from the six temporary piezometers at Hangar 2835 are presented on **Figure 4-3** and in **Table 4-2**. Analysis indicated the following:

- PFOA, PFOS, and PFBS were detected in site groundwater.
- PFOA was detected at all six grab groundwater sample locations, with concentrations ranging from 0.86 J ng/L (estimated) at PX-H2835-WT05 to 451.26 ng/L at PX-H2835-WT03. PFOA detections exceeded the PAL of 40 ng/L at two of the six grab groundwater sample locations (PX-H2835-WT03 and PX-H2835-WT04).
- PFOS was detected at all six grab groundwater sample locations, with concentrations ranging from 2 J ng/L (estimated) at PX-H2835-WT05 to 98.55 ng/L at PX-H2835-WT04. PFOS detections exceeded the PAL of 40 ng/L at two of the six grab groundwater sample locations (PX-H2835-WT03 and PX-H2835-WT04).
- PFBS was detected at all six grab groundwater sample locations, with concentrations ranging from 0.74 J ng/L (estimated) at PX-H2835-WT05 to 5.52 ng/L at PX-H2835-WT02. None of the PFBS detections exceeded the PAL of 600 ng/L.

4.2.5 Groundwater Analytical Results for Hangar 2805

Results of groundwater samples collected from the seven temporary piezometers at Hangar 2805 are presented on **Figure 4-4** and in **Table 4-2**. Analysis indicated the following:

- PFOA, PFOS, and PFBS were detected in site groundwater.
- PFOA was detected at all seven grab groundwater sample locations, with concentrations ranging from 18.36 ng/L at PX-H2805-WT07 to 130.92 ng/L at PX-H2805-WT01. PFOA detections exceeded the PAL of 40 ng/L at three of the seven grab groundwater sample locations.
- PFOS was detected at all seven grab groundwater sample locations, with concentrations ranging from 8.22 ng/L at PX-H2805-WT01 to 20.01 ng/L at PX-H2805-WT03. None of the PFOS detections exceeded the PAL of 40 ng/L.
- PFBS was detected at all seven grab groundwater sample locations, with concentrations ranging from 1.53 J ng/L (estimated) at PX-H2805-WT07 to 78.67 J ng/L (estimated) at PX-H2805-WT03. None of the PFBS detections exceeded the PAL of 600 ng/L.

4.2.6 Groundwater Analytical Results for Building 840

Results of groundwater samples collected from the four temporary piezometers at Building 840 are presented on **Figure 4-5** and in **Table 4-2**. Analysis indicated the following:

- PFOA, PFOS, and PFBS were detected in site groundwater.
- PFOA was detected at all four grab groundwater sample locations, with concentrations ranging from 1.84 J ng/L (estimated) at PX-B840-WT02 to 99.66 ng/L at PX-B840-WT03. PFOA detections exceeded the PAL of 40 ng/L at two of the four grab groundwater sample locations (PX-B840-WT01 and PX-B840-WT03).
- PFOS was detected at all four grab groundwater sample locations, with concentrations ranging from 5.74 ng/L at PX-B840-WT02 to 10,655.8 ng/L at PX-B840-WT03. PFOS detections exceeded the PAL of 40 ng/L at two of the four grab groundwater sample locations (PX-B840-WT01 and PX-B840-WT03).

- PFBS was detected at all four grab groundwater sample locations, with concentrations ranging from 2.05 J ng/L (estimated) at PX-B840-WT02 to 265.29 ng/L at PX-B840-WT03. None of the PFBS detections exceeded the PAL of 600 ng/L.

4.3 Surface Water

Results of the surface water sample collected from the only surface water sample location at Hangar 110 (PX-H110-SW01) are presented on **Figure 4-2** and in **Table 4-3**. Analysis indicated the following:

- PFOA, PFOS, and PFBS were detected in site surface water at estimated concentrations of 3.07 J ng/L, 4.23 J ng/L, and 1.27 J ng/L, respectively. None of the PFOA, PFOS, and PFBS detections exceeded the corresponding PALs.

4.4 Sediment

Results of sediment samples collected from the two sediment sample locations at Hangar 110 (PX-H110-SD01 and PX-H110-SD02) are presented on **Figure 4-2** and in **Table 4-4**. Analysis indicated the following:

- PFOA, PFOS, and PFBS were not detected in site sediment.

Table 4-1. Soil Analytical Data for PFOA, PFOS, and PFBS (September/October 2020)
Basewide PFAS Site Inspection Report
NAS Patuxent River, St. Mary's County, Maryland

Sample Location	Date Sampled	PFOA (µg/kg)	PFOS (µg/kg)	PFBS (µg/kg)
Project Action Limits (PALs) :		**130** [a]	**130** [a]	**1,900** [a]
Building 103 – Air Operations Fire Station				
SURFACE SOIL				
PX-B103-SS01	10/22/2020	**2 J**	**73.33**	1.12 U
PX-B103-SS02	10/22/2020	**0.91 J**	**30.58**	1.28 U
PX-B103-SS03	10/22/2020	**2.57 J**	**51.5 J**	1.2 U
PX-B103-SS04	10/23/2020	**1.4 J**	**105.32**	1.23 U
PX-B103-SS05	10/23/2020	2.08 U [b]	**154.98 J** [b]	1.04 U [b]
SUBSURFACE SOIL				
PX-B103-SB01	10/22/2020	2.2 U [b]	**31.04**	1.1 U [b]
PX-B103-SB02	10/22/2020	2.08 U	**16.81**	1.04 U
PX-B103-SB03	10/22/2020	**2.26 J**	**229.53**	0.95 U
PX-B103-SB04	10/23/2020	2.06 U	**7.38**	1.03 U
PX-B103-SB05	10/23/2020	2.11 U	**6.76**	1.05 U
Hangar 110 – Test Pilot School Aircraft Hangar				
SURFACE SOIL				
PX-H110-SS01	10/24/2020	2.26 U	2.26 U	1.13 U
PX-H110-SS02	10/24/2020	2.33 U	2.33 U	1.16 U
PX-H110-SS03	10/24/2020	2.08 U [b]	2.08 U [b]	1.04 U [b]
PX-H110-SS04	10/24/2020	2.04 U	2.04 U	1.02 U
PX-H110-SS05	10/23/2020	**0.85 J**	**5.3 J**	1.26 U
SUBSURFACE SOIL				
PX-H110-SB01	10/24/2020	2.14 U	2.14 U	1.07 U
PX-H110-SB02	10/24/2020	2.29 U	2.29 U	1.14 U
PX-H110-SB03	10/24/2020	2.05 U	2.05 U	1.03 U
PX-H110-SB04	10/24/2020	2.48 U	2.48 U	1.24 U
PX-H110-SB05	10/23/2020	2.14 U	2.14 U	1.07 U
Hangar 2835 – Air Test & Evaluation Squadron 20 Hangar				
SURFACE SOIL				
PX-H2835-SS01	9/11/2020	2.38 U	**1.01 J**	1.19 U
PX-H2835-SS02	9/11/2020	2.29 U	**1.74 J**	1.14 U
PX-H2835-SS03	9/11/2020	**0.97 J**	**3.53 J**	1.16 U
PX-H2835-SS04	9/11/2020	**2.35 J**	2.5 U	1.25 U
SUBSURFACE SOIL				
PX-H2835-SB01	9/11/2020	2.65 U [b]	2.65 U [b]	1.32 U [b]
PX-H2835-SB02	9/11/2020	2.38 U	2.38 U	1.19 U
PX-H2835-SB03	9/11/2020	2.22 U	2.22 U	1.11 U
PX-H2835-SB04	9/11/2020	**0.88 J**	2.21 U	1.1 U
Hangar 2805 – Presidential Helicopter Hangar				
SURFACE SOIL				
PX-H2805-SS01	10/20/2020	2.03 U	**1.04 J**	1.02 U
PX-H2805-SS02	10/20/2020	2.31 U	**0.82 J**	1.16 U
PX-H2805-SS03	10/20/2020	2.29 U	2.29 U	1.14 U
PX-H2805-SS04	10/20/2020	2.17 U	**0.95 J**	1.09 U
PX-H2805-SS05	10/20/2020	2.31 U [b]	2.31 U [b]	1.16 U [b]
PX-H2805-SS06	10/20/2020	2.04 U	2.04 U	1.02 U
PX-H2805-SS07	10/20/2020	2.14 U	**1.99 J**	1.07 U

Table 4-1. Soil Analytical Data for PFOA, PFOS, and PFBS (September/October 2020)
Basewide PFAS Site Inspection Report
NAS Patuxent River, St. Mary's County, Maryland

Sample Location	Date Sampled	PFOA (µg/kg)	PFOS (µg/kg)	PFBS (µg/kg)
Project Action Limits (PALs) :		**130** [a]	**130** [a]	**1,900** [a]
Hangar 2805 – Presidential Helicopter Hangar (continued)				
SUBSURFACE SOIL				
PX-H2805-SB01	10/20/2020	2.48 U	2.48 U	1.24 U
PX-H2805-SB02	10/20/2020	2.2 U	2.2 U	1.1 U
PX-H2805-SB03	10/20/2020	2.04 U	2.04 U	1.02 U
PX-H2805-SB04	10/20/2020	2.29 U	2.29 U	1.14 U
PX-H2805-SB05	10/20/2020	2.48 U	2.48 U	1.24 U
PX-H2805-SB06	10/20/2020	2.15 U	2.15 U	1.08 U
PX-H2805-SB07	10/20/2020	2.06 U	2.06 U	1.13 U
Building 840: Skeet Range – Aircraft Crash Site				
SURFACE SOIL				
PX-B840-SS01	10/21/2020	2.25 U	**16.33**	1.12 U
PX-B840-SS02	10/21/2020	2.52 U	**1.13 J**	1.26 U
PX-B840-SS03	10/21/2020	2.42 U	**19.16**	1.21 U
PX-B840-SS04	10/21/2020	**0.88 J**	**5.3 J**	1.17 U
PX-B840-SS05	10/21/2020	**3.88 J**	**10.84** [b]	1.25 U [b]
PX-B840-SS06	10/21/2020	2.5 U	**20.85**	1.25 U
PX-B840-SS07	10/21/2020	2.4 U	**23.14**	1.2 U
SUBSURFACE SOIL				
PX-B840-SB01	10/21/2020	2.63 U [b]	2.63 U [b]	1.32 U [b]
PX-B840-SB02	10/21/2020	2.3 U	2.3 U	1.15 U
PX-B840-SB03	10/21/2020	2.29 U	**37.48**	1.14 U
PX-B840-SB04	10/21/2020	2.09 U	**0.82 J**	1.05 U
PX-B840-SB05	10/21/2020	2.38 U	2.38 U	1.19 U
PX-B840-SB06	10/21/2020	2.29 U	**13.62**	1.14 U
PX-B840-SB07	10/21/2020	2.53 U	**2.87 J**	1.27 U

Notes:

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

[b] Result from a field duplicate sample.

Bolding indicates detection.

Shading and bolding indicate exceedance of screening value.

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

U = Analyte not detected.

RI = Remedial Investigation

SI = Site Inspection

µg/kg = microgram(s) per kilogram

Table 4-2. Groundwater Analytical Data for PFOA, PFOS, and PFBS (September/October 2020)
Basewide PFAS Site Inspection Report
NAS Patuxent River, St. Mary's County, Maryland

Sample Location	Date Sampled	PFOA (ng/L)	PFOS (ng/L)	PFBS (ng/L)
Project Action Limits (PALs) :		**40 [a]**	**40 [a]**	**600 [a]**
Building 103 – Air Operations Fire Station				
GRAB GROUNDWATER				
PX-B103-WT01	10/22/2020	**516.09**	**30,405.99**	**125.98**
PX-B103-WT02	10/22/2020	**99.45**	**2,012.72 [b]**	**21.53 [b]**
PX-B103-WT03	10/22/2020	**1,379.76**	**6,313.46**	**159.09**
PX-B103-WT04	10/23/2020	**34.94 J**	**12,809.16**	**23.47**
PX-B103-WT05	10/23/2020	**43.39**	**8,173.38**	**11.98**
PX-B103-WT06	10/22/2020	**419.99**	**4,784.1**	**64.73**
PX-B103-WT07	groundwater sample not collected at PX-B103-WT07 (piezometer was dry)			
PX-B103-WT08	10/23/2020	**42.85**	**5,796.36**	**7.59**
Hangar 110 – Test Pilot School Aircraft Hangar				
GRAB GROUNDWATER				
PX-H110-WT01	10/24/2020	**3.63 J**	**111.14**	**1.87 J**
PX-H110-WT02	10/24/2020	**54.41 [b]**	**173.91**	**12.96**
PX-H110-WT03	10/24/2020	**6.54 J**	**175.58**	**7.54**
PX-H110-WT04	10/24/2020	**0.91 J**	**22.14**	**1.16 J**
PX-H110-WT05	10/23/2020	**15.64**	**52.52**	**4.98**
Hangar 2835 – Air Test & Evaluation Squadron 20 Hangar				
GRAB GROUNDWATER				
PX-H2835-WT01	9/11/2020	**1.82 J**	**4.45 J**	**1.17 J**
PX-H2835-WT02	9/11/2020	**37.71**	**17.09**	**5.52**
PX-H2835-WT03	9/11/2020	**451.26**	**57.44**	**3.33 J**
PX-H2835-WT04	9/11/2020	**200.84**	**98.55**	**5.44**
PX-H2835-WT05	9/11/2020	**0.86 J**	**2 J**	**0.74 J**
PX-H2835-WT06	9/11/2020	**8.73**	**3.92 J**	**3.83 J**
Hangar 2805 – Presidential Helicopter Hangar				
GRAB GROUNDWATER				
PX-H2805-WT01	10/20/2020	**130.92**	**8.22**	**7.09**
PX-H2805-WT02	10/20/2020	**30.69 [b]**	**16.13**	**6.46**
PX-H2805-WT03	10/20/2020	**52.37**	**20.01**	**78.67 J**
PX-H2805-WT04	10/20/2020	**23.06**	**10.57**	**2.73 J**
PX-H2805-WT05	10/20/2020	**49.43**	**10.07**	**4.71 J**
PX-H2805-WT06	10/20/2020	**37.84**	**15.39**	**1.99 J**
PX-H2805-WT07	10/20/2020	**18.36**	**18.4**	**1.53 J**

Table 4-2. Groundwater Analytical Data for PFOA, PFOS, and PFBS (September/October 2020)
Basewide PFAS Site Inspection Report
NAS Patuxent River, St. Mary's County, Maryland

Sample Location	Date Sampled	PFOA (ng/L)	PFOS (ng/L)	PFBS (ng/L)
Project Action Limits (PALs) :		**40 [a]**	**40 [a]**	**600 [a]**
Building 840: Skeet Range – Aircraft Crash Site				
GRAB GROUNDWATER				
PX-B840-WT01	10/21/2020	**79.98**	**9,620.95**	**17.48**
PX-B840-WT02	10/21/2020	**1.84 J**	**5.74 [b]**	**2.05 J [b]**
PX-B840-WT03	10/21/2020	**99.66**	**10,655.8**	**265.29**
PX-B840-WT04	10/21/2020	**9.12**	**36.21**	**3.36 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, the PALs are based on the May 2021 USEPA Regional Screening Levels (USEPA, 2021).
[b] Result from a field duplicate sample.
Bolding indicates detection.
Shading and bolding indicate exceedance of screening value.
J = Analyte present. Reported value may or may not be accurate or precise.
PAL = project action limit
RI = Remedial Investigation
SI = Site Inspection
ng/L = nanogram(s) per liter or parts per trillion

Table 4-3. Surface Water Analytical Data for PFOA, PFOS, and PFBS (October 2020)
Basewide PFAS Site Inspection Report
NAS Patuxent River, St. Mary's County, Maryland

Sample Location	Date Sampled	PFOA (ng/L)	PFOS (ng/L)	PFBS (ng/L)
Project Action Limits (PALs):		**400** [a,b]	**400** [a,b]	**6,000** [a,b]
Hangar 110 – Test Pilot School Aircraft Hangar				
SURFACE WATER				
PX-H110-SW01	10/24/2020	**3.07 J** [c]	**4.23 J** [c]	**1.27 J** [c]

Notes:
[a] The PALs for PFOA and PFOS for this investigation align with screening values for moving a site from the SI phase to the RI phase included in the Assistant Secretary of Defense Memorandum issued on October 15, 2019 (DoD, 2019b). For PFBS, the PALs are based on the May 2021 USEPA Regional Screening Levels (USEPA, 2021).
[b] Per the SAP (CH2M, 2020), the PALs for surface water are one order of magnitude higher than the PALs for groundwater.
[c] Result from a field duplicate sample.
Bolding indicates detection.
J = Analyte present. Reported value may or may not be accurate or precise.
RI = Remedial Investigation
SI = Site Inspection
ng/L = nanogram(s) per liter or parts per trillion

Table 4-4. Sediment Analytical Data for PFOA, PFOS, and PFBS (October 2020)
Basewide PFAS Site Inspection Report
NAS Patuxent River, St. Mary's County, Maryland

Sample Location	Date Sampled	PFOA (µg/kg)	PFOS (µg/kg)	PFBS (µg/kg)
Project Action Limits (PALs):		**1,300** [a,b]	**1,300** [a,b]	**19,000** [a,b]
Hangar 110 – Test Pilot School Aircraft Hangar				
SEDIMENT				
PX-H110-SD01	10/24/2020	2.44 U [c]	2.44 U [c]	1.22 U [c]
PX-H110-SD02	10/23/2020	2.23 U	2.23 U	1.12 U

Notes:

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

[b] Per the SAP (CH2M, 2020), the PALs for sediment are one order of magnitude higher than the PALs for soil.

[c] Result from a field duplicate sample.

U = Analyte not detected.

RI = Remedial Investigation

SI = Site Inspection

µg/kg = microgram(s) per kilogram

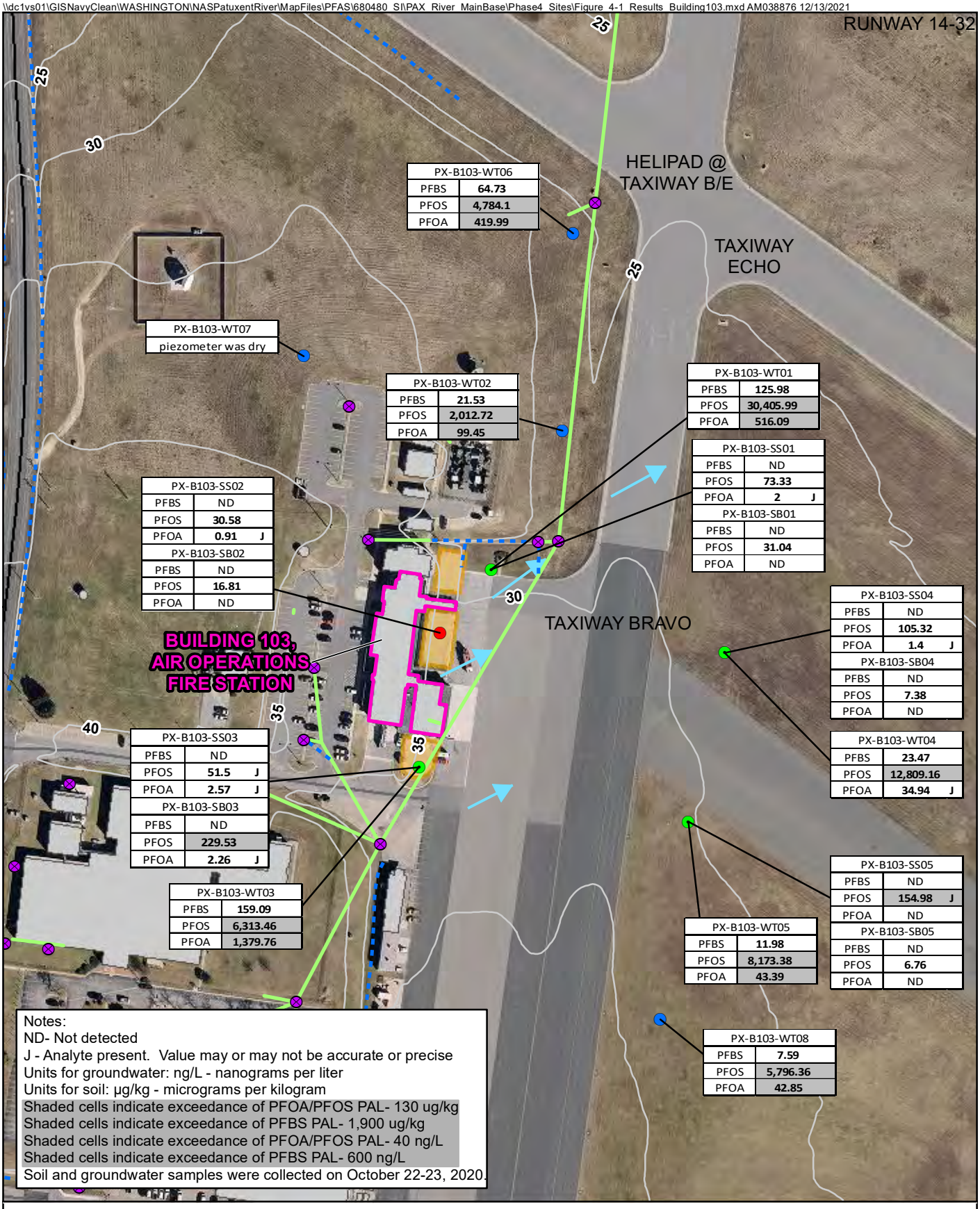

Figure 4-1
PFOA, PFOS, and PFBS Concentrations for
Building 103 – Air Operations Fire Station
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

ch2m

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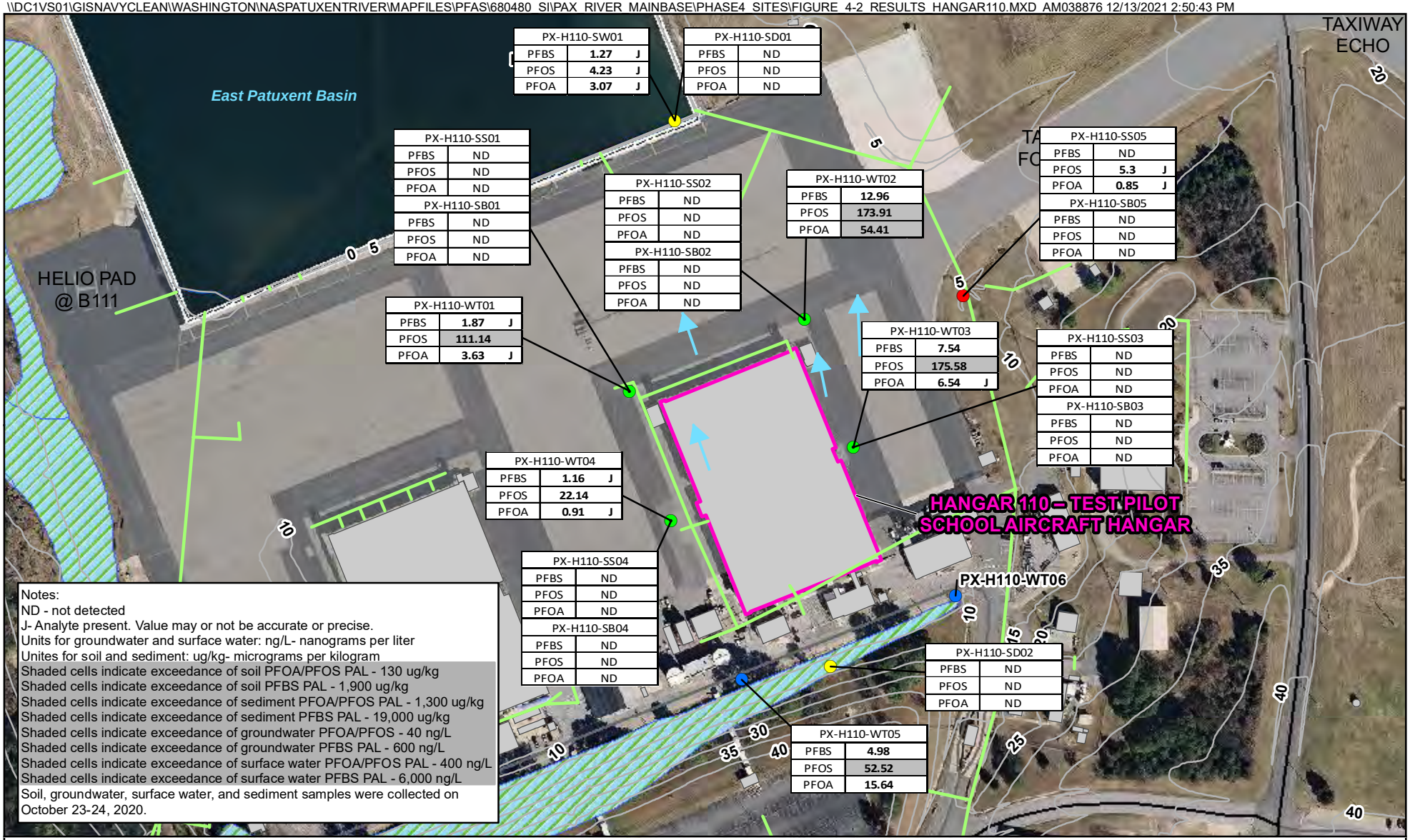

Notes:
ND - not detected
J- Analyte present. Value may or not be accurate or precise.
Units for groundwater and surface water: ng/L- nanograms per liter
Unites for soil and sediment: ug/kg- micrograms per kilogram
Shaded cells indicate exceedance of soil PFOA/PFOS PAL - 130 ug/kg
Shaded cells indicate exceedance of soil PFBS PAL - 1,900 ug/kg
Shaded cells indicate exceedance of sediment PFOA/PFOS PAL - 1,300 ug/kg
Shaded cells indicate exceedance of sediment PFBS PAL - 19,000 ug/kg
Shaded cells indicate exceedance of groundwater PFOA/PFOS - 40 ng/L
Shaded cells indicate exceedance of groundwater PFBS PAL - 600 ng/L
Shaded cells indicate exceedance of surface water PFOA/PFOS PAL - 400 ng/L
Shaded cells indicate exceedance of surface water PFBS PAL - 6,000 ng/L
Soil, groundwater, surface water, and sediment samples were collected on October 23-24, 2020.

Legend

- Co-located Groundwater and Soil Sample Location
- Groundwater Sample Location
- Surface water/Sediment sample location
- Surface/Subsurface Soil Sample Location
- Confirmed PFAS Release Area
- Groundwater Flow Direction
- Stormwater Line
- Elevation Contour 5 ft
- Building
- Wetland Area
- Installation Boundary

N

0 125 250 Feet

Figure 4-2
PFOA, PFOS, and PFBS Concentrations for
Hangar 110 – Test Pilot School Aircraft Hangar
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

ch2m

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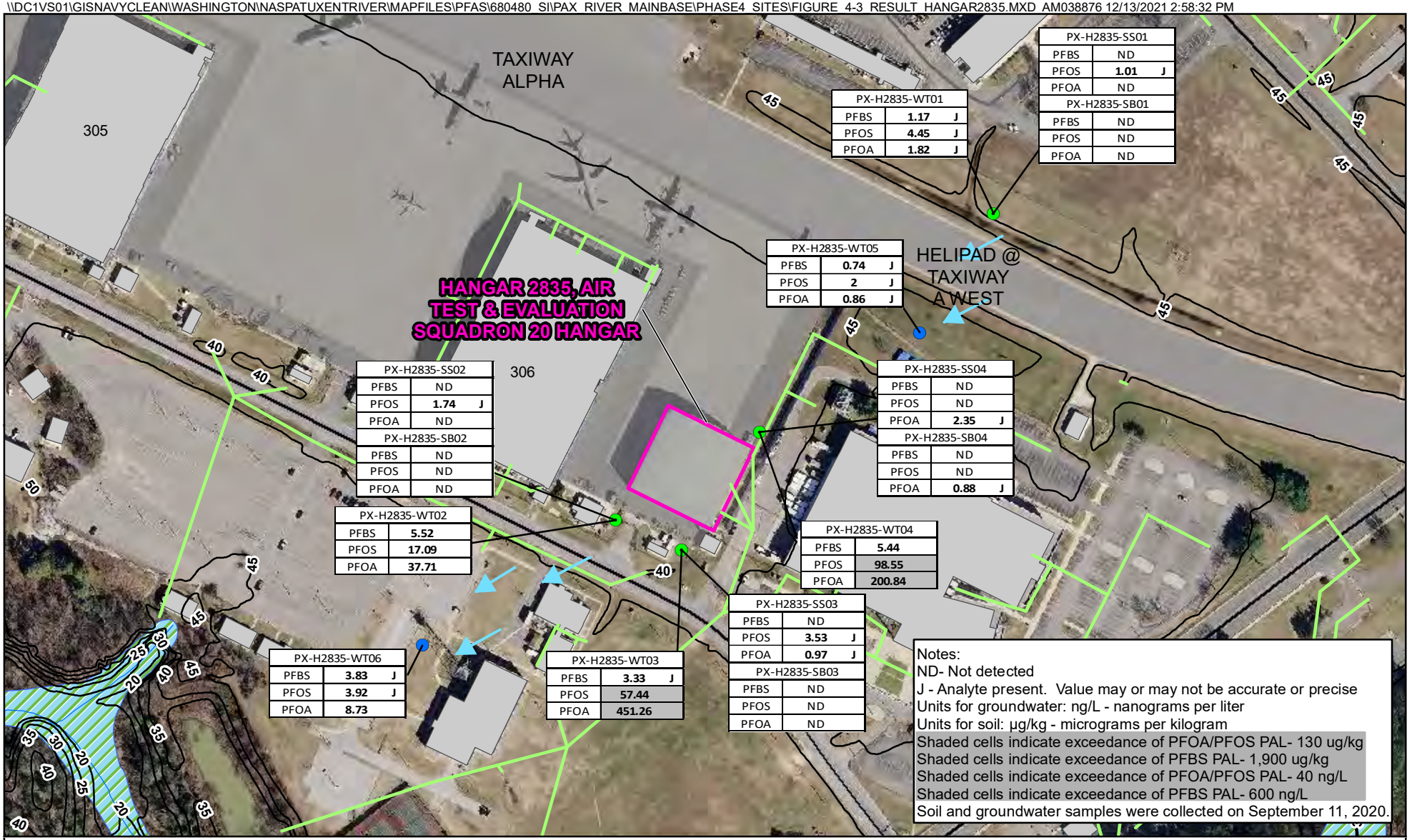

Legend

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

N

0 125 250 Feet

Figure 4-3
PFOA, PFOS, and PFBS Concentrations for
Hangar 2835 – Air Test & Evaluation Squadron 20 Hangar
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

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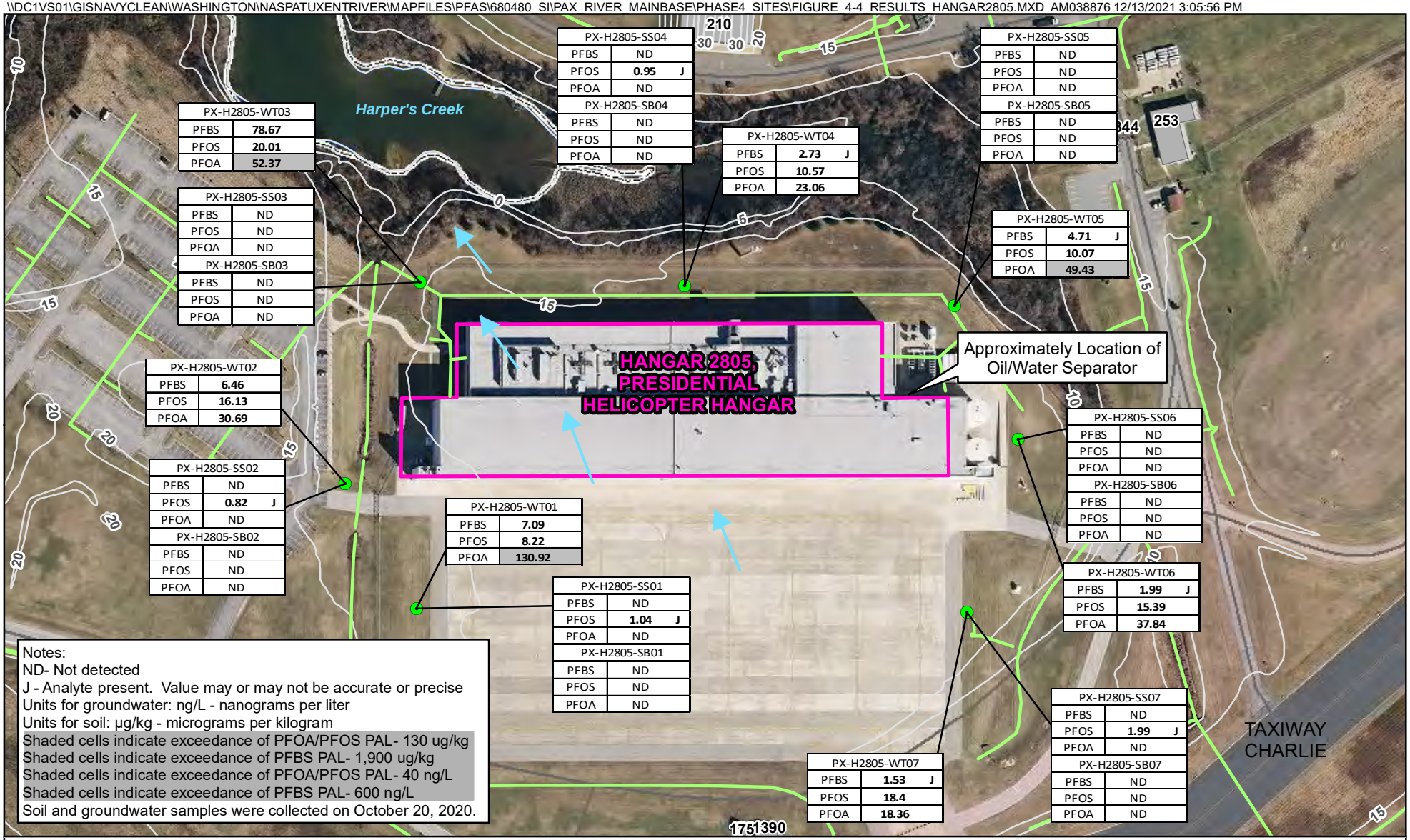

Legend

- Co-located Groundwater and Soil Sample Location
- Confirmed PFAS Release Area
- Groundwater Flow Direction
- Stormwater
- Elevation Contour 5 ft
- Installation Boundary

N

0 100 200 Feet

Figure 4-4
PFOA, PFOS, and PFBS Concentrations for
Hangar 2805 – Presidential Helicopter Hangar
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

ch2m:

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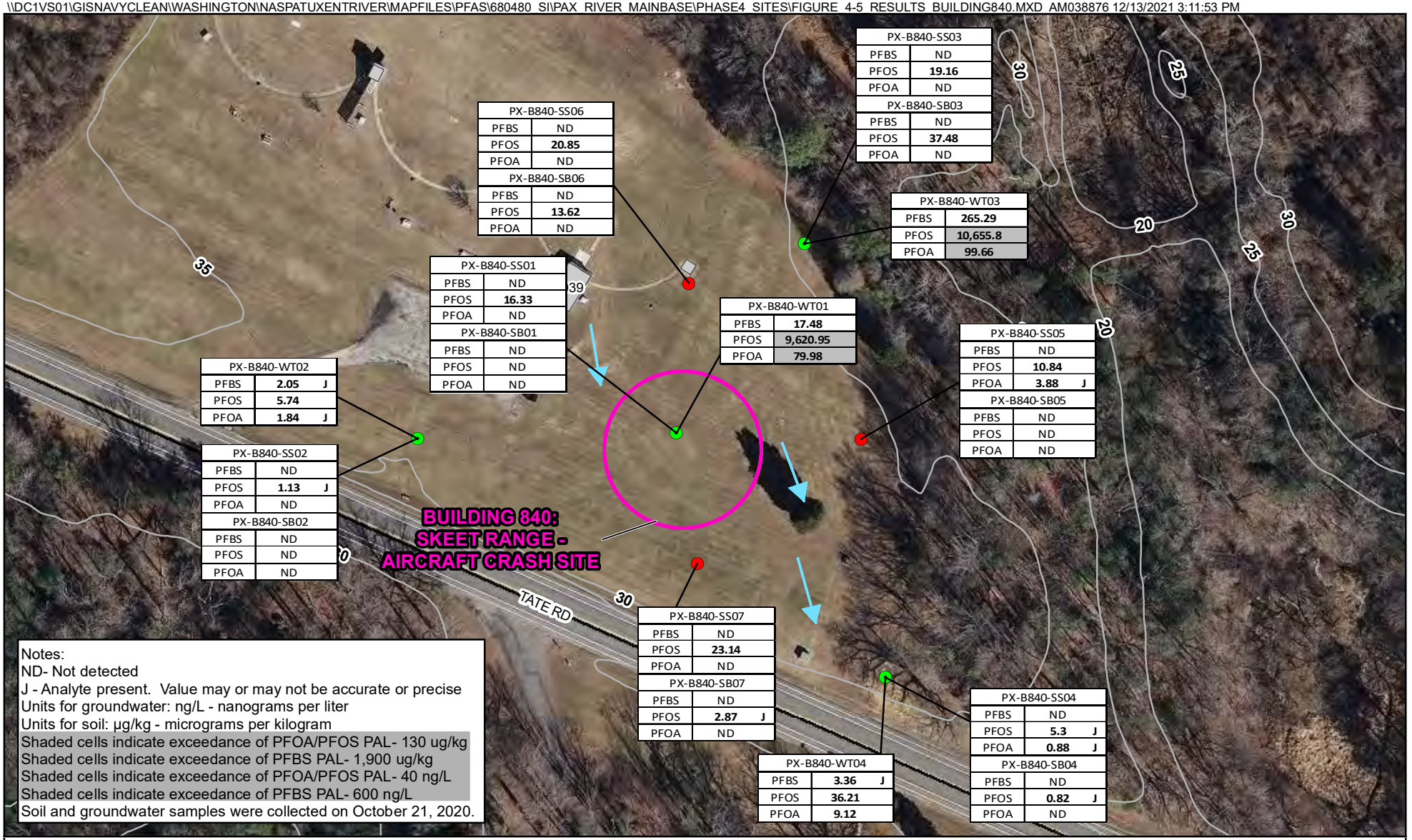

Notes:
ND- Not detected
J - Analyte present. Value may or may not be accurate or precise
Units for groundwater: ng/L - nanograms per liter
Units for soil: µg/kg - micrograms per kilogram
Shaded cells indicate exceedance of PFOA/PFOS PAL- 130 ug/kg
Shaded cells indicate exceedance of PFBS PAL- 1,900 ug/kg
Shaded cells indicate exceedance of PFOA/PFOS PAL- 40 ng/L
Shaded cells indicate exceedance of PFBS PAL- 600 ng/L
Soil and groundwater samples were collected on October 21, 2020.

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

N

0 50 100
Feet

Figure 4-5
PFOA, PFOS, and PFBS Concentrations for
Building 840: Skeet Range – Aircraft Crash Site
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

ch2m

SECTION 5

Conclusions and Recommendations

Table 5-1 summarizes the results of the PFAS SI conducted for Building 103, Hangar 110, Hangar 2835, Hangar 2805, and Building 840 at NAS Patuxent River.

Table 5-1. Conclusions of PFAS SI
Basewide PFAS Site Inspection Report
NAS Patuxent River, St. Mary's County, Maryland

Objective	Results
Determine whether PFAS (if present) were detected at concentrations that exceed the PALs for soil, groundwater, surface water, and sediment.	Building 103: • PFOA and PFOS were detected in site soil; detected concentrations of PFOS exceeded the corresponding PAL. PFBS was not detected in site soil. • PFOA, PFOS, and PFBS were detected in site groundwater; detected concentrations of PFOA and PFOS exceeded the corresponding PALs. Groundwater analytical results were for grab groundwater samples collected from temporary piezometers. Hangar 110: • PFOA and PFOS were detected in site soil; none of the detected concentrations exceeded the corresponding PALs. PFBS was not detected in site soil. • PFOA, PFOS, and PFBS were detected in site groundwater; detected concentrations of PFOA and PFOS exceeded the corresponding PALs. Groundwater analytical results were for grab groundwater samples collected from temporary piezometers. • PFOA, PFOS, and PFBS were detected in site surface water; none of the detected concentrations exceeded the corresponding PALs. • PFOA, PFOS, and PFBS were not detected in site sediment. Hangar 2835: • PFOA and PFOS were detected in site soil; none of the detected concentrations exceeded the corresponding PALs. PFBS was not detected in site soil. • PFOA, PFOS, and PFBS were detected in site groundwater; detected concentrations of PFOA and PFOS exceeded the corresponding PALs. Groundwater analytical results were for grab groundwater samples collected from temporary piezometers. Hangar 2805: • PFOS was detected in site soil; none of the detected concentrations exceeded the corresponding PAL. PFOA and PFBS were not detected in site soil. • PFOA, PFOS, and PFBS were detected in site groundwater; detected concentrations of PFOA exceeded the corresponding PAL. Groundwater analytical results were for grab groundwater samples collected from temporary piezometers. Building 840: • PFOA and PFOS were detected in site soil; none of the detected concentrations exceeded the corresponding PALs. PFBS was not detected in site soil. • PFOA, PFOS, and PFBS were detected in site groundwater; detected concentrations of PFOA and PFOS exceeded the corresponding PALs. Groundwater analytical results were for grab groundwater samples collected from temporary piezometers.
Determine the potential for PFAS (if present) to migrate offsite.	Building 103: • Groundwater flow is predominantly to the northeast in the direction of Harper's Creek, and there is the potential for migration of PFAS in that direction. There is no potential drinking water exposure because groundwater flow is not toward off-installation wells, the surficial aquifer at the installation is not used for drinking water on- or off-installation, and there are confining units isolating the aquifers used for drinking water.

Table 5-1. Conclusions of PFAS SI
Basewide PFAS Site Inspection Report
NAS Patuxent River, St. Mary's County, Maryland

Objective	Results
	Hangar 110: • Groundwater flow is predominantly to the north-northwest in the direction of the Patuxent River, and there is the potential for migration of PFAS in that direction. There is no potential drinking water exposure because groundwater flow is not toward off-installation wells, the surficial aquifer at the installation is not used for drinking water on- or off-installation, and there are confining units isolating the aquifers used for drinking water. Hangar 2835: • Groundwater flow is predominantly to the southwest in the direction of a tributary to Gardiner's Pond, and there is the potential for migration of PFAS in that direction. There is no potential drinking water exposure because groundwater flow is not toward off-installation wells, the surficial aquifer at the installation is not used for drinking water on- or off-installation, and there are confining units isolating the aquifers used for drinking water. Hangar 2805: • Groundwater flow is predominantly to the north-northwest in the direction of Harper's Creek, and there is the potential for migration of PFAS in that direction. There is no potential drinking water exposure because groundwater flow is not toward off-installation wells, the surficial aquifer at the installation is not used for drinking water on- or off-installation, and there are confining units isolating the aquifers used for drinking water. Building 840: • Groundwater flow is predominantly to the south-southeast in the direction of Holton Pond, and there is the potential for migration of PFAS in that direction. There is no potential drinking water exposure because groundwater flow is not toward off-installation wells, the surficial aquifer at the installation is not used for drinking water on- or off-installation, and there are confining units isolating the aquifers used for drinking water.

The following actions are proposed as part of the recommended RIs at Building 103, Hangar 110, Hangar 2835, Hangar 2805, and Building 840:

1. Collect additional soil samples at each site to better define the extent of PFOA, PFOS, and PFBS in soil.
2. Install permanent monitoring wells at each site to better define the extent of PFOA, PFOS, and PFBS in groundwater and evaluate reproducibility of analytical results from highly turbid temporary piezometer samples collected during the SI. New monitoring wells will also provide additional groundwater elevation data, which will help to refine the groundwater flow direction estimates developed in the SI field investigation.
3. Consider the collection of surface water and sediment samples (if deemed necessary) to better define the extent of PFOA, PFOS, and PFBS at the sites.
4. Soil and groundwater samples will be analyzed for PFAS in accordance with Navy guidance, which will be updated as new USEPA and DoD guidance and directives are issued.
5. After the collection of additional soil data, consider the state-of-the-science (e.g., use of lysimeter testing) to evaluate the potential for soil to leach to groundwater above unacceptable risk levels at each location where soil impacts are identified.

6. Based on data collected during the RIs, develop the conceptual site model (CSM) for each site. Each CSM will incorporate information to fully define the fate and transport of PFAS at NAS Patuxent River.
7. Perform a quantitative human health risk assessment (HHRA) to evaluate potential risks to human health associated with exposure to PFAS detected in environmental media at each respective AOI, and an initial screening ecological risk assessment (SERA). Potential human health and ecological risks associated with PFAS should be evaluated within the applicable DoD, Navy, and/or USEPA policy, guidance, or directives using the state-of-the-science toxicological information available and current at the time the RI report is prepared.

SECTION 6

References

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Appendix A
Survey Data

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

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

POINT NAME	NORTH	EAST	GR. ELEV.	PVC ELEV.	DESC.
PXBRACSWT01	228760.5693	1479716.811	16.75	17.05	MW
PXBRACSWT02	228888.9942	1479918.085	16.69	16.99	MW
PXBRACSWT03	228937.9769	1480170.841	16.66	17.01	MW
PXBRACSWT04	228759.0199	1480019.328	15.30	15.55	MW
PXBRACSWT05	228652.2495	1479917.609	13.62	14.02	MW
PXBRACSWT06	228521.6126	1480034.423	14.21	14.56	MW
PXBRACSWT07	228657.7925	1480181.605	14.99	15.39	MW
PXH2133WT01	221971.4946	1483439.978	15.56	15.91	MW
PXH2133WT02	222119.3609	1483773.366	16.66	16.91	MW
PXH2133WT03	221955.1899	1484077.886	15.26	16.11	MW
PXH2133WT04	221647.3468	1484176.903	15.67	16.12	MW
PXH2133WT05	221374.4666	1484034.463	15.69	16.04	MW
PXH2133WT06	221432.2786	1483743.124	13.03	13.63	MW
PXH2835WT01	224094.8216	1474608.405	45.28	45.68	MW
PXH2835WT02	223535.212	1473920.634	42.33	42.78	MW
PXH2835WT03	223481.212	1474040.594	40.65	40.95	MW
PXH2835WT04	223696.0789	1474182.024	40.67	41.17	MW
PXH2835WT05	223877.2208	1474473.981	44.50	44.85	MW
PXH2835WT06	223306.4742	1473568.89	47.28	47.48	MW
PXS41WT01	229629.736	1479508.871	20.11	20.51	MW
PXS41WT02	229488.4921	1479115.97	23.70	24.00	MW
PXS41WT03	229308.0289	1478939.466	27.16	27.46	MW
PXS41WT04	229237.6139	1479165.878	18.89	19.09	MW
PXS41WT05	229177.8764	1478994.294	26.21	27.06	MW
PXS41WT06	229030.4429	1479039.139	26.31	26.71	MW
PXS41WT07	228896.5128	1478827.331	23.97	24.32	MW

BASE CONTROL FOUND

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

GENERAL NOTES

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

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

Thomas Gregory Pendleton
Maryland Professional Land Surveyor 21925

STATE OF MARYLAND · THOMAS GREGORY PENDLETON · 21925 · PROFESSIONAL LAND SURVEYOR

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

Scale: As Shown

Bronson Road, Site 41, Hanger 2133 and Hanger 2835

Survey Services for Location of Piezometer
CLEAN 9000 CTO-JU40

Naval Air Station Patuxant
California, Maryland

FILENAME
NSA_UXO-02.dwg

DATE: September 09, 2020

PROJECT: Survey Services
Contract: CLEAN 9000 CTO-4304
NAVAL AIR STATION PATUXENT
CALIFORNIA, MARYLAND
Date: November 17, 2020

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

POINT NAME	NORTH	EAST	GR. ELEV.	PVC ELEV.	DESC.
PX_B103_WT01	227383.583	1478100.367	29.69	30.09	MW
PX_B103_WT02	227591.543	1478207.878	27.02	27.22	MW
PX_B103_WT03	227087.633	1477992.283	34.68	35.08	MW
PX_B103_WT04	227258.575	1478451.370	28.20	28.55	MW
PX_B103_WT05	227005.945	1478396.348	30.65	31.05	MW
PX_B103_WT06	227883.890	1478226.557	26.56	26.76	MW
PX_B103_WT07	227702.534	1477820.061	36.80	38.95	MW
PX_B103_WT08	226710.090	1478354.448	32.92	33.22	MW
PX_B840_WT01	220106.21	1477226.63	32.45	33.05	MW
PX_B840_WT02	220102.22	1477037.78	30.05	30.25	MW
PX_B840_WT03	220244.13	1477319.57	29.42	29.82	MW
PX_B840_WT04	219928.00	1477378.66	30.22	30.52	MW
PX_H100_WT01	227916.491	1476166.901	8.98	8.98	MW
PX_H100_WT02	228047.336	1476485.388	9.02	9.02	MW
PX_H100_WT03	227813.784	1476574.843	9.82	9.82	MW
PX_H100_WT04	227679.210	1476242.959	9.42	9.42	MW
PX_H100_WT05	227389.244	1476371.486	9.76	9.76	MW
PX_H2805_WT01	227554.677	1481594.083	15.37	15.77	MW
PX_H2805_WT02	227736.599	1481490.540	17.13	17.33	MW
PX_H2805_WT03	228030.599	1481599.441	14.00	14.20	MW
PX_H2805_WT04	228025.363	1481984.745	16.85	17.05	MW
PX_H2805_WT05	227996.607	1482377.624	16.48	16.88	MW
PX_H2805_WT06	227801.168	1482469.296	16.47	16.82	MW
PX_H2805_WT07	227548.676	1482395.685	15.64	16.14	MW

BASE CONTROL FOUND

NUMBER	NORTH	EAST	ELEV		DESC.
SHOOP	229798.701	1477979.174	32.97		Brass Disk Monument
BEACH	232642.289	1481735.738	15.57		Brass Disk Monument
PYLON	218415.791	1484841.213	6.14		Brass Disk Monument

GENERAL NOTES

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

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

Thomas Gregory Pendleton
Maryland Professional Land Surveyor 21925

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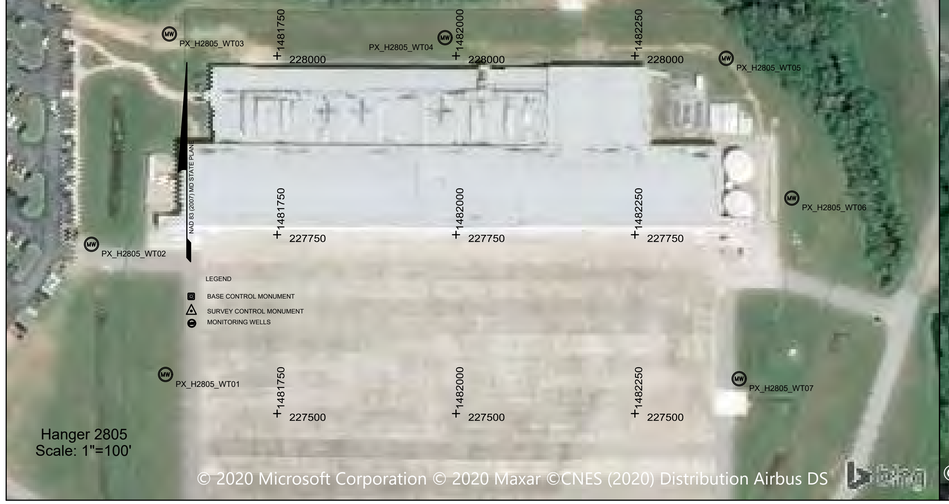

Scale: As Shown

Building 103, Hanger 110, Hanger 2805 and Building 840

Survey Services for Location of Piezometer
CLEAN 9000 CTO-JU40

Naval Air Station Patuxant
California, Maryland

FILENAME
NSA_UXO-02.dwg

DATE: September 28, 2020

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

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

ANALYTICAL RESULTS

PERFORMED BY

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

Report Date 11/25/2020

Report # 220102866

Project PAX Basewide - CTO-4256

Deliver To	***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 Gnore	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: _____

** 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	Lab Sample # / Comments
PAX-IDW01-102420-PA	GW	Comp	10/24/20	1325	10/24/20	1325		4	X	1
PAX-IDW01-102420-XX	SO	Comp	10/24/20	1330	10/24/20	1330		2	X	2

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:

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

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 Battelle 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~~	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]	10/26/20	1630	1	[signature]	10-27-20	930
2				2			
3				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 Battelle 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**

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 for Per- and Polyfluoroalkyl Substances Site Inspection at Buildings 103 and 840 and Hangars 110, 2835, and 2805, Naval Air Station Patuxent River, St. Mary's County, Maryland

DATE: February 19, 2021

1.0 Introduction

Historical use of aqueous film-forming foam during fire and emergency response, testing, and training activities at Naval Air Station (NAS) Patuxent River has prompted the Department of the Navy (Navy) to conduct a per- and polyfluoroalkyl substances (PFAS) Site Inspection (SI) at the installation. The purpose of this technical memorandum is to present the results of the data validation process for the soil and water samples collected in September and October 2020 during the PFAS SI at Buildings 103 and 840 and Hangars 110, 2835, and 2805.

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

SDG
20-1133
20-1137
20-1331
20-1332
20-1333
20-1334
20-1353
20-1354
20-1355
20-1356
20-1357
20-1512
20-1527

The process for conducting this data quality assessment included a review of the data to assess the accuracy, precision, and completeness based on procedures described in the DoD guidance document *Data Validation Guidelines Module 3: Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories Table B-15* (DoD, 2020), the project-specific sampling and analysis plan (SAP) for the PFAS SI (CH2M HILL, Inc. [CH2M], 2020), and professional judgment. The quality assurance (QA)/quality control (QC) summary forms and data reports were reviewed, and the resulting findings are documented within each subsection that follows.

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

2.0 Validation Flag Definitions

The following primary qualifiers were used to qualify the data:

[NULL]: **Detected.** The analyte was analyzed for and detected at the concentration shown.

[J]: **Estimated.** The reported result was an estimated value with an unknown bias.

[U]: **Undetected.** The analyte was not detected and was reported as less than the limit of detection (LOD) or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

[UJ]: **Detection limit estimated.** The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.

[R]: **Rejected.** The data are not useable.

[Exclude]: **Excluded.** Data were not used due to another value being more appropriate.

3.0 Quality Control Measures

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

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

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

4.0 Quality Control Review

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

4.1 Holding Time

All holding time requirements were met with the exception of sample PX-H110-WT03-1020. Associated results were qualified as estimated. Affected data are summarized in **Attachment 2**.

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

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

- **MS/MSD**:
  - Spiked sample PX-H2835-WT04-0920 exhibited low recoveries in the MS/MSD for perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA).
  - Spiked sample PX-H2805-WT03-1020 exhibited low recoveries in the MS/MSD for perfluorohexanoic acid (PFHxA) and perfluorobutanesulfonic acid (PFBS).
  - Spiked sample PX-B103-SS03-000H exhibited low recoveries in the MS/MSD for perfluorooctane sulfonate (PFOS).
  - Spiked sample PX-B103-WT04-1020 exhibited low recoveries in the MS/MSD for perfluorooctanoic acid (PFOA), HFPO-DA, and 4,8-dioxa-3H-perfluorononanoic acid (ADONA).
- **Surrogates:**
  - Various samples exhibited low recoveries in the surrogates over several SDGs.

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

4.3 Field Duplicate Precision

- Native sample PX-B103-SS05-000H and field duplicate PX-B103-SS05P-000H did not meet precision criteria for PFOS.

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

4.4 Analytical Blanks

- Several target analytes were detected in the method blanks for SDGs 20-1331, 20-1332, and 20-1357.
- Several target analytes were detected in various field blanks in SDGs 20-1331 and 20-1332.
- Several target analytes were detected in various equipment blanks in SDGs 20-1331, 20-1332, and 20-1357.

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

4.5 Calibration

All calibration acceptance criteria were met.

4.6 Serial Dilution

All serial dilution acceptance criteria were met.

4.7 Reporting Limits Evaluation

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

5.0 PARCC

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

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

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 100% complete and the completeness goal of 95% was exceeded.

Comparability is another qualitative measure designed to express the confidence with which one data set may be compared to another. Factors that affect comparability are sample collection and handling techniques, sample matrix, and analytical methods. In this case, because approved SOPs were used for sample collection and handling, common sample matrices were evaluated, and EPA SW-846 methods were utilized, the data user may express confidence in that fact that this data set is comparable to others of acceptable data quality. Comparability is controlled by the other PARCC parameters, because data sets can be compared with confidence only when precision and accuracy are known. Precision and accuracy were demonstrated to be acceptable, and the data user may be confident that this data set is comparable to others of high data quality.

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

6.0 Conclusion

A review of the analytical data submitted for the September and October 2020 PFAS SI sampling events for Buildings 103 and 840 and Hangars 110, 2835, and 2805 has been completed. The validation review demonstrated that the analytical systems were generally in control and all of the data results can be used in the project decision making process.

7.0 References

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

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

Attachment 1
Secondary Data Qualifier Codes

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

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

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

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

Attachment 2
Assigned Qualifiers

Attachment 2. Assigned Qualifiers.

Sample ID	Sample Type	Analytical Method	Parameter	Lab Result	Lab Qual	Final Result	Primary Qualifier	Units	Secondary Qualifier
PX-B103-EB01-102320-SO	EB	PFAS_QSM5.3	Perfluorododecanoic Acid (PFDoA)	0.47	U	0.47	UJ	NG_L	SSL
PX-B103-EB01-102320-SO	EB	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	1.89	U	1.89	UJ	NG_L	SSL
PX-B103-EB01-102320-SO	EB	PFAS_QSM5.3	N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA)	0.94	U	0.94	UJ	NG_L	SSL
PX-H2835-WT04-0920	REG	PFAS_QSM5.3	Perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA)	0.45	U	0.45	UJ	NG_L	MSL
PX-B103-SS05-000H	REG	PFAS_QSM5.3	Perfluorooctane Sulfonate (PFOS)	90.82		90.82	J	NG_G	FD
PX-B103-SS05P-000H	FD	PFAS_QSM5.3	Perfluorooctane Sulfonate (PFOS)	154.98	D	154.98	J	NG_G	FD
PX-B103-WT04-1020	REG	PFAS_QSM5.3	Perfluorohexanoic Acid (PFHxA)	93.85		93.85	J	NG_L	SSL
PX-B103-WT04-1020	REG	PFAS_QSM5.3	Perfluoroheptanoic acid (PFHpA)	52.17		52.17	J	NG_L	SSL
PX-H2805-WT03-1020	REG	PFAS_QSM5.3	Perfluorohexanoic Acid (PFHxA)	131.54	D	131.54	J	NG_L	MSL
PX-H2805-WT03-1020	REG	PFAS_QSM5.3	Perfluorobutanesulfonic acid (PFBS)	78.67		78.67	J	NG_L	MSL
PX-B103-SS03-000H	REG	PFAS_QSM5.3	Perfluorooctane Sulfonate (PFOS)	51.5		51.5	J	NG_G	MSL
PX-B103-WT08-1020	REG	PFAS_QSM5.3	Perfluoroheptanoic acid (PFHpA)	23.3		23.3	J	NG_L	SSL
PX-H2805-EB01-102020-GW	EB	PFAS_QSM5.3	Perfluoroundecanoic Acid (PFUnA)	0.24	J	0.48	U	NG_L	MBL
PX-H2805-EB01-102020-GW	EB	PFAS_QSM5.3	Perfluorobutanesulfonic acid (PFBS)	0.16	J	0.48	U	NG_L	MBL
PX-H2805-FB01-102020	FB	PFAS_QSM5.3	Perfluoroundecanoic Acid (PFUnA)	0.25	J	0.48	U	NG_L	MBL
PX-H2805-FB01-102020	FB	PFAS_QSM5.3	Perfluorobutanesulfonic acid (PFBS)	0.16	J	0.48	U	NG_L	MBL
PX-B840-WT01-1020	REG	PFAS_QSM5.3	Perfluorononanoic acid (PFNA)	43.5		43.5	J	NG_L	SSL
PX-H2805-WT01-1020	REG	PFAS_QSM5.3	Perfluoroundecanoic Acid (PFUnA)	0.26	J	0.5	U	NG_L	MBL
PX-B840-WT03-1020	REG	PFAS_QSM5.3	Perfluorononanoic acid (PFNA)	1.92	J	1.92	J	NG_L	SSL
PX-H2805-WT03-1020	REG	PFAS_QSM5.3	Perfluoroundecanoic Acid (PFUnA)	0.29	J	0.49	U	NG_L	MBL
PX-B840-WT03-1020	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	1.96	U	1.96	UJ	NG_L	SSL
PX-B840-WT04-1020	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	1.85	U	1.85	UJ	NG_L	SSL
PX-H110-EB01-102320-GW	EB	PFAS_QSM5.3	Perfluorohexanoic Acid (PFHxA)	1.39	U	1.39	UJ	NG_L	SSL
PX-H110-EB01-102320-GW	EB	PFAS_QSM5.3	Perfluorooctanoic acid (PFOA)	1.39	U	1.39	UJ	NG_L	SSL
PX-H110-EB01-102320-SO	EB	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	2	U	2	UJ	NG_L	SSL
PX-H2805-WT04-1020	REG	PFAS_QSM5.3	Perfluoroundecanoic Acid (PFUnA)	0.38	J	0.47	U	NG_L	MBL
PX-H110-EB01-102420-SO	EB	PFAS_QSM5.3	Perfluorohexanoic Acid (PFHxA)	2.06	J	2.06	J	NG_L	SSL
PX-H110-EB01-102420-SO	EB	PFAS_QSM5.3	Perfluorooctanoic acid (PFOA)	1.47	U	1.47	UJ	NG_L	SSL
PX-H110-SB02-0304	REG	PFAS_QSM5.3	Perfluorooctane Sulfonate (PFOS)	0.85	J	2.29	U	NG_G	EBL
PX-H110-SS03-000H	REG	PFAS_QSM5.3	Perfluorooctane Sulfonate (PFOS)	0.93	J	1.9	U	NG_G	EBL
PX-H110-SS03P-000H	FD	PFAS_QSM5.3	Perfluorooctane Sulfonate (PFOS)	0.73	J	2.08	U	NG_G	EBL

Attachment 2. Assigned Qualifiers.

Sample ID	Sample Type	Analytical Method	Parameter	Lab Result	Lab Qual	Final Result	Primary Qualifier	Units	Secondary Qualifier
PX-H110-SW01-1020	REG	PFAS_QSM5.3	Perfluorohexanoic Acid (PFHxA)	4.04	J	4.04	J	NG_L	SSL
PX-H110-SW01-1020	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	1.96	U	1.96	UJ	NG_L	SSL
PX-H110-SW01P-1020	FD	PFAS_QSM5.3	Perfluorohexanoic Acid (PFHxA)	4.6	J	4.6	J	NG_L	SSL
PX-H110-SW01P-1020	FD	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	2	U	2	UJ	NG_L	SSL
PX-H110-WT01-1020	REG	PFAS_QSM5.3	Perfluorohexanoic Acid (PFHxA)	7.94		7.94	J	NG_L	SSL
PX-H110-WT01-1020	REG	PFAS_QSM5.3	Perfluoroheptanoic acid (PFHpA)	3.02	J	3.02	J	NG_L	SSL
PX-H110-WT01-1020	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	1.96	U	1.96	UJ	NG_L	SSL
PX-H110-WT02-1020	REG	PFAS_QSM5.3	Perfluoroheptanoic acid (PFHpA)	48.47		48.47	J	NG_L	SSL
PX-H110-WT02-1020	REG	PFAS_QSM5.3	Perfluorooctanoic acid (PFOA)	53.55		53.55	J	NG_L	SSL
PX-H110-WT02-1020	REG	PFAS_QSM5.3	Perfluoroundecanoic Acid (PFUnA)	0.49	U	0.49	UJ	NG_L	SSL
PX-H110-WT02-1020	REG	PFAS_QSM5.3	Perfluorododecanoic Acid (PFDoA)	0.49	U	0.49	UJ	NG_L	SSL
PX-H110-WT02-1020	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	1.96	U	1.96	UJ	NG_L	SSL
PX-H110-WT02P-1020	FD	PFAS_QSM5.3	Perfluoroheptanoic acid (PFHpA)	51.15		51.15	J	NG_L	SSL
PX-H110-WT02P-1020	FD	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	2	U	2	UJ	NG_L	SSL
PX-H110-WT03-1020	REG	PFAS_QSM5.3	Perfluorohexanoic Acid (PFHxA)	19.68		19.68	J	NG_L	SSL
PX-H110-WT03-1020	REG	PFAS_QSM5.3	Perfluoroheptanoic acid (PFHpA)	12.83		12.83	J	NG_L	SSL
PX-H110-WT03-1020	REG	PFAS_QSM5.3	Perfluorooctanoic acid (PFOA)	6.54		6.54	J	NG_L	SSL
PX-H110-WT03-1020	REG	PFAS_QSM5.3	Perfluoroundecanoic Acid (PFUnA)	0.5	U	0.5	UJ	NG_L	SSL
PX-H110-WT03-1020	REG	PFAS_QSM5.3	Perfluorododecanoic Acid (PFDoA)	0.5	U	0.5	UJ	NG_L	SSL
PX-H110-WT03-1020	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	2	U	2	Exclude	NG_L	SSL
PX-H110-WT03-1020	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	2	UT	2	UJ	NG_L	HT
PX-H110-WT04-1020	REG	PFAS_QSM5.3	Perfluorohexanoic Acid (PFHxA)	2.77	J	2.77	J	NG_L	SSL
PX-H110-WT04-1020	REG	PFAS_QSM5.3	Perfluorododecanoic Acid (PFDoA)	0.5	U	0.5	UJ	NG_L	SSL
PX-H110-WT04-1020	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	2	U	2	UJ	NG_L	SSL
PX-B103-WT04-1020	REG	PFAS_QSM5.3	Perfluorooctanoic acid (PFOA)	34.94		34.94	J	NG_L	MSL
PX-H110-WT05-1020	REG	PFAS_QSM5.3	Perfluorohexanoic Acid (PFHxA)	16.39		16.39	J	NG_L	SSL
PX-H110-WT05-1020	REG	PFAS_QSM5.3	Perfluoroheptanoic acid (PFHpA)	6.02		6.02	J	NG_L	SSL
PX-H110-WT05-1020	REG	PFAS_QSM5.3	Perfluorododecanoic Acid (PFDoA)	0.49	U	0.49	UJ	NG_L	SSL
PX-H110-WT05-1020	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	1.96	U	1.96	UJ	NG_L	SSL
PX-H2805-WT05-1020	REG	PFAS_QSM5.3	Perfluoroundecanoic Acid (PFUnA)	0.33	J	0.48	U	NG_L	MBL
PX-H2805-WT06-1020	REG	PFAS_QSM5.3	Perfluoroundecanoic Acid (PFUnA)	0.28	J	0.49	U	NG_L	MBL

Attachment 2. Assigned Qualifiers.

Sample ID	Sample Type	Analytical Method	Parameter	Lab Result	Lab Qual	Final Result	Primary Qualifier	Units	Secondary Qualifier
PX-H2805-WT07-1020	REG	PFAS_QSM5.3	Perfluoroundecanoic Acid (PFUnA)	0.51	J	0.51	U	NG_L	MBL
PX-B840-EB01-102120-GW	EB	PFAS_QSM5.3	Perfluorobutanesulfonic acid (PFBS)	0.17	J	0.48	U	NG_L	MBL
PX-B840-EB01-102120-SO	EB	PFAS_QSM5.3	Perfluorobutanesulfonic acid (PFBS)	0.17	J	0.47	U	NG_L	MBL
PX-B840-FB01-102120	FB	PFAS_QSM5.3	Perfluorobutanesulfonic acid (PFBS)	0.15	J	0.47	U	NG_L	MBL
PX-B840-FB01-102120	FB	PFAS_QSM5.3	Perfluorohexanesulfonic acid (PFHxS)	0.1	J	0.38	U	NG_L	MBL
PX-H2805-WT02P-1020	FD	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	1.96	U	1.96	UJ	NG_L	SSL
PX-B103-WT04-1020	REG	PFAS_QSM5.3	Perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA)	0.47	U	0.47	UJ	NG_L	MSL
PX-B840-WT02-1020	REG	PFAS_QSM5.3	Perfluoroundecanoic Acid (PFUnA)	0.27	J	0.47	U	NG_L	MBL
PX-H2805-WT03-1020	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	1.96	U	1.96	UJ	NG_L	SSL
PX-B103-WT04-1020	REG	PFAS_QSM5.3	4,8-dioxa-3H-perfluorononanoic acid (ADONA)	0.94	U	0.94	UJ	NG_L	MSL
PX-B840-WT03-1020	REG	PFAS_QSM5.3	Perfluoroundecanoic Acid (PFUnA)	0.3	J	0.49	U	NG_L	MBL
PX-H2805-EB01-102020-SO	EB	PFAS_QSM5.3	Perfluoroundecanoic Acid (PFUnA)	0.23	J	0.47	U	NG_L	MBL
PX-H2805-EB01-102020-SO	EB	PFAS_QSM5.3	Perfluorobutanesulfonic acid (PFBS)	0.22	J	0.47	U	NG_L	MBL
PX-H110-EB01-102320-SO	EB	PFAS_QSM5.3	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	0.37	J	0.5	U	NG_L	MBL
PX-H2835-WT01-0920	REG	PFAS_QSM5.3	Perfluorohexanoic Acid (PFHxA)	1.02	J	1.02	J	NG_L	SSL
PX-H2835-WT02-0920	REG	PFAS_QSM5.3	Perfluorohexanoic Acid (PFHxA)	38.47		38.47	J	NG_L	SSL
PX-H2835-WT02-0920	REG	PFAS_QSM5.3	Perfluoroheptanoic acid (PFHpA)	53.61		53.61	J	NG_L	SSL
PX-H2835-WT02P-0920	FD	PFAS_QSM5.3	Perfluorohexanoic Acid (PFHxA)	39.97		39.97	J	NG_L	SSL
PX-H110-WT04-1020	REG	PFAS_QSM5.3	Perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA)	0.5	U	0.5	UJ	NG_L	MSL
PX-H2835-WT05-0920	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	1.85	U	1.85	UJ	NG_L	SSL
PX-H2835-WT06-0920	REG	PFAS_QSM5.3	Perfluorohexanoic Acid (PFHxA)	16.11		16.11	J	NG_L	SSL

Attachment 3
Data Validation Reports

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

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

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

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

Specific method references are as follows:

Analysis	*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-H2835-FB01-091120	None - ND	-	-	-
PX-H2835-EB01-091120-GW	None - ND	-	-	-
PX-H2835-EB01-091120-SO	None - ND	-	-	-
PX-FFDA-FB01-091220	None - ND	-	-	-
PX-FFDA-EB01-091220	None - ND	-	-	-

Surrogate Spike Recoveries

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

Laboratory Fortified Blank (LFB)

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

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

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

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

Internal Standard (IS) Area Performance

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

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

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

Field Duplicate Sample Precision

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

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

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

Signed: Nancy Weaver Dated: 11/2/20

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-H2835-WT03-0920
Battelle ID	H9862-FS
Sample Type	SA
Collection Date	09/11/2020
Extraction Date	09/22/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	WATER
Sample Size	0.270
Size Unit-Basis	L

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

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

2

Client ID	PX-H2835-WT02-0920
Battelle ID	H9863-FS
Sample Type	SA
Collection Date	09/11/2020
Extraction Date	09/22/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	WATER
Sample Size	0.275
Size Unit-Basis	L

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

MW 10/29/20

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

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

7

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

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

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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-H2835-WT02P-0920
Battelle ID	H9864-FS
Sample Type	SA
Collection Date	09/11/2020
Extraction Date	09/22/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	WATER
Sample Size	0.275
Size Unit-Basis	L

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

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

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Client ID	PX-H2835-WT02P-0920
Battelle ID	H9864-FS
Sample Type	SA
Collection Date	09/11/2020
Extraction Date	09/22/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS

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

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

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Client ID		PX-H2835-WT01-0920
Battelle ID		H9865-FS
Sample Type		SA
Collection Date		09/11/2020
Extraction Date		09/22/2020
Analytical Instrument		Sciex 6500+ LC/MS/MS
% Moisture		NA
Matrix		WATER
Sample Size		0.275
Size Unit-Basis		L

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

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

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

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

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

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Client ID	PX-H2835-WT04-0920
Battelle ID	H9866-FS
Sample Type	SA
Collection Date	09/11/2020
Extraction Date	09/22/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	WATER
Sample Size	0.275
Size Unit-Basis	L

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

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

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Client ID	PX-H2835-WT05-0920
Battelle ID	H9869-FS
Sample Type	SA
Collection Date	09/11/2020
Extraction Date	09/22/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	WATER
Sample Size	0.270
Size Unit-Basis	L

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

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

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

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

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

Client ID		PX-H2835-WT06-0920							
Battelle ID		H9870-FS							
Sample Type		SA							
Collection Date		09/11/2020							
Extraction Date		09/22/2020							
Analytical Instrument		Sciex 6500+ LC/MS/MS							
% Moisture		NA							
Matrix		WATER							
Sample Size		0.270							
Size Unit-Basis		L							
Analyte	CAS No.	Result (ng/L)		Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	16.11	J	H9870-FS(0)	1.000	10/9/2020	0.49	1.39	4.63
PFHpA	375-85-9	13.44		H9870-FS(0)	1.000	10/9/2020	0.24	0.93	4.63
PFOA	335-67-1	8.73		H9870-FS(0)	1.000	10/9/2020	0.47	1.39	4.63
PFNA	375-95-1	3.89	J	H9870-FS(0)	1.000	10/9/2020	0.29	0.93	4.63
PFDA	335-76-2	0.42	J	H9870-FS(0)	1.000	10/9/2020	0.13	0.46	4.63
PFUnA	2058-94-8	0.46	U	H9870-FS(0)	1.000	10/9/2020	0.20	0.46	4.63
PFDoA	307-55-1	0.46	U	H9870-FS(0)	1.000	10/9/2020	0.18	0.46	4.63
PFTrDA	72629-94-8	0.46	U	H9870-FS(0)	1.000	10/9/2020	0.14	0.46	4.63
PFTeDA	376-06-7	1.85	U	H9870-FS(0)	1.000	10/9/2020	0.68	1.85	4.63
NMeFOSAA	2355-31-9	0.93	U	H9870-FS(0)	1.000	10/9/2020	0.32	0.93	4.63
NEtFOSAA	2991-50-6	0.93	U	H9870-FS(0)	1.000	10/9/2020	0.46	0.93	4.63
PFBS	375-73-5	3.83	J	H9870-FS(0)	1.000	10/9/2020	0.13	0.46	4.63
PFHxS	355-46-4	8.45		H9870-FS(0)	1.000	10/9/2020	0.10	0.37	4.63
PFOS	1763-23-1	3.92	J	H9870-FS(0)	1.000	10/9/2020	0.41	0.93	4.63
HFPO-DA	13252-13-6	0.46	U	H9870-FS(0)	1.000	10/9/2020	0.23	0.46	4.63
Adona	919005-14-4	0.93	U	H9870-FS(0)	1.000	10/9/2020	0.25	0.93	4.63
11Cl-PF3OUdS	763051-92-9	0.46	U	H9870-FS(0)	1.000	10/9/2020	0.21	0.46	4.63
9Cl-PF3ONS	756426-58-1	0.93	U	H9870-FS(0)	1.000	10/9/2020	0.25	0.93	4.63

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

Client ID	PX-H2835-WT06-0920
Battelle ID	H9870-FS
Sample Type	SA
Collection Date	09/11/2020
Extraction Date	09/22/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS

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

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

Client ID	PX-H2835-FB01-091120
Battelle ID	H9871-FS
Sample Type	SA
Collection Date	09/11/2020
Extraction Date	09/22/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	WATER
Sample Size	0.270
Size Unit-Basis	L

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

BATTELLE
It can be done

9

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

Client ID	PX-H2835-EB01-091120-GW
Battelle ID	H9872-FS
Sample Type	SA
Collection Date	09/11/2020
Extraction Date	09/22/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	WATER
Sample Size	0.270
Size Unit-Basis	L

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

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It can be done

10

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

Client ID	PX-H2835-EB01-091120-SO
Battelle ID	H9884-FS
Sample Type	SA
Collection Date	09/11/2020
Extraction Date	09/22/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	WATER
Sample Size	0.270
Size Unit-Basis	L

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

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

BATTELLE
It can be done

11

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

Client ID	PX-FFDA-WT01-0920
Battelle ID	H9885-FS
Sample Type	SA
Collection Date	09/12/2020
Extraction Date	09/22/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	WATER
Sample Size	0.270
Size Unit-Basis	L

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

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

BATTELLE
It can be done

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

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

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

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

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-1137
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: October 30, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-H2835-SS03-000H	H9873-FS	Soil
1MS	PX-H2835-SS03-000HMS	H9874-FSMS	Soil
1MSD	PX-H2835-SS03-000HMSD	H9875-FSMSD	Soil
2	PX-H2835-SB03-0304	H9876-FS	Soil
3	PX-H2835-SS02-000H	H9877-FS	Soil
4	PX-H2835-SB02-0304	H9878-FS	Soil
5	PX-H2835-SS04-000H	H9879-FS	Soil
6	PX-H2835-SB04-0304	H9880-FS	Soil
7	PX-H2835-SS01-000H	H9881-FS	Soil
8	PX-H2835-SB01P-0304	H9882-FS	Soil
9	PX-H2835-SB01-0304	H9883-FS	Soil
10	PX-FFDA-SS01-000H	H9907-FS	Soil
11	PX-FFDA-SB01-0304	H9908-FS	Soil
12	PX-FFDA-SB01P-0304	H9909-FS	Soil

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

Specific method references are as follows:

Analysis	*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. There were no qualifications.

Per- and Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

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

Holding Times

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

LC/MS Tuning

- All criteria were met.

Initial Calibration

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

Continuing Calibration

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

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC sample results are summarized below.

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

Surrogate Spike Recoveries

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

Laboratory Fortified Blank (LFB)

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

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

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

Internal Standard (IS) Area Performance

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

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

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

Compound	PX-H2835-SS01-000H ng/g	PX-H2835-SB01P-0304 ng/g	RPD	Qualifier
PFOS	1.01	2.65U	NC	None

Compound	PX-FFDA-SB01-0304 ng/g	PX-FFDA-SB01P-0304 ng/g	RPD	Qualifier
None	ND	ND	-	-

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

Signed: Nancy Weaver Dated: 11/2/20

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-H2835-SS03-000H
Battelle ID	H9873-FS
Sample Type	SA
Collection Date	09/11/2020
Extraction Date	09/18/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	19.51
Matrix	SOIL
Sample Size	1.72
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.33 U	H9873-FS(3)	10.000	10/9/2020	0.83	2.33	5.81
PFHpA	375-85-9	1.74 U	H9873-FS(3)	10.000	10/9/2020	0.59	1.74	5.81
PFOA	335-67-1	0.97 J	H9873-FS(3)	10.000	10/9/2020	0.71	2.33	5.81
PFNA	375-95-1	1.16 U	H9873-FS(3)	10.000	10/9/2020	0.57	1.16	5.81
PFDA	335-76-2	0.87 J	H9873-FS(3)	10.000	10/9/2020	0.53	1.16	5.81
PFUnA	2058-94-8	0.69 J	H9873-FS(3)	10.000	10/9/2020	0.53	1.16	5.81
PFDoA	307-55-1	2.33 U	H9873-FS(3)	10.000	10/9/2020	0.71	2.33	5.81
PFTrDA	72629-94-8	1.16 U	H9873-FS(5)	10.000	10/12/2020	0.33	1.16	5.81
PFTeDA	376-06-7	2.91 U	H9873-FS(5)	10.000	10/12/2020	1.26	2.91	5.81
NMeFOSAA	2355-31-9	2.91 U	H9873-FS(3)	10.000	10/9/2020	1.19	2.91	5.81
NEtFOSAA	2991-50-6	2.33 U	H9873-FS(3)	10.000	10/9/2020	0.87	2.33	5.81
PFBS	375-73-5	1.16 U	H9873-FS(3)	10.000	10/9/2020	0.41	1.16	5.81
PFHxS	355-46-4	1.36 J	H9873-FS(3)	10.000	10/9/2020	0.94	2.33	5.81
PFOS	1763-23-1	3.53 J	H9873-FS(3)	10.000	10/9/2020	0.80	2.33	5.81
HFPO-DA	13252-13-6	2.33 U	H9873-FS(3)	10.000	10/9/2020	0.74	2.33	5.81
Adona	919005-14-4	2.33 U	H9873-FS(3)	10.000	10/9/2020	0.97	2.33	5.81
11Cl-PF3OUdS	763051-92-9	1.74 U	H9873-FS(3)	10.000	10/9/2020	0.60	1.74	5.81
9Cl-PF3ONS	756426-58-1	1.16 U	H9873-FS(3)	10.000	10/9/2020	0.56	1.16	5.81

MW 10/30/20
Analyzed by: Griffith, Lauren
Printed: 10/13/2020

BATTELLE
It can be done

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

2

Client ID	PX-H2835-SB03-0304
Battelle ID	H9876-FS
Sample Type	SA
Collection Date	09/11/2020
Extraction Date	09/18/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	7.47
Matrix	SOIL
Sample Size	1.80
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.22 U	H9876-FS(3)	10.000	10/9/2020	0.79	2.22	5.56
PFHpA	**375-85-9**	**1.67 U**	**H9876-FS(3)**	**10.000**	**10/9/2020**	**0.57**	**1.67**	**5.56**
PFOA	335-67-1	2.22 U	H9876-FS(3)	10.000	10/9/2020	0.68	2.22	5.56
PFNA	**375-95-1**	**1.11 U**	**H9876-FS(3)**	**10.000**	**10/9/2020**	**0.54**	**1.11**	**5.56**
PFDA	335-76-2	1.11 U	H9876-FS(3)	10.000	10/9/2020	0.51	1.11	5.56
PFUnA	**2058-94-8**	**1.11 U**	**H9876-FS(3)**	**10.000**	**10/9/2020**	**0.51**	**1.11**	**5.56**
PFDoA	307-55-1	2.22 U	H9876-FS(3)	10.000	10/9/2020	0.68	2.22	5.56
PFTrDA	**72629-94-8**	**1.11 U**	**H9876-FS(3)**	**10.000**	**10/9/2020**	**0.31**	**1.11**	**5.56**
PFTeDA	376-06-7	2.78 U	H9876-FS(3)	10.000	10/9/2020	1.20	2.78	5.56
NMeFOSAA	**2355-31-9**	**2.78 U**	**H9876-FS(3)**	**10.000**	**10/9/2020**	**1.13**	**2.78**	**5.56**
NEtFOSAA	2991-50-6	2.22 U	H9876-FS(3)	10.000	10/9/2020	0.83	2.22	5.56
PFBS	**375-73-5**	**1.11 U**	**H9876-FS(3)**	**10.000**	**10/9/2020**	**0.39**	**1.11**	**5.56**
PFHxS	355-46-4	2.22 U	H9876-FS(3)	10.000	10/9/2020	0.90	2.22	5.56
PFOS	**1763-23-1**	**2.22 U**	**H9876-FS(3)**	**10.000**	**10/9/2020**	**0.77**	**2.22**	**5.56**
HFPO-DA	13252-13-6	2.22 U	H9876-FS(3)	10.000	10/9/2020	0.71	2.22	5.56
Adona	**919005-14-4**	**2.22 U**	**H9876-FS(3)**	**10.000**	**10/9/2020**	**0.92**	**2.22**	**5.56**
11Cl-PF3OUdS	763051-92-9	1.67 U	H9876-FS(3)	10.000	10/9/2020	0.58	1.67	5.56
9Cl-PF3ONS	**756426-58-1**	**1.11 U**	**H9876-FS(3)**	**10.000**	**10/9/2020**	**0.53**	**1.11**	**5.56**

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

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Client ID	PX-H2835-SS02-000H
Battelle ID	H9877-FS
Sample Type	SA
Collection Date	09/11/2020
Extraction Date	09/18/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	13.15
Matrix	SOIL
Sample Size	1.75
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.29 U	H9877-FS(3)	10.000	10/9/2020	0.81	2.29	5.71
PFHpA	375-85-9	1.71 U	H9877-FS(3)	10.000	10/9/2020	0.58	1.71	5.71
PFOA	335-67-1	2.29 U	H9877-FS(3)	10.000	10/9/2020	0.70	2.29	5.71
PFNA	375-95-1	1.14 U	H9877-FS(3)	10.000	10/9/2020	0.56	1.14	5.71
PFDA	335-76-2	1.14 U	H9877-FS(3)	10.000	10/9/2020	0.53	1.14	5.71
PFUnA	2058-94-8	1.14 U	H9877-FS(3)	10.000	10/9/2020	0.53	1.14	5.71
PFDoA	307-55-1	2.29 U	H9877-FS(3)	10.000	10/9/2020	0.70	2.29	5.71
PFTrDA	72629-94-8	1.14 U	H9877-FS(5)	10.000	10/12/2020	0.32	1.14	5.71
PFTeDA	376-06-7	2.86 U	H9877-FS(5)	10.000	10/12/2020	1.23	2.86	5.71
NMeFOSAA	2355-31-9	2.86 U	H9877-FS(3)	10.000	10/9/2020	1.17	2.86	5.71
NEtFOSAA	2991-50-6	2.29 U	H9877-FS(3)	10.000	10/9/2020	0.86	2.29	5.71
PFBS	375-73-5	1.14 U	H9877-FS(3)	10.000	10/9/2020	0.40	1.14	5.71
PFHxS	355-46-4	2.29 U	H9877-FS(3)	10.000	10/9/2020	0.93	2.29	5.71
PFOS	1763-23-1	1.74 J	H9877-FS(3)	10.000	10/9/2020	0.79	2.29	5.71
HFPO-DA	13252-13-6	2.29 U	H9877-FS(3)	10.000	10/9/2020	0.73	2.29	5.71
Adona	919005-14-4	2.29 U	H9877-FS(3)	10.000	10/9/2020	0.95	2.29	5.71
11Cl-PF3OUdS	763051-92-9	1.71 U	H9877-FS(3)	10.000	10/9/2020	0.59	1.71	5.71
9Cl-PF3ONS	756426-58-1	1.14 U	H9877-FS(3)	10.000	10/9/2020	0.55	1.14	5.71

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Analyzed by: Griffith, Lauren
Printed: 10/13/2020

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

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Client ID	PX-H2835-SB02-0304
Battelle ID	H9878-FS
Sample Type	SA
Collection Date	09/11/2020
Extraction Date	09/18/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	14.90
Matrix	SOIL
Sample Size	1.68
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.38 U	H9878-FS(3)	10.000	10/9/2020	0.85	2.38	5.95
PFHpA	375-85-9	1.79 U	H9878-FS(3)	10.000	10/9/2020	0.61	1.79	5.95
PFOA	335-67-1	2.38 U	H9878-FS(3)	10.000	10/9/2020	0.73	2.38	5.95
PFNA	375-95-1	1.19 U	H9878-FS(3)	10.000	10/9/2020	0.58	1.19	5.95
PFDA	335-76-2	1.19 U	H9878-FS(3)	10.000	10/9/2020	0.55	1.19	5.95
PFUnA	2058-94-8	1.19 U	H9878-FS(3)	10.000	10/9/2020	0.55	1.19	5.95
PFDoA	307-55-1	2.38 U	H9878-FS(3)	10.000	10/9/2020	0.73	2.38	5.95
PFTrDA	72629-94-8	1.19 U	H9878-FS(5)	10.000	10/12/2020	0.33	1.19	5.95
PFTeDA	376-06-7	2.98 U	H9878-FS(5)	10.000	10/12/2020	1.29	2.98	5.95
NMeFOSAA	2355-31-9	2.98 U	H9878-FS(3)	10.000	10/9/2020	1.21	2.98	5.95
NEtFOSAA	2991-50-6	2.38 U	H9878-FS(3)	10.000	10/9/2020	0.89	2.38	5.95
PFBS	375-73-5	1.19 U	H9878-FS(3)	10.000	10/9/2020	0.42	1.19	5.95
PFHxS	355-46-4	2.38 U	H9878-FS(3)	10.000	10/9/2020	0.96	2.38	5.95
PFOS	1763-23-1	2.38 U	H9878-FS(3)	10.000	10/9/2020	0.82	2.38	5.95
HFPO-DA	13252-13-6	2.38 U	H9878-FS(3)	10.000	10/9/2020	0.76	2.38	5.95
Adona	919005-14-4	2.38 U	H9878-FS(3)	10.000	10/9/2020	0.99	2.38	5.95
11Cl-PF3OUdS	763051-92-9	1.79 U	H9878-FS(3)	10.000	10/9/2020	0.62	1.79	5.95
9Cl-PF3ONS	756426-58-1	1.19 U	H9878-FS(3)	10.000	10/9/2020	0.57	1.19	5.95

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Printed: 10/13/2020

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

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Client ID	PX-H2835-SS04-000H
Battelle ID	H9879-FS
Sample Type	SA
Collection Date	09/11/2020
Extraction Date	09/18/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	12.88
Matrix	SOIL
Sample Size	1.60
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.10 J	H9879-FS(3)	10.000	10/9/2020	0.89	2.50	6.25
PFHpA	375-85-9	1.30 J	H9879-FS(3)	10.000	10/9/2020	0.64	1.88	6.25
PFOA	335-67-1	2.35 J	H9879-FS(3)	10.000	10/9/2020	0.76	2.50	6.25
PFNA	375-95-1	1.37 J	H9879-FS(3)	10.000	10/9/2020	0.61	1.25	6.25
PFDA	335-76-2	7.89	H9879-FS(3)	10.000	10/9/2020	0.58	1.25	6.25
PFUnA	2058-94-8	6.03 J	H9879-FS(3)	10.000	10/9/2020	0.58	1.25	6.25
PFDoA	307-55-1	6.89	H9879-FS(3)	10.000	10/9/2020	0.76	2.50	6.25
PFTrDA	72629-94-8	1.97 J	H9879-FS(3)	10.000	10/9/2020	0.35	1.25	6.25
PFTeDA	376-06-7	1.71 J	H9879-FS(3)	10.000	10/9/2020	1.35	3.13	6.25
NMeFOSAA	2355-31-9	3.13 U	H9879-FS(3)	10.000	10/9/2020	1.28	3.13	6.25
NEtFOSAA	2991-50-6	2.50 U	H9879-FS(3)	10.000	10/9/2020	0.94	2.50	6.25
PFBS	375-73-5	1.25 U	H9879-FS(3)	10.000	10/9/2020	0.44	1.25	6.25
PFHxS	355-46-4	2.50 U	H9879-FS(3)	10.000	10/9/2020	1.01	2.50	6.25
PFOS	1763-23-1	2.50 U	H9879-FS(3)	10.000	10/9/2020	0.86	2.50	6.25
HFPO-DA	13252-13-6	2.50 U	H9879-FS(3)	10.000	10/9/2020	0.80	2.50	6.25
Adona	919005-14-4	2.50 U	H9879-FS(3)	10.000	10/9/2020	1.04	2.50	6.25
11Cl-PF3OUdS	763051-92-9	1.88 U	H9879-FS(3)	10.000	10/9/2020	0.65	1.88	6.25
9Cl-PF3ONS	756426-58-1	1.25 U	H9879-FS(3)	10.000	10/9/2020	0.60	1.25	6.25

MW 10/30/20
Analyzed by: Griffith, Lauren
Printed: 10/13/2020

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

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Client ID	PX-H2835-SB04-0304
Battelle ID	H9880-FS
Sample Type	SA
Collection Date	09/11/2020
Extraction Date	09/18/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	4.21
Matrix	SOIL
Sample Size	1.81
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.21 U	H9880-FS(3)	10.000	10/10/2020	0.78	2.21	5.52
PFHpA	375-85-9	0.61 J	H9880-FS(3)	10.000	10/10/2020	0.56	1.66	5.52
PFOA	335-67-1	0.88 J	H9880-FS(3)	10.000	10/10/2020	0.67	2.21	5.52
PFNA	375-95-1	0.86 J	H9880-FS(3)	10.000	10/10/2020	0.54	1.10	5.52
PFDA	335-76-2	1.22 J	H9880-FS(3)	10.000	10/10/2020	0.51	1.10	5.52
PFUnA	2058-94-8	1.10 U	H9880-FS(3)	10.000	10/10/2020	0.51	1.10	5.52
PFDoA	307-55-1	2.21 U	H9880-FS(3)	10.000	10/10/2020	0.67	2.21	5.52
PFTrDA	72629-94-8	1.10 U	H9880-FS(3)	10.000	10/10/2020	0.31	1.10	5.52
PFTeDA	376-06-7	2.76 U	H9880-FS(3)	10.000	10/10/2020	1.19	2.76	5.52
NMeFOSAA	2355-31-9	2.76 U	H9880-FS(3)	10.000	10/10/2020	1.13	2.76	5.52
NEtFOSAA	2991-50-6	2.21 U	H9880-FS(3)	10.000	10/10/2020	0.83	2.21	5.52
PFBS	375-73-5	1.10 U	H9880-FS(3)	10.000	10/10/2020	0.39	1.10	5.52
PFHxS	355-46-4	2.21 U	H9880-FS(3)	10.000	10/10/2020	0.90	2.21	5.52
PFOS	1763-23-1	2.21 U	H9880-FS(3)	10.000	10/10/2020	0.76	2.21	5.52
HFPO-DA	13252-13-6	2.21 U	H9880-FS(3)	10.000	10/10/2020	0.71	2.21	5.52
Adona	919005-14-4	2.21 U	H9880-FS(3)	10.000	10/10/2020	0.92	2.21	5.52
11Cl-PF3OUdS	763051-92-9	1.66 U	H9880-FS(3)	10.000	10/10/2020	0.57	1.66	5.52
9Cl-PF3ONS	756426-58-1	1.10 U	H9880-FS(3)	10.000	10/10/2020	0.53	1.10	5.52

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Analyzed by: Griffith, Lauren
Printed: 10/13/2020

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

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Client ID		PX-H2835-SS01-000H							
Battelle ID		H9881-FS							
Sample Type		SA							
Collection Date		09/11/2020							
Extraction Date		09/18/2020							
Analytical Instrument		Sciex 5500 LC/MS/MS							
% Moisture		23.15							
Matrix		SOIL							
Sample Size		1.68							
Size Unit-Basis		g							
Analyte	CAS No.	Result (ng/g_Dry)		Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.38	U	H9881-FS(3)	10.000	10/10/2020	0.85	2.38	5.95
PFHpA	375-85-9	1.79	U	H9881-FS(3)	10.000	10/10/2020	0.61	1.79	5.95
PFOA	335-67-1	2.38	U	H9881-FS(3)	10.000	10/10/2020	0.73	2.38	5.95
PFNA	375-95-1	1.19	U	H9881-FS(3)	10.000	10/10/2020	0.58	1.19	5.95
PFDA	335-76-2	1.19	U	H9881-FS(3)	10.000	10/10/2020	0.55	1.19	5.95
PFUnA	2058-94-8	1.19	U	H9881-FS(3)	10.000	10/10/2020	0.55	1.19	5.95
PFDoA	307-55-1	2.38	U	H9881-FS(3)	10.000	10/10/2020	0.73	2.38	5.95
PFTrDA	72629-94-8	1.19	U	H9881-FS(3)	10.000	10/10/2020	0.33	1.19	5.95
PFTeDA	376-06-7	2.98	U	H9881-FS(3)	10.000	10/10/2020	1.29	2.98	5.95
NMeFOSAA	2355-31-9	2.98	U	H9881-FS(3)	10.000	10/10/2020	1.21	2.98	5.95
NEtFOSAA	2991-50-6	2.38	U	H9881-FS(3)	10.000	10/10/2020	0.89	2.38	5.95
PFBS	375-73-5	1.19	U	H9881-FS(3)	10.000	10/10/2020	0.42	1.19	5.95
PFHxS	355-46-4	2.38	U	H9881-FS(3)	10.000	10/10/2020	0.96	2.38	5.95
PFOS	1763-23-1	1.01	J	H9881-FS(3)	10.000	10/10/2020	0.82	2.38	5.95
HFPO-DA	13252-13-6	2.38	U	H9881-FS(3)	10.000	10/10/2020	0.76	2.38	5.95
Adona	919005-14-4	2.38	U	H9881-FS(3)	10.000	10/10/2020	0.99	2.38	5.95
11Cl-PF3OUdS	763051-92-9	1.79	U	H9881-FS(3)	10.000	10/10/2020	0.62	1.79	5.95
9Cl-PF3ONS	756426-58-1	1.19	U	H9881-FS(3)	10.000	10/10/2020	0.57	1.19	5.95

NW 10/30/20

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

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Client ID	PX-H2835-SB01P-0304
Battelle ID	H9882-FS
Sample Type	SA
Collection Date	09/11/2020
Extraction Date	09/18/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	17.94
Matrix	SOIL
Sample Size	1.51
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.65 U	H9882-FS(3)	10.000	10/10/2020	0.94	2.65	6.62
PFHpA	**375-85-9**	**1.99 U**	**H9882-FS(3)**	**10.000**	**10/10/2020**	**0.68**	**1.99**	**6.62**
PFOA	335-67-1	2.65 U	H9882-FS(3)	10.000	10/10/2020	0.81	2.65	6.62
PFNA	**375-95-1**	**1.32 U**	**H9882-FS(3)**	**10.000**	**10/10/2020**	**0.65**	**1.32**	**6.62**
PFDA	335-76-2	1.32 U	H9882-FS(3)	10.000	10/10/2020	0.61	1.32	6.62
PFUnA	**2058-94-8**	**1.32 U**	**H9882-FS(3)**	**10.000**	**10/10/2020**	**0.61**	**1.32**	**6.62**
PFDoA	307-55-1	2.65 U	H9882-FS(3)	10.000	10/10/2020	0.81	2.65	6.62
PFTrDA	**72629-94-8**	**1.32 U**	**H9882-FS(3)**	**10.000**	**10/10/2020**	**0.37**	**1.32**	**6.62**
PFTeDA	376-06-7	3.31 U	H9882-FS(3)	10.000	10/10/2020	1.43	3.31	6.62
NMeFOSAA	**2355-31-9**	**3.31 U**	**H9882-FS(3)**	**10.000**	**10/10/2020**	**1.35**	**3.31**	**6.62**
NEtFOSAA	2991-50-6	2.65 U	H9882-FS(3)	10.000	10/10/2020	0.99	2.65	6.62
PFBS	**375-73-5**	**1.32 U**	**H9882-FS(3)**	**10.000**	**10/10/2020**	**0.46**	**1.32**	**6.62**
PFHxS	355-46-4	2.65 U	H9882-FS(3)	10.000	10/10/2020	1.07	2.65	6.62
PFOS	**1763-23-1**	**2.65 U**	**H9882-FS(3)**	**10.000**	**10/10/2020**	**0.91**	**2.65**	**6.62**
HFPO-DA	13252-13-6	2.65 U	H9882-FS(3)	10.000	10/10/2020	0.85	2.65	6.62
Adona	**919005-14-4**	**2.65 U**	**H9882-FS(3)**	**10.000**	**10/10/2020**	**1.10**	**2.65**	**6.62**
11Cl-PF3OUdS	763051-92-9	1.99 U	H9882-FS(3)	10.000	10/10/2020	0.69	1.99	6.62
9Cl-PF3ONS	**756426-58-1**	**1.32 U**	**H9882-FS(3)**	**10.000**	**10/10/2020**	**0.64**	**1.32**	**6.62**

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

9

Client ID	PX-H2835-SB01-0304
Battelle ID	H9883-FS
Sample Type	SA
Collection Date	09/11/2020
Extraction Date	09/18/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	14.50
Matrix	SOIL
Sample Size	1.85
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.16 U	H9883-FS(3)	10.000	10/10/2020	0.77	2.16	5.41
PFHpA	375-85-9	1.62 U	H9883-FS(3)	10.000	10/10/2020	0.55	1.62	5.41
PFOA	335-67-1	2.16 U	H9883-FS(3)	10.000	10/10/2020	0.66	2.16	5.41
PFNA	375-95-1	1.08 U	H9883-FS(3)	10.000	10/10/2020	0.53	1.08	5.41
PFDA	335-76-2	1.08 U	H9883-FS(3)	10.000	10/10/2020	0.50	1.08	5.41
PFUnA	2058-94-8	1.08 U	H9883-FS(3)	10.000	10/10/2020	0.50	1.08	5.41
PFDoA	307-55-1	2.16 U	H9883-FS(3)	10.000	10/10/2020	0.66	2.16	5.41
PFTrDA	72629-94-8	1.08 U	H9883-FS(3)	10.000	10/10/2020	0.30	1.08	5.41
PFTeDA	376-06-7	2.70 U	H9883-FS(3)	10.000	10/10/2020	1.17	2.70	5.41
NMeFOSAA	2355-31-9	2.70 U	H9883-FS(3)	10.000	10/10/2020	1.10	2.70	5.41
NEtFOSAA	2991-50-6	2.16 U	H9883-FS(3)	10.000	10/10/2020	0.81	2.16	5.41
PFBS	375-73-5	1.08 U	H9883-FS(3)	10.000	10/10/2020	0.38	1.08	5.41
PFHxS	355-46-4	2.16 U	H9883-FS(3)	10.000	10/10/2020	0.88	2.16	5.41
PFOS	1763-23-1	2.16 U	H9883-FS(3)	10.000	10/10/2020	0.75	2.16	5.41
HFPO-DA	13252-13-6	2.16 U	H9883-FS(3)	10.000	10/10/2020	0.69	2.16	5.41
Adona	919005-14-4	2.16 U	H9883-FS(3)	10.000	10/10/2020	0.90	2.16	5.41
11Cl-PF3OUdS	763051-92-9	1.62 U	H9883-FS(3)	10.000	10/10/2020	0.56	1.62	5.41
9Cl-PF3ONS	756426-58-1	1.08 U	H9883-FS(3)	10.000	10/10/2020	0.52	1.08	5.41

BATTELLE
It can be done

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

10

Client ID	PX-FFDA-SS01-000H
Battelle ID	H9907-FS
Sample Type	SA
Collection Date	09/12/2020
Extraction Date	09/18/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	9.37
Matrix	SOIL
Sample Size	1.69
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.37 U	H9907-FS(3)	10.000	10/10/2020	0.84	2.37	5.92
PFHpA	375-85-9	1.78 U	H9907-FS(3)	10.000	10/10/2020	0.60	1.78	5.92
PFOA	335-67-1	2.37 U	H9907-FS(3)	10.000	10/10/2020	0.72	2.37	5.92
PFNA	375-95-1	1.18 U	H9907-FS(3)	10.000	10/10/2020	0.58	1.18	5.92
PFDA	335-76-2	1.18 U	H9907-FS(3)	10.000	10/10/2020	0.54	1.18	5.92
PFUnA	2058-94-8	1.18 U	H9907-FS(3)	10.000	10/10/2020	0.54	1.18	5.92
PFDoA	307-55-1	2.37 U	H9907-FS(3)	10.000	10/10/2020	0.72	2.37	5.92
PFTrDA	72629-94-8	1.18 U	H9907-FS(3)	10.000	10/10/2020	0.33	1.18	5.92
PFTeDA	376-06-7	2.96 U	H9907-FS(3)	10.000	10/10/2020	1.28	2.96	5.92
NMeFOSAA	2355-31-9	2.96 U	H9907-FS(3)	10.000	10/10/2020	1.21	2.96	5.92
NEtFOSAA	2991-50-6	2.37 U	H9907-FS(3)	10.000	10/10/2020	0.89	2.37	5.92
PFBS	375-73-5	1.18 U	H9907-FS(3)	10.000	10/10/2020	0.41	1.18	5.92
PFHxS	355-46-4	2.37 U	H9907-FS(3)	10.000	10/10/2020	0.96	2.37	5.92
PFOS	1763-23-1	1.38 J	H9907-FS(3)	10.000	10/10/2020	0.82	2.37	5.92
HFPO-DA	13252-13-6	2.37 U	H9907-FS(3)	10.000	10/10/2020	0.76	2.37	5.92
Adona	919005-14-4	2.37 U	H9907-FS(3)	10.000	10/10/2020	0.98	2.37	5.92
11Cl-PF3OUdS	763051-92-9	1.78 U	H9907-FS(3)	10.000	10/10/2020	0.62	1.78	5.92
9Cl-PF3ONS	756426-58-1	1.18 U	H9907-FS(3)	10.000	10/10/2020	0.57	1.18	5.92

10/30/20
Analyzed by: Griffith, Lauren
Printed: 10/13/2020

BATTELLE
It can be done

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

11

Client ID	PX-FFDA-SB01-0304
Battelle ID	H9908-FS
Sample Type	SA
Collection Date	09/12/2020
Extraction Date	09/18/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	21.07
Matrix	SOIL
Sample Size	1.44
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.78 U	H9908-FS(3)	10.000	10/10/2020	0.99	2.78	6.94
PFHpA	375-85-9	2.08 U	H9908-FS(3)	10.000	10/10/2020	0.71	2.08	6.94
PFOA	335-67-1	2.78 U	H9908-FS(3)	10.000	10/10/2020	0.85	2.78	6.94
PFNA	375-95-1	1.39 U	H9908-FS(3)	10.000	10/10/2020	0.68	1.39	6.94
PFDA	335-76-2	1.39 U	H9908-FS(3)	10.000	10/10/2020	0.64	1.39	6.94
PFUnA	2058-94-8	1.39 U	H9908-FS(3)	10.000	10/10/2020	0.64	1.39	6.94
PFDoA	307-55-1	2.78 U	H9908-FS(3)	10.000	10/10/2020	0.85	2.78	6.94
PFTrDA	72629-94-8	1.39 U	H9908-FS(3)	10.000	10/10/2020	0.39	1.39	6.94
PFTeDA	376-06-7	3.47 U	H9908-FS(3)	10.000	10/10/2020	1.50	3.47	6.94
NMeFOSAA	2355-31-9	3.47 U	H9908-FS(3)	10.000	10/10/2020	1.42	3.47	6.94
NEtFOSAA	2991-50-6	2.78 U	H9908-FS(3)	10.000	10/10/2020	1.04	2.78	6.94
PFBS	375-73-5	1.39 U	H9908-FS(3)	10.000	10/10/2020	0.49	1.39	6.94
PFHxS	355-46-4	2.78 U	H9908-FS(3)	10.000	10/10/2020	1.13	2.78	6.94
PFOS	1763-23-1	2.78 U	H9908-FS(3)	10.000	10/10/2020	0.96	2.78	6.94
HFPO-DA	13252-13-6	2.78 U	H9908-FS(3)	10.000	10/10/2020	0.89	2.78	6.94
Adona	919005-14-4	2.78 U	H9908-FS(3)	10.000	10/10/2020	1.15	2.78	6.94
11Cl-PF3OUdS	763051-92-9	2.08 U	H9908-FS(3)	10.000	10/10/2020	0.72	2.08	6.94
9Cl-PF3ONS	756426-58-1	1.39 U	H9908-FS(3)	10.000	10/10/2020	0.67	1.39	6.94

BATTELLE
It can be done

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

12

Client ID	PX-FFDA-SB01P-0304
Battelle ID	H9909-FS
Sample Type	SA
Collection Date	09/12/2020
Extraction Date	09/18/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	22.71
Matrix	SOIL
Sample Size	1.64
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.44 U	H9909-FS(3)	10.000	10/10/2020	0.87	2.44	6.10
PFHpA	375-85-9	1.83 U	H9909-FS(3)	10.000	10/10/2020	0.62	1.83	6.10
PFOA	335-67-1	2.44 U	H9909-FS(3)	10.000	10/10/2020	0.74	2.44	6.10
PFNA	375-95-1	1.22 U	H9909-FS(3)	10.000	10/10/2020	0.60	1.22	6.10
PFDA	335-76-2	1.22 U	H9909-FS(3)	10.000	10/10/2020	0.56	1.22	6.10
PFUnA	2058-94-8	1.22 U	H9909-FS(3)	10.000	10/10/2020	0.56	1.22	6.10
PFDoA	307-55-1	2.44 U	H9909-FS(3)	10.000	10/10/2020	0.74	2.44	6.10
PFTrDA	72629-94-8	1.22 U	H9909-FS(3)	10.000	10/10/2020	0.34	1.22	6.10
PFTeDA	376-06-7	3.05 U	H9909-FS(3)	10.000	10/10/2020	1.32	3.05	6.10
NMeFOSAA	2355-31-9	3.05 U	H9909-FS(3)	10.000	10/10/2020	1.24	3.05	6.10
NEtFOSAA	2991-50-6	2.44 U	H9909-FS(3)	10.000	10/10/2020	0.91	2.44	6.10
PFBS	375-73-5	1.22 U	H9909-FS(3)	10.000	10/10/2020	0.43	1.22	6.10
PFHxS	355-46-4	2.44 U	H9909-FS(3)	10.000	10/10/2020	0.99	2.44	6.10
PFOS	1763-23-1	2.44 U	H9909-FS(3)	10.000	10/10/2020	0.84	2.44	6.10
HFPO-DA	13252-13-6	2.44 U	H9909-FS(3)	10.000	10/10/2020	0.78	2.44	6.10
Adona	919005-14-4	2.44 U	H9909-FS(3)	10.000	10/10/2020	1.01	2.44	6.10
11Cl-PF3OUdS	763051-92-9	1.83 U	H9909-FS(3)	10.000	10/10/2020	0.63	1.83	6.10
9Cl-PF3ONS	756426-58-1	1.22 U	H9909-FS(3)	10.000	10/10/2020	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: 20-1331
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: December 11, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-H2805-FB01-102020	G1814-FS	Water
2	PX-H2805-EB01-102020-GW	G1815-FS	Water
3	PX-H2805-WT07-1020	G1820-FS	Water
4	PX-H2805-WT06-1020	G1824-FS	Water
5	PX-H2805-WT05-1020	G1827-FS	Water
6	PX-H2805-WT04-1020	G1828-FS	Water
7	PX-H2805-WT03-1020	G1833-FS	Water
7MS	PX-H2805-WT03-1020MS	G1834-FSMS	Water
7MSD	PX-H2805-WT03-1020MSD	G1835-FSMSD	Water
8	PX-H2805-WT01-1020	G1841-FS	Water
9	PX-H2805-WT02-1020	G1842-FS	Water
10	PX-H2805-WT02P-1020	G1843-FS	Water

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

Specific method references are as follows:

Analysis	*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
LE58 IB	PFUnA	0.29	U	1-8
	PFBS	0.20	U	1, 2
	PFHxS	0.14	None	All Samples ND or >5X
	11C1-PF3OUdS	0.25	None	All Samples ND

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-H2805-FB01-102020	None - ND	-	-	-
PX-H2805-EB01-102020-GW	None - ND	-	-	-

Surrogate Spike Recoveries

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

Laboratory Fortified Blank (LFB)

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

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

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

EDS Sample ID	Compound	MS %R/MSD %R/RDP	Qualifier
7	PFHxA	29%/22%/OK	J
	PFBS	47%/32%/38	J

Internal Standard (IS) Area Performance

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

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- The samples were analyzed at various dilutions due to high concentrations of target compounds. The reporting limits were adjusted accordingly. No action was required.
- Several samples were re-extracted outside of holding times in SDG 20-1512 to verify surrogate deficiencies. Use the original analysis results for reporting purposes.

Field Duplicate Sample Precision

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

Compound	PX-H2805-WT02-1020 ng/L	PX-H2805-WT02P-1020 ng/L	RPD	Qualifier
PFHxA	15.49	14.53	6%	None
PFHpA	7.72	7.71	0%	
PFOA	27.46	30.69	11%	
PFNA	1.01	0.99	2%	
PFBS	6.46	6.03	7%	
PFHxS	61.28	66.19	8%	
PFOS	16.13	16.06	0%	

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

Signed: Nancy Weaver Dated: 12/17/20

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

Client ID	PX-H2805-FB01-102020
Battelle ID	G1814-FS
Sample Type	SA
Collection Date	10/20/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	AQ
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	G1814-FS(0)	1.000	11/17/2020	0.51	1.44	4.81	
PFHpA	375-85-9	0.96 U	G1814-FS(0)	1.000	11/17/2020	0.25	0.96	4.81	
PFOA	335-67-1	1.44 U	G1814-FS(0)	1.000	11/17/2020	0.49	1.44	4.81	
PFNA	375-95-1	0.96 U	G1814-FS(0)	1.000	11/17/2020	0.30	0.96	4.81	
PFDA	335-76-2	0.48 U	G1814-FS(0)	1.000	11/17/2020	0.13	0.48	4.81	
PFUnA	2058-94-8	0.48 ~~0.25 J~~ U	G1814-FS(0)	1.000	11/17/2020	0.21	0.48	4.81	MBL
PFDoA	307-55-1	0.48 U	G1814-FS(0)	1.000	11/17/2020	0.18	0.48	4.81	
PFTrDA	72629-94-8	0.48 U	G1814-FS(0)	1.000	11/17/2020	0.14	0.48	4.81	
PFTeDA	376-06-7	1.92 U	G1814-FS(0)	1.000	11/17/2020	0.70	1.92	4.81	
NMeFOSAA	2355-31-9	0.96 U	G1814-FS(0)	1.000	11/17/2020	0.34	0.96	4.81	
NEtFOSAA	2991-50-6	0.96 U	G1814-FS(0)	1.000	11/17/2020	0.48	0.96	4.81	
PFBS	375-73-5	0.48 ~~0.16 J~~ U	G1814-FS(0)	1.000	11/17/2020	0.13	0.48	4.81	MBL
PFHxS	355-46-4	0.38 U	G1814-FS(0)	1.000	11/17/2020	0.11	0.38	4.81	
PFOS	1763-23-1	0.96 U	G1814-FS(0)	1.000	11/17/2020	0.42	0.96	4.81	
HFPO-DA	13252-13-6	0.48 U	G1814-FS(0)	1.000	11/17/2020	0.24	0.48	4.81	
Adona	919005-14-4	0.96 U	G1814-FS(0)	1.000	11/17/2020	0.26	0.96	4.81	
11Cl-PF3OUdS	763051-92-9	0.48 U	G1814-FS(0)	1.000	11/17/2020	0.22	0.48	4.81	
9Cl-PF3ONS	756426-58-1	0.96 U	G1814-FS(0)	1.000	11/17/2020	0.26	0.96	4.81	

NW 12/11/20
Analyzed by: Griffith, Lauren
Printed: 11/19/2020

BATTELLE
It can be done

2

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

Client ID	PX-H2805-EB01-102020-GW
Battelle ID	G1815-FS
Sample Type	SA
Collection Date	10/20/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	AQ
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	G1815-FS(0)	1.000	11/17/2020	0.51	1.44	4.81	
PFHpA	375-85-9	0.96 U	G1815-FS(0)	1.000	11/17/2020	0.25	0.96	4.81	
PFOA	335-67-1	1.44 U	G1815-FS(0)	1.000	11/17/2020	0.49	1.44	4.81	
PFNA	375-95-1	0.96 U	G1815-FS(0)	1.000	11/17/2020	0.30	0.96	4.81	
PFDA	335-76-2	0.48 U	G1815-FS(0)	1.000	11/17/2020	0.13	0.48	4.81	
PFUnA	2058-94-8	0.48 ~~0.24~~ U	G1815-FS(0)	1.000	11/17/2020	0.21	0.48	4.81	MBL
PFDoA	307-55-1	0.48 U	G1815-FS(0)	1.000	11/17/2020	0.18	0.48	4.81	
PFTrDA	72629-94-8	0.48 U	G1815-FS(0)	1.000	11/17/2020	0.14	0.48	4.81	
PFTeDA	376-06-7	1.92 U	G1815-FS(0)	1.000	11/17/2020	0.70	1.92	4.81	
NMeFOSAA	2355-31-9	0.96 U	G1815-FS(0)	1.000	11/17/2020	0.34	0.96	4.81	
NEtFOSAA	2991-50-6	0.96 U	G1815-FS(0)	1.000	11/17/2020	0.48	0.96	4.81	
PFBS	375-73-5	0.48 ~~0.16~~ U	G1815-FS(0)	1.000	11/17/2020	0.13	0.48	4.81	MBL
PFHxS	355-46-4	0.38 U	G1815-FS(0)	1.000	11/17/2020	0.11	0.38	4.81	
PFOS	1763-23-1	0.96 U	G1815-FS(0)	1.000	11/17/2020	0.42	0.96	4.81	
HFPO-DA	13252-13-6	0.48 U	G1815-FS(0)	1.000	11/17/2020	0.24	0.48	4.81	
Adona	919005-14-4	0.96 U	G1815-FS(0)	1.000	11/17/2020	0.26	0.96	4.81	
11Cl-PF3OUdS	763051-92-9	0.48 U	G1815-FS(0)	1.000	11/17/2020	0.22	0.48	4.81	
9Cl-PF3ONS	756426-58-1	0.96 U	G1815-FS(0)	1.000	11/17/2020	0.26	0.96	4.81	

MW 12/11/20
Analyzed by: Griffith, Lauren
Printed: 11/19/2020

BATTELLE
It can be done

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

Client ID	PX-H2805-WT07-1020
Battelle ID	G1820-FS
Sample Type	SA
Collection Date	10/20/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	GW
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	8.81	G1820-FS(0)	1.000	11/17/2020	0.51	1.44	4.81	
PFHpA	375-85-9	6.39	G1820-FS(0)	1.000	11/17/2020	0.25	0.96	4.81	
PFOA	335-67-1	18.36	G1820-FS(0)	1.000	11/17/2020	0.49	1.44	4.81	
PFNA	375-95-1	2.35 J	G1820-FS(0)	1.000	11/17/2020	0.30	0.96	4.81	
PFDA	335-76-2	0.82 J	G1820-FS(0)	1.000	11/17/2020	0.13	0.48	4.81	
PFUnA	2058-94-8	0.51 J U	G1820-FS(0)	1.000	11/17/2020	0.21	0.48	4.81	MBL
PFDoA	307-55-1	0.48 U	G1820-FS(0)	1.000	11/17/2020	0.18	0.48	4.81	
PFTrDA	72629-94-8	0.48 U	G1820-FS(0)	1.000	11/17/2020	0.14	0.48	4.81	
PFTeDA	376-06-7	1.92 U	G1820-FS(0)	1.000	11/17/2020	0.70	1.92	4.81	
NMeFOSAA	2355-31-9	0.96 U	G1820-FS(0)	1.000	11/17/2020	0.34	0.96	4.81	
NEtFOSAA	2991-50-6	0.96 U	G1820-FS(0)	1.000	11/17/2020	0.48	0.96	4.81	
PFBS	375-73-5	1.53 J	G1820-FS(0)	1.000	11/17/2020	0.13	0.48	4.81	
PFHxS	355-46-4	9.43	G1820-FS(0)	1.000	11/17/2020	0.11	0.38	4.81	
PFOS	1763-23-1	18.40	G1820-FS(0)	1.000	11/17/2020	0.42	0.96	4.81	
HFPO-DA	13252-13-6	0.48 U	G1820-FS(0)	1.000	11/17/2020	0.24	0.48	4.81	
Adona	919005-14-4	0.96 U	G1820-FS(0)	1.000	11/17/2020	0.26	0.96	4.81	
11Cl-PF3OUdS	763051-92-9	0.48 U	G1820-FS(0)	1.000	11/17/2020	0.22	0.48	4.81	
9Cl-PF3ONS	756426-58-1	0.96 U	G1820-FS(0)	1.000	11/17/2020	0.26	0.96	4.81	

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

Client ID	PX-H2805-WT06-1020
Battelle ID	G1824-FS
Sample Type	SA
Collection Date	10/20/2020
Extraction Date	10/28/2020
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	31.13	G1824-FS(0)	1.000	11/17/2020	0.52	1.47	4.90	
PFHpA	**375-85-9**	**23.06**	**G1824-FS(0)**	**1.000**	**11/17/2020**	**0.25**	**0.98**	**4.90**	
PFOA	335-67-1	37.84	G1824-FS(0)	1.000	11/17/2020	0.50	1.47	4.90	
PFNA	**375-95-1**	**6.45**	**G1824-FS(0)**	**1.000**	**11/17/2020**	**0.30**	**0.98**	**4.90**	
PFDA	335-76-2	1.98 J	G1824-FS(0)	1.000	11/17/2020	0.14	0.49	4.90	
PFUnA	**2058-94-8**	0.49 ~~0.28 J~~ U	**G1824-FS(0)**	**1.000**	**11/17/2020**	**0.22**	**0.49**	**4.90**	MBL
PFDoA	307-55-1	0.49 U	G1824-FS(0)	1.000	11/17/2020	0.19	0.49	4.90	
PFTrDA	**72629-94-8**	**0.49 U**	**G1824-FS(0)**	**1.000**	**11/17/2020**	**0.15**	**0.49**	**4.90**	
PFTeDA	376-06-7	1.96 U	G1824-FS(0)	1.000	11/17/2020	0.72	1.96	4.90	
NMeFOSAA	**2355-31-9**	**0.98 U**	**G1824-FS(0)**	**1.000**	**11/17/2020**	**0.34**	**0.98**	**4.90**	
NEtFOSAA	2991-50-6	0.98 U	G1824-FS(0)	1.000	11/17/2020	0.49	0.98	4.90	
PFBS	**375-73-5**	**1.99 J**	**G1824-FS(0)**	**1.000**	**11/17/2020**	**0.14**	**0.49**	**4.90**	
PFHxS	355-46-4	24.21	G1824-FS(0)	1.000	11/17/2020	0.11	0.39	4.90	
PFOS	**1763-23-1**	**15.39**	**G1824-FS(0)**	**1.000**	**11/17/2020**	**0.43**	**0.98**	**4.90**	
HFPO-DA	13252-13-6	0.49 U	G1824-FS(0)	1.000	11/17/2020	0.25	0.49	4.90	
Adona	**919005-14-4**	**0.98 U**	**G1824-FS(0)**	**1.000**	**11/17/2020**	**0.26**	**0.98**	**4.90**	
11Cl-PF3OUdS	763051-92-9	0.49 U	G1824-FS(0)	1.000	11/17/2020	0.23	0.49	4.90	
9Cl-PF3ONS	**756426-58-1**	**0.98 U**	**G1824-FS(0)**	**1.000**	**11/17/2020**	**0.26**	**0.98**	**4.90**	

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

Client ID		PX-H2805-WT05-1020							
Battelle ID		G1827-FS							
Sample Type		SA							
Collection Date		10/20/2020							
Extraction Date		10/28/2020							
Analytical Instrument		Sciex 5500 LC/MS/MS							
% Moisture		NA							
Matrix		GW							
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	561.83	D	G1827-FS-D(3)	12.500	11/17/2020	6.37	18.03	60.10
PFHpA	**375-85-9**	**148.06**	**D**	**G1827-FS-D(3)**	**12.500**	**11/17/2020**	**3.13**	**12.02**	**60.10**
PFOA	335-67-1	49.43		G1827-FS(0)	1.000	11/17/2020	0.49	1.44	4.81
PFNA	**375-95-1**	**8.99**		**G1827-FS(0)**	**1.000**	**11/17/2020**	**0.30**	**0.96**	**4.81**
PFDA	335-76-2	1.99	J	G1827-FS(0)	1.000	11/17/2020	0.13	0.48	4.81
PFUnA	**2058-94-8**	0.48 ~~0.33~~	**U**	**G1827-FS(0)**	**1.000**	**11/17/2020**	**0.21**	**0.48**	**4.81**
PFDoA	307-55-1	0.48	U	G1827-FS(0)	1.000	11/17/2020	0.18	0.48	4.81
PFTrDA	**72629-94-8**	**0.48**	**U**	**G1827-FS(0)**	**1.000**	**11/17/2020**	**0.14**	**0.48**	**4.81**
PFTeDA	376-06-7	1.92	U	G1827-FS(0)	1.000	11/17/2020	0.70	1.92	4.81
NMeFOSAA	**2355-31-9**	**0.96**	**U**	**G1827-FS(0)**	**1.000**	**11/17/2020**	**0.34**	**0.96**	**4.81**
NEtFOSAA	2991-50-6	0.96	U	G1827-FS(0)	1.000	11/17/2020	0.48	0.96	4.81
PFBS	**375-73-5**	**4.71**	**J**	**G1827-FS(0)**	**1.000**	**11/17/2020**	**0.13**	**0.48**	**4.81**
PFHxS	355-46-4	5.02		G1827-FS(0)	1.000	11/17/2020	0.11	0.38	4.81
PFOS	**1763-23-1**	**10.07**		**G1827-FS(0)**	**1.000**	**11/17/2020**	**0.42**	**0.96**	**4.81**
HFPO-DA	13252-13-6	0.48	U	G1827-FS(0)	1.000	11/17/2020	0.24	0.48	4.81
Adona	**919005-14-4**	**0.96**	**U**	**G1827-FS(0)**	**1.000**	**11/17/2020**	**0.26**	**0.96**	**4.81**
11Cl-PF3OUdS	763051-92-9	0.48	U	G1827-FS(0)	1.000	11/17/2020	0.22	0.48	4.81
9Cl-PF3ONS	**756426-58-1**	**0.96**	**U**	**G1827-FS(0)**	**1.000**	**11/17/2020**	**0.26**	**0.96**	**4.81**

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

Client ID	PX-H2805-WT04-1020
Battelle ID	G1828-FS
Sample Type	SA
Collection Date	10/20/2020
Extraction Date	10/28/2020
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	20.53	G1828-FS(0)	1.000	11/17/2020	0.50	1.42	4.72
PFHpA	**375-85-9**	**18.02**	**G1828-FS(0)**	**1.000**	**11/17/2020**	**0.25**	**0.94**	**4.72**
PFOA	335-67-1	23.06	G1828-FS(0)	1.000	11/17/2020	0.48	1.42	4.72
PFNA	**375-95-1**	**4.63 J**	**G1828-FS(0)**	**1.000**	**11/17/2020**	**0.29**	**0.94**	**4.72**
PFDA	335-76-2	1.03 J	G1828-FS(0)	1.000	11/17/2020	0.13	0.47	4.72
PFUnA	**2058-94-8**	0.47 ~~0.38~~ U	**G1828-FS(0)**	**1.000**	**11/17/2020**	**0.21**	**0.47**	**4.72**
PFDoA	307-55-1	0.47 U	G1828-FS(0)	1.000	11/17/2020	0.18	0.47	4.72
PFTrDA	**72629-94-8**	**0.47 U**	**G1828-FS(0)**	**1.000**	**11/17/2020**	**0.14**	**0.47**	**4.72**
PFTeDA	376-06-7	1.89 U	G1828-FS(0)	1.000	11/17/2020	0.69	1.89	4.72
NMeFOSAA	**2355-31-9**	**0.94 U**	**G1828-FS(0)**	**1.000**	**11/17/2020**	**0.33**	**0.94**	**4.72**
NEtFOSAA	2991-50-6	0.94 U	G1828-FS(0)	1.000	11/17/2020	0.47	0.94	4.72
PFBS	**375-73-5**	**2.73 J**	**G1828-FS(0)**	**1.000**	**11/17/2020**	**0.13**	**0.47**	**4.72**
PFHxS	355-46-4	15.74	G1828-FS(0)	1.000	11/17/2020	0.10	0.38	4.72
PFOS	**1763-23-1**	**10.57**	**G1828-FS(0)**	**1.000**	**11/17/2020**	**0.42**	**0.94**	**4.72**
HFPO-DA	13252-13-6	0.47 U	G1828-FS(0)	1.000	11/17/2020	0.24	0.47	4.72
Adona	**919005-14-4**	**0.94 U**	**G1828-FS(0)**	**1.000**	**11/17/2020**	**0.25**	**0.94**	**4.72**
11Cl-PF3OUdS	763051-92-9	0.47 U	G1828-FS(0)	1.000	11/17/2020	0.22	0.47	4.72
9Cl-PF3ONS	**756426-58-1**	**0.94 U**	**G1828-FS(0)**	**1.000**	**11/17/2020**	**0.25**	**0.94**	**4.72**

0.47 u

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

Client ID		PX-H2805-WT03-1020							
Battelle ID		G1833-FS							
Sample Type		SA							
Collection Date		10/20/2020							
Extraction Date		10/28/2020							
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	131.54	J	G1833-FS-D(3)	5.000	11/17/2020	2.60	7.35	24.51	MSL
PFHpA	375-85-9	44.77		G1833-FS(0)	1.000	11/17/2020	0.25	0.98	4.90	
PFOA	335-67-1	52.37		G1833-FS(0)	1.000	11/17/2020	0.50	1.47	4.90	
PFNA	375-95-1	2.12	J	G1833-FS(0)	1.000	11/17/2020	0.30	0.98	4.90	
PFDA	335-76-2	0.49	U	G1833-FS(0)	1.000	11/17/2020	0.14	0.49	4.90	
PFUnA	2058-94-8	0.49 ~~0.29~~	U	G1833-FS(0)	1.000	11/17/2020	0.22	0.49	4.90	MBL
PFDoA	307-55-1	0.49	U	G1833-FS(0)	1.000	11/17/2020	0.19	0.49	4.90	
PFTrDA	72629-94-8	0.49	U	G1833-FS(0)	1.000	11/17/2020	0.15	0.49	4.90	
PFTeDA	376-06-7	1.96	UJ	G1833-FS(0)	1.000	11/17/2020	0.72	1.96	4.90	SSL
NMeFOSAA	2355-31-9	0.98	U	G1833-FS(0)	1.000	11/17/2020	0.34	0.98	4.90	
NEtFOSAA	2991-50-6	0.98	U	G1833-FS(0)	1.000	11/17/2020	0.49	0.98	4.90	
PFBS	375-73-5	78.67	J	G1833-FS(0)	1.000	11/17/2020	0.14	0.49	4.90	MSL
PFHxS	355-46-4	24.06		G1833-FS(0)	1.000	11/17/2020	0.11	0.39	4.90	
PFOS	1763-23-1	20.01		G1833-FS(0)	1.000	11/17/2020	0.43	0.98	4.90	
HFPO-DA	13252-13-6	0.49	U	G1833-FS(0)	1.000	11/17/2020	0.25	0.49	4.90	
Adona	919005-14-4	0.98	U	G1833-FS(0)	1.000	11/17/2020	0.26	0.98	4.90	
11Cl-PF3OUdS	763051-92-9	0.49	U	G1833-FS(0)	1.000	11/17/2020	0.23	0.49	4.90	
9Cl-PF3ONS	756426-58-1	0.98	U	G1833-FS(0)	1.000	11/17/2020	0.26	0.98	4.90	

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

Client ID	PX-H2805-WT03-1020
Battelle ID	G1833-FS
Sample Type	SA
Collection Date	10/20/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	84	G1833-FS-D(3)	11/17/2020
13C4-PFHpA	89	G1833-FS(0)	11/17/2020
13C8-PFOA	92	G1833-FS(0)	11/17/2020
13C9-PFNA	91	G1833-FS(0)	11/17/2020
13C6-PFDA	88	G1833-FS(0)	11/17/2020
13C7-PFUnA	78	G1833-FS(0)	11/17/2020
13C2-PFDoA	67	G1833-FS(0)	11/17/2020
13C2-PFTeDA	35	G1833-FS(0)	11/17/2020
d3-MeFOSAA	97	G1833-FS(0)	11/17/2020
d5-EtFOSAA	105	G1833-FS(0)	11/17/2020
13C3-PFBS	99	G1833-FS(0)	11/17/2020
13C3-PFHxS	97	G1833-FS(0)	11/17/2020
13C8-PFOS	104	G1833-FS(0)	11/17/2020
13C3-HFPO-DA	84	G1833-FS(0)	11/17/2020

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

Client ID		PX-H2805-WT01-1020						
Battelle ID		G1841-FS						
Sample Type		SA						
Collection Date		10/20/2020						
Extraction Date		10/28/2020						
Analytical Instrument		Sciex 5500 LC/MS/MS						
% Moisture		NA						
Matrix		GW						
Sample Size		0.250						
Size Unit-Basis		L						
Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	64.59	G1841-FS(0)	1.000	11/17/2020	0.53	1.50	5.00
PFHpA	**375-85-9**	**39.45**	**G1841-FS(0)**	**1.000**	**11/17/2020**	**0.26**	**1.00**	**5.00**
PFOA	335-67-1	130.92 ϕ	G1841-FS-D(3)	5.000	11/17/2020	2.55	7.50	25.00
PFNA	**375-95-1**	**1.53 J**	**G1841-FS(0)**	**1.000**	**11/17/2020**	**0.31**	**1.00**	**5.00**
PFDA	335-76-2	0.50 U	G1841-FS(0)	1.000	11/17/2020	0.14	0.50	5.00
PFUnA	**2058-94-8**	0.50 ~~0.26~~ U	**G1841-FS(0)**	**1.000**	**11/17/2020**	**0.22**	**0.50**	**5.00** MBL
PFDoA	307-55-1	0.50 U	G1841-FS(0)	1.000	11/17/2020	0.19	0.50	5.00
PFTrDA	**72629-94-8**	**0.50 U**	**G1841-FS(0)**	**1.000**	**11/17/2020**	**0.15**	**0.50**	**5.00**
PFTeDA	376-06-7	2.00 U	G1841-FS(0)	1.000	11/17/2020	0.73	2.00	5.00
NMeFOSAA	**2355-31-9**	**1.00 U**	**G1841-FS(0)**	**1.000**	**11/17/2020**	**0.35**	**1.00**	**5.00**
NEtFOSAA	2991-50-6	1.00 U	G1841-FS(0)	1.000	11/17/2020	0.50	1.00	5.00
PFBS	**375-73-5**	**7.09**	**G1841-FS(0)**	**1.000**	**11/17/2020**	**0.14**	**0.50**	**5.00**
PFHxS	355-46-4	61.45	G1841-FS(0)	1.000	11/17/2020	0.11	0.40	5.00
PFOS	**1763-23-1**	**8.22**	**G1841-FS(0)**	**1.000**	**11/17/2020**	**0.44**	**1.00**	**5.00**
HFPO-DA	13252-13-6	0.50 U	G1841-FS(0)	1.000	11/17/2020	0.25	0.50	5.00
Adona	**919005-14-4**	**1.00 U**	**G1841-FS(0)**	**1.000**	**11/17/2020**	**0.27**	**1.00**	**5.00**
11Cl-PF3OUdS	763051-92-9	0.50 U	G1841-FS(0)	1.000	11/17/2020	0.23	0.50	5.00
9Cl-PF3ONS	**756426-58-1**	**1.00 U**	**G1841-FS(0)**	**1.000**	**11/17/2020**	**0.27**	**1.00**	**5.00**

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

Client ID	PX-H2805-WT02-1020
Battelle ID	G1842-FS
Sample Type	SA
Collection Date	10/20/2020
Extraction Date	10/28/2020
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	15.49	G1842-FS(0)	1.000	11/17/2020	0.52	1.47	4.90
PFHpA	**375-85-9**	**7.72**	**G1842-FS(0)**	**1.000**	**11/17/2020**	**0.25**	**0.98**	**4.90**
PFOA	335-67-1	27.46	G1842-FS(0)	1.000	11/17/2020	0.50	1.47	4.90
PFNA	**375-95-1**	**1.01 J**	**G1842-FS(0)**	**1.000**	**11/17/2020**	**0.30**	**0.98**	**4.90**
PFDA	335-76-2	0.49 U	G1842-FS(0)	1.000	11/17/2020	0.14	0.49	4.90
PFUnA	**2058-94-8**	**0.49 U**	**G1842-FS(0)**	**1.000**	**11/17/2020**	**0.22**	**0.49**	**4.90**
PFDoA	307-55-1	0.49 U	G1842-FS(0)	1.000	11/17/2020	0.19	0.49	4.90
PFTrDA	**72629-94-8**	**0.49 U**	**G1842-FS(0)**	**1.000**	**11/17/2020**	**0.15**	**0.49**	**4.90**
PFTeDA	376-06-7	1.96 U	G1842-FS(0)	1.000	11/17/2020	0.72	1.96	4.90
NMeFOSAA	**2355-31-9**	**0.98 U**	**G1842-FS(0)**	**1.000**	**11/17/2020**	**0.34**	**0.98**	**4.90**
NEtFOSAA	2991-50-6	0.98 U	G1842-FS(0)	1.000	11/17/2020	0.49	0.98	4.90
PFBS	**375-73-5**	**6.46**	**G1842-FS(0)**	**1.000**	**11/17/2020**	**0.14**	**0.49**	**4.90**
PFHxS	355-46-4	61.28	G1842-FS(0)	1.000	11/17/2020	0.11	0.39	4.90
PFOS	**1763-23-1**	**16.13**	**G1842-FS(0)**	**1.000**	**11/17/2020**	**0.43**	**0.98**	**4.90**
HFPO-DA	13252-13-6	0.49 U	G1842-FS(0)	1.000	11/17/2020	0.25	0.49	4.90
Adona	**919005-14-4**	**0.98 U**	**G1842-FS(0)**	**1.000**	**11/17/2020**	**0.26**	**0.98**	**4.90**
11Cl-PF3OUdS	763051-92-9	0.49 U	G1842-FS(0)	1.000	11/17/2020	0.23	0.49	4.90
9Cl-PF3ONS	**756426-58-1**	**0.98 U**	**G1842-FS(0)**	**1.000**	**11/17/2020**	**0.26**	**0.98**	**4.90**

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

Client ID		PX-H2805-WT02P-1020							
Battelle ID		G1843-FS							
Sample Type		SA							
Collection Date		10/20/2020							
Extraction Date		10/28/2020							
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	14.53		G1843-FS(0)	1.000	11/17/2020	0.52	1.47	4.90	
PFHpA	**375-85-9**	**7.71**		**G1843-FS(0)**	**1.000**	**11/17/2020**	**0.25**	**0.98**	**4.90**	
PFOA	335-67-1	30.69		G1843-FS(0)	1.000	11/17/2020	0.50	1.47	4.90	
PFNA	**375-95-1**	**0.99**	J	**G1843-FS(0)**	**1.000**	**11/17/2020**	**0.30**	**0.98**	**4.90**	
PFDA	335-76-2	0.49	U	G1843-FS(0)	1.000	11/17/2020	0.14	0.49	4.90	
PFUnA	**2058-94-8**	**0.49**	**U**	**G1843-FS(0)**	**1.000**	**11/17/2020**	**0.22**	**0.49**	**4.90**	
PFDoA	307-55-1	0.49	U	G1843-FS(0)	1.000	11/17/2020	0.19	0.49	4.90	
PFTrDA	**72629-94-8**	**0.49**	**U**	**G1843-FS(0)**	**1.000**	**11/17/2020**	**0.15**	**0.49**	**4.90**	
PFTeDA	376-06-7	1.96	J UJ	G1843-FS(0)	1.000	11/17/2020	0.72	1.96	4.90	SSL
NMeFOSAA	**2355-31-9**	**0.98**	**U**	**G1843-FS(0)**	**1.000**	**11/17/2020**	**0.34**	**0.98**	**4.90**	
NEtFOSAA	2991-50-6	0.98	U	G1843-FS(0)	1.000	11/17/2020	0.49	0.98	4.90	
PFBS	**375-73-5**	**6.03**		**G1843-FS(0)**	**1.000**	**11/17/2020**	**0.14**	**0.49**	**4.90**	
PFHxS	355-46-4	66.19		G1843-FS(0)	1.000	11/17/2020	0.11	0.39	4.90	
PFOS	**1763-23-1**	**16.06**		**G1843-FS(0)**	**1.000**	**11/17/2020**	**0.43**	**0.98**	**4.90**	
HFPO-DA	13252-13-6	0.49	U	G1843-FS(0)	1.000	11/17/2020	0.25	0.49	4.90	
Adona	**919005-14-4**	**0.98**	**U**	**G1843-FS(0)**	**1.000**	**11/17/2020**	**0.26**	**0.98**	**4.90**	
11Cl-PF3OUdS	763051-92-9	0.49	U	G1843-FS(0)	1.000	11/17/2020	0.23	0.49	4.90	
9Cl-PF3ONS	**756426-58-1**	**0.98**	**U**	**G1843-FS(0)**	**1.000**	**11/17/2020**	**0.26**	**0.98**	**4.90**	

MW 12.1.1/20
Analyzed by: Griffith, Lauren

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

Client ID	PX-H2805-WT02P-1020
Battelle ID	G1843-FS
Sample Type	SA
Collection Date	10/20/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	77	G1843-FS(0)	11/17/2020
13C4-PFHpA	**85**	**G1843-FS(0)**	**11/17/2020**
13C8-PFOA	82	G1843-FS(0)	11/17/2020
13C9-PFNA	**82**	**G1843-FS(0)**	**11/17/2020**
13C6-PFDA	77	G1843-FS(0)	11/17/2020
13C7-PFUnA	**70**	**G1843-FS(0)**	**11/17/2020**
13C2-PFDoA	57	G1843-FS(0)	11/17/2020
13C2-PFTeDA	**43** N	**G1843-FS(0)**	**11/17/2020**
d3-MeFOSAA	84	G1843-FS(0)	11/17/2020
d5-EtFOSAA	**82**	**G1843-FS(0)**	**11/17/2020**
13C3-PFBS	84	G1843-FS(0)	11/17/2020
13C3-PFHxS	**78**	**G1843-FS(0)**	**11/17/2020**
13C8-PFOS	74	G1843-FS(0)	11/17/2020
13C3-HFPO-DA	**78**	**G1843-FS(0)**	**11/17/2020**

MW 12/1/20
Analyzed by: Griffith, Lauren
Printed: 11/19/2020

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-1332
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: December 11, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-H2805-EB01-102020-SO	G1844-FS	Water
2	PX-B840-FB01-102120	G1848-FS	Water
3	PX-B840-EB01-102120-GW	G1849-FS	Water
4	PX-B840-WT01-1020	G1852-FS	Water
5	PX-B840-WT04-1020	G1855-FS	Water
5MS	PX-B840-WT04-1020MS	G1859-FSMS	Water
5MSD	PX-B840-WT04-1020MSD	G1860-FSMSD	Water
6	PX-B840-WT03-1020	G1865-FS	Water
7	PX-B840-EB01-102120-SO	G1870-FS	Water
8	PX-B840 WT02-1020	G1871-FS	Water
9	PX-B840-WT02P-1020	G1872-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for five water samples, three aqueous equipment blank samples, and one aqueous field blank sample collected on October 20-21, 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
LE58 1B	PFUnA	0.29	U	1, 6, 8
	PFBS	0.20	U	1, 2, 3, 7
	PFHxS	0.14	U	2
	11Cl-PF3OUdS	0.25	None	All Samples ND

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-H2805-EB01-102020-SO	None - ND	-	-	-
PX-B840-FB01-102120	None - ND	-	-	-
PX-B840-EB01-102120-GW	None - ND	-	-	-
PX-B840-EB01-102120-SO	None - ND	-	-	-

Surrogate Spike Recoveries

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

Laboratory Fortified Blank (LFB)

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

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

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

Internal Standard (IS) Area Performance

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

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- The samples were analyzed at various dilutions due to high concentrations of target compounds. The reporting limits were adjusted accordingly. No action was required.
- Several samples were re-extracted outside of holding times in SDG 20-1512 to verify surrogate deficiencies. Use the original analysis results for reporting purposes.

Field Duplicate Sample Precision

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

Compound	PX-B840-WT02-1020 ng/L	PX-B840-WT02P-1020 ng/L	RPD	Qualifier
PFHxA	1.96	1.82	7%	None
PFHpA	0.44	0.51	15%	
PFOA	1.84	1.79	3%	
PFBS	1.94	2.05	6%	
PFHxS	10.40	10.88	5%	
PFOS	5.00	5.74	14%	

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

Signed: Nancy Weaver Dated: 12/17/20

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-H2805-EB01-102020-SO
Battelle ID	G1844-FS
Sample Type	SA
Collection Date	10/20/2020
Extraction Date	10/29/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	AQ
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	G1844-FS(0)	1.000	11/17/2020	0.50	1.42	4.72	
PFHpA	375-85-9	0.94 U	G1844-FS(0)	1.000	11/17/2020	0.25	0.94	4.72	
PFOA	335-67-1	1.42 U	G1844-FS(0)	1.000	11/17/2020	0.48	1.42	4.72	
PFNA	375-95-1	0.94 U	G1844-FS(0)	1.000	11/17/2020	0.29	0.94	4.72	
PFDA	335-76-2	0.47 U	G1844-FS(0)	1.000	11/17/2020	0.13	0.47	4.72	
PFUnA	2058-94-8	0.47 ~~0.23~~ U	G1844-FS(0)	1.000	11/17/2020	0.21	0.47	4.72	MBL
PFDoA	307-55-1	0.47 U	G1844-FS(0)	1.000	11/17/2020	0.18	0.47	4.72	
PFTrDA	72629-94-8	0.47 U	G1844-FS(0)	1.000	11/17/2020	0.14	0.47	4.72	
PFTeDA	376-06-7	1.89 U	G1844-FS(0)	1.000	11/17/2020	0.69	1.89	4.72	
NMeFOSAA	2355-31-9	0.94 U	G1844-FS(0)	1.000	11/17/2020	0.33	0.94	4.72	
NEtFOSAA	2991-50-6	0.94 U	G1844-FS(0)	1.000	11/17/2020	0.47	0.94	4.72	
PFBS	375-73-5	0.47 ~~0.22~~ U	G1844-FS(0)	1.000	11/17/2020	0.13	0.47	4.72	MBL
PFHxS	355-46-4	0.38 U	G1844-FS(0)	1.000	11/17/2020	0.10	0.38	4.72	
PFOS	1763-23-1	0.94 U	G1844-FS(0)	1.000	11/17/2020	0.42	0.94	4.72	
HFPO-DA	13252-13-6	0.47 U	G1844-FS(0)	1.000	11/17/2020	0.24	0.47	4.72	
Adona	919005-14-4	0.94 U	G1844-FS(0)	1.000	11/17/2020	0.25	0.94	4.72	
11Cl-PF3OUdS	763051-92-9	0.47 U	G1844-FS(0)	1.000	11/17/2020	0.22	0.47	4.72	
9Cl-PF3ONS	756426-58-1	0.94 U	G1844-FS(0)	1.000	11/17/2020	0.25	0.94	4.72	

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2

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

Client ID	PX-B840-FB01-102120
Battelle ID	G1848-FS
Sample Type	SA
Collection Date	10/21/2020
Extraction Date	10/29/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	AQ
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	G1848-FS(0)	1.000	11/17/2020	0.50	1.42	4.72	
PFHpA	375-85-9	0.94 U	G1848-FS(0)	1.000	11/17/2020	0.25	0.94	4.72	
PFOA	335-67-1	1.42 U	G1848-FS(0)	1.000	11/17/2020	0.48	1.42	4.72	
PFNA	375-95-1	0.94 U	G1848-FS(0)	1.000	11/17/2020	0.29	0.94	4.72	
PFDA	335-76-2	0.47 U	G1848-FS(0)	1.000	11/17/2020	0.13	0.47	4.72	
PFUnA	2058-94-8	0.47 U	G1848-FS(0)	1.000	11/17/2020	0.21	0.47	4.72	
PFDoA	307-55-1	0.47 U	G1848-FS(0)	1.000	11/17/2020	0.18	0.47	4.72	
PFTrDA	72629-94-8	0.47 U	G1848-FS(0)	1.000	11/17/2020	0.14	0.47	4.72	
PFTeDA	376-06-7	1.89 U	G1848-FS(0)	1.000	11/17/2020	0.69	1.89	4.72	
NMeFOSAA	2355-31-9	0.94 U	G1848-FS(0)	1.000	11/17/2020	0.33	0.94	4.72	
NEtFOSAA	2991-50-6	0.94 U	G1848-FS(0)	1.000	11/17/2020	0.47	0.94	4.72	
PFBS	375-73-5	0.47 ~~0.15~~ U	G1848-FS(0)	1.000	11/17/2020	0.13	0.47	4.72	MBL
PFHxS	355-46-4	0.38 ~~0.10~~ U	G1848-FS(0)	1.000	11/17/2020	0.10	0.38	4.72	MBL
PFOS	1763-23-1	0.94 U	G1848-FS(0)	1.000	11/17/2020	0.42	0.94	4.72	
HFPO-DA	13252-13-6	0.47 U	G1848-FS(0)	1.000	11/17/2020	0.24	0.47	4.72	
Adona	919005-14-4	0.94 U	G1848-FS(0)	1.000	11/17/2020	0.25	0.94	4.72	
11Cl-PF3OUdS	763051-92-9	0.47 U	G1848-FS(0)	1.000	11/17/2020	0.22	0.47	4.72	
9Cl-PF3ONS	756426-58-1	0.94 U	G1848-FS(0)	1.000	11/17/2020	0.25	0.94	4.72	

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3

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

Client ID	PX-B840-EB01-102120-GW
Battelle ID	G1849-FS
Sample Type	SA
Collection Date	10/21/2020
Extraction Date	10/29/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	AQ
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	G1849-FS(0)	1.000	11/17/2020	0.51	1.44	4.81	
PFHpA	375-85-9	0.96 U	G1849-FS(0)	1.000	11/17/2020	0.25	0.96	4.81	
PFOA	335-67-1	1.44 U	G1849-FS(0)	1.000	11/17/2020	0.49	1.44	4.81	
PFNA	375-95-1	0.96 U	G1849-FS(0)	1.000	11/17/2020	0.30	0.96	4.81	
PFDA	335-76-2	0.48 U	G1849-FS(0)	1.000	11/17/2020	0.13	0.48	4.81	
PFUnA	2058-94-8	0.48 U	G1849-FS(0)	1.000	11/17/2020	0.21	0.48	4.81	
PFDoA	307-55-1	0.48 U	G1849-FS(0)	1.000	11/17/2020	0.18	0.48	4.81	
PFTrDA	72629-94-8	0.48 U	G1849-FS(0)	1.000	11/17/2020	0.14	0.48	4.81	
PFTeDA	376-06-7	1.92 U	G1849-FS(0)	1.000	11/17/2020	0.70	1.92	4.81	
NMeFOSAA	2355-31-9	0.96 U	G1849-FS(0)	1.000	11/17/2020	0.34	0.96	4.81	
NEtFOSAA	2991-50-6	0.96 U	G1849-FS(0)	1.000	11/17/2020	0.48	0.96	4.81	
PFBS	375-73-5	0.48 ~~0.17~~ U	G1849-FS(0)	1.000	11/17/2020	0.13	0.48	4.81	MBL
PFHxS	355-46-4	0.38 U	G1849-FS(0)	1.000	11/17/2020	0.11	0.38	4.81	
PFOS	1763-23-1	0.96 U	G1849-FS(0)	1.000	11/17/2020	0.42	0.96	4.81	
HFPO-DA	13252-13-6	0.48 U	G1849-FS(0)	1.000	11/17/2020	0.24	0.48	4.81	
Adona	919005-14-4	0.96 U	G1849-FS(0)	1.000	11/17/2020	0.26	0.96	4.81	
11Cl-PF3OUdS	763051-92-9	0.48 U	G1849-FS(0)	1.000	11/17/2020	0.22	0.48	4.81	
9Cl-PF3ONS	756426-58-1	0.96 U	G1849-FS(0)	1.000	11/17/2020	0.26	0.96	4.81	

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4

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

Client ID	PX-B840-WT01-1020
Battelle ID	G1852-FS
Sample Type	SA
Collection Date	10/21/2020
Extraction Date	10/29/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	GW
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	229.40 D	G1852-FS-D(3)	12.500	11/17/2020	6.37	18.03	60.10	
PFHpA	**375-85-9**	**135.41**	**G1852-FS(0)**	**1.000**	**11/17/2020**	**0.25**	**0.96**	**4.81**	
PFOA	335-67-1	79.98	G1852-FS(0)	1.000	11/17/2020	0.49	1.44	4.81	
PFNA	**375-95-1**	**43.50** J	**G1852-FS(0)**	**1.000**	**11/17/2020**	**0.30**	**0.96**	**4.81**	SSL
PFDA	335-76-2	0.38 J	G1852-FS(0)	1.000	11/17/2020	0.13	0.48	4.81	
PFUnA	**2058-94-8**	**0.48 U**	**G1852-FS(0)**	**1.000**	**11/17/2020**	**0.21**	**0.48**	**4.81**	
PFDoA	307-55-1	0.48 U	G1852-FS(0)	1.000	11/17/2020	0.18	0.48	4.81	
PFTrDA	**72629-94-8**	**0.48 U**	**G1852-FS(0)**	**1.000**	**11/17/2020**	**0.14**	**0.48**	**4.81**	
PFTeDA	376-06-7	1.92 U	G1852-FS(0)	1.000	11/17/2020	0.70	1.92	4.81	
NMeFOSAA	**2355-31-9**	**0.96 U**	**G1852-FS(0)**	**1.000**	**11/17/2020**	**0.34**	**0.96**	**4.81**	
NEtFOSAA	2991-50-6	0.96 U	G1852-FS(0)	1.000	11/17/2020	0.48	0.96	4.81	
PFBS	**375-73-5**	**17.48**	**G1852-FS(0)**	**1.000**	**11/17/2020**	**0.13**	**0.48**	**4.81**	
PFHxS	355-46-4	3533.65 D	G1852-FS-D(5)	62.500	11/17/2020	6.61	24.04	300.48	
PFOS	**1763-23-1**	**9620.95 D**	**G1852-FS-D(7)**	**312.500**	**11/18/2020**	**132.21**	**300.48**	**1502.40**	
HFPO-DA	13252-13-6	0.48 U	G1852-FS(0)	1.000	11/17/2020	0.24	0.48	4.81	
Adona	**919005-14-4**	**0.96 U**	**G1852-FS(0)**	**1.000**	**11/17/2020**	**0.26**	**0.96**	**4.81**	
11Cl-PF3OUdS	763051-92-9	0.48 U	G1852-FS(0)	1.000	11/17/2020	0.22	0.48	4.81	
9Cl-PF3ONS	**756426-58-1**	**0.96 U**	**G1852-FS(0)**	**1.000**	**11/17/2020**	**0.26**	**0.96**	**4.81**	

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

Client ID	PX-B840-WT01-1020
Battelle ID	G1852-FS
Sample Type	SA
Collection Date	10/21/2020
Extraction Date	10/29/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	95 D	G1852-FS-D(3)	11/17/2020
13C4-PFHpA	**60**	**G1852-FS(0)**	**11/17/2020**
13C8-PFOA	91	G1852-FS(0)	11/17/2020
13C9-PFNA	**36** M	**G1852-FS(0)**	**11/17/2020**
13C6-PFDA	87	G1852-FS(0)	11/17/2020
13C7-PFUnA	**88**	**G1852-FS(0)**	**11/17/2020**
13C2-PFDoA	77	G1852-FS(0)	11/17/2020
13C2-PFTeDA	**70**	**G1852-FS(0)**	**11/17/2020**
d3-MeFOSAA	99 D	G1852-FS-D(7)	11/18/2020
d5-EtFOSAA	**91** D	**G1852-FS-D(7)**	**11/18/2020**
13C3-PFBS	97 D	G1852-FS-D(7)	11/18/2020
13C3-PFHxS	**93** D	**G1852-FS-D(7)**	**11/18/2020**
13C8-PFOS	104 D	G1852-FS-D(7)	11/18/2020
13C3-HFPO-DA	**103**	**G1852-FS(0)**	**11/17/2020**

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

Client ID	PX-B840-WT04-1020
Battelle ID	G1855-FS
Sample Type	SA
Collection Date	10/21/2020
Extraction Date	10/29/2020
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	6.89	G1855-FS(0)	1.000	11/17/2020	0.49	1.39	4.63	
PFHpA	375-85-9	1.28 J	G1855-FS(0)	1.000	11/17/2020	0.24	0.93	4.63	
PFOA	335-67-1	9.12	G1855-FS(0)	1.000	11/17/2020	0.47	1.39	4.63	
PFNA	375-95-1	0.93 U	G1855-FS(0)	1.000	11/17/2020	0.29	0.93	4.63	
PFDA	335-76-2	0.46 U	G1855-FS(0)	1.000	11/17/2020	0.13	0.46	4.63	
PFUnA	2058-94-8	0.46 U	G1855-FS(0)	1.000	11/17/2020	0.20	0.46	4.63	
PFDoA	307-55-1	0.46 U	G1855-FS(0)	1.000	11/17/2020	0.18	0.46	4.63	
PFTrDA	72629-94-8	0.46 U	G1855-FS(0)	1.000	11/17/2020	0.14	0.46	4.63	
PFTeDA	376-06-7	1.85 J UJ	G1855-FS(0)	1.000	11/17/2020	0.68	1.85	4.63	SSL
NMeFOSAA	2355-31-9	0.93 U	G1855-FS(0)	1.000	11/17/2020	0.32	0.93	4.63	
NEtFOSAA	2991-50-6	0.93 U	G1855-FS(0)	1.000	11/17/2020	0.46	0.93	4.63	
PFBS	375-73-5	3.36 J	G1855-FS(0)	1.000	11/17/2020	0.13	0.46	4.63	
PFHxS	355-46-4	34.19	G1855-FS(0)	1.000	11/17/2020	0.10	0.37	4.63	
PFOS	1763-23-1	36.21	G1855-FS(0)	1.000	11/17/2020	0.41	0.93	4.63	
HFPO-DA	13252-13-6	0.46 U	G1855-FS(0)	1.000	11/17/2020	0.23	0.46	4.63	
Adona	919005-14-4	0.93 U	G1855-FS(0)	1.000	11/17/2020	0.25	0.93	4.63	
11Cl-PF3OUdS	763051-92-9	0.46 U	G1855-FS(0)	1.000	11/17/2020	0.21	0.46	4.63	
9Cl-PF3ONS	756426-58-1	0.93 U	G1855-FS(0)	1.000	11/17/2020	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-B840-WT04-1020
Battelle ID	G1855-FS
Sample Type	SA
Collection Date	10/21/2020
Extraction Date	10/29/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	86	G1855-FS(0)	11/17/2020
13C4-PFHpA	90	G1855-FS(0)	11/17/2020
13C8-PFOA	88	G1855-FS(0)	11/17/2020
13C9-PFNA	87	G1855-FS(0)	11/17/2020
13C6-PFDA	75	G1855-FS(0)	11/17/2020
13C7-PFUnA	68	G1855-FS(0)	11/17/2020
13C2-PFDoA	56	G1855-FS(0)	11/17/2020
13C2-PFTeDA	21	G1855-FS(0)	11/17/2020
d3-MeFOSAA	78	G1855-FS(0)	11/17/2020
d5-EtFOSAA	66	G1855-FS(0)	11/17/2020
13C3-PFBS	98	G1855-FS(0)	11/17/2020
13C3-PFHxS	89	G1855-FS(0)	11/17/2020
13C8-PFOS	91	G1855-FS(0)	11/17/2020
13C3-HFPO-DA	83	G1855-FS(0)	11/17/2020

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

b

Client ID	PX-B840-WT03-1020
Battelle ID	G1865-FS
Sample Type	SA
Collection Date	10/21/2020
Extraction Date	10/29/2020
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	690.05 D	G1865-FS-D(5)	62.500	11/17/2020	32.48	91.91	306.37	
PFHpA	**375-85-9**	**40.03**	**G1865-FS(0)**	**1.000**	**11/17/2020**	**0.25**	**0.98**	**4.90**	
PFOA	335-67-1	99.66	G1865-FS(0)	1.000	11/17/2020	0.50	1.47	4.90	
PFNA	**375-95-1**	**1.92 J**	**G1865-FS(0)**	**1.000**	**11/17/2020**	**0.30**	**0.98**	**4.90**	SSL
PFDA	335-76-2	0.49 U	G1865-FS(0)	1.000	11/17/2020	0.14	0.49	4.90	
PFUnA	**2058-94-8**	0.49 ~~0.307~~ U	**G1865-FS(0)**	**1.000**	**11/17/2020**	**0.22**	**0.49**	**4.90**	MBL
PFDoA	307-55-1	0.49 U	G1865-FS(0)	1.000	11/17/2020	0.19	0.49	4.90	
PFTrDA	**72629-94-8**	**0.49 U**	**G1865-FS(0)**	**1.000**	**11/17/2020**	**0.15**	**0.49**	**4.90**	
PFTeDA	376-06-7	1.96 UJ	G1865-FS(0)	1.000	11/17/2020	0.72	1.96	4.90	SSL
NMeFOSAA	**2355-31-9**	**0.98 U**	**G1865-FS(0)**	**1.000**	**11/17/2020**	**0.34**	**0.98**	**4.90**	
NEtFOSAA	2991-50-6	0.98 U	G1865-FS(0)	1.000	11/17/2020	0.49	0.98	4.90	
PFBS	**375-73-5**	**265.29 D**	**G1865-FS-D(3)**	**12.500**	**11/17/2020**	**1.72**	**6.13**	**61.27**	
PFHxS	355-46-4	7441.08 D	G1865-FS-D(7)	312.500	11/18/2020	33.70	122.55	1531.86	
PFOS	**1763-23-1**	**10655.80 D**	**G1865-FS-D(7)**	**312.500**	**11/18/2020**	**134.80**	**306.37**	**1531.86**	
HFPO-DA	13252-13-6	0.35 J	G1865-FS(0)	1.000	11/17/2020	0.25	0.49	4.90	
Adona	**919005-14-4**	**0.98 U**	**G1865-FS(0)**	**1.000**	**11/17/2020**	**0.26**	**0.98**	**4.90**	
11Cl-PF3OUdS	763051-92-9	0.49 U	G1865-FS(0)	1.000	11/17/2020	0.23	0.49	4.90	
9Cl-PF3ONS	**756426-58-1**	**0.98 U**	**G1865-FS(0)**	**1.000**	**11/17/2020**	**0.26**	**0.98**	**4.90**	

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

Client ID	PX-B840-WT03-1020
Battelle ID	G1865-FS
Sample Type	SA
Collection Date	10/21/2020
Extraction Date	10/29/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	99 D	G1865-FS-D(5)	11/17/2020
13C4-PFHpA	**59**	**G1865-FS(0)**	**11/17/2020**
13C8-PFOA	85	G1865-FS(0)	11/17/2020
13C9-PFNA	**43** M	**G1865-FS(0)**	**11/17/2020**
13C6-PFDA	92	G1865-FS(0)	11/17/2020
13C7-PFUnA	**73**	**G1865-FS(0)**	**11/17/2020**
13C2-PFDoA	61	G1865-FS(0)	11/17/2020
13C2-PFTeDA	**18** M	**G1865-FS(0)**	**11/17/2020**
d3-MeFOSAA	96 D	G1865-FS-D(7)	11/18/2020
d5-EtFOSAA	**96** D	**G1865-FS-D(7)**	**11/18/2020**
13C3-PFBS	101 D	G1865-FS-D(7)	11/18/2020
13C3-PFHxS	**104** D	**G1865-FS-D(7)**	**11/18/2020**
13C8-PFOS	103 D	G1865-FS-D(7)	11/18/2020
13C3-HFPO-DA	**122**	**G1865-FS(0)**	**11/17/2020**

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

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Client ID	PX-B840-EB01-102120-SO
Battelle ID	G1870-FS
Sample Type	SA
Collection Date	10/21/2020
Extraction Date	10/29/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	AQ
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	G1870-FS(0)	1.000	11/17/2020	0.50	1.42	4.72	
PFHpA	**375-85-9**	**0.94 U**	**G1870-FS(0)**	**1.000**	**11/17/2020**	**0.25**	**0.94**	**4.72**	
PFOA	335-67-1	1.42 U	G1870-FS(0)	1.000	11/17/2020	0.48	1.42	4.72	
PFNA	**375-95-1**	**0.94 U**	**G1870-FS(0)**	**1.000**	**11/17/2020**	**0.29**	**0.94**	**4.72**	
PFDA	335-76-2	0.47 U	G1870-FS(0)	1.000	11/17/2020	0.13	0.47	4.72	
PFUnA	**2058-94-8**	**0.47 U**	**G1870-FS(0)**	**1.000**	**11/17/2020**	**0.21**	**0.47**	**4.72**	
PFDoA	307-55-1	0.47 U	G1870-FS(0)	1.000	11/17/2020	0.18	0.47	4.72	
PFTrDA	**72629-94-8**	**0.47 U**	**G1870-FS(0)**	**1.000**	**11/17/2020**	**0.14**	**0.47**	**4.72**	
PFTeDA	376-06-7	1.89 U	G1870-FS(0)	1.000	11/17/2020	0.69	1.89	4.72	
NMeFOSAA	**2355-31-9**	**0.94 U**	**G1870-FS(0)**	**1.000**	**11/17/2020**	**0.33**	**0.94**	**4.72**	
NEtFOSAA	2991-50-6	0.94 U	G1870-FS(0)	1.000	11/17/2020	0.47	0.94	4.72	
PFBS	**375-73-5**	0.47 ~~0.17~~ U	**G1870-FS(0)**	**1.000**	**11/17/2020**	**0.13**	**0.47**	**4.72**	MBL
PFHxS	355-46-4	0.38 U	G1870-FS(0)	1.000	11/17/2020	0.10	0.38	4.72	
PFOS	**1763-23-1**	**0.94 U**	**G1870-FS(0)**	**1.000**	**11/17/2020**	**0.42**	**0.94**	**4.72**	
HFPO-DA	13252-13-6	0.47 U	G1870-FS(0)	1.000	11/17/2020	0.24	0.47	4.72	
Adona	**919005-14-4**	**0.94 U**	**G1870-FS(0)**	**1.000**	**11/17/2020**	**0.25**	**0.94**	**4.72**	
11Cl-PF3OUdS	763051-92-9	0.47 U	G1870-FS(0)	1.000	11/17/2020	0.22	0.47	4.72	
9Cl-PF3ONS	**756426-58-1**	**0.94 U**	**G1870-FS(0)**	**1.000**	**11/17/2020**	**0.25**	**0.94**	**4.72**	

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

Client ID		PX-B840-WT02-1020							
Battelle ID		G1871-FS							
Sample Type		SA							
Collection Date		10/21/2020							
Extraction Date		10/29/2020							
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	1.96	J	G1871-FS(0)	1.000	11/17/2020	0.50	1.42	4.72
PFHpA	375-85-9	0.44	J	G1871-FS(0)	1.000	11/17/2020	0.25	0.94	4.72
PFOA	335-67-1	1.84	J	G1871-FS(0)	1.000	11/17/2020	0.48	1.42	4.72
PFNA	375-95-1	0.94	U	G1871-FS(0)	1.000	11/17/2020	0.29	0.94	4.72
PFDA	335-76-2	0.47	U	G1871-FS(0)	1.000	11/17/2020	0.13	0.47	4.72
PFUnA	2058-94-8	0.47 ~~0.27~~	U	G1871-FS(0)	1.000	11/17/2020	0.21	0.47	4.72
PFDoA	307-55-1	0.47	U	G1871-FS(0)	1.000	11/17/2020	0.18	0.47	4.72
PFTrDA	72629-94-8	0.47	U	G1871-FS(0)	1.000	11/17/2020	0.14	0.47	4.72
PFTeDA	376-06-7	1.89	U	G1871-FS(0)	1.000	11/17/2020	0.69	1.89	4.72
NMeFOSAA	2355-31-9	0.94	U	G1871-FS(0)	1.000	11/17/2020	0.33	0.94	4.72
NEtFOSAA	2991-50-6	0.94	U	G1871-FS(0)	1.000	11/17/2020	0.47	0.94	4.72
PFBS	375-73-5	1.94	J	G1871-FS(0)	1.000	11/17/2020	0.13	0.47	4.72
PFHxS	355-46-4	10.40		G1871-FS(0)	1.000	11/17/2020	0.10	0.38	4.72
PFOS	1763-23-1	5.00		G1871-FS(0)	1.000	11/17/2020	0.42	0.94	4.72
HFPO-DA	13252-13-6	0.47	U	G1871-FS(0)	1.000	11/17/2020	0.24	0.47	4.72
Adona	919005-14-4	0.94	U	G1871-FS(0)	1.000	11/17/2020	0.25	0.94	4.72
11Cl-PF3OUdS	763051-92-9	0.47	U	G1871-FS(0)	1.000	11/17/2020	0.22	0.47	4.72
9Cl-PF3ONS	756426-58-1	0.94	U	G1871-FS(0)	1.000	11/17/2020	0.25	0.94	4.72

0.47 U MBL

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

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Client ID		PX-B840-WT02P-1020						
Battelle ID		G1872-FS						
Sample Type		SA						
Collection Date		10/21/2020						
Extraction Date		10/29/2020						
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	1.82 J	G1872-FS(0)	1.000	11/17/2020	0.49	1.39	4.63
PFHpA	375-85-9	0.51 J	G1872-FS(0)	1.000	11/17/2020	0.24	0.93	4.63
PFOA	335-67-1	1.79 J	G1872-FS(0)	1.000	11/17/2020	0.47	1.39	4.63
PFNA	375-95-1	0.93 U	G1872-FS(0)	1.000	11/17/2020	0.29	0.93	4.63
PFDA	335-76-2	0.46 U	G1872-FS(0)	1.000	11/17/2020	0.13	0.46	4.63
PFUnA	2058-94-8	0.46 U	G1872-FS(0)	1.000	11/17/2020	0.20	0.46	4.63
PFDoA	307-55-1	0.46 U	G1872-FS(0)	1.000	11/17/2020	0.18	0.46	4.63
PFTrDA	72629-94-8	0.46 U	G1872-FS(0)	1.000	11/17/2020	0.14	0.46	4.63
PFTeDA	376-06-7	1.85 U	G1872-FS(0)	1.000	11/17/2020	0.68	1.85	4.63
NMeFOSAA	2355-31-9	0.93 U	G1872-FS(0)	1.000	11/17/2020	0.32	0.93	4.63
NEtFOSAA	2991-50-6	0.93 U	G1872-FS(0)	1.000	11/17/2020	0.46	0.93	4.63
PFBS	375-73-5	2.05 J	G1872-FS(0)	1.000	11/17/2020	0.13	0.46	4.63
PFHxS	355-46-4	10.88	G1872-FS(0)	1.000	11/17/2020	0.10	0.37	4.63
PFOS	1763-23-1	5.74	G1872-FS(0)	1.000	11/17/2020	0.41	0.93	4.63
HFPO-DA	13252-13-6	0.46 U	G1872-FS(0)	1.000	11/17/2020	0.23	0.46	4.63
Adona	919005-14-4	0.93 U	G1872-FS(0)	1.000	11/17/2020	0.25	0.93	4.63
11Cl-PF3OUdS	763051-92-9	0.46 U	G1872-FS(0)	1.000	11/17/2020	0.21	0.46	4.63
9Cl-PF3ONS	756426-58-1	0.93 U	G1872-FS(0)	1.000	11/17/2020	0.25	0.93	4.63

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-1333
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: December 11, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-H2805-SS07-000H	G1816-FS	Soil
2	PX-H2805-SB07-0304	G1817-FS	Soil
3	PX-H2805-SS06-000H	G1818-FS	Soil
4	PX-H2805-SB06-0304	G1819-FS	Soil
5	PX-H2805-SS05-000H	G1821-FS	Soil
6	PX-H2805-SS05P-000H	G1822-FS	Soil
7	PX-H2805-SB05-0304	G1823-FS	Soil
8	PX-H2805-SS04-000H	G1825-FS	Soil
9	PX-H2805-SB04-0304	G1826-FS	Soil
10	PX-H2805-SS03-000H	G1829-FS	Soil
10MS	PX-H2805-SS03-000HMS	G1830-FSMS	Soil
10MSD	PX-H2805-SS03-000HMSD	G1831-FSMSD	Soil
11	PX-H2805-SB03-0304	G1832-FS	Soil
12	PX-H2805-SS01-000H	G1836-FS	Soil
13	PX-H2805-SB01-0304	G1837-FS	Soil
14	PX-H2805-SB01P-0304	G1838-FS	Soil
15	PX-H2805-SS02-000H	G1839-FS	Soil

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

Specific method references are as follows:

Analysis	*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. There were no qualifications.

Per- and Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

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

Holding Times

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

LC/MS Tuning

- All criteria were met.

Initial Calibration

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

Continuing Calibration

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

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-B840-FB01-102120	None - ND	-	-	-
PX-H2805-EB01-102020-SO	None - ND	-	-	-
PX-B840-EB01-102120-GW	None - ND	-	-	-

Surrogate Spike Recoveries

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

Laboratory Fortified Blank (LFB)

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

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

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

Internal Standard (IS) Area Performance

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

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

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

Compound	PX-H2805-SS05-000H ng/g	PX-H2805-SS05P-000H ng/g	RPD	Qualifier
PFNA	0.63	1.20	62%	None - <5X LOQ

Compound	PX-H2805-SB01-0304 ng/g	PX-H2805-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: 12/17/20

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-H2805-SS07-000H
Battelle ID	G1816-FS
Sample Type	SA
Collection Date	10/20/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	12.72
Matrix	SO
Sample Size	1.87
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.14 U	G1816-FS(3)	10.000	11/14/2020	0.76	2.14	5.35
PFHpA	375-85-9	1.60 U	G1816-FS(3)	10.000	11/14/2020	0.55	1.60	5.35
PFOA	335-67-1	2.14 U	G1816-FS(3)	10.000	11/14/2020	0.65	2.14	5.35
PFNA	375-95-1	1.07 U	G1816-FS(3)	10.000	11/14/2020	0.52	1.07	5.35
PFDA	335-76-2	1.07 U	G1816-FS(3)	10.000	11/14/2020	0.49	1.07	5.35
PFUnA	2058-94-8	1.07 U	G1816-FS(3)	10.000	11/14/2020	0.49	1.07	5.35
PFDoA	307-55-1	2.14 U	G1816-FS(3)	10.000	11/14/2020	0.65	2.14	5.35
PFTrDA	72629-94-8	1.07 U	G1816-FS(3)	10.000	11/14/2020	0.30	1.07	5.35
PFTeDA	376-06-7	2.67 U	G1816-FS(3)	10.000	11/14/2020	1.16	2.67	5.35
NMeFOSAA	2355-31-9	2.67 U	G1816-FS(3)	10.000	11/14/2020	1.09	2.67	5.35
NEtFOSAA	2991-50-6	2.14 U	G1816-FS(3)	10.000	11/14/2020	0.80	2.14	5.35
PFBS	375-73-5	1.07 U	G1816-FS(3)	10.000	11/14/2020	0.37	1.07	5.35
PFHxS	355-46-4	2.14 U	G1816-FS(3)	10.000	11/14/2020	0.87	2.14	5.35
PFOS	1763-23-1	1.99 J	G1816-FS(3)	10.000	11/14/2020	0.74	2.14	5.35
HFPO-DA	13252-13-6	2.14 U	G1816-FS(3)	10.000	11/14/2020	0.68	2.14	5.35
Adona	919005-14-4	2.14 U	G1816-FS(3)	10.000	11/14/2020	0.89	2.14	5.35
11Cl-PF3OUdS	763051-92-9	1.60 U	G1816-FS(3)	10.000	11/14/2020	0.56	1.60	5.35
9Cl-PF3ONS	756426-58-1	1.07 U	G1816-FS(3)	10.000	11/14/2020	0.51	1.07	5.35

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2

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

Client ID	PX-H2805-SB07-0304
Battelle ID	G1817-FS
Sample Type	SA
Collection Date	10/20/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	5.96
Matrix	SO
Sample Size	1.94
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.06 U	G1817-FS(3)	10.000	11/14/2020	0.73	2.06	5.15
PFHpA	**375-85-9**	**1.55 U**	**G1817-FS(3)**	**10.000**	**11/14/2020**	**0.53**	**1.55**	**5.15**
PFOA	335-67-1	2.06 U	G1817-FS(3)	10.000	11/14/2020	0.63	2.06	5.15
PFNA	**375-95-1**	**1.03 U**	**G1817-FS(3)**	**10.000**	**11/14/2020**	**0.51**	**1.03**	**5.15**
PFDA	335-76-2	1.03 U	G1817-FS(3)	10.000	11/14/2020	0.47	1.03	5.15
PFUnA	**2058-94-8**	**1.03 U**	**G1817-FS(3)**	**10.000**	**11/14/2020**	**0.47**	**1.03**	**5.15**
PFDoA	307-55-1	2.06 U	G1817-FS(3)	10.000	11/14/2020	0.63	2.06	5.15
PFTrDA	**72629-94-8**	**1.03 U**	**G1817-FS(3)**	**10.000**	**11/14/2020**	**0.29**	**1.03**	**5.15**
PFTeDA	376-06-7	2.58 U	G1817-FS(3)	10.000	11/14/2020	1.11	2.58	5.15
NMeFOSAA	**2355-31-9**	**2.58 U**	**G1817-FS(3)**	**10.000**	**11/14/2020**	**1.05**	**2.58**	**5.15**
NEtFOSAA	2991-50-6	2.06 U	G1817-FS(3)	10.000	11/14/2020	0.77	2.06	5.15
PFBS	**375-73-5**	**1.03 U**	**G1817-FS(3)**	**10.000**	**11/14/2020**	**0.36**	**1.03**	**5.15**
PFHxS	355-46-4	2.06 U	G1817-FS(3)	10.000	11/14/2020	0.84	2.06	5.15
PFOS	**1763-23-1**	**2.06 U**	**G1817-FS(3)**	**10.000**	**11/14/2020**	**0.71**	**2.06**	**5.15**
HFPO-DA	13252-13-6	2.06 U	G1817-FS(3)	10.000	11/14/2020	0.66	2.06	5.15
Adona	**919005-14-4**	**2.06 U**	**G1817-FS(3)**	**10.000**	**11/14/2020**	**0.86**	**2.06**	**5.15**
11Cl-PF3OUdS	763051-92-9	1.55 U	G1817-FS(3)	10.000	11/14/2020	0.54	1.55	5.15
9Cl-PF3ONS	**756426-58-1**	**1.03 U**	**G1817-FS(3)**	**10.000**	**11/14/2020**	**0.49**	**1.03**	**5.15**

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3

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

Client ID	PX-H2805-SS06-000H
Battelle ID	G1818-FS
Sample Type	SA
Collection Date	10/20/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	10.17
Matrix	SO
Sample Size	1.96
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.04 U	G1818-FS(3)	10.000	11/14/2020	0.72	2.04	5.10
PFHpA	375-85-9	1.53 U	G1818-FS(3)	10.000	11/14/2020	0.52	1.53	5.10
PFOA	335-67-1	2.04 U	G1818-FS(3)	10.000	11/14/2020	0.62	2.04	5.10
PFNA	375-95-1	1.02 U	G1818-FS(3)	10.000	11/14/2020	0.50	1.02	5.10
PFDA	335-76-2	1.02 U	G1818-FS(3)	10.000	11/14/2020	0.47	1.02	5.10
PFUnA	2058-94-8	1.02 U	G1818-FS(3)	10.000	11/14/2020	0.47	1.02	5.10
PFDoA	307-55-1	2.04 U	G1818-FS(3)	10.000	11/14/2020	0.62	2.04	5.10
PFTrDA	72629-94-8	1.02 U	G1818-FS(3)	10.000	11/14/2020	0.29	1.02	5.10
PFTeDA	376-06-7	2.55 U	G1818-FS(3)	10.000	11/14/2020	1.10	2.55	5.10
NMeFOSAA	2355-31-9	2.55 U	G1818-FS(3)	10.000	11/14/2020	1.04	2.55	5.10
NEtFOSAA	2991-50-6	2.04 U	G1818-FS(3)	10.000	11/14/2020	0.77	2.04	5.10
PFBS	375-73-5	1.02 U	G1818-FS(3)	10.000	11/14/2020	0.36	1.02	5.10
PFHxS	355-46-4	2.04 U	G1818-FS(3)	10.000	11/14/2020	0.83	2.04	5.10
PFOS	1763-23-1	2.04 U	G1818-FS(3)	10.000	11/14/2020	0.70	2.04	5.10
HFPO-DA	13252-13-6	2.04 U	G1818-FS(3)	10.000	11/14/2020	0.65	2.04	5.10
Adona	919005-14-4	2.04 U	G1818-FS(3)	10.000	11/14/2020	0.85	2.04	5.10
11Cl-PF3OUdS	763051-92-9	1.53 U	G1818-FS(3)	10.000	11/14/2020	0.53	1.53	5.10
9Cl-PF3ONS	756426-58-1	1.02 U	G1818-FS(3)	10.000	11/14/2020	0.49	1.02	5.10

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4

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

Client ID	PX-H2805-SB06-0304
Battelle ID	G1819-FS
Sample Type	SA
Collection Date	10/20/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	6.70
Matrix	SO
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	G1819-FS(3)	10.000	11/14/2020	0.76	2.15	5.38
PFHpA	375-85-9	1.61 U	G1819-FS(3)	10.000	11/14/2020	0.55	1.61	5.38
PFOA	335-67-1	2.15 U	G1819-FS(3)	10.000	11/14/2020	0.66	2.15	5.38
PFNA	375-95-1	1.08 U	G1819-FS(3)	10.000	11/14/2020	0.53	1.08	5.38
PFDA	335-76-2	1.08 U	G1819-FS(3)	10.000	11/14/2020	0.49	1.08	5.38
PFUnA	2058-94-8	1.08 U	G1819-FS(3)	10.000	11/14/2020	0.49	1.08	5.38
PFDoA	307-55-1	2.15 U	G1819-FS(3)	10.000	11/14/2020	0.66	2.15	5.38
PFTrDA	72629-94-8	1.08 U	G1819-FS(3)	10.000	11/14/2020	0.30	1.08	5.38
PFTeDA	376-06-7	2.69 U	G1819-FS(3)	10.000	11/14/2020	1.16	2.69	5.38
NMeFOSAA	2355-31-9	2.69 U	G1819-FS(3)	10.000	11/14/2020	1.10	2.69	5.38
NEtFOSAA	2991-50-6	2.15 U	G1819-FS(3)	10.000	11/14/2020	0.81	2.15	5.38
PFBS	375-73-5	1.08 U	G1819-FS(3)	10.000	11/14/2020	0.38	1.08	5.38
PFHxS	355-46-4	2.15 U	G1819-FS(3)	10.000	11/14/2020	0.87	2.15	5.38
PFOS	1763-23-1	2.15 U	G1819-FS(3)	10.000	11/14/2020	0.74	2.15	5.38
HFPO-DA	13252-13-6	2.15 U	G1819-FS(3)	10.000	11/14/2020	0.69	2.15	5.38
Adona	919005-14-4	2.15 U	G1819-FS(3)	10.000	11/14/2020	0.89	2.15	5.38
11Cl-PF3OUdS	763051-92-9	1.61 U	G1819-FS(3)	10.000	11/14/2020	0.56	1.61	5.38
9Cl-PF3ONS	756426-58-1	1.08 U	G1819-FS(3)	10.000	11/14/2020	0.52	1.08	5.38

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5

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

Client ID	PX-H2805-SS05-000H
Battelle ID	G1821-FS
Sample Type	SA
Collection Date	10/20/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	8.64
Matrix	SO
Sample Size	1.85
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.16 U	G1821-FS(3)	10.000	11/14/2020	0.77	2.16	5.41
PFHpA	375-85-9	1.62 U	G1821-FS(3)	10.000	11/14/2020	0.55	1.62	5.41
PFOA	335-67-1	2.16 U	G1821-FS(3)	10.000	11/14/2020	0.66	2.16	5.41
PFNA	375-95-1	0.63 J	G1821-FS(3)	10.000	11/14/2020	0.53	1.08	5.41
PFDA	335-76-2	1.08 U	G1821-FS(3)	10.000	11/14/2020	0.50	1.08	5.41
PFUnA	2058-94-8	1.08 U	G1821-FS(3)	10.000	11/14/2020	0.50	1.08	5.41
PFDoA	307-55-1	2.16 U	G1821-FS(3)	10.000	11/14/2020	0.66	2.16	5.41
PFTrDA	72629-94-8	1.08 U	G1821-FS(3)	10.000	11/14/2020	0.30	1.08	5.41
PFTeDA	376-06-7	2.70 U	G1821-FS(3)	10.000	11/14/2020	1.17	2.70	5.41
NMeFOSAA	2355-31-9	2.70 U	G1821-FS(3)	10.000	11/14/2020	1.10	2.70	5.41
NEtFOSAA	2991-50-6	2.16 U	G1821-FS(3)	10.000	11/14/2020	0.81	2.16	5.41
PFBS	375-73-5	1.08 U	G1821-FS(3)	10.000	11/14/2020	0.38	1.08	5.41
PFHxS	355-46-4	2.16 U	G1821-FS(3)	10.000	11/14/2020	0.88	2.16	5.41
PFOS	1763-23-1	2.16 U	G1821-FS(3)	10.000	11/14/2020	0.75	2.16	5.41
HFPO-DA	13252-13-6	2.16 U	G1821-FS(3)	10.000	11/14/2020	0.69	2.16	5.41
Adona	919005-14-4	2.16 U	G1821-FS(3)	10.000	11/14/2020	0.90	2.16	5.41
11Cl-PF3OUdS	763051-92-9	1.62 U	G1821-FS(3)	10.000	11/14/2020	0.56	1.62	5.41
9Cl-PF3ONS	756426-58-1	1.08 U	G1821-FS(3)	10.000	11/14/2020	0.52	1.08	5.41

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6

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

Client ID	PX-H2805-SS05P-000H
Battelle ID	G1822-FS
Sample Type	SA
Collection Date	10/20/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	7.79
Matrix	SO
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	G1822-FS(3)	10.000	11/14/2020	0.82	2.31	5.78
PFHpA	375-85-9	1.73 U	G1822-FS(3)	10.000	11/14/2020	0.59	1.73	5.78
PFOA	335-67-1	2.31 U	G1822-FS(3)	10.000	11/14/2020	0.71	2.31	5.78
PFNA	375-95-1	1.20 J	G1822-FS(3)	10.000	11/14/2020	0.57	1.16	5.78
PFDA	335-76-2	1.16 U	G1822-FS(3)	10.000	11/14/2020	0.53	1.16	5.78
PFUnA	2058-94-8	1.16 U	G1822-FS(3)	10.000	11/14/2020	0.53	1.16	5.78
PFDoA	307-55-1	2.31 U	G1822-FS(3)	10.000	11/14/2020	0.71	2.31	5.78
PFTrDA	72629-94-8	1.16 U	G1822-FS(3)	10.000	11/14/2020	0.32	1.16	5.78
PFTeDA	376-06-7	2.89 U	G1822-FS(3)	10.000	11/14/2020	1.25	2.89	5.78
NMeFOSAA	2355-31-9	2.89 U	G1822-FS(3)	10.000	11/14/2020	1.18	2.89	5.78
NEtFOSAA	2991-50-6	2.31 U	G1822-FS(3)	10.000	11/14/2020	0.87	2.31	5.78
PFBS	375-73-5	1.16 U	G1822-FS(3)	10.000	11/14/2020	0.40	1.16	5.78
PFHxS	355-46-4	2.31 U	G1822-FS(3)	10.000	11/14/2020	0.94	2.31	5.78
PFOS	1763-23-1	2.31 U	G1822-FS(3)	10.000	11/14/2020	0.80	2.31	5.78
HFPO-DA	13252-13-6	2.31 U	G1822-FS(3)	10.000	11/14/2020	0.74	2.31	5.78
Adona	919005-14-4	2.31 U	G1822-FS(3)	10.000	11/14/2020	0.96	2.31	5.78
11Cl-PF3OUdS	763051-92-9	1.73 U	G1822-FS(3)	10.000	11/14/2020	0.60	1.73	5.78
9Cl-PF3ONS	756426-58-1	1.16 U	G1822-FS(3)	10.000	11/14/2020	0.55	1.16	5.78

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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-H2805-SB05-0304
Battelle ID	G1823-FS
Sample Type	SA
Collection Date	10/20/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	13.48
Matrix	SO
Sample Size	1.61
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.48 U	G1823-FS(3)	10.000	11/14/2020	0.88	2.48	6.21
PFHpA	**375-85-9**	**1.86 U**	**G1823-FS(3)**	**10.000**	**11/14/2020**	**0.63**	**1.86**	**6.21**
PFOA	335-67-1	2.48 U	G1823-FS(3)	10.000	11/14/2020	0.76	2.48	6.21
PFNA	**375-95-1**	**1.24 U**	**G1823-FS(3)**	**10.000**	**11/14/2020**	**0.61**	**1.24**	**6.21**
PFDA	335-76-2	1.24 U	G1823-FS(3)	10.000	11/14/2020	0.57	1.24	6.21
PFUnA	**2058-94-8**	**1.24 U**	**G1823-FS(3)**	**10.000**	**11/14/2020**	**0.57**	**1.24**	**6.21**
PFDoA	307-55-1	2.48 U	G1823-FS(3)	10.000	11/14/2020	0.76	2.48	6.21
PFTrDA	**72629-94-8**	**1.24 U**	**G1823-FS(3)**	**10.000**	**11/14/2020**	**0.35**	**1.24**	**6.21**
PFTeDA	376-06-7	3.11 U	G1823-FS(3)	10.000	11/14/2020	1.34	3.11	6.21
NMeFOSAA	**2355-31-9**	**3.11 U**	**G1823-FS(3)**	**10.000**	**11/14/2020**	**1.27**	**3.11**	**6.21**
NEtFOSAA	2991-50-6	2.48 U	G1823-FS(3)	10.000	11/14/2020	0.93	2.48	6.21
PFBS	**375-73-5**	**1.24 U**	**G1823-FS(3)**	**10.000**	**11/14/2020**	**0.43**	**1.24**	**6.21**
PFHxS	355-46-4	2.48 U	G1823-FS(3)	10.000	11/14/2020	1.01	2.48	6.21
PFOS	**1763-23-1**	**2.48 U**	**G1823-FS(3)**	**10.000**	**11/14/2020**	**0.86**	**2.48**	**6.21**
HFPO-DA	13252-13-6	2.48 U	G1823-FS(3)	10.000	11/14/2020	0.80	2.48	6.21
Adona	**919005-14-4**	**2.48 U**	**G1823-FS(3)**	**10.000**	**11/14/2020**	**1.03**	**2.48**	**6.21**
11Cl-PF3OUdS	763051-92-9	1.86 U	G1823-FS(3)	10.000	11/14/2020	0.65	1.86	6.21
9Cl-PF3ONS	**756426-58-1**	**1.24 U**	**G1823-FS(3)**	**10.000**	**11/14/2020**	**0.60**	**1.24**	**6.21**

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

Client ID	PX-H2805-SS04-000H
Battelle ID	G1825-FS
Sample Type	SA
Collection Date	10/20/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	10.92
Matrix	SO
Sample Size	1.84
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.17 U	G1825-FS(3)	10.000	11/14/2020	0.77	2.17	5.43
PFHpA	375-85-9	1.63 U	G1825-FS(3)	10.000	11/14/2020	0.55	1.63	5.43
PFOA	335-67-1	2.17 U	G1825-FS(3)	10.000	11/14/2020	0.66	2.17	5.43
PFNA	375-95-1	1.09 U	G1825-FS(3)	10.000	11/14/2020	0.53	1.09	5.43
PFDA	335-76-2	1.09 U	G1825-FS(3)	10.000	11/14/2020	0.50	1.09	5.43
PFUnA	2058-94-8	1.09 U	G1825-FS(3)	10.000	11/14/2020	0.50	1.09	5.43
PFDoA	307-55-1	2.17 U	G1825-FS(3)	10.000	11/14/2020	0.66	2.17	5.43
PFTrDA	72629-94-8	1.09 U	G1825-FS(3)	10.000	11/14/2020	0.30	1.09	5.43
PFTeDA	376-06-7	2.72 U	G1825-FS(3)	10.000	11/14/2020	1.17	2.72	5.43
NMeFOSAA	2355-31-9	2.72 U	G1825-FS(3)	10.000	11/14/2020	1.11	2.72	5.43
NEtFOSAA	2991-50-6	2.17 U	G1825-FS(3)	10.000	11/14/2020	0.82	2.17	5.43
PFBS	375-73-5	1.09 U	G1825-FS(3)	10.000	11/14/2020	0.38	1.09	5.43
PFHxS	355-46-4	2.17 U	G1825-FS(3)	10.000	11/14/2020	0.88	2.17	5.43
PFOS	1763-23-1	0.95 J	G1825-FS(3)	10.000	11/14/2020	0.75	2.17	5.43
HFPO-DA	13252-13-6	2.17 U	G1825-FS(3)	10.000	11/14/2020	0.70	2.17	5.43
Adona	919005-14-4	2.17 U	G1825-FS(3)	10.000	11/14/2020	0.90	2.17	5.43
11Cl-PF3OUdS	763051-92-9	1.63 U	G1825-FS(3)	10.000	11/14/2020	0.57	1.63	5.43
9Cl-PF3ONS	756426-58-1	1.09 U	G1825-FS(3)	10.000	11/14/2020	0.52	1.09	5.43

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

Client ID	PX-H2805-SB04-0304
Battelle ID	G1826-FS
Sample Type	SA
Collection Date	10/20/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	13.15
Matrix	SO
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	G1826-FS(3)	10.000	11/14/2020	0.81	2.29	5.71
PFHpA	375-85-9	1.71 U	G1826-FS(3)	10.000	11/14/2020	0.58	1.71	5.71
PFOA	335-67-1	2.29 U	G1826-FS(3)	10.000	11/14/2020	0.70	2.29	5.71
PFNA	375-95-1	1.14 U	G1826-FS(3)	10.000	11/14/2020	0.56	1.14	5.71
PFDA	335-76-2	1.14 U	G1826-FS(3)	10.000	11/14/2020	0.53	1.14	5.71
PFUnA	2058-94-8	1.14 U	G1826-FS(3)	10.000	11/14/2020	0.53	1.14	5.71
PFDoA	307-55-1	2.29 U	G1826-FS(3)	10.000	11/14/2020	0.70	2.29	5.71
PFTrDA	72629-94-8	1.14 U	G1826-FS(3)	10.000	11/14/2020	0.32	1.14	5.71
PFTeDA	376-06-7	2.86 U	G1826-FS(3)	10.000	11/14/2020	1.23	2.86	5.71
NMeFOSAA	2355-31-9	2.86 U	G1826-FS(3)	10.000	11/14/2020	1.17	2.86	5.71
NEtFOSAA	2991-50-6	2.29 U	G1826-FS(3)	10.000	11/14/2020	0.86	2.29	5.71
PFBS	375-73-5	1.14 U	G1826-FS(3)	10.000	11/14/2020	0.40	1.14	5.71
PFHxS	355-46-4	2.29 U	G1826-FS(3)	10.000	11/14/2020	0.93	2.29	5.71
PFOS	1763-23-1	2.29 U	G1826-FS(3)	10.000	11/14/2020	0.79	2.29	5.71
HFPO-DA	13252-13-6	2.29 U	G1826-FS(3)	10.000	11/14/2020	0.73	2.29	5.71
Adona	919005-14-4	2.29 U	G1826-FS(3)	10.000	11/14/2020	0.95	2.29	5.71
11Cl-PF3OUdS	763051-92-9	1.71 U	G1826-FS(3)	10.000	11/14/2020	0.59	1.71	5.71
9Cl-PF3ONS	756426-58-1	1.14 U	G1826-FS(3)	10.000	11/14/2020	0.55	1.14	5.71

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

Client ID	PX-H2805-SS03-000H
Battelle ID	G1829-FS
Sample Type	SA
Collection Date	10/20/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	9.58
Matrix	SO
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	G1829-FS(3)	10.000	11/14/2020	0.81	2.29	5.71
PFHpA	**375-85-9**	**1.71 U**	**G1829-FS(3)**	**10.000**	**11/14/2020**	**0.58**	**1.71**	**5.71**
PFOA	335-67-1	2.29 U	G1829-FS(3)	10.000	11/14/2020	0.70	2.29	5.71
PFNA	**375-95-1**	**1.14 U**	**G1829-FS(3)**	**10.000**	**11/14/2020**	**0.56**	**1.14**	**5.71**
PFDA	335-76-2	1.14 U	G1829-FS(3)	10.000	11/14/2020	0.53	1.14	5.71
PFUnA	**2058-94-8**	**1.14 U**	**G1829-FS(3)**	**10.000**	**11/14/2020**	**0.53**	**1.14**	**5.71**
PFDoA	307-55-1	2.29 U	G1829-FS(3)	10.000	11/14/2020	0.70	2.29	5.71
PFTrDA	**72629-94-8**	**1.14 U**	**G1829-FS(3)**	**10.000**	**11/14/2020**	**0.32**	**1.14**	**5.71**
PFTeDA	376-06-7	2.86 U	G1829-FS(3)	10.000	11/14/2020	1.23	2.86	5.71
NMeFOSAA	**2355-31-9**	**2.86 U**	**G1829-FS(3)**	**10.000**	**11/14/2020**	**1.17**	**2.86**	**5.71**
NEtFOSAA	2991-50-6	2.29 U	G1829-FS(3)	10.000	11/14/2020	0.86	2.29	5.71
PFBS	**375-73-5**	**1.14 U**	**G1829-FS(3)**	**10.000**	**11/14/2020**	**0.40**	**1.14**	**5.71**
PFHxS	355-46-4	2.29 U	G1829-FS(3)	10.000	11/14/2020	0.93	2.29	5.71
PFOS	**1763-23-1**	**2.29 U**	**G1829-FS(3)**	**10.000**	**11/14/2020**	**0.79**	**2.29**	**5.71**
HFPO-DA	13252-13-6	2.29 U	G1829-FS(3)	10.000	11/14/2020	0.73	2.29	5.71
Adona	**919005-14-4**	**2.29 U**	**G1829-FS(3)**	**10.000**	**11/14/2020**	**0.95**	**2.29**	**5.71**
11Cl-PF3OUdS	763051-92-9	1.71 U	G1829-FS(3)	10.000	11/14/2020	0.59	1.71	5.71
9Cl-PF3ONS	**756426-58-1**	**1.14 U**	**G1829-FS(3)**	**10.000**	**11/14/2020**	**0.55**	**1.14**	**5.71**

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

Client ID	PX-H2805-SB03-0304
Battelle ID	G1832-FS
Sample Type	SA
Collection Date	10/20/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	5.16
Matrix	SO
Sample Size	1.96
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.04 U	G1832-FS(3)	10.000	11/14/2020	0.72	2.04	5.10
PFHpA	375-85-9	1.53 U	G1832-FS(3)	10.000	11/14/2020	0.52	1.53	5.10
PFOA	335-67-1	2.04 U	G1832-FS(3)	10.000	11/14/2020	0.62	2.04	5.10
PFNA	375-95-1	1.02 U	G1832-FS(3)	10.000	11/14/2020	0.50	1.02	5.10
PFDA	335-76-2	1.02 U	G1832-FS(3)	10.000	11/14/2020	0.47	1.02	5.10
PFUnA	2058-94-8	1.02 U	G1832-FS(3)	10.000	11/14/2020	0.47	1.02	5.10
PFDoA	307-55-1	2.04 U	G1832-FS(3)	10.000	11/14/2020	0.62	2.04	5.10
PFTrDA	72629-94-8	1.02 U	G1832-FS(3)	10.000	11/14/2020	0.29	1.02	5.10
PFTeDA	376-06-7	2.55 U	G1832-FS(3)	10.000	11/14/2020	1.10	2.55	5.10
NMeFOSAA	2355-31-9	2.55 U	G1832-FS(3)	10.000	11/14/2020	1.04	2.55	5.10
NEtFOSAA	2991-50-6	2.04 U	G1832-FS(3)	10.000	11/14/2020	0.77	2.04	5.10
PFBS	375-73-5	1.02 U	G1832-FS(3)	10.000	11/14/2020	0.36	1.02	5.10
PFHxS	355-46-4	2.04 U	G1832-FS(3)	10.000	11/14/2020	0.83	2.04	5.10
PFOS	1763-23-1	2.04 U	G1832-FS(3)	10.000	11/14/2020	0.70	2.04	5.10
HFPO-DA	13252-13-6	2.04 U	G1832-FS(3)	10.000	11/14/2020	0.65	2.04	5.10
Adona	919005-14-4	2.04 U	G1832-FS(3)	10.000	11/14/2020	0.85	2.04	5.10
11Cl-PF3OUdS	763051-92-9	1.53 U	G1832-FS(3)	10.000	11/14/2020	0.53	1.53	5.10
9Cl-PF3ONS	756426-58-1	1.02 U	G1832-FS(3)	10.000	11/14/2020	0.49	1.02	5.10

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

Client ID	PX-H2805-SS01-000H
Battelle ID	G1836-FS
Sample Type	SA
Collection Date	10/20/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	9.82
Matrix	SO
Sample Size	1.97
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.03 U	G1836-FS(3)	10.000	11/14/2020	0.72	2.03	5.08
PFHpA	**375-85-9**	**1.52 U**	**G1836-FS(3)**	**10.000**	**11/14/2020**	**0.52**	**1.52**	**5.08**
PFOA	335-67-1	2.03 U	G1836-FS(3)	10.000	11/14/2020	0.62	2.03	5.08
PFNA	**375-95-1**	**1.02 U**	**G1836-FS(3)**	**10.000**	**11/14/2020**	**0.50**	**1.02**	**5.08**
PFDA	335-76-2	1.02 U	G1836-FS(3)	10.000	11/14/2020	0.47	1.02	5.08
PFUnA	**2058-94-8**	**1.02 U**	**G1836-FS(3)**	**10.000**	**11/14/2020**	**0.47**	**1.02**	**5.08**
PFDoA	307-55-1	2.03 U	G1836-FS(3)	10.000	11/14/2020	0.62	2.03	5.08
PFTrDA	**72629-94-8**	**1.02 U**	**G1836-FS(3)**	**10.000**	**11/14/2020**	**0.28**	**1.02**	**5.08**
PFTeDA	376-06-7	2.54 U	G1836-FS(3)	10.000	11/14/2020	1.10	2.54	5.08
NMeFOSAA	**2355-31-9**	**2.54 U**	**G1836-FS(3)**	**10.000**	**11/14/2020**	**1.04**	**2.54**	**5.08**
NEtFOSAA	2991-50-6	2.03 U	G1836-FS(3)	10.000	11/14/2020	0.76	2.03	5.08
PFBS	**375-73-5**	**1.02 U**	**G1836-FS(3)**	**10.000**	**11/14/2020**	**0.36**	**1.02**	**5.08**
PFHxS	355-46-4	2.03 U	G1836-FS(3)	10.000	11/14/2020	0.82	2.03	5.08
PFOS	**1763-23-1**	**1.04 J**	**G1836-FS(3)**	**10.000**	**11/14/2020**	**0.70**	**2.03**	**5.08**
HFPO-DA	13252-13-6	2.03 U	G1836-FS(3)	10.000	11/14/2020	0.65	2.03	5.08
Adona	**919005-14-4**	**2.03 U**	**G1836-FS(3)**	**10.000**	**11/14/2020**	**0.84**	**2.03**	**5.08**
11Cl-PF3OUdS	763051-92-9	1.52 U	G1836-FS(3)	10.000	11/14/2020	0.53	1.52	5.08
9Cl-PF3ONS	**756426-58-1**	**1.02 U**	**G1836-FS(3)**	**10.000**	**11/14/2020**	**0.49**	**1.02**	**5.08**

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

Client ID	PX-H2805-SB01-0304
Battelle ID	G1837-FS
Sample Type	SA
Collection Date	10/20/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	12.24
Matrix	SO
Sample Size	1.61
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.48 U	G1837-FS(3)	10.000	11/14/2020	0.88	2.48	6.21
PFHpA	375-85-9	1.86 U	G1837-FS(3)	10.000	11/14/2020	0.63	1.86	6.21
PFOA	335-67-1	2.48 U	G1837-FS(3)	10.000	11/14/2020	0.76	2.48	6.21
PFNA	375-95-1	1.24 U	G1837-FS(3)	10.000	11/14/2020	0.61	1.24	6.21
PFDA	335-76-2	1.24 U	G1837-FS(3)	10.000	11/14/2020	0.57	1.24	6.21
PFUnA	2058-94-8	1.24 U	G1837-FS(3)	10.000	11/14/2020	0.57	1.24	6.21
PFDoA	307-55-1	2.48 U	G1837-FS(3)	10.000	11/14/2020	0.76	2.48	6.21
PFTrDA	72629-94-8	1.24 U	G1837-FS(3)	10.000	11/14/2020	0.35	1.24	6.21
PFTeDA	376-06-7	3.11 U	G1837-FS(3)	10.000	11/14/2020	1.34	3.11	6.21
NMeFOSAA	2355-31-9	3.11 U	G1837-FS(3)	10.000	11/14/2020	1.27	3.11	6.21
NEtFOSAA	2991-50-6	2.48 U	G1837-FS(3)	10.000	11/14/2020	0.93	2.48	6.21
PFBS	375-73-5	1.24 U	G1837-FS(3)	10.000	11/14/2020	0.43	1.24	6.21
PFHxS	355-46-4	2.48 U	G1837-FS(3)	10.000	11/14/2020	1.01	2.48	6.21
PFOS	1763-23-1	2.48 U	G1837-FS(3)	10.000	11/14/2020	0.86	2.48	6.21
HFPO-DA	13252-13-6	2.48 U	G1837-FS(3)	10.000	11/14/2020	0.80	2.48	6.21
Adona	919005-14-4	2.48 U	G1837-FS(3)	10.000	11/14/2020	1.03	2.48	6.21
11Cl-PF3OUdS	763051-92-9	1.86 U	G1837-FS(3)	10.000	11/14/2020	0.65	1.86	6.21
9Cl-PF3ONS	756426-58-1	1.24 U	G1837-FS(3)	10.000	11/14/2020	0.60	1.24	6.21

BATTELLE
It can be done

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

Client ID	PX-H2805-SB01P-0304
Battelle ID	G1838-FS
Sample Type	SA
Collection Date	10/20/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	10.76
Matrix	SO
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	G1838-FS(3)	10.000	11/14/2020	0.81	2.29	5.71
PFHpA	375-85-9	1.71 U	G1838-FS(3)	10.000	11/14/2020	0.58	1.71	5.71
PFOA	335-67-1	2.29 U	G1838-FS(3)	10.000	11/14/2020	0.70	2.29	5.71
PFNA	375-95-1	1.14 U	G1838-FS(3)	10.000	11/14/2020	0.56	1.14	5.71
PFDA	335-76-2	1.14 U	G1838-FS(3)	10.000	11/14/2020	0.53	1.14	5.71
PFUnA	2058-94-8	1.14 U	G1838-FS(3)	10.000	11/14/2020	0.53	1.14	5.71
PFDoA	307-55-1	2.29 U	G1838-FS(3)	10.000	11/14/2020	0.70	2.29	5.71
PFTrDA	72629-94-8	1.14 U	G1838-FS(3)	10.000	11/14/2020	0.32	1.14	5.71
PFTeDA	376-06-7	2.86 U	G1838-FS(3)	10.000	11/14/2020	1.23	2.86	5.71
NMeFOSAA	2355-31-9	2.86 U	G1838-FS(3)	10.000	11/14/2020	1.17	2.86	5.71
NEtFOSAA	2991-50-6	2.29 U	G1838-FS(3)	10.000	11/14/2020	0.86	2.29	5.71
PFBS	375-73-5	1.14 U	G1838-FS(3)	10.000	11/14/2020	0.40	1.14	5.71
PFHxS	355-46-4	2.29 U	G1838-FS(3)	10.000	11/14/2020	0.93	2.29	5.71
PFOS	1763-23-1	2.29 U	G1838-FS(3)	10.000	11/14/2020	0.79	2.29	5.71
HFPO-DA	13252-13-6	2.29 U	G1838-FS(3)	10.000	11/14/2020	0.73	2.29	5.71
Adona	919005-14-4	2.29 U	G1838-FS(3)	10.000	11/14/2020	0.95	2.29	5.71
11Cl-PF3OUdS	763051-92-9	1.71 U	G1838-FS(3)	10.000	11/14/2020	0.59	1.71	5.71
9Cl-PF3ONS	756426-58-1	1.14 U	G1838-FS(3)	10.000	11/14/2020	0.55	1.14	5.71

BATTELLE
It can be done

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

Client ID	PX-H2805-SS02-000H
Battelle ID	G1839-FS
Sample Type	SA
Collection Date	10/20/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	11.04
Matrix	SO
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	G1839-FS(3)	10.000	11/14/2020	0.82	2.31	5.78
PFHpA	375-85-9	1.73 U	G1839-FS(3)	10.000	11/14/2020	0.59	1.73	5.78
PFOA	335-67-1	2.31 U	G1839-FS(3)	10.000	11/14/2020	0.71	2.31	5.78
PFNA	375-95-1	1.16 U	G1839-FS(3)	10.000	11/14/2020	0.57	1.16	5.78
PFDA	335-76-2	1.16 U	G1839-FS(3)	10.000	11/14/2020	0.53	1.16	5.78
PFUnA	2058-94-8	1.16 U	G1839-FS(3)	10.000	11/14/2020	0.53	1.16	5.78
PFDoA	307-55-1	2.31 U	G1839-FS(3)	10.000	11/14/2020	0.71	2.31	5.78
PFTrDA	72629-94-8	1.16 U	G1839-FS(3)	10.000	11/14/2020	0.32	1.16	5.78
PFTeDA	376-06-7	2.89 U	G1839-FS(3)	10.000	11/14/2020	1.25	2.89	5.78
NMeFOSAA	2355-31-9	2.89 U	G1839-FS(3)	10.000	11/14/2020	1.18	2.89	5.78
NEtFOSAA	2991-50-6	2.31 U	G1839-FS(3)	10.000	11/14/2020	0.87	2.31	5.78
PFBS	375-73-5	1.16 U	G1839-FS(3)	10.000	11/14/2020	0.40	1.16	5.78
PFHxS	355-46-4	2.31 U	G1839-FS(3)	10.000	11/14/2020	0.94	2.31	5.78
PFOS	1763-23-1	0.82 J	G1839-FS(3)	10.000	11/14/2020	0.80	2.31	5.78
HFPO-DA	13252-13-6	2.31 U	G1839-FS(3)	10.000	11/14/2020	0.74	2.31	5.78
Adona	919005-14-4	2.31 U	G1839-FS(3)	10.000	11/14/2020	0.96	2.31	5.78
11Cl-PF3OUdS	763051-92-9	1.73 U	G1839-FS(3)	10.000	11/14/2020	0.60	1.73	5.78
9Cl-PF3ONS	756426-58-1	1.16 U	G1839-FS(3)	10.000	11/14/2020	0.55	1.16	5.78

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-1334
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: December 11, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-H2805-SB02-0304	G1840-FS	Soil
2	PX-B840-SS01-000H	G1845-FS	Soil
3	PX-B840-SB01-0304	G1846-FS	Soil
4	PX-B840-SB01P-0304	G1847-FS	Soil
5	PX-B840-SS07-000H	G1850-FS	Soil
6	PX-B840-SB07-0304	G1851-FS	Soil
7	PX-B840-SS04-000H	G1853-FS	Soil
8	PX-B840-SB04-0304	G1854-FS	Soil
9	PX-B840-SS05-000H	G1856-FS	Soil
10	PX-B840-SS05P-000H	G1857-FS	Soil
11	PX-B840-SB05-0304	G1858-FS	Soil
12	PX-B840-SS03-000H	G1861-FS	Soil
12MS	PX-B840-SS03-000HMS	G1862-FSMS	Soil
12MSD	PX-B840-SS03-000HMSD	G1863-FSMSD	Soil
13	PX-B840-SB03-0304	G1864-FS	Soil
14	PX-B840-SS06-000H	G1866-FS	Soil
15	PX-B840-SB06-0304	G1867-FS	Soil
16	PX-B840-SS02-000H	G1868-FS	Soil
17	PX-B840-SB02-0304	G1869-FS	Soil

A Stage 2B/4 data validation was performed on the analytical data for seventeen soil samples collected on October 20-21, 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. There were no qualifications.

Per- and Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

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

Holding Times

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

LC/MS Tuning

- All criteria were met.

Initial Calibration

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

Continuing Calibration

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

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-B840-FB01-102120	None - ND	-	-	-
PX-H2805-EB01-102020-SO	None - ND	-	-	-
PX-B840-EB01-102120-GW	None - ND	-	-	-

Surrogate Spike Recoveries

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

Laboratory Fortified Blank (LFB)

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

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

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

Internal Standard (IS) Area Performance

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

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

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

Compound	PX-B840-SB01-0304 ng/g	PX-B840-SB01P-0304 ng/g	RPD	Qualifier
PFHxS	2.58	2.24	14%	None

Compound	PX-B840-SS05-000H ng/g	PX-B840-SS05P-000H ng/g	RPD	Qualifier
PFHxA	2.43	2.18	11%	None
PFOA	3.88	3.65	6%	
PFHxS	2.94	2.98	1%	
PFOS	9.46	10.84	14%	

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

Signed: Nancy Weaver Dated: 12/17/20

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-H2805-SB02-0304
Battelle ID	G1840-FS
Sample Type	SA
Collection Date	10/20/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	9.46
Matrix	SO
Sample Size	1.82
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.20 U	G1840-FS(3)	10.000	11/14/2020	0.78	2.20	5.49
PFHpA	375-85-9	1.65 U	G1840-FS(3)	10.000	11/14/2020	0.56	1.65	5.49
PFOA	335-67-1	2.20 U	G1840-FS(3)	10.000	11/14/2020	0.67	2.20	5.49
PFNA	375-95-1	1.10 U	G1840-FS(3)	10.000	11/14/2020	0.54	1.10	5.49
PFDA	335-76-2	1.10 U	G1840-FS(3)	10.000	11/14/2020	0.51	1.10	5.49
PFUnA	2058-94-8	1.10 U	G1840-FS(3)	10.000	11/14/2020	0.51	1.10	5.49
PFDoA	307-55-1	2.20 U	G1840-FS(3)	10.000	11/14/2020	0.67	2.20	5.49
PFTrDA	72629-94-8	1.10 U	G1840-FS(3)	10.000	11/14/2020	0.31	1.10	5.49
PFTeDA	376-06-7	2.75 U	G1840-FS(3)	10.000	11/14/2020	1.19	2.75	5.49
NMeFOSAA	2355-31-9	2.75 U	G1840-FS(3)	10.000	11/14/2020	1.12	2.75	5.49
NEtFOSAA	2991-50-6	2.20 U	G1840-FS(3)	10.000	11/14/2020	0.82	2.20	5.49
PFBS	375-73-5	1.10 U	G1840-FS(3)	10.000	11/14/2020	0.38	1.10	5.49
PFHxS	355-46-4	2.20 U	G1840-FS(3)	10.000	11/14/2020	0.89	2.20	5.49
PFOS	1763-23-1	2.20 U	G1840-FS(3)	10.000	11/14/2020	0.76	2.20	5.49
HFPO-DA	13252-13-6	2.20 U	G1840-FS(3)	10.000	11/14/2020	0.70	2.20	5.49
Adona	919005-14-4	2.20 U	G1840-FS(3)	10.000	11/14/2020	0.91	2.20	5.49
11Cl-PF3OUdS	763051-92-9	1.65 U	G1840-FS(3)	10.000	11/14/2020	0.57	1.65	5.49
9Cl-PF3ONS	756426-58-1	1.10 U	G1840-FS(3)	10.000	11/14/2020	0.53	1.10	5.49

BATTELLE
It can be done

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

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Client ID		PX-B840-SS01-000H						
Battelle ID		G1845-FS						
Sample Type		SA						
Collection Date		10/21/2020						
Extraction Date		10/28/2020						
Analytical Instrument		Sciex 5500 LC/MS/MS						
% Moisture		17.89						
Matrix		SO						
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	G1845-FS(3)	10.000	11/15/2020	0.80	2.25	5.62
PFHpA	375-85-9	1.69 U	G1845-FS(3)	10.000	11/15/2020	0.57	1.69	5.62
PFOA	335-67-1	2.25 U	G1845-FS(3)	10.000	11/15/2020	0.69	2.25	5.62
PFNA	375-95-1	1.12 U	G1845-FS(3)	10.000	11/15/2020	0.55	1.12	5.62
PFDA	335-76-2	1.12 U	G1845-FS(3)	10.000	11/15/2020	0.52	1.12	5.62
PFUnA	2058-94-8	1.12 U	G1845-FS(3)	10.000	11/15/2020	0.52	1.12	5.62
PFDoA	307-55-1	2.25 U	G1845-FS(3)	10.000	11/15/2020	0.69	2.25	5.62
PFTrDA	72629-94-8	1.12 U	G1845-FS(3)	10.000	11/15/2020	0.31	1.12	5.62
PFTeDA	376-06-7	2.81 U	G1845-FS(3)	10.000	11/15/2020	1.21	2.81	5.62
NMeFOSAA	2355-31-9	2.81 U	G1845-FS(3)	10.000	11/15/2020	1.15	2.81	5.62
NEtFOSAA	2991-50-6	2.25 U	G1845-FS(3)	10.000	11/15/2020	0.84	2.25	5.62
PFBS	375-73-5	1.12 U	G1845-FS(3)	10.000	11/15/2020	0.39	1.12	5.62
PFHxS	355-46-4	0.96 J	G1845-FS(3)	10.000	11/15/2020	0.91	2.25	5.62
PFOS	1763-23-1	16.33	G1845-FS(3)	10.000	11/15/2020	0.78	2.25	5.62
HFPO-DA	13252-13-6	2.25 U	G1845-FS(3)	10.000	11/15/2020	0.72	2.25	5.62
Adona	919005-14-4	2.25 U	G1845-FS(3)	10.000	11/15/2020	0.93	2.25	5.62
11Cl-PF3OUdS	763051-92-9	1.69 U	G1845-FS(3)	10.000	11/15/2020	0.58	1.69	5.62
9Cl-PF3ONS	756426-58-1	1.12 U	G1845-FS(3)	10.000	11/15/2020	0.54	1.12	5.62

BATTELLE
It can be done

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

3

Client ID	PX-B840-SB01-0304
Battelle ID	G1846-FS
Sample Type	SA
Collection Date	10/21/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	16.34
Matrix	SO
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	G1846-FS(3)	10.000	11/15/2020	0.86	2.41	6.02
PFHpA	375-85-9	1.81 U	G1846-FS(3)	10.000	11/15/2020	0.61	1.81	6.02
PFOA	335-67-1	2.41 U	G1846-FS(3)	10.000	11/15/2020	0.73	2.41	6.02
PFNA	375-95-1	1.20 U	G1846-FS(3)	10.000	11/15/2020	0.59	1.20	6.02
PFDA	335-76-2	1.20 U	G1846-FS(3)	10.000	11/15/2020	0.55	1.20	6.02
PFUnA	2058-94-8	1.20 U	G1846-FS(3)	10.000	11/15/2020	0.55	1.20	6.02
PFDoA	307-55-1	2.41 U	G1846-FS(3)	10.000	11/15/2020	0.73	2.41	6.02
PFTrDA	72629-94-8	1.20 U	G1846-FS(3)	10.000	11/15/2020	0.34	1.20	6.02
PFTeDA	376-06-7	3.01 U	G1846-FS(3)	10.000	11/15/2020	1.30	3.01	6.02
NMeFOSAA	2355-31-9	3.01 U	G1846-FS(3)	10.000	11/15/2020	1.23	3.01	6.02
NEtFOSAA	2991-50-6	2.41 U	G1846-FS(3)	10.000	11/15/2020	0.90	2.41	6.02
PFBS	375-73-5	1.20 U	G1846-FS(3)	10.000	11/15/2020	0.42	1.20	6.02
PFHxS	355-46-4	2.58 J	G1846-FS(3)	10.000	11/15/2020	0.98	2.41	6.02
PFOS	1763-23-1	2.41 U	G1846-FS(3)	10.000	11/15/2020	0.83	2.41	6.02
HFPO-DA	13252-13-6	2.41 U	G1846-FS(3)	10.000	11/15/2020	0.77	2.41	6.02
Adona	919005-14-4	2.41 U	G1846-FS(3)	10.000	11/15/2020	1.00	2.41	6.02
11Cl-PF3OUdS	763051-92-9	1.81 U	G1846-FS(3)	10.000	11/15/2020	0.63	1.81	6.02
9Cl-PF3ONS	756426-58-1	1.20 U	G1846-FS(3)	10.000	11/15/2020	0.58	1.20	6.02

BATTELLE
It can be done

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

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Client ID	PX-B840-SB01P-0304
Battelle ID	G1847-FS
Sample Type	SA
Collection Date	10/21/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	16.82
Matrix	SO
Sample Size	1.52
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.63 U	G1847-FS(3)	10.000	11/14/2020	0.93	2.63	6.58
PFHpA	375-85-9	1.97 U	G1847-FS(3)	10.000	11/14/2020	0.67	1.97	6.58
PFOA	335-67-1	2.63 U	G1847-FS(3)	10.000	11/14/2020	0.80	2.63	6.58
PFNA	375-95-1	1.32 U	G1847-FS(3)	10.000	11/14/2020	0.64	1.32	6.58
PFDA	335-76-2	1.32 U	G1847-FS(3)	10.000	11/14/2020	0.61	1.32	6.58
PFUnA	2058-94-8	1.32 U	G1847-FS(3)	10.000	11/14/2020	0.61	1.32	6.58
PFDoA	307-55-1	2.63 U	G1847-FS(3)	10.000	11/14/2020	0.80	2.63	6.58
PFTrDA	72629-94-8	1.32 U	G1847-FS(3)	10.000	11/14/2020	0.37	1.32	6.58
PFTeDA	376-06-7	3.29 U	G1847-FS(3)	10.000	11/14/2020	1.42	3.29	6.58
NMeFOSAA	2355-31-9	3.29 U	G1847-FS(3)	10.000	11/14/2020	1.34	3.29	6.58
NEtFOSAA	2991-50-6	2.63 U	G1847-FS(3)	10.000	11/14/2020	0.99	2.63	6.58
PFBS	375-73-5	1.32 U	G1847-FS(3)	10.000	11/14/2020	0.46	1.32	6.58
PFHxS	355-46-4	2.24 J	G1847-FS(3)	10.000	11/14/2020	1.07	2.63	6.58
PFOS	1763-23-1	2.63 U	G1847-FS(3)	10.000	11/14/2020	0.91	2.63	6.58
HFPO-DA	13252-13-6	2.63 U	G1847-FS(3)	10.000	11/14/2020	0.84	2.63	6.58
Adona	919005-14-4	2.63 U	G1847-FS(3)	10.000	11/14/2020	1.09	2.63	6.58
11Cl-PF3OUdS	763051-92-9	1.97 U	G1847-FS(3)	10.000	11/14/2020	0.68	1.97	6.58
9Cl-PF3ONS	756426-58-1	1.32 U	G1847-FS(3)	10.000	11/14/2020	0.63	1.32	6.58

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It can be done

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

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Client ID	PX-B840-SS07-000H
Battelle ID	G1850-FS
Sample Type	SA
Collection Date	10/21/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	18.33
Matrix	SO
Sample Size	1.67
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.40 U	G1850-FS(3)	10.000	11/14/2020	0.85	2.40	5.99
PFHpA	375-85-9	1.80 U	G1850-FS(3)	10.000	11/14/2020	0.61	1.80	5.99
PFOA	335-67-1	2.40 U	G1850-FS(3)	10.000	11/14/2020	0.73	2.40	5.99
PFNA	375-95-1	1.20 U	G1850-FS(3)	10.000	11/14/2020	0.59	1.20	5.99
PFDA	335-76-2	1.20 U	G1850-FS(3)	10.000	11/14/2020	0.55	1.20	5.99
PFUnA	2058-94-8	1.20 U	G1850-FS(3)	10.000	11/14/2020	0.55	1.20	5.99
PFDoA	307-55-1	2.40 U	G1850-FS(3)	10.000	11/14/2020	0.73	2.40	5.99
PFTrDA	72629-94-8	1.20 U	G1850-FS(3)	10.000	11/14/2020	0.34	1.20	5.99
PFTeDA	376-06-7	2.99 U	G1850-FS(3)	10.000	11/14/2020	1.29	2.99	5.99
NMeFOSAA	2355-31-9	2.99 U	G1850-FS(3)	10.000	11/14/2020	1.22	2.99	5.99
NEtFOSAA	2991-50-6	2.40 U	G1850-FS(3)	10.000	11/14/2020	0.90	2.40	5.99
PFBS	375-73-5	1.20 U	G1850-FS(3)	10.000	11/14/2020	0.42	1.20	5.99
PFHxS	355-46-4	2.40 U	G1850-FS(3)	10.000	11/14/2020	0.97	2.40	5.99
PFOS	1763-23-1	23.14	G1850-FS(3)	10.000	11/14/2020	0.83	2.40	5.99
HFPO-DA	13252-13-6	2.40 U	G1850-FS(3)	10.000	11/14/2020	0.77	2.40	5.99
Adona	919005-14-4	2.40 U	G1850-FS(3)	10.000	11/14/2020	0.99	2.40	5.99
11Cl-PF3OUdS	763051-92-9	1.80 U	G1850-FS(3)	10.000	11/14/2020	0.62	1.80	5.99
9Cl-PF3ONS	756426-58-1	1.20 U	G1850-FS(3)	10.000	11/14/2020	0.57	1.20	5.99

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It can be done

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

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Client ID	PX-B840-SB07-0304
Battelle ID	G1851-FS
Sample Type	SA
Collection Date	10/21/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	15.47
Matrix	SO
Sample Size	1.58
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.53 U	G1851-FS(3)	10.000	11/14/2020	0.90	2.53	6.33
PFHpA	375-85-9	1.90 U	G1851-FS(3)	10.000	11/14/2020	0.65	1.90	6.33
PFOA	335-67-1	2.53 U	G1851-FS(3)	10.000	11/14/2020	0.77	2.53	6.33
PFNA	375-95-1	1.27 U	G1851-FS(3)	10.000	11/14/2020	0.62	1.27	6.33
PFDA	335-76-2	1.27 U	G1851-FS(3)	10.000	11/14/2020	0.58	1.27	6.33
PFUnA	2058-94-8	1.27 U	G1851-FS(3)	10.000	11/14/2020	0.58	1.27	6.33
PFDoA	307-55-1	2.53 U	G1851-FS(3)	10.000	11/14/2020	0.77	2.53	6.33
PFTrDA	72629-94-8	1.27 U	G1851-FS(3)	10.000	11/14/2020	0.35	1.27	6.33
PFTeDA	376-06-7	3.16 U	G1851-FS(3)	10.000	11/14/2020	1.37	3.16	6.33
NMeFOSAA	2355-31-9	3.16 U	G1851-FS(3)	10.000	11/14/2020	1.29	3.16	6.33
NEtFOSAA	2991-50-6	2.53 U	G1851-FS(3)	10.000	11/14/2020	0.95	2.53	6.33
PFBS	375-73-5	1.27 U	G1851-FS(3)	10.000	11/14/2020	0.44	1.27	6.33
PFHxS	355-46-4	2.53 U	G1851-FS(3)	10.000	11/14/2020	1.03	2.53	6.33
PFOS	1763-23-1	2.87 J	G1851-FS(3)	10.000	11/14/2020	0.87	2.53	6.33
HFPO-DA	13252-13-6	2.53 U	G1851-FS(3)	10.000	11/14/2020	0.81	2.53	6.33
Adona	919005-14-4	2.53 U	G1851-FS(3)	10.000	11/14/2020	1.05	2.53	6.33
11Cl-PF3OUdS	763051-92-9	1.90 U	G1851-FS(3)	10.000	11/14/2020	0.66	1.90	6.33
9Cl-PF3ONS	756426-58-1	1.27 U	G1851-FS(3)	10.000	11/14/2020	0.61	1.27	6.33

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It can be done

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

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Client ID	PX-B840-SS04-000H
Battelle ID	G1853-FS
Sample Type	SA
Collection Date	10/21/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	14.74
Matrix	SO
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	1.07 J	G1853-FS(3)	10.000	11/15/2020	0.83	2.34	5.85
PFHpA	375-85-9	1.75 U	G1853-FS(3)	10.000	11/15/2020	0.60	1.75	5.85
PFOA	335-67-1	0.88 J	G1853-FS(3)	10.000	11/15/2020	0.71	2.34	5.85
PFNA	375-95-1	1.17 U	G1853-FS(3)	10.000	11/15/2020	0.57	1.17	5.85
PFDA	335-76-2	1.17 U	G1853-FS(3)	10.000	11/15/2020	0.54	1.17	5.85
PFUnA	2058-94-8	1.17 U	G1853-FS(3)	10.000	11/15/2020	0.54	1.17	5.85
PFDoA	307-55-1	2.34 U	G1853-FS(3)	10.000	11/15/2020	0.71	2.34	5.85
PFTrDA	72629-94-8	1.17 U	G1853-FS(3)	10.000	11/15/2020	0.33	1.17	5.85
PFTeDA	376-06-7	2.92 U	G1853-FS(3)	10.000	11/15/2020	1.26	2.92	5.85
NMeFOSAA	2355-31-9	2.92 U	G1853-FS(3)	10.000	11/15/2020	1.19	2.92	5.85
NEtFOSAA	2991-50-6	2.34 U	G1853-FS(3)	10.000	11/15/2020	0.88	2.34	5.85
PFBS	375-73-5	1.17 U	G1853-FS(3)	10.000	11/15/2020	0.41	1.17	5.85
PFHxS	355-46-4	1.08 J	G1853-FS(3)	10.000	11/15/2020	0.95	2.34	5.85
PFOS	1763-23-1	5.30 J	G1853-FS(3)	10.000	11/15/2020	0.81	2.34	5.85
HFPO-DA	13252-13-6	2.34 U	G1853-FS(3)	10.000	11/15/2020	0.75	2.34	5.85
Adona	919005-14-4	2.34 U	G1853-FS(3)	10.000	11/15/2020	0.97	2.34	5.85
11Cl-PF3OUdS	763051-92-9	1.75 U	G1853-FS(3)	10.000	11/15/2020	0.61	1.75	5.85
9Cl-PF3ONS	756426-58-1	1.17 U	G1853-FS(3)	10.000	11/15/2020	0.56	1.17	5.85

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It can be done

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

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Client ID	PX-B840-SB04-0304
Battelle ID	G1854-FS
Sample Type	SA
Collection Date	10/21/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	9.30
Matrix	SO
Sample Size	1.91
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.09 U	G1854-FS(3)	10.000	11/14/2020	0.74	2.09	5.24
PFHpA	**375-85-9**	**1.57 U**	**G1854-FS(3)**	**10.000**	**11/14/2020**	**0.53**	**1.57**	**5.24**
PFOA	335-67-1	2.09 U	G1854-FS(3)	10.000	11/14/2020	0.64	2.09	5.24
PFNA	**375-95-1**	**1.05 U**	**G1854-FS(3)**	**10.000**	**11/14/2020**	**0.51**	**1.05**	**5.24**
PFDA	335-76-2	1.05 U	G1854-FS(3)	10.000	11/14/2020	0.48	1.05	5.24
PFUnA	**2058-94-8**	**1.05 U**	**G1854-FS(3)**	**10.000**	**11/14/2020**	**0.48**	**1.05**	**5.24**
PFDoA	307-55-1	2.09 U	G1854-FS(3)	10.000	11/14/2020	0.64	2.09	5.24
PFTrDA	**72629-94-8**	**1.05 U**	**G1854-FS(3)**	**10.000**	**11/14/2020**	**0.29**	**1.05**	**5.24**
PFTeDA	376-06-7	2.62 U	G1854-FS(3)	10.000	11/14/2020	1.13	2.62	5.24
NMeFOSAA	**2355-31-9**	**2.62 U**	**G1854-FS(3)**	**10.000**	**11/14/2020**	**1.07**	**2.62**	**5.24**
NEtFOSAA	2991-50-6	2.09 U	G1854-FS(3)	10.000	11/14/2020	0.79	2.09	5.24
PFBS	**375-73-5**	**1.05 U**	**G1854-FS(3)**	**10.000**	**11/14/2020**	**0.37**	**1.05**	**5.24**
PFHxS	355-46-4	2.09 U	G1854-FS(3)	10.000	11/14/2020	0.85	2.09	5.24
PFOS	**1763-23-1**	**0.82 J**	**G1854-FS(3)**	**10.000**	**11/14/2020**	**0.72**	**2.09**	**5.24**
HFPO-DA	13252-13-6	2.09 U	G1854-FS(3)	10.000	11/14/2020	0.67	2.09	5.24
Adona	**919005-14-4**	**2.09 U**	**G1854-FS(3)**	**10.000**	**11/14/2020**	**0.87**	**2.09**	**5.24**
11Cl-PF3OUdS	763051-92-9	1.57 U	G1854-FS(3)	10.000	11/14/2020	0.54	1.57	5.24
9Cl-PF3ONS	**756426-58-1**	**1.05 U**	**G1854-FS(3)**	**10.000**	**11/14/2020**	**0.50**	**1.05**	**5.24**

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

Client ID	PX-B840-SS05-000H
Battelle ID	G1856-FS
Sample Type	SA
Collection Date	10/21/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	18.42
Matrix	SO
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	2.43 J	G1856-FS(3)	10.000	11/15/2020	0.83	2.33	5.81
PFHpA	375-85-9	1.74 U	G1856-FS(3)	10.000	11/15/2020	0.59	1.74	5.81
PFOA	335-67-1	3.88 J	G1856-FS(3)	10.000	11/15/2020	0.71	2.33	5.81
PFNA	375-95-1	1.16 U	G1856-FS(3)	10.000	11/15/2020	0.57	1.16	5.81
PFDA	335-76-2	1.16 U	G1856-FS(3)	10.000	11/15/2020	0.53	1.16	5.81
PFUnA	2058-94-8	1.16 U	G1856-FS(3)	10.000	11/15/2020	0.53	1.16	5.81
PFDoA	307-55-1	2.33 U	G1856-FS(3)	10.000	11/15/2020	0.71	2.33	5.81
PFTrDA	72629-94-8	1.16 U	G1856-FS(3)	10.000	11/15/2020	0.33	1.16	5.81
PFTeDA	376-06-7	2.91 U	G1856-FS(3)	10.000	11/15/2020	1.26	2.91	5.81
NMeFOSAA	2355-31-9	2.91 U	G1856-FS(3)	10.000	11/15/2020	1.19	2.91	5.81
NEtFOSAA	2991-50-6	2.33 U	G1856-FS(3)	10.000	11/15/2020	0.87	2.33	5.81
PFBS	375-73-5	1.16 U	G1856-FS(3)	10.000	11/15/2020	0.41	1.16	5.81
PFHxS	355-46-4	2.94 J	G1856-FS(3)	10.000	11/15/2020	0.94	2.33	5.81
PFOS	1763-23-1	9.46	G1856-FS(3)	10.000	11/15/2020	0.80	2.33	5.81
HFPO-DA	13252-13-6	2.33 U	G1856-FS(3)	10.000	11/15/2020	0.74	2.33	5.81
Adona	919005-14-4	2.33 U	G1856-FS(3)	10.000	11/15/2020	0.97	2.33	5.81
11Cl-PF3OUdS	763051-92-9	1.74 U	G1856-FS(3)	10.000	11/15/2020	0.60	1.74	5.81
9Cl-PF3ONS	756426-58-1	1.16 U	G1856-FS(3)	10.000	11/15/2020	0.56	1.16	5.81

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

Client ID	PX-B840-SS05P-000H
Battelle ID	G1857-FS
Sample Type	SA
Collection Date	10/21/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	19.39
Matrix	SO
Sample Size	1.60
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.18 J	G1857-FS(3)	10.000	11/15/2020	0.89	2.50	6.25
PFHpA	375-85-9	1.88 U	G1857-FS(3)	10.000	11/15/2020	0.64	1.88	6.25
PFOA	335-67-1	3.65 J	G1857-FS(3)	10.000	11/15/2020	0.76	2.50	6.25
PFNA	375-95-1	1.25 U	G1857-FS(3)	10.000	11/15/2020	0.61	1.25	6.25
PFDA	335-76-2	1.25 U	G1857-FS(3)	10.000	11/15/2020	0.58	1.25	6.25
PFUnA	2058-94-8	1.25 U	G1857-FS(3)	10.000	11/15/2020	0.58	1.25	6.25
PFDoA	307-55-1	2.50 U	G1857-FS(3)	10.000	11/15/2020	0.76	2.50	6.25
PFTrDA	72629-94-8	1.25 U	G1857-FS(3)	10.000	11/15/2020	0.35	1.25	6.25
PFTeDA	376-06-7	3.13 U	G1857-FS(3)	10.000	11/15/2020	1.35	3.13	6.25
NMeFOSAA	2355-31-9	3.13 U	G1857-FS(3)	10.000	11/15/2020	1.28	3.13	6.25
NEtFOSAA	2991-50-6	2.50 U	G1857-FS(3)	10.000	11/15/2020	0.94	2.50	6.25
PFBS	375-73-5	1.25 U	G1857-FS(3)	10.000	11/15/2020	0.44	1.25	6.25
PFHxS	355-46-4	2.98 J	G1857-FS(3)	10.000	11/15/2020	1.01	2.50	6.25
PFOS	1763-23-1	10.84	G1857-FS(3)	10.000	11/15/2020	0.86	2.50	6.25
HFPO-DA	13252-13-6	2.50 U	G1857-FS(3)	10.000	11/15/2020	0.80	2.50	6.25
Adona	919005-14-4	2.50 U	G1857-FS(3)	10.000	11/15/2020	1.04	2.50	6.25
11Cl-PF3OUdS	763051-92-9	1.88 U	G1857-FS(3)	10.000	11/15/2020	0.65	1.88	6.25
9Cl-PF3ONS	756426-58-1	1.25 U	G1857-FS(3)	10.000	11/15/2020	0.60	1.25	6.25

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

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Client ID	PX-B840-SB05-0304
Battelle ID	G1858-FS
Sample Type	SA
Collection Date	10/21/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	12.29
Matrix	SO
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	G1858-FS(3)	10.000	11/14/2020	0.85	2.38	5.95
PFHpA	**375-85-9**	**1.79 U**	**G1858-FS(3)**	**10.000**	**11/14/2020**	**0.61**	**1.79**	**5.95**
PFOA	335-67-1	2.38 U	G1858-FS(3)	10.000	11/14/2020	0.73	2.38	5.95
PFNA	**375-95-1**	**1.19 U**	**G1858-FS(3)**	**10.000**	**11/14/2020**	**0.58**	**1.19**	**5.95**
PFDA	335-76-2	1.19 U	G1858-FS(3)	10.000	11/14/2020	0.55	1.19	5.95
PFUnA	**2058-94-8**	**1.19 U**	**G1858-FS(3)**	**10.000**	**11/14/2020**	**0.55**	**1.19**	**5.95**
PFDoA	307-55-1	2.38 U	G1858-FS(3)	10.000	11/14/2020	0.73	2.38	5.95
PFTrDA	**72629-94-8**	**1.19 U**	**G1858-FS(3)**	**10.000**	**11/14/2020**	**0.33**	**1.19**	**5.95**
PFTeDA	376-06-7	2.98 U	G1858-FS(3)	10.000	11/14/2020	1.29	2.98	5.95
NMeFOSAA	**2355-31-9**	**2.98 U**	**G1858-FS(3)**	**10.000**	**11/14/2020**	**1.21**	**2.98**	**5.95**
NEtFOSAA	2991-50-6	2.38 U	G1858-FS(3)	10.000	11/14/2020	0.89	2.38	5.95
PFBS	**375-73-5**	**1.19 U**	**G1858-FS(3)**	**10.000**	**11/14/2020**	**0.42**	**1.19**	**5.95**
PFHxS	355-46-4	2.38 U	G1858-FS(3)	10.000	11/14/2020	0.96	2.38	5.95
PFOS	**1763-23-1**	**2.38 U**	**G1858-FS(3)**	**10.000**	**11/14/2020**	**0.82**	**2.38**	**5.95**
HFPO-DA	13252-13-6	2.38 U	G1858-FS(3)	10.000	11/14/2020	0.76	2.38	5.95
Adona	**919005-14-4**	**2.38 U**	**G1858-FS(3)**	**10.000**	**11/14/2020**	**0.99**	**2.38**	**5.95**
11Cl-PF3OUdS	763051-92-9	1.79 U	G1858-FS(3)	10.000	11/14/2020	0.62	1.79	5.95
9Cl-PF3ONS	**756426-58-1**	**1.19 U**	**G1858-FS(3)**	**10.000**	**11/14/2020**	**0.57**	**1.19**	**5.95**

BATTELLE
It can be done

12

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

Client ID	PX-B840-SS03-000H
Battelle ID	G1861-FS
Sample Type	SA
Collection Date	10/21/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	12.20
Matrix	SO
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	G1861-FS(3)	10.000	11/14/2020	0.86	2.42	6.06
PFHpA	**375-85-9**	**1.82 U**	**G1861-FS(3)**	**10.000**	**11/14/2020**	**0.62**	**1.82**	**6.06**
PFOA	335-67-1	2.42 U	G1861-FS(3)	10.000	11/14/2020	0.74	2.42	6.06
PFNA	**375-95-1**	**1.21 U**	**G1861-FS(3)**	**10.000**	**11/14/2020**	**0.59**	**1.21**	**6.06**
PFDA	335-76-2	1.21 U	G1861-FS(3)	10.000	11/14/2020	0.56	1.21	6.06
PFUnA	**2058-94-8**	**1.21 U**	**G1861-FS(3)**	**10.000**	**11/14/2020**	**0.56**	**1.21**	**6.06**
PFDoA	307-55-1	2.42 U	G1861-FS(3)	10.000	11/14/2020	0.74	2.42	6.06
PFTrDA	**72629-94-8**	**1.21 U**	**G1861-FS(3)**	**10.000**	**11/14/2020**	**0.34**	**1.21**	**6.06**
PFTeDA	376-06-7	3.03 U	G1861-FS(3)	10.000	11/14/2020	1.31	3.03	6.06
NMeFOSAA	**2355-31-9**	**3.03 U**	**G1861-FS(3)**	**10.000**	**11/14/2020**	**1.24**	**3.03**	**6.06**
NEtFOSAA	2991-50-6	2.42 U	G1861-FS(3)	10.000	11/14/2020	0.91	2.42	6.06
PFBS	**375-73-5**	**1.21 U**	**G1861-FS(3)**	**10.000**	**11/14/2020**	**0.42**	**1.21**	**6.06**
PFHxS	355-46-4	2.07 J	G1861-FS(3)	10.000	11/14/2020	0.98	2.42	6.06
PFOS	**1763-23-1**	**19.16**	**G1861-FS(3)**	**10.000**	**11/14/2020**	**0.84**	**2.42**	**6.06**
HFPO-DA	13252-13-6	2.42 U	G1861-FS(3)	10.000	11/14/2020	0.78	2.42	6.06
Adona	**919005-14-4**	**2.42 U**	**G1861-FS(3)**	**10.000**	**11/14/2020**	**1.01**	**2.42**	**6.06**
11Cl-PF3OUdS	763051-92-9	1.82 U	G1861-FS(3)	10.000	11/14/2020	0.63	1.82	6.06
9Cl-PF3ONS	**756426-58-1**	**1.21 U**	**G1861-FS(3)**	**10.000**	**11/14/2020**	**0.58**	**1.21**	**6.06**

BATTELLE
It can be done

13

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

Client ID	PX-B840-SB03-0304
Battelle ID	G1864-FS
Sample Type	SA
Collection Date	10/21/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	6.19
Matrix	SO
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	G1864-FS(3)	10.000	11/14/2020	0.81	2.29	5.71
PFHpA	375-85-9	1.71 U	G1864-FS(3)	10.000	11/14/2020	0.58	1.71	5.71
PFOA	335-67-1	2.29 U	G1864-FS(3)	10.000	11/14/2020	0.70	2.29	5.71
PFNA	375-95-1	1.14 U	G1864-FS(3)	10.000	11/14/2020	0.56	1.14	5.71
PFDA	335-76-2	1.14 U	G1864-FS(3)	10.000	11/14/2020	0.53	1.14	5.71
PFUnA	2058-94-8	1.14 U	G1864-FS(3)	10.000	11/14/2020	0.53	1.14	5.71
PFDoA	307-55-1	2.29 U	G1864-FS(3)	10.000	11/14/2020	0.70	2.29	5.71
PFTrDA	72629-94-8	1.14 U	G1864-FS(3)	10.000	11/14/2020	0.32	1.14	5.71
PFTeDA	376-06-7	2.86 U	G1864-FS(3)	10.000	11/14/2020	1.23	2.86	5.71
NMeFOSAA	2355-31-9	2.86 U	G1864-FS(3)	10.000	11/14/2020	1.17	2.86	5.71
NEtFOSAA	2991-50-6	2.29 U	G1864-FS(3)	10.000	11/14/2020	0.86	2.29	5.71
PFBS	375-73-5	1.14 U	G1864-FS(3)	10.000	11/14/2020	0.40	1.14	5.71
PFHxS	355-46-4	1.09 J	G1864-FS(3)	10.000	11/14/2020	0.93	2.29	5.71
PFOS	1763-23-1	37.48	G1864-FS(3)	10.000	11/14/2020	0.79	2.29	5.71
HFPO-DA	13252-13-6	2.29 U	G1864-FS(3)	10.000	11/14/2020	0.73	2.29	5.71
Adona	919005-14-4	2.29 U	G1864-FS(3)	10.000	11/14/2020	0.95	2.29	5.71
11Cl-PF3OUdS	763051-92-9	1.71 U	G1864-FS(3)	10.000	11/14/2020	0.59	1.71	5.71
9Cl-PF3ONS	756426-58-1	1.14 U	G1864-FS(3)	10.000	11/14/2020	0.55	1.14	5.71

BATTELLE
It can be done

14

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

Client ID	PX-B840-SS06-000H
Battelle ID	G1866-FS
Sample Type	SA
Collection Date	10/21/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	17.57
Matrix	SO
Sample Size	1.60
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.50 U	G1866-FS(3)	10.000	11/14/2020	0.89	2.50	6.25
PFHpA	375-85-9	1.88 U	G1866-FS(3)	10.000	11/14/2020	0.64	1.88	6.25
PFOA	335-67-1	2.50 U	G1866-FS(3)	10.000	11/14/2020	0.76	2.50	6.25
PFNA	375-95-1	1.25 U	G1866-FS(3)	10.000	11/14/2020	0.61	1.25	6.25
PFDA	335-76-2	1.25 U	G1866-FS(3)	10.000	11/14/2020	0.58	1.25	6.25
PFUnA	2058-94-8	1.25 U	G1866-FS(3)	10.000	11/14/2020	0.58	1.25	6.25
PFDoA	307-55-1	2.50 U	G1866-FS(3)	10.000	11/14/2020	0.76	2.50	6.25
PFTrDA	72629-94-8	1.25 U	G1866-FS(3)	10.000	11/14/2020	0.35	1.25	6.25
PFTeDA	376-06-7	3.13 U	G1866-FS(3)	10.000	11/14/2020	1.35	3.13	6.25
NMeFOSAA	2355-31-9	3.13 U	G1866-FS(3)	10.000	11/14/2020	1.28	3.13	6.25
NEtFOSAA	2991-50-6	2.50 U	G1866-FS(3)	10.000	11/14/2020	0.94	2.50	6.25
PFBS	375-73-5	1.25 U	G1866-FS(3)	10.000	11/14/2020	0.44	1.25	6.25
PFHxS	355-46-4	1.57 J	G1866-FS(3)	10.000	11/14/2020	1.01	2.50	6.25
PFOS	1763-23-1	20.85	G1866-FS(3)	10.000	11/14/2020	0.86	2.50	6.25
HFPO-DA	13252-13-6	2.50 U	G1866-FS(3)	10.000	11/14/2020	0.80	2.50	6.25
Adona	919005-14-4	2.50 U	G1866-FS(3)	10.000	11/14/2020	1.04	2.50	6.25
11Cl-PF3OUdS	763051-92-9	1.88 U	G1866-FS(3)	10.000	11/14/2020	0.65	1.88	6.25
9Cl-PF3ONS	756426-58-1	1.25 U	G1866-FS(3)	10.000	11/14/2020	0.60	1.25	6.25

BATTELLE
It can be done

15

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

Client ID	PX-B840-SB06-0304
Battelle ID	G1867-FS
Sample Type	SA
Collection Date	10/21/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	10.21
Matrix	SO
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	G1867-FS(3)	10.000	11/14/2020	0.81	2.29	5.71
PFHpA	**375-85-9**	**1.71 U**	**G1867-FS(3)**	**10.000**	**11/14/2020**	**0.58**	**1.71**	**5.71**
PFOA	335-67-1	2.29 U	G1867-FS(3)	10.000	11/14/2020	0.70	2.29	5.71
PFNA	**375-95-1**	**1.14 U**	**G1867-FS(3)**	**10.000**	**11/14/2020**	**0.56**	**1.14**	**5.71**
PFDA	335-76-2	1.14 U	G1867-FS(3)	10.000	11/14/2020	0.53	1.14	5.71
PFUnA	**2058-94-8**	**1.14 U**	**G1867-FS(3)**	**10.000**	**11/14/2020**	**0.53**	**1.14**	**5.71**
PFDoA	307-55-1	2.29 U	G1867-FS(3)	10.000	11/14/2020	0.70	2.29	5.71
PFTrDA	**72629-94-8**	**1.14 U**	**G1867-FS(3)**	**10.000**	**11/14/2020**	**0.32**	**1.14**	**5.71**
PFTeDA	376-06-7	2.86 U	G1867-FS(3)	10.000	11/14/2020	1.23	2.86	5.71
NMeFOSAA	**2355-31-9**	**2.86 U**	**G1867-FS(3)**	**10.000**	**11/14/2020**	**1.17**	**2.86**	**5.71**
NEtFOSAA	2991-50-6	2.29 U	G1867-FS(3)	10.000	11/14/2020	0.86	2.29	5.71
PFBS	**375-73-5**	**1.14 U**	**G1867-FS(3)**	**10.000**	**11/14/2020**	**0.40**	**1.14**	**5.71**
PFHxS	355-46-4	2.29 U	G1867-FS(3)	10.000	11/14/2020	0.93	2.29	5.71
PFOS	**1763-23-1**	**13.62**	**G1867-FS(3)**	**10.000**	**11/14/2020**	**0.79**	**2.29**	**5.71**
HFPO-DA	13252-13-6	2.29 U	G1867-FS(3)	10.000	11/14/2020	0.73	2.29	5.71
Adona	**919005-14-4**	**2.29 U**	**G1867-FS(3)**	**10.000**	**11/14/2020**	**0.95**	**2.29**	**5.71**
11Cl-PF3OUdS	763051-92-9	1.71 U	G1867-FS(3)	10.000	11/14/2020	0.59	1.71	5.71
9Cl-PF3ONS	**756426-58-1**	**1.14 U**	**G1867-FS(3)**	**10.000**	**11/14/2020**	**0.55**	**1.14**	**5.71**

BATTELLE
It can be done

16

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

Client ID	PX-B840-SS02-000H
Battelle ID	G1868-FS
Sample Type	SA
Collection Date	10/21/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	13.84
Matrix	SO
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	G1868-FS(3)	10.000	11/14/2020	0.89	2.52	6.29
PFHpA	375-85-9	1.89 U	G1868-FS(3)	10.000	11/14/2020	0.64	1.89	6.29
PFOA	335-67-1	2.52 U	G1868-FS(3)	10.000	11/14/2020	0.77	2.52	6.29
PFNA	375-95-1	1.26 U	G1868-FS(3)	10.000	11/14/2020	0.62	1.26	6.29
PFDA	335-76-2	1.26 U	G1868-FS(3)	10.000	11/14/2020	0.58	1.26	6.29
PFUnA	2058-94-8	1.26 U	G1868-FS(3)	10.000	11/14/2020	0.58	1.26	6.29
PFDoA	307-55-1	2.52 U	G1868-FS(3)	10.000	11/14/2020	0.77	2.52	6.29
PFTrDA	72629-94-8	1.26 U	G1868-FS(3)	10.000	11/14/2020	0.35	1.26	6.29
PFTeDA	376-06-7	3.14 U	G1868-FS(3)	10.000	11/14/2020	1.36	3.14	6.29
NMeFOSAA	2355-31-9	3.14 U	G1868-FS(3)	10.000	11/14/2020	1.28	3.14	6.29
NEtFOSAA	2991-50-6	2.52 U	G1868-FS(3)	10.000	11/14/2020	0.94	2.52	6.29
PFBS	375-73-5	1.26 U	G1868-FS(3)	10.000	11/14/2020	0.44	1.26	6.29
PFHxS	355-46-4	2.52 U	G1868-FS(3)	10.000	11/14/2020	1.02	2.52	6.29
PFOS	1763-23-1	1.13 J	G1868-FS(3)	10.000	11/14/2020	0.87	2.52	6.29
HFPO-DA	13252-13-6	2.52 U	G1868-FS(3)	10.000	11/14/2020	0.81	2.52	6.29
Adona	919005-14-4	2.52 U	G1868-FS(3)	10.000	11/14/2020	1.04	2.52	6.29
11Cl-PF3OUdS	763051-92-9	1.89 U	G1868-FS(3)	10.000	11/14/2020	0.65	1.89	6.29
9Cl-PF3ONS	756426-58-1	1.26 U	G1868-FS(3)	10.000	11/14/2020	0.60	1.26	6.29

BATTELLE
It can be done

17

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

Client ID	PX-B840-SB02-0304
Battelle ID	G1869-FS
Sample Type	SA
Collection Date	10/21/2020
Extraction Date	10/28/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	13.60
Matrix	SO
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	G1869-FS(3)	10.000	11/14/2020	0.82	2.30	5.75
PFHpA	**375-85-9**	**1.72 U**	**G1869-FS(3)**	**10.000**	**11/14/2020**	**0.59**	**1.72**	**5.75**
PFOA	335-67-1	2.30 U	G1869-FS(3)	10.000	11/14/2020	0.70	2.30	5.75
PFNA	**375-95-1**	**1.15 U**	**G1869-FS(3)**	**10.000**	**11/14/2020**	**0.56**	**1.15**	**5.75**
PFDA	335-76-2	1.15 U	G1869-FS(3)	10.000	11/14/2020	0.53	1.15	5.75
PFUnA	**2058-94-8**	**1.15 U**	**G1869-FS(3)**	**10.000**	**11/14/2020**	**0.53**	**1.15**	**5.75**
PFDoA	307-55-1	2.30 U	G1869-FS(3)	10.000	11/14/2020	0.70	2.30	5.75
PFTrDA	**72629-94-8**	**1.15 U**	**G1869-FS(3)**	**10.000**	**11/14/2020**	**0.32**	**1.15**	**5.75**
PFTeDA	376-06-7	2.87 U	G1869-FS(3)	10.000	11/14/2020	1.24	2.87	5.75
NMeFOSAA	**2355-31-9**	**2.87 U**	**G1869-FS(3)**	**10.000**	**11/14/2020**	**1.17**	**2.87**	**5.75**
NEtFOSAA	2991-50-6	2.30 U	G1869-FS(3)	10.000	11/14/2020	0.86	2.30	5.75
PFBS	**375-73-5**	**1.15 U**	**G1869-FS(3)**	**10.000**	**11/14/2020**	**0.40**	**1.15**	**5.75**
PFHxS	355-46-4	2.30 U	G1869-FS(3)	10.000	11/14/2020	0.93	2.30	5.75
PFOS	**1763-23-1**	**2.30 U**	**G1869-FS(3)**	**10.000**	**11/14/2020**	**0.79**	**2.30**	**5.75**
HFPO-DA	13252-13-6	2.30 U	G1869-FS(3)	10.000	11/14/2020	0.74	2.30	5.75
Adona	**919005-14-4**	**2.30 U**	**G1869-FS(3)**	**10.000**	**11/14/2020**	**0.95**	**2.30**	**5.75**
11Cl-PF3OUdS	763051-92-9	1.72 U	G1869-FS(3)	10.000	11/14/2020	0.60	1.72	5.75
9Cl-PF3ONS	**756426-58-1**	**1.15 U**	**G1869-FS(3)**	**10.000**	**11/14/2020**	**0.55**	**1.15**	**5.75**

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-1353
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: December 12, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-B103-SS01-000H	G1938-FS	Soil
2	PX-B103-SB01-0304	G1939-FS	Soil
3	PX-B103-SB01P-0304	G1940-FS	Soil
4	PX-B103-SS02-000H	G1943-FS	Soil
5	PX-B103-SB02-0304	G1944-FS	Soil
6	PX-B103-SS03-000H	G1946-FS	Soil
6MS	PX-B103-SS03-000HMS	G1947-FSMS	Soil
6MSD	PX-B103-SS03-000HMSD	G1948-FSMSD	Soil
7	PX-B103-SB03-0304	G1949-FS	Soil
8	PX-B103-SS04-000H	G1952-FS	Soil
9	PX-B103-SB04-0304	G1953-FS	Soil

A Stage 2B/4 data validation was performed on the analytical data for nine soil samples collected on October 22-23, 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-B103-EB01-102220-SO	None - ND	-	-	-

Surrogate Spike Recoveries

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

Laboratory Fortified Blank (LFB)

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

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

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

EDS Sample ID	Compound	MS %R/MSD %R/RDP	Qualifier
6	PFOS	32%/64%/66.7	J

Internal Standard (IS) Area Performance

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

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

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

Field Duplicate Sample Precision

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

Compound	PX-B103-SB01-0304 ng/g	PX-B103-SB01P-0304 ng/g	RPD	Qualifier
PFHxS	1.00	0.92	8%	None
PFOS	31.04	30.26	3%	

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

Signed: Nancy Weaver Dated: 12/17/20

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-B103-SS01-000H
Battelle ID	G1938-FS
Sample Type	SA
Collection Date	10/22/2020
Extraction Date	11/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	12.46
Matrix	SO
Sample Size	1.78
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.18 J	G1938-FS(3)	10.000	11/18/2020	0.80	2.25	5.62
PFHpA	375-85-9	1.69 U	G1938-FS(3)	10.000	11/18/2020	0.57	1.69	5.62
PFOA	335-67-1	2.00 J	G1938-FS(3)	10.000	11/18/2020	0.69	2.25	5.62
PFNA	375-95-1	0.85 J	G1938-FS(3)	10.000	11/18/2020	0.55	1.12	5.62
PFDA	335-76-2	0.53 J	G1938-FS(3)	10.000	11/18/2020	0.52	1.12	5.62
PFUnA	2058-94-8	1.51 J	G1938-FS(3)	10.000	11/18/2020	0.52	1.12	5.62
PFDoA	307-55-1	2.25 U	G1938-FS(3)	10.000	11/18/2020	0.69	2.25	5.62
PFTrDA	72629-94-8	1.12 U	G1938-FS(3)	10.000	11/18/2020	0.31	1.12	5.62
PFTeDA	376-06-7	2.81 U	G1938-FS(3)	10.000	11/18/2020	1.21	2.81	5.62
NMeFOSAA	2355-31-9	2.81 U	G1938-FS(3)	10.000	11/18/2020	1.15	2.81	5.62
NEtFOSAA	2991-50-6	2.25 U	G1938-FS(3)	10.000	11/18/2020	0.84	2.25	5.62
PFBS	375-73-5	1.12 U	G1938-FS(3)	10.000	11/18/2020	0.39	1.12	5.62
PFHxS	355-46-4	3.95 J	G1938-FS(3)	10.000	11/18/2020	0.91	2.25	5.62
PFOS	1763-23-1	73.33	G1938-FS(3)	10.000	11/18/2020	0.78	2.25	5.62
HFPO-DA	13252-13-6	2.25 U	G1938-FS(3)	10.000	11/18/2020	0.72	2.25	5.62
Adona	919005-14-4	2.25 U	G1938-FS(3)	10.000	11/18/2020	0.93	2.25	5.62
11Cl-PF3OUdS	763051-92-9	1.69 U	G1938-FS(3)	10.000	11/18/2020	0.58	1.69	5.62
9Cl-PF3ONS	756426-58-1	1.12 U	G1938-FS(3)	10.000	11/18/2020	0.54	1.12	5.62

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

Client ID	PX-B103-SB01-0304
Battelle ID	G1939-FS
Sample Type	SA
Collection Date	10/22/2020
Extraction Date	11/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	9.95
Matrix	SO
Sample Size	1.90
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.11 U	G1939-FS(3)	10.000	11/18/2020	0.75	2.11	5.26
PFHpA	375-85-9	1.58 U	G1939-FS(3)	10.000	11/18/2020	0.54	1.58	5.26
PFOA	335-67-1	2.11 U	G1939-FS(3)	10.000	11/18/2020	0.64	2.11	5.26
PFNA	375-95-1	1.05 U	G1939-FS(3)	10.000	11/18/2020	0.52	1.05	5.26
PFDA	335-76-2	1.05 U	G1939-FS(3)	10.000	11/18/2020	0.48	1.05	5.26
PFUnA	2058-94-8	1.05 U	G1939-FS(3)	10.000	11/18/2020	0.48	1.05	5.26
PFDoA	307-55-1	2.11 U	G1939-FS(3)	10.000	11/18/2020	0.64	2.11	5.26
PFTrDA	72629-94-8	1.05 U	G1939-FS(3)	10.000	11/18/2020	0.29	1.05	5.26
PFTeDA	376-06-7	2.63 U	G1939-FS(3)	10.000	11/18/2020	1.14	2.63	5.26
NMeFOSAA	2355-31-9	2.63 U	G1939-FS(3)	10.000	11/18/2020	1.07	2.63	5.26
NEtFOSAA	2991-50-6	2.11 U	G1939-FS(3)	10.000	11/18/2020	0.79	2.11	5.26
PFBS	375-73-5	1.05 U	G1939-FS(3)	10.000	11/18/2020	0.37	1.05	5.26
PFHxS	355-46-4	1.00 J	G1939-FS(3)	10.000	11/18/2020	0.85	2.11	5.26
PFOS	1763-23-1	31.04	G1939-FS(3)	10.000	11/18/2020	0.73	2.11	5.26
HFPO-DA	13252-13-6	2.11 U	G1939-FS(3)	10.000	11/18/2020	0.67	2.11	5.26
Adona	919005-14-4	2.11 U	G1939-FS(3)	10.000	11/18/2020	0.87	2.11	5.26
11Cl-PF3OUdS	763051-92-9	1.58 U	G1939-FS(3)	10.000	11/18/2020	0.55	1.58	5.26
9Cl-PF3ONS	756426-58-1	1.05 U	G1939-FS(3)	10.000	11/18/2020	0.51	1.05	5.26

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

Client ID	PX-B103-SB01P-0304
Battelle ID	G1940-FS
Sample Type	SA
Collection Date	10/22/2020
Extraction Date	11/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	10.92
Matrix	SO
Sample Size	1.82
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.20 U	G1940-FS(3)	10.000	11/18/2020	0.78	2.20	5.49
PFHpA	375-85-9	1.65 U	G1940-FS(3)	10.000	11/18/2020	0.56	1.65	5.49
PFOA	335-67-1	2.20 U	G1940-FS(3)	10.000	11/18/2020	0.67	2.20	5.49
PFNA	375-95-1	1.10 U	G1940-FS(3)	10.000	11/18/2020	0.54	1.10	5.49
PFDA	335-76-2	1.10 U	G1940-FS(3)	10.000	11/18/2020	0.51	1.10	5.49
PFUnA	2058-94-8	1.10 U	G1940-FS(3)	10.000	11/18/2020	0.51	1.10	5.49
PFDoA	307-55-1	2.20 U	G1940-FS(3)	10.000	11/18/2020	0.67	2.20	5.49
PFTrDA	72629-94-8	1.10 U	G1940-FS(3)	10.000	11/18/2020	0.31	1.10	5.49
PFTeDA	376-06-7	2.75 U	G1940-FS(3)	10.000	11/18/2020	1.19	2.75	5.49
NMeFOSAA	2355-31-9	2.75 U	G1940-FS(3)	10.000	11/18/2020	1.12	2.75	5.49
NEtFOSAA	2991-50-6	2.20 U	G1940-FS(3)	10.000	11/18/2020	0.82	2.20	5.49
PFBS	375-73-5	1.10 U	G1940-FS(3)	10.000	11/18/2020	0.38	1.10	5.49
PFHxS	355-46-4	0.92 J	G1940-FS(3)	10.000	11/18/2020	0.89	2.20	5.49
PFOS	1763-23-1	30.26	G1940-FS(3)	10.000	11/18/2020	0.76	2.20	5.49
HFPO-DA	13252-13-6	2.20 U	G1940-FS(3)	10.000	11/18/2020	0.70	2.20	5.49
Adona	919005-14-4	2.20 U	G1940-FS(3)	10.000	11/18/2020	0.91	2.20	5.49
11Cl-PF3OUdS	763051-92-9	1.65 U	G1940-FS(3)	10.000	11/18/2020	0.57	1.65	5.49
9Cl-PF3ONS	756426-58-1	1.10 U	G1940-FS(3)	10.000	11/18/2020	0.53	1.10	5.49

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

Client ID	PX-B103-SS02-000H
Battelle ID	G1943-FS
Sample Type	SA
Collection Date	10/22/2020
Extraction Date	11/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	16.62
Matrix	SO
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	0.92 J	G1943-FS(3)	10.000	11/18/2020	0.91	2.56	6.41
PFHpA	**375-85-9**	**1.92 U**	**G1943-FS(3)**	**10.000**	**11/18/2020**	**0.65**	**1.92**	**6.41**
PFOA	335-67-1	0.91 J	G1943-FS(3)	10.000	11/18/2020	0.78	2.56	6.41
PFNA	**375-95-1**	**1.28 U**	**G1943-FS(3)**	**10.000**	**11/18/2020**	**0.63**	**1.28**	**6.41**
PFDA	335-76-2	1.28 U	G1943-FS(3)	10.000	11/18/2020	0.59	1.28	6.41
PFUnA	**2058-94-8**	**0.60 J**	**G1943-FS(3)**	**10.000**	**11/18/2020**	**0.59**	**1.28**	**6.41**
PFDoA	307-55-1	2.56 U	G1943-FS(3)	10.000	11/18/2020	0.78	2.56	6.41
PFTrDA	**72629-94-8**	**1.28 U**	**G1943-FS(3)**	**10.000**	**11/18/2020**	**0.36**	**1.28**	**6.41**
PFTeDA	376-06-7	3.21 U	G1943-FS(3)	10.000	11/18/2020	1.38	3.21	6.41
NMeFOSAA	**2355-31-9**	**3.21 U**	**G1943-FS(3)**	**10.000**	**11/18/2020**	**1.31**	**3.21**	**6.41**
NEtFOSAA	2991-50-6	2.56 U	G1943-FS(3)	10.000	11/18/2020	0.96	2.56	6.41
PFBS	**375-73-5**	**1.28 U**	**G1943-FS(3)**	**10.000**	**11/18/2020**	**0.45**	**1.28**	**6.41**
PFHxS	355-46-4	2.42 J	G1943-FS(3)	10.000	11/18/2020	1.04	2.56	6.41
PFOS	**1763-23-1**	**30.58**	**G1943-FS(3)**	**10.000**	**11/18/2020**	**0.88**	**2.56**	**6.41**
HFPO-DA	13252-13-6	2.56 U	G1943-FS(3)	10.000	11/18/2020	0.82	2.56	6.41
Adona	**919005-14-4**	**2.56 U**	**G1943-FS(3)**	**10.000**	**11/18/2020**	**1.06**	**2.56**	**6.41**
11Cl-PF3OUdS	763051-92-9	1.92 U	G1943-FS(3)	10.000	11/18/2020	0.67	1.92	6.41
9Cl-PF3ONS	**756426-58-1**	**1.28 U**	**G1943-FS(3)**	**10.000**	**11/18/2020**	**0.62**	**1.28**	**6.41**

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

Client ID	PX-B103-SB02-0304
Battelle ID	G1944-FS
Sample Type	SA
Collection Date	10/22/2020
Extraction Date	11/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	10.59
Matrix	SO
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	G1944-FS(3)	10.000	11/18/2020	0.74	2.08	5.21
PFHpA	375-85-9	1.56 U	G1944-FS(3)	10.000	11/18/2020	0.53	1.56	5.21
PFOA	335-67-1	2.08 U	G1944-FS(3)	10.000	11/18/2020	0.64	2.08	5.21
PFNA	375-95-1	1.04 U	G1944-FS(3)	10.000	11/18/2020	0.51	1.04	5.21
PFDA	335-76-2	1.04 U	G1944-FS(3)	10.000	11/18/2020	0.48	1.04	5.21
PFUnA	2058-94-8	1.04 U	G1944-FS(3)	10.000	11/18/2020	0.48	1.04	5.21
PFDoA	307-55-1	2.08 U	G1944-FS(3)	10.000	11/18/2020	0.64	2.08	5.21
PFTrDA	72629-94-8	1.04 U	G1944-FS(3)	10.000	11/18/2020	0.29	1.04	5.21
PFTeDA	376-06-7	2.60 U	G1944-FS(3)	10.000	11/18/2020	1.13	2.60	5.21
NMeFOSAA	2355-31-9	2.60 U	G1944-FS(3)	10.000	11/18/2020	1.06	2.60	5.21
NEtFOSAA	2991-50-6	2.08 U	G1944-FS(3)	10.000	11/18/2020	0.78	2.08	5.21
PFBS	375-73-5	1.04 U	G1944-FS(3)	10.000	11/18/2020	0.36	1.04	5.21
PFHxS	355-46-4	2.13 J	G1944-FS(3)	10.000	11/18/2020	0.84	2.08	5.21
PFOS	1763-23-1	16.81	G1944-FS(3)	10.000	11/18/2020	0.72	2.08	5.21
HFPO-DA	13252-13-6	2.08 U	G1944-FS(3)	10.000	11/18/2020	0.67	2.08	5.21
Adona	919005-14-4	2.08 U	G1944-FS(3)	10.000	11/18/2020	0.86	2.08	5.21
11Cl-PF3OUdS	763051-92-9	1.56 U	G1944-FS(3)	10.000	11/18/2020	0.54	1.56	5.21
9Cl-PF3ONS	756426-58-1	1.04 U	G1944-FS(3)	10.000	11/18/2020	0.50	1.04	5.21

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

Client ID	PX-B103-SS03-000H
Battelle ID	G1946-FS
Sample Type	SA
Collection Date	10/22/2020
Extraction Date	11/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	12.94
Matrix	SO
Sample Size	1.67
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	1.43 J	G1946-FS(3)	10.000	11/18/2020	0.85	2.40	5.99	
PFHpA	375-85-9	0.97 J	G1946-FS(3)	10.000	11/18/2020	0.61	1.80	5.99	
PFOA	335-67-1	2.57 J	G1946-FS(3)	10.000	11/18/2020	0.73	2.40	5.99	
PFNA	375-95-1	1.34 J	G1946-FS(3)	10.000	11/18/2020	0.59	1.20	5.99	
PFDA	335-76-2	0.74 J	G1946-FS(3)	10.000	11/18/2020	0.55	1.20	5.99	
PFUnA	2058-94-8	2.20 J	G1946-FS(3)	10.000	11/18/2020	0.55	1.20	5.99	
PFDoA	307-55-1	2.40 U	G1946-FS(3)	10.000	11/18/2020	0.73	2.40	5.99	
PFTrDA	72629-94-8	1.20 U	G1946-FS(3)	10.000	11/18/2020	0.34	1.20	5.99	
PFTeDA	376-06-7	2.99 U	G1946-FS(3)	10.000	11/18/2020	1.29	2.99	5.99	
NMeFOSAA	2355-31-9	2.99 U	G1946-FS(3)	10.000	11/18/2020	1.22	2.99	5.99	
NEtFOSAA	2991-50-6	2.40 U	G1946-FS(3)	10.000	11/18/2020	0.90	2.40	5.99	
PFBS	375-73-5	1.20 U	G1946-FS(3)	10.000	11/18/2020	0.42	1.20	5.99	
PFHxS	355-46-4	4.98 J	G1946-FS(3)	10.000	11/18/2020	0.97	2.40	5.99	
PFOS	1763-23-1	51.50 J	G1946-FS(3)	10.000	11/18/2020	0.83	2.40	5.99	MSL
HFPO-DA	13252-13-6	2.40 U	G1946-FS(3)	10.000	11/18/2020	0.77	2.40	5.99	
Adona	919005-14-4	2.40 U	G1946-FS(3)	10.000	11/18/2020	0.99	2.40	5.99	
11Cl-PF3OUdS	763051-92-9	1.80 U	G1946-FS(3)	10.000	11/18/2020	0.62	1.80	5.99	
9Cl-PF3ONS	756426-58-1	1.20 U	G1946-FS(3)	10.000	11/18/2020	0.57	1.20	5.99	

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

Client ID	PX-B103-SB03-0304
Battelle ID	G1949-FS
Sample Type	SA
Collection Date	10/22/2020
Extraction Date	11/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	4.07
Matrix	SO
Sample Size	2.10
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.90 U	G1949-FS(3)	10.000	11/18/2020	0.68	1.90	4.76
PFHpA	375-85-9	0.50 J	G1949-FS(3)	10.000	11/18/2020	0.49	1.43	4.76
PFOA	335-67-1	2.26 J	G1949-FS(3)	10.000	11/18/2020	0.58	1.90	4.76
PFNA	375-95-1	5.04	G1949-FS(3)	10.000	11/18/2020	0.47	0.95	4.76
PFDA	335-76-2	0.98 J	G1949-FS(3)	10.000	11/18/2020	0.44	0.95	4.76
PFUnA	2058-94-8	0.95 U	G1949-FS(3)	10.000	11/18/2020	0.44	0.95	4.76
PFDoA	307-55-1	1.90 U	G1949-FS(3)	10.000	11/18/2020	0.58	1.90	4.76
PFTrDA	72629-94-8	0.95 U	G1949-FS(3)	10.000	11/18/2020	0.27	0.95	4.76
PFTeDA	376-06-7	2.38 U	G1949-FS(3)	10.000	11/18/2020	1.03	2.38	4.76
NMeFOSAA	2355-31-9	2.38 U	G1949-FS(3)	10.000	11/18/2020	0.97	2.38	4.76
NEtFOSAA	2991-50-6	1.90 U	G1949-FS(3)	10.000	11/18/2020	0.71	1.90	4.76
PFBS	375-73-5	0.95 U	G1949-FS(3)	10.000	11/18/2020	0.33	0.95	4.76
PFHxS	355-46-4	5.67	G1949-FS(3)	10.000	11/18/2020	0.77	1.90	4.76
PFOS	1763-23-1	229.53 D	G1949-FS-D(5)	50.000	11/18/2020	3.29	9.52	23.81
HFPO-DA	13252-13-6	1.90 U	G1949-FS(3)	10.000	11/18/2020	0.61	1.90	4.76
Adona	919005-14-4	1.90 U	G1949-FS(3)	10.000	11/18/2020	0.79	1.90	4.76
11Cl-PF3OUdS	763051-92-9	1.43 U	G1949-FS(3)	10.000	11/18/2020	0.50	1.43	4.76
9Cl-PF3ONS	756426-58-1	0.95 U	G1949-FS(3)	10.000	11/18/2020	0.46	0.95	4.76

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

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Client ID	PX-B103-SS04-000H
Battelle ID	G1952-FS
Sample Type	SA
Collection Date	10/23/2020
Extraction Date	11/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	24.87
Matrix	SO
Sample Size	1.63
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.20 J	G1952-FS(3)	10.000	11/18/2020	0.87	2.45	6.13
PFHpA	375-85-9	1.84 U	G1952-FS(3)	10.000	11/18/2020	0.63	1.84	6.13
PFOA	335-67-1	1.40 J	G1952-FS(3)	10.000	11/18/2020	0.75	2.45	6.13
PFNA	375-95-1	0.70 J	G1952-FS(3)	10.000	11/18/2020	0.60	1.23	6.13
PFDA	335-76-2	1.23 U	G1952-FS(3)	10.000	11/18/2020	0.56	1.23	6.13
PFUnA	2058-94-8	0.69 J	G1952-FS(3)	10.000	11/18/2020	0.56	1.23	6.13
PFDoA	307-55-1	2.45 U	G1952-FS(3)	10.000	11/18/2020	0.75	2.45	6.13
PFTrDA	72629-94-8	1.23 U	G1952-FS(3)	10.000	11/18/2020	0.34	1.23	6.13
PFTeDA	376-06-7	3.07 U	G1952-FS(3)	10.000	11/18/2020	1.33	3.07	6.13
NMeFOSAA	2355-31-9	3.07 U	G1952-FS(3)	10.000	11/18/2020	1.25	3.07	6.13
NEtFOSAA	2991-50-6	2.45 U	G1952-FS(3)	10.000	11/18/2020	0.92	2.45	6.13
PFBS	375-73-5	1.23 U	G1952-FS(3)	10.000	11/18/2020	0.43	1.23	6.13
PFHxS	355-46-4	2.48 J	G1952-FS(3)	10.000	11/18/2020	0.99	2.45	6.13
PFOS	1763-23-1	105.32	G1952-FS(3)	10.000	11/18/2020	0.85	2.45	6.13
HFPO-DA	13252-13-6	2.45 U	G1952-FS(3)	10.000	11/18/2020	0.79	2.45	6.13
Adona	919005-14-4	2.45 U	G1952-FS(3)	10.000	11/18/2020	1.02	2.45	6.13
11Cl-PF3OUdS	763051-92-9	1.84 U	G1952-FS(3)	10.000	11/18/2020	0.64	1.84	6.13
9Cl-PF3ONS	756426-58-1	1.23 U	G1952-FS(3)	10.000	11/18/2020	0.59	1.23	6.13

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

Client ID	PX-B103-SB04-0304
Battelle ID	G1953-FS
Sample Type	SA
Collection Date	10/23/2020
Extraction Date	11/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	5.80
Matrix	SO
Sample Size	1.94
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.06 U	G1953-FS(3)	10.000	11/18/2020	0.73	2.06	5.15
PFHpA	375-85-9	1.55 U	G1953-FS(3)	10.000	11/18/2020	0.53	1.55	5.15
PFOA	335-67-1	2.06 U	G1953-FS(3)	10.000	11/18/2020	0.63	2.06	5.15
PFNA	375-95-1	1.03 U	G1953-FS(3)	10.000	11/18/2020	0.51	1.03	5.15
PFDA	335-76-2	1.03 U	G1953-FS(3)	10.000	11/18/2020	0.47	1.03	5.15
PFUnA	2058-94-8	1.03 U	G1953-FS(3)	10.000	11/18/2020	0.47	1.03	5.15
PFDoA	307-55-1	2.06 U	G1953-FS(3)	10.000	11/18/2020	0.63	2.06	5.15
PFTrDA	72629-94-8	1.03 U	G1953-FS(3)	10.000	11/18/2020	0.29	1.03	5.15
PFTeDA	376-06-7	2.58 U	G1953-FS(3)	10.000	11/18/2020	1.11	2.58	5.15
NMeFOSAA	2355-31-9	2.58 U	G1953-FS(3)	10.000	11/18/2020	1.05	2.58	5.15
NEtFOSAA	2991-50-6	2.06 U	G1953-FS(3)	10.000	11/18/2020	0.77	2.06	5.15
PFBS	375-73-5	1.03 U	G1953-FS(3)	10.000	11/18/2020	0.36	1.03	5.15
PFHxS	355-46-4	2.06 U	G1953-FS(3)	10.000	11/18/2020	0.84	2.06	5.15
PFOS	1763-23-1	7.38	G1953-FS(3)	10.000	11/18/2020	0.71	2.06	5.15
HFPO-DA	13252-13-6	2.06 U	G1953-FS(3)	10.000	11/18/2020	0.66	2.06	5.15
Adona	919005-14-4	2.06 U	G1953-FS(3)	10.000	11/18/2020	0.86	2.06	5.15
11Cl-PF3OUdS	763051-92-9	1.55 U	G1953-FS(3)	10.000	11/18/2020	0.54	1.55	5.15
9Cl-PF3ONS	756426-58-1	1.03 U	G1953-FS(3)	10.000	11/18/2020	0.49	1.03	5.15

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-1354
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: December 12, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-B103-SS05-000H	G1954-FS	Soil
2	PX-B103-SS05P-000H	G1955-FS	Soil
3	PX-B103-SB05-0304	G1959-FS	Soil
4	PX-H110-SS05-000H	G1962-FS	Soil
4MS	PX-H110-SS05-000HMS	G1963-FSMS	Soil
4MSD	PX-H110-SS05-000HMSD	G1964-FSMSD	Soil
5	PX-H110-SB05-0304	G1965-FS	Soil
6	PX-H110-SS04-000H	G1974-FS	Soil
7	PX-H110-SB04-0304	G1975-FS	Soil
8	PX-H110-SS01 000H	G1979-FS	Soil
9	PX-H110-SB01-0304	G1980-FS	Soil

A Stage 2B/4 data validation was performed on the analytical data for nine soil samples collected on October 23-24, 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-I1110-EB01-102420-SO	PFHxS	2.06	None	All Samples ND
	NMeFOSAA	0.39	None	
	PFOS	0.61	None	
PX-B103-EB01-102320-SO	None - ND	-	-	-

Surrogate Spike Recoveries

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

Laboratory Fortified Blank (LFB)

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

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

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

Internal Standard (IS) Area Performance

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

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- 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 unacceptable. These results were qualified as estimated (J).

Compound	PX-B103-SS05-000H ng/g	PX-B103-SS05P-000H ng/g	RPD	Qualifier
PFOS	90.82	154.98	52%	J

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

Signed: Nancy Weaver Dated: 12/17/20

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-B103-SS05-000H
Battelle ID	G1954-FS
Sample Type	SA
Collection Date	10/23/2020
Extraction Date	11/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	4.78
Matrix	SO
Sample Size	1.96
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	2.04 U	G1954-FS(3)	10.000	11/18/2020	0.72	2.04	5.10	
PFHpA	375-85-9	1.53 U	G1954-FS(3)	10.000	11/18/2020	0.52	1.53	5.10	
PFOA	335-67-1	2.04 U	G1954-FS(3)	10.000	11/18/2020	0.62	2.04	5.10	
PFNA	375-95-1	1.02 U	G1954-FS(3)	10.000	11/18/2020	0.50	1.02	5.10	
PFDA	335-76-2	1.02 U	G1954-FS(3)	10.000	11/18/2020	0.47	1.02	5.10	
PFUnA	2058-94-8	1.02 U	G1954-FS(3)	10.000	11/18/2020	0.47	1.02	5.10	
PFDoA	307-55-1	2.04 U	G1954-FS(3)	10.000	11/18/2020	0.62	2.04	5.10	
PFTrDA	72629-94-8	1.02 U	G1954-FS(3)	10.000	11/18/2020	0.29	1.02	5.10	
PFTeDA	376-06-7	2.55 U	G1954-FS(3)	10.000	11/18/2020	1.10	2.55	5.10	
NMeFOSAA	2355-31-9	2.55 U	G1954-FS(3)	10.000	11/18/2020	1.04	2.55	5.10	
NEtFOSAA	2991-50-6	2.04 U	G1954-FS(3)	10.000	11/18/2020	0.77	2.04	5.10	
PFBS	375-73-5	1.02 U	G1954-FS(3)	10.000	11/18/2020	0.36	1.02	5.10	
PFHxS	355-46-4	2.04 U	G1954-FS(3)	10.000	11/18/2020	0.83	2.04	5.10	
PFOS	1763-23-1	90.82 J	G1954-FS(3)	10.000	11/18/2020	0.70	2.04	5.10	FD
HFPO-DA	13252-13-6	2.04 U	G1954-FS(3)	10.000	11/18/2020	0.65	2.04	5.10	
Adona	919005-14-4	2.04 U	G1954-FS(3)	10.000	11/18/2020	0.85	2.04	5.10	
11Cl-PF3OUdS	763051-92-9	1.53 U	G1954-FS(3)	10.000	11/18/2020	0.53	1.53	5.10	
9Cl-PF3ONS	756426-58-1	1.02 U	G1954-FS(3)	10.000	11/18/2020	0.49	1.02	5.10	

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2

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

Client ID	PX-B103-SS05P-000H
Battelle ID	G1955-FS
Sample Type	SA
Collection Date	10/23/2020
Extraction Date	11/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	6.57
Matrix	SO
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	G1955-FS(3)	10.000	11/18/2020	0.74	2.08	5.21	
PFHpA	**375-85-9**	**1.56 U**	**G1955-FS(3)**	**10.000**	**11/18/2020**	**0.53**	**1.56**	**5.21**	
PFOA	335-67-1	2.08 U	G1955-FS(3)	10.000	11/18/2020	0.64	2.08	5.21	
PFNA	**375-95-1**	**1.04 U**	**G1955-FS(3)**	**10.000**	**11/18/2020**	**0.51**	**1.04**	**5.21**	
PFDA	335-76-2	1.04 U	G1955-FS(3)	10.000	11/18/2020	0.48	1.04	5.21	
PFUnA	**2058-94-8**	**1.04 U**	**G1955-FS(3)**	**10.000**	**11/18/2020**	**0.48**	**1.04**	**5.21**	
PFDoA	307-55-1	2.08 U	G1955-FS(3)	10.000	11/18/2020	0.64	2.08	5.21	
PFTrDA	**72629-94-8**	**1.04 U**	**G1955-FS(3)**	**10.000**	**11/18/2020**	**0.29**	**1.04**	**5.21**	
PFTeDA	376-06-7	2.60 U	G1955-FS(3)	10.000	11/18/2020	1.13	2.60	5.21	
NMeFOSAA	**2355-31-9**	**2.60 U**	**G1955-FS(3)**	**10.000**	**11/18/2020**	**1.06**	**2.60**	**5.21**	
NEtFOSAA	2991-50-6	2.08 U	G1955-FS(3)	10.000	11/18/2020	0.78	2.08	5.21	
PFBS	**375-73-5**	**1.04 U**	**G1955-FS(3)**	**10.000**	**11/18/2020**	**0.36**	**1.04**	**5.21**	
PFHxS	355-46-4	2.08 U	G1955-FS(3)	10.000	11/18/2020	0.84	2.08	5.21	
PFOS	**1763-23-1**	**154.98 J**	**G1955-FS-D(5)**	**50.000**	**11/18/2020**	**3.59**	**10.42**	**26.04**	FD
HFPO-DA	13252-13-6	2.08 U	G1955-FS(3)	10.000	11/18/2020	0.67	2.08	5.21	
Adona	**919005-14-4**	**2.08 U**	**G1955-FS(3)**	**10.000**	**11/18/2020**	**0.86**	**2.08**	**5.21**	
11Cl-PF3OUdS	763051-92-9	1.56 U	G1955-FS(3)	10.000	11/18/2020	0.54	1.56	5.21	
9Cl-PF3ONS	**756426-58-1**	**1.04 U**	**G1955-FS(3)**	**10.000**	**11/18/2020**	**0.50**	**1.04**	**5.21**	

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3

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

Client ID	PX-B103-SB05-0304
Battelle ID	G1959-FS
Sample Type	SA
Collection Date	10/23/2020
Extraction Date	11/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	5.15
Matrix	SO
Sample Size	1.90
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.11 U	G1959-FS(3)	10.000	11/18/2020	0.75	2.11	5.26
PFHpA	375-85-9	1.58 U	G1959-FS(3)	10.000	11/18/2020	0.54	1.58	5.26
PFOA	335-67-1	2.11 U	G1959-FS(3)	10.000	11/18/2020	0.64	2.11	5.26
PFNA	375-95-1	1.05 U	G1959-FS(3)	10.000	11/18/2020	0.52	1.05	5.26
PFDA	335-76-2	1.05 U	G1959-FS(3)	10.000	11/18/2020	0.48	1.05	5.26
PFUnA	2058-94-8	1.05 U	G1959-FS(3)	10.000	11/18/2020	0.48	1.05	5.26
PFDoA	307-55-1	2.11 U	G1959-FS(3)	10.000	11/18/2020	0.64	2.11	5.26
PFTrDA	72629-94-8	1.05 U	G1959-FS(3)	10.000	11/18/2020	0.29	1.05	5.26
PFTeDA	376-06-7	2.63 U	G1959-FS(3)	10.000	11/18/2020	1.14	2.63	5.26
NMeFOSAA	2355-31-9	2.63 U	G1959-FS(3)	10.000	11/18/2020	1.07	2.63	5.26
NEtFOSAA	2991-50-6	2.11 U	G1959-FS(3)	10.000	11/18/2020	0.79	2.11	5.26
PFBS	375-73-5	1.05 U	G1959-FS(3)	10.000	11/18/2020	0.37	1.05	5.26
PFHxS	355-46-4	2.11 U	G1959-FS(3)	10.000	11/18/2020	0.85	2.11	5.26
PFOS	1763-23-1	6.76	G1959-FS(3)	10.000	11/18/2020	0.73	2.11	5.26
HFPO-DA	13252-13-6	2.11 U	G1959-FS(3)	10.000	11/18/2020	0.67	2.11	5.26
Adona	919005-14-4	2.11 U	G1959-FS(3)	10.000	11/18/2020	0.87	2.11	5.26
11Cl-PF3OUdS	763051-92-9	1.58 U	G1959-FS(3)	10.000	11/18/2020	0.55	1.58	5.26
9Cl-PF3ONS	756426-58-1	1.05 U	G1959-FS(3)	10.000	11/18/2020	0.51	1.05	5.26

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

Client ID	PX-H110-SS05-000H
Battelle ID	G1962-FS
Sample Type	SA
Collection Date	10/23/2020
Extraction Date	11/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	18.54
Matrix	SO
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	G1962-FS(3)	10.000	11/18/2020	0.89	2.52	6.29
PFHpA	375-85-9	1.89 U	G1962-FS(3)	10.000	11/18/2020	0.64	1.89	6.29
PFOA	335-67-1	0.85 J	G1962-FS(3)	10.000	11/18/2020	0.77	2.52	6.29
PFNA	375-95-1	1.26 U	G1962-FS(3)	10.000	11/18/2020	0.62	1.26	6.29
PFDA	335-76-2	1.26 U	G1962-FS(3)	10.000	11/18/2020	0.58	1.26	6.29
PFUnA	2058-94-8	1.26 U	G1962-FS(3)	10.000	11/18/2020	0.58	1.26	6.29
PFDoA	307-55-1	2.52 U	G1962-FS(3)	10.000	11/18/2020	0.77	2.52	6.29
PFTrDA	72629-94-8	1.26 U	G1962-FS(3)	10.000	11/18/2020	0.35	1.26	6.29
PFTeDA	376-06-7	3.14 U	G1962-FS(3)	10.000	11/18/2020	1.36	3.14	6.29
NMeFOSAA	2355-31-9	3.14 U	G1962-FS(3)	10.000	11/18/2020	1.28	3.14	6.29
NEtFOSAA	2991-50-6	2.52 U	G1962-FS(3)	10.000	11/18/2020	0.94	2.52	6.29
PFBS	375-73-5	1.26 U	G1962-FS(3)	10.000	11/18/2020	0.44	1.26	6.29
PFHxS	355-46-4	1.89 J	G1962-FS(3)	10.000	11/18/2020	1.02	2.52	6.29
PFOS	1763-23-1	5.30 J	G1962-FS(3)	10.000	11/18/2020	0.87	2.52	6.29
HFPO-DA	13252-13-6	2.52 U	G1962-FS(3)	10.000	11/18/2020	0.81	2.52	6.29
Adona	919005-14-4	2.52 U	G1962-FS(3)	10.000	11/18/2020	1.04	2.52	6.29
11Cl-PF3OUdS	763051-92-9	1.89 U	G1962-FS(3)	10.000	11/18/2020	0.65	1.89	6.29
9Cl-PF3ONS	756426-58-1	1.26 U	G1962-FS(3)	10.000	11/18/2020	0.60	1.26	6.29

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It can be done

5

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

Client ID	PX-H110-SB05-0304
Battelle ID	G1965-FS
Sample Type	SA
Collection Date	10/23/2020
Extraction Date	11/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	10.15
Matrix	SO
Sample Size	1.87
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.14 U	G1965-FS(3)	10.000	11/18/2020	0.76	2.14	5.35
PFHpA	375-85-9	1.60 U	G1965-FS(3)	10.000	11/18/2020	0.55	1.60	5.35
PFOA	335-67-1	2.14 U	G1965-FS(3)	10.000	11/18/2020	0.65	2.14	5.35
PFNA	375-95-1	1.07 U	G1965-FS(3)	10.000	11/18/2020	0.52	1.07	5.35
PFDA	335-76-2	1.07 U	G1965-FS(3)	10.000	11/18/2020	0.49	1.07	5.35
PFUnA	2058-94-8	1.07 U	G1965-FS(3)	10.000	11/18/2020	0.49	1.07	5.35
PFDoA	307-55-1	2.14 U	G1965-FS(3)	10.000	11/18/2020	0.65	2.14	5.35
PFTrDA	72629-94-8	1.07 U	G1965-FS(3)	10.000	11/18/2020	0.30	1.07	5.35
PFTeDA	376-06-7	2.67 U	G1965-FS(3)	10.000	11/18/2020	1.16	2.67	5.35
NMeFOSAA	2355-31-9	2.67 U	G1965-FS(3)	10.000	11/18/2020	1.09	2.67	5.35
NEtFOSAA	2991-50-6	2.14 U	G1965-FS(3)	10.000	11/18/2020	0.80	2.14	5.35
PFBS	375-73-5	1.07 U	G1965-FS(3)	10.000	11/18/2020	0.37	1.07	5.35
PFHxS	355-46-4	2.14 U	G1965-FS(3)	10.000	11/18/2020	0.87	2.14	5.35
PFOS	1763-23-1	2.14 U	G1965-FS(3)	10.000	11/18/2020	0.74	2.14	5.35
HFPO-DA	13252-13-6	2.14 U	G1965-FS(3)	10.000	11/18/2020	0.68	2.14	5.35
Adona	919005-14-4	2.14 U	G1965-FS(3)	10.000	11/18/2020	0.89	2.14	5.35
11Cl-PF3OUdS	763051-92-9	1.60 U	G1965-FS(3)	10.000	11/18/2020	0.56	1.60	5.35
9Cl-PF3ONS	756426-58-1	1.07 U	G1965-FS(3)	10.000	11/18/2020	0.51	1.07	5.35

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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-H110-SS04-000H
Battelle ID	G1974-FS
Sample Type	SA
Collection Date	10/24/2020
Extraction Date	11/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	5.45
Matrix	SO
Sample Size	1.96
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.04 U	G1974-FS(3)	10.000	11/18/2020	0.72	2.04	5.10
PFHpA	375-85-9	1.53 U	G1974-FS(3)	10.000	11/18/2020	0.52	1.53	5.10
PFOA	335-67-1	2.04 U	G1974-FS(3)	10.000	11/18/2020	0.62	2.04	5.10
PFNA	375-95-1	1.02 U	G1974-FS(3)	10.000	11/18/2020	0.50	1.02	5.10
PFDA	335-76-2	1.02 U	G1974-FS(3)	10.000	11/18/2020	0.47	1.02	5.10
PFUnA	2058-94-8	1.02 U	G1974-FS(3)	10.000	11/18/2020	0.47	1.02	5.10
PFDoA	307-55-1	2.04 U	G1974-FS(3)	10.000	11/18/2020	0.62	2.04	5.10
PFTrDA	72629-94-8	1.02 U	G1974-FS(3)	10.000	11/18/2020	0.29	1.02	5.10
PFTeDA	376-06-7	2.55 U	G1974-FS(3)	10.000	11/18/2020	1.10	2.55	5.10
NMeFOSAA	2355-31-9	2.55 U	G1974-FS(3)	10.000	11/18/2020	1.04	2.55	5.10
NEtFOSAA	2991-50-6	2.04 U	G1974-FS(3)	10.000	11/18/2020	0.77	2.04	5.10
PFBS	375-73-5	1.02 U	G1974-FS(3)	10.000	11/18/2020	0.36	1.02	5.10
PFHxS	355-46-4	2.04 U	G1974-FS(3)	10.000	11/18/2020	0.83	2.04	5.10
PFOS	1763-23-1	2.04 U	G1974-FS(3)	10.000	11/18/2020	0.70	2.04	5.10
HFPO-DA	13252-13-6	2.04 U	G1974-FS(3)	10.000	11/18/2020	0.65	2.04	5.10
Adona	919005-14-4	2.04 U	G1974-FS(3)	10.000	11/18/2020	0.85	2.04	5.10
11Cl-PF3OUdS	763051-92-9	1.53 U	G1974-FS(3)	10.000	11/18/2020	0.53	1.53	5.10
9Cl-PF3ONS	756426-58-1	1.02 U	G1974-FS(3)	10.000	11/18/2020	0.49	1.02	5.10

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

Client ID	PX-H110-SB04-0304
Battelle ID	G1975-FS
Sample Type	SA
Collection Date	10/24/2020
Extraction Date	11/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	17.59
Matrix	SO
Sample Size	1.61
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.48 U	G1975-FS(3)	10.000	11/18/2020	0.88	2.48	6.21
PFHpA	375-85-9	1.86 U	G1975-FS(3)	10.000	11/18/2020	0.63	1.86	6.21
PFOA	335-67-1	2.48 U	G1975-FS(3)	10.000	11/18/2020	0.76	2.48	6.21
PFNA	375-95-1	1.24 U	G1975-FS(3)	10.000	11/18/2020	0.61	1.24	6.21
PFDA	335-76-2	1.24 U	G1975-FS(3)	10.000	11/18/2020	0.57	1.24	6.21
PFUnA	2058-94-8	1.24 U	G1975-FS(3)	10.000	11/18/2020	0.57	1.24	6.21
PFDoA	307-55-1	2.48 U	G1975-FS(3)	10.000	11/18/2020	0.76	2.48	6.21
PFTrDA	72629-94-8	1.24 U	G1975-FS(3)	10.000	11/18/2020	0.35	1.24	6.21
PFTeDA	376-06-7	3.11 U	G1975-FS(3)	10.000	11/18/2020	1.34	3.11	6.21
NMeFOSAA	2355-31-9	3.11 U	G1975-FS(3)	10.000	11/18/2020	1.27	3.11	6.21
NEtFOSAA	2991-50-6	2.48 U	G1975-FS(3)	10.000	11/18/2020	0.93	2.48	6.21
PFBS	375-73-5	1.24 U	G1975-FS(3)	10.000	11/18/2020	0.43	1.24	6.21
PFHxS	355-46-4	2.48 U	G1975-FS(3)	10.000	11/18/2020	1.01	2.48	6.21
PFOS	1763-23-1	2.48 U	G1975-FS(3)	10.000	11/18/2020	0.86	2.48	6.21
HFPO-DA	13252-13-6	2.48 U	G1975-FS(3)	10.000	11/18/2020	0.80	2.48	6.21
Adona	919005-14-4	2.48 U	G1975-FS(3)	10.000	11/18/2020	1.03	2.48	6.21
11Cl-PF3OUdS	763051-92-9	1.86 U	G1975-FS(3)	10.000	11/18/2020	0.65	1.86	6.21
9Cl-PF3ONS	756426-58-1	1.24 U	G1975-FS(3)	10.000	11/18/2020	0.60	1.24	6.21

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

Client ID	PX-H110-SS01-000H
Battelle ID	G1979-FS
Sample Type	SA
Collection Date	10/24/2020
Extraction Date	11/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	5.67
Matrix	SO
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	G1979-FS(3)	10.000	11/18/2020	0.80	2.26	5.65
PFHpA	375-85-9	1.69 U	G1979-FS(3)	10.000	11/18/2020	0.58	1.69	5.65
PFOA	335-67-1	2.26 U	G1979-FS(3)	10.000	11/18/2020	0.69	2.26	5.65
PFNA	375-95-1	1.13 U	G1979-FS(3)	10.000	11/18/2020	0.55	1.13	5.65
PFDA	335-76-2	1.13 U	G1979-FS(3)	10.000	11/18/2020	0.52	1.13	5.65
PFUnA	2058-94-8	1.13 U	G1979-FS(3)	10.000	11/18/2020	0.52	1.13	5.65
PFDoA	307-55-1	2.26 U	G1979-FS(3)	10.000	11/18/2020	0.69	2.26	5.65
PFTrDA	72629-94-8	1.13 U	G1979-FS(3)	10.000	11/18/2020	0.32	1.13	5.65
PFTeDA	376-06-7	2.82 U	G1979-FS(3)	10.000	11/18/2020	1.22	2.82	5.65
NMeFOSAA	2355-31-9	2.82 U	G1979-FS(3)	10.000	11/18/2020	1.15	2.82	5.65
NEtFOSAA	2991-50-6	2.26 U	G1979-FS(3)	10.000	11/18/2020	0.85	2.26	5.65
PFBS	375-73-5	1.13 U	G1979-FS(3)	10.000	11/18/2020	0.40	1.13	5.65
PFHxS	355-46-4	2.26 U	G1979-FS(3)	10.000	11/18/2020	0.92	2.26	5.65
PFOS	1763-23-1	2.26 U	G1979-FS(3)	10.000	11/18/2020	0.78	2.26	5.65
HFPO-DA	13252-13-6	2.26 U	G1979-FS(3)	10.000	11/18/2020	0.72	2.26	5.65
Adona	919005-14-4	2.26 U	G1979-FS(3)	10.000	11/18/2020	0.94	2.26	5.65
11Cl-PF3OUdS	763051-92-9	1.69 U	G1979-FS(3)	10.000	11/18/2020	0.59	1.69	5.65
9Cl-PF3ONS	756426-58-1	1.13 U	G1979-FS(3)	10.000	11/18/2020	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-H110-SB01-0304
Battelle ID	G1980-FS
Sample Type	SA
Collection Date	10/24/2020
Extraction Date	11/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	7.74
Matrix	SO
Sample Size	1.87
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.14 U	G1980-FS(3)	10.000	11/18/2020	0.76	2.14	5.35
PFHpA	375-85-9	1.60 U	G1980-FS(3)	10.000	11/18/2020	0.55	1.60	5.35
PFOA	335-67-1	2.14 U	G1980-FS(3)	10.000	11/18/2020	0.65	2.14	5.35
PFNA	375-95-1	1.07 U	G1980-FS(3)	10.000	11/18/2020	0.52	1.07	5.35
PFDA	335-76-2	1.07 U	G1980-FS(3)	10.000	11/18/2020	0.49	1.07	5.35
PFUnA	2058-94-8	1.07 U	G1980-FS(3)	10.000	11/18/2020	0.49	1.07	5.35
PFDoA	307-55-1	2.14 U	G1980-FS(3)	10.000	11/18/2020	0.65	2.14	5.35
PFTrDA	72629-94-8	1.07 U	G1980-FS(3)	10.000	11/18/2020	0.30	1.07	5.35
PFTeDA	376-06-7	2.67 U	G1980-FS(3)	10.000	11/18/2020	1.16	2.67	5.35
NMeFOSAA	2355-31-9	2.67 U	G1980-FS(3)	10.000	11/18/2020	1.09	2.67	5.35
NEtFOSAA	2991-50-6	2.14 U	G1980-FS(3)	10.000	11/18/2020	0.80	2.14	5.35
PFBS	375-73-5	1.07 U	G1980-FS(3)	10.000	11/18/2020	0.37	1.07	5.35
PFHxS	355-46-4	2.14 U	G1980-FS(3)	10.000	11/18/2020	0.87	2.14	5.35
PFOS	1763-23-1	2.14 U	G1980-FS(3)	10.000	11/18/2020	0.74	2.14	5.35
HFPO-DA	13252-13-6	2.14 U	G1980-FS(3)	10.000	11/18/2020	0.68	2.14	5.35
Adona	919005-14-4	2.14 U	G1980-FS(3)	10.000	11/18/2020	0.89	2.14	5.35
11Cl-PF3OUdS	763051-92-9	1.60 U	G1980-FS(3)	10.000	11/18/2020	0.56	1.60	5.35
9Cl-PF3ONS	756426-58-1	1.07 U	G1980-FS(3)	10.000	11/18/2020	0.51	1.07	5.35

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-1355
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: December 12, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-H110-SD02-000H	G1968-FS	Sediment
1MS	PX-H110-SD02-000HMS	G1969-FSMS	Sediment
1MSD	PX-H110-SD02-000HMSD	G1970-FSMSD	Sediment
2	PX-H110-SB01P-0304	G1981-FS	Soil
3	PX-H110-SD01-000H	G1984-FS	Sediment
4	PX-H110-SD01P-000H	G1985-FS	Sediment
5	PX-H110-SS02-000H	G1987-FS	Soil
6	PX-H110-SB02-0304	G1988-FS	Soil
7	PX-H110-SS03-000H	G1991-FS	Soil
8	PX-H110-SS03P-000H	G1992-FS	Soil
9	PX-H110-SB03-0304	G1993-FS	Soil

A Stage 2B/4 data validation was performed on the analytical data for six soil samples and three sediment samples collected on October 23-24, 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-H110-EB01-102420-SO	PFHxS	2.06	None	All Samples ND
	NMeFOSAA	0.39	None	
	PFOS	0.61	U	6, 7, 8
PX-H110-EB01-102320-SO	None - ND	-	-	-

Surrogate Spike Recoveries

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

Laboratory Fortified Blank (LFB)

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

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

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

Internal Standard (IS) Area Performance

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

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

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

Compound	PX-H110-SD01-000H ng/g	PX-H110-SD01P-000H ng/g	RPD	Qualifier
None	ND	ND	-	-

Compound	PX-H110-SS03-000H ng/g	PX-H110-SS03P-000H ng/g	RPD	Qualifier
None	ND	ND	-	-

Compound	PX-H110-SB01-0304 ng/g	PX-H110-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: 12/17/20

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-H110-SD02-000H
Battelle ID	G1968-FS
Sample Type	SA
Collection Date	10/23/2020
Extraction Date	11/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	10.50
Matrix	SD
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	G1968-FS(3)	10.000	11/18/2020	0.79	2.23	5.59
PFHpA	**375-85-9**	**1.68 U**	**G1968-FS(3)**	**10.000**	**11/18/2020**	**0.57**	**1.68**	**5.59**
PFOA	335-67-1	2.23 U	G1968-FS(3)	10.000	11/18/2020	0.68	2.23	5.59
PFNA	**375-95-1**	**1.12 U**	**G1968-FS(3)**	**10.000**	**11/18/2020**	**0.55**	**1.12**	**5.59**
PFDA	335-76-2	1.12 U	G1968-FS(3)	10.000	11/18/2020	0.51	1.12	5.59
PFUnA	**2058-94-8**	**1.12 U**	**G1968-FS(3)**	**10.000**	**11/18/2020**	**0.51**	**1.12**	**5.59**
PFDoA	307-55-1	2.23 U	G1968-FS(3)	10.000	11/18/2020	0.68	2.23	5.59
PFTrDA	**72629-94-8**	**1.12 U**	**G1968-FS(3)**	**10.000**	**11/18/2020**	**0.31**	**1.12**	**5.59**
PFTeDA	376-06-7	2.79 U	G1968-FS(3)	10.000	11/18/2020	1.21	2.79	5.59
NMeFOSAA	**2355-31-9**	**2.79 U**	**G1968-FS(3)**	**10.000**	**11/18/2020**	**1.14**	**2.79**	**5.59**
NEtFOSAA	2991-50-6	2.23 U	G1968-FS(3)	10.000	11/18/2020	0.84	2.23	5.59
PFBS	**375-73-5**	**1.12 U**	**G1968-FS(3)**	**10.000**	**11/18/2020**	**0.39**	**1.12**	**5.59**
PFHxS	355-46-4	2.23 U	G1968-FS(3)	10.000	11/18/2020	0.91	2.23	5.59
PFOS	**1763-23-1**	**2.23 U**	**G1968-FS(3)**	**10.000**	**11/18/2020**	**0.77**	**2.23**	**5.59**
HFPO-DA	13252-13-6	2.23 U	G1968-FS(3)	10.000	11/18/2020	0.72	2.23	5.59
Adona	**919005-14-4**	**2.23 U**	**G1968-FS(3)**	**10.000**	**11/18/2020**	**0.93**	**2.23**	**5.59**
11Cl-PF3OUdS	763051-92-9	1.68 U	G1968-FS(3)	10.000	11/18/2020	0.58	1.68	5.59
9Cl-PF3ONS	**756426-58-1**	**1.12 U**	**G1968-FS(3)**	**10.000**	**11/18/2020**	**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-H110-SB01P-0304
Battelle ID	G1981-FS
Sample Type	SA
Collection Date	10/24/2020
Extraction Date	11/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	7.52
Matrix	SO
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	G1981-FS(3)	10.000	11/18/2020	0.73	2.05	5.13
PFHpA	**375-85-9**	**1.54 U**	**G1981-FS(3)**	**10.000**	**11/18/2020**	**0.52**	**1.54**	**5.13**
PFOA	335-67-1	2.05 U	G1981-FS(3)	10.000	11/18/2020	0.63	2.05	5.13
PFNA	**375-95-1**	**1.03 U**	**G1981-FS(3)**	**10.000**	**11/18/2020**	**0.50**	**1.03**	**5.13**
PFDA	335-76-2	1.03 U	G1981-FS(3)	10.000	11/18/2020	0.47	1.03	5.13
PFUnA	**2058-94-8**	**1.03 U**	**G1981-FS(3)**	**10.000**	**11/18/2020**	**0.47**	**1.03**	**5.13**
PFDoA	307-55-1	2.05 U	G1981-FS(3)	10.000	11/18/2020	0.63	2.05	5.13
PFTrDA	**72629-94-8**	**1.03 U**	**G1981-FS(3)**	**10.000**	**11/18/2020**	**0.29**	**1.03**	**5.13**
PFTeDA	376-06-7	2.56 U	G1981-FS(3)	10.000	11/18/2020	1.11	2.56	5.13
NMeFOSAA	**2355-31-9**	**2.56 U**	**G1981-FS(3)**	**10.000**	**11/18/2020**	**1.05**	**2.56**	**5.13**
NEtFOSAA	2991-50-6	2.05 U	G1981-FS(3)	10.000	11/18/2020	0.77	2.05	5.13
PFBS	**375-73-5**	**1.03 U**	**G1981-FS(3)**	**10.000**	**11/18/2020**	**0.36**	**1.03**	**5.13**
PFHxS	355-46-4	2.05 U	G1981-FS(3)	10.000	11/18/2020	0.83	2.05	5.13
PFOS	**1763-23-1**	**2.05 U**	**G1981-FS(3)**	**10.000**	**11/18/2020**	**0.71**	**2.05**	**5.13**
HFPO-DA	13252-13-6	2.05 U	G1981-FS(3)	10.000	11/18/2020	0.66	2.05	5.13
Adona	**919005-14-4**	**2.05 U**	**G1981-FS(3)**	**10.000**	**11/18/2020**	**0.85**	**2.05**	**5.13**
11Cl-PF3OUdS	763051-92-9	1.54 U	G1981-FS(3)	10.000	11/18/2020	0.53	1.54	5.13
9Cl-PF3ONS	**756426-58-1**	**1.03 U**	**G1981-FS(3)**	**10.000**	**11/18/2020**	**0.49**	**1.03**	**5.13**

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3

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

Client ID	PX-H110-SD01-000H
Battelle ID	G1984-FS
Sample Type	SA
Collection Date	10/24/2020
Extraction Date	11/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	14.29
Matrix	SD
Sample Size	1.69
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.37 U	G1984-FS(3)	10.000	11/18/2020	0.84	2.37	5.92
PFHpA	375-85-9	1.78 U	G1984-FS(3)	10.000	11/18/2020	0.60	1.78	5.92
PFOA	335-67-1	2.37 U	G1984-FS(3)	10.000	11/18/2020	0.72	2.37	5.92
PFNA	375-95-1	1.18 U	G1984-FS(3)	10.000	11/18/2020	0.58	1.18	5.92
PFDA	335-76-2	1.18 U	G1984-FS(3)	10.000	11/18/2020	0.54	1.18	5.92
PFUnA	2058-94-8	1.18 U	G1984-FS(3)	10.000	11/18/2020	0.54	1.18	5.92
PFDoA	307-55-1	2.37 U	G1984-FS(3)	10.000	11/18/2020	0.72	2.37	5.92
PFTrDA	72629-94-8	1.18 U	G1984-FS(3)	10.000	11/18/2020	0.33	1.18	5.92
PFTeDA	376-06-7	2.96 U	G1984-FS(3)	10.000	11/18/2020	1.28	2.96	5.92
NMeFOSAA	2355-31-9	2.96 U	G1984-FS(3)	10.000	11/18/2020	1.21	2.96	5.92
NEtFOSAA	2991-50-6	2.37 U	G1984-FS(3)	10.000	11/18/2020	0.89	2.37	5.92
PFBS	375-73-5	1.18 U	G1984-FS(3)	10.000	11/18/2020	0.41	1.18	5.92
PFHxS	355-46-4	2.37 U	G1984-FS(3)	10.000	11/18/2020	0.96	2.37	5.92
PFOS	1763-23-1	2.37 U	G1984-FS(3)	10.000	11/18/2020	0.82	2.37	5.92
HFPO-DA	13252-13-6	2.37 U	G1984-FS(3)	10.000	11/18/2020	0.76	2.37	5.92
Adona	919005-14-4	2.37 U	G1984-FS(3)	10.000	11/18/2020	0.98	2.37	5.92
11Cl-PF3OUdS	763051-92-9	1.78 U	G1984-FS(3)	10.000	11/18/2020	0.62	1.78	5.92
9Cl-PF3ONS	756426-58-1	1.18 U	G1984-FS(3)	10.000	11/18/2020	0.57	1.18	5.92

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

Client ID	PX-H110-SD01P-000H
Battelle ID	G1985-FS
Sample Type	SA
Collection Date	10/24/2020
Extraction Date	11/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	19.47
Matrix	SD
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	G1985-FS(3)	10.000	11/18/2020	0.87	2.44	6.10
PFHpA	375-85-9	1.83 U	G1985-FS(3)	10.000	11/18/2020	0.62	1.83	6.10
PFOA	335-67-1	2.44 U	G1985-FS(3)	10.000	11/18/2020	0.74	2.44	6.10
PFNA	375-95-1	1.22 U	G1985-FS(3)	10.000	11/18/2020	0.60	1.22	6.10
PFDA	335-76-2	1.22 U	G1985-FS(3)	10.000	11/18/2020	0.56	1.22	6.10
PFUnA	2058-94-8	1.22 U	G1985-FS(3)	10.000	11/18/2020	0.56	1.22	6.10
PFDoA	307-55-1	2.44 U	G1985-FS(3)	10.000	11/18/2020	0.74	2.44	6.10
PFTrDA	72629-94-8	1.22 U	G1985-FS(3)	10.000	11/18/2020	0.34	1.22	6.10
PFTeDA	376-06-7	3.05 U	G1985-FS(3)	10.000	11/18/2020	1.32	3.05	6.10
NMeFOSAA	2355-31-9	3.05 U	G1985-FS(3)	10.000	11/18/2020	1.24	3.05	6.10
NEtFOSAA	2991-50-6	2.44 U	G1985-FS(3)	10.000	11/18/2020	0.91	2.44	6.10
PFBS	375-73-5	1.22 U	G1985-FS(3)	10.000	11/18/2020	0.43	1.22	6.10
PFHxS	355-46-4	2.44 U	G1985-FS(3)	10.000	11/18/2020	0.99	2.44	6.10
PFOS	1763-23-1	2.44 U	G1985-FS(3)	10.000	11/18/2020	0.84	2.44	6.10
HFPO-DA	13252-13-6	2.44 U	G1985-FS(3)	10.000	11/18/2020	0.78	2.44	6.10
Adona	919005-14-4	2.44 U	G1985-FS(3)	10.000	11/18/2020	1.01	2.44	6.10
11Cl-PF3OUdS	763051-92-9	1.83 U	G1985-FS(3)	10.000	11/18/2020	0.63	1.83	6.10
9Cl-PF3ONS	756426-58-1	1.22 U	G1985-FS(3)	10.000	11/18/2020	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-H110-SS02-000H
Battelle ID	G1987-FS
Sample Type	SA
Collection Date	10/24/2020
Extraction Date	11/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	12.00
Matrix	SO
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	G1987-FS(3)	10.000	11/18/2020	0.83	2.33	5.81
PFHpA	375-85-9	1.74 U	G1987-FS(3)	10.000	11/18/2020	0.59	1.74	5.81
PFOA	335-67-1	2.33 U	G1987-FS(3)	10.000	11/18/2020	0.71	2.33	5.81
PFNA	375-95-1	1.16 U	G1987-FS(3)	10.000	11/18/2020	0.57	1.16	5.81
PFDA	335-76-2	1.16 U	G1987-FS(3)	10.000	11/18/2020	0.53	1.16	5.81
PFUnA	2058-94-8	1.16 U	G1987-FS(3)	10.000	11/18/2020	0.53	1.16	5.81
PFDoA	307-55-1	2.33 U	G1987-FS(3)	10.000	11/18/2020	0.71	2.33	5.81
PFTrDA	72629-94-8	1.16 U	G1987-FS(3)	10.000	11/18/2020	0.33	1.16	5.81
PFTeDA	376-06-7	2.91 U	G1987-FS(3)	10.000	11/18/2020	1.26	2.91	5.81
NMeFOSAA	2355-31-9	2.91 U	G1987-FS(3)	10.000	11/18/2020	1.19	2.91	5.81
NEtFOSAA	2991-50-6	2.33 U	G1987-FS(3)	10.000	11/18/2020	0.87	2.33	5.81
PFBS	375-73-5	1.16 U	G1987-FS(3)	10.000	11/18/2020	0.41	1.16	5.81
PFHxS	355-46-4	2.33 U	G1987-FS(3)	10.000	11/18/2020	0.94	2.33	5.81
PFOS	1763-23-1	2.33 U	G1987-FS(3)	10.000	11/18/2020	0.80	2.33	5.81
HFPO-DA	13252-13-6	2.33 U	G1987-FS(3)	10.000	11/18/2020	0.74	2.33	5.81
Adona	919005-14-4	2.33 U	G1987-FS(3)	10.000	11/18/2020	0.97	2.33	5.81
11Cl-PF3OUdS	763051-92-9	1.74 U	G1987-FS(3)	10.000	11/18/2020	0.60	1.74	5.81
9Cl-PF3ONS	756426-58-1	1.16 U	G1987-FS(3)	10.000	11/18/2020	0.56	1.16	5.81

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

Client ID	PX-H110-SB02-0304
Battelle ID	G1988-FS
Sample Type	SA
Collection Date	10/24/2020
Extraction Date	11/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	4.79
Matrix	SO
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	G1988-FS(3)	10.000	11/18/2020	0.81	2.29	5.71	
PFHpA	375-85-9	1.71 U	G1988-FS(3)	10.000	11/18/2020	0.58	1.71	5.71	
PFOA	335-67-1	2.29 U	G1988-FS(3)	10.000	11/18/2020	0.70	2.29	5.71	
PFNA	375-95-1	1.14 U	G1988-FS(3)	10.000	11/18/2020	0.56	1.14	5.71	
PFDA	335-76-2	1.14 U	G1988-FS(3)	10.000	11/18/2020	0.53	1.14	5.71	
PFUnA	2058-94-8	1.14 U	G1988-FS(3)	10.000	11/18/2020	0.53	1.14	5.71	
PFDoA	307-55-1	2.29 U	G1988-FS(3)	10.000	11/18/2020	0.70	2.29	5.71	
PFTrDA	72629-94-8	1.14 U	G1988-FS(3)	10.000	11/18/2020	0.32	1.14	5.71	
PFTeDA	376-06-7	2.86 U	G1988-FS(3)	10.000	11/18/2020	1.23	2.86	5.71	
NMeFOSAA	2355-31-9	2.86 U	G1988-FS(3)	10.000	11/18/2020	1.17	2.86	5.71	
NEtFOSAA	2991-50-6	2.29 U	G1988-FS(3)	10.000	11/18/2020	0.86	2.29	5.71	
PFBS	375-73-5	1.14 U	G1988-FS(3)	10.000	11/18/2020	0.40	1.14	5.71	
PFHxS	355-46-4	2.29 U	G1988-FS(3)	10.000	11/18/2020	0.93	2.29	5.71	
PFOS	1763-23-1	2.29 ~~0.857~~ U	G1988-FS(3)	10.000	11/18/2020	0.79	2.29	5.71	EBL
HFPO-DA	13252-13-6	2.29 U	G1988-FS(3)	10.000	11/18/2020	0.73	2.29	5.71	
Adona	919005-14-4	2.29 U	G1988-FS(3)	10.000	11/18/2020	0.95	2.29	5.71	
11Cl-PF3OUdS	763051-92-9	1.71 U	G1988-FS(3)	10.000	11/18/2020	0.59	1.71	5.71	
9Cl-PF3ONS	756426-58-1	1.14 U	G1988-FS(3)	10.000	11/18/2020	0.55	1.14	5.71	

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

Client ID	PX-H110-SS03-000H
Battelle ID	G1991-FS
Sample Type	SA
Collection Date	10/24/2020
Extraction Date	11/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	3.76
Matrix	SO
Sample Size	2.10
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	1.90 U	G1991-FS(3)	10.000	11/18/2020	0.68	1.90	4.76	
PFHpA	375-85-9	1.43 U	G1991-FS(3)	10.000	11/18/2020	0.49	1.43	4.76	
PFOA	335-67-1	1.90 U	G1991-FS(3)	10.000	11/18/2020	0.58	1.90	4.76	
PFNA	375-95-1	0.95 U	G1991-FS(3)	10.000	11/18/2020	0.47	0.95	4.76	
PFDA	335-76-2	0.95 U	G1991-FS(3)	10.000	11/18/2020	0.44	0.95	4.76	
PFUnA	2058-94-8	0.95 U	G1991-FS(3)	10.000	11/18/2020	0.44	0.95	4.76	
PFDoA	307-55-1	1.90 U	G1991-FS(3)	10.000	11/18/2020	0.58	1.90	4.76	
PFTrDA	72629-94-8	0.95 U	G1991-FS(3)	10.000	11/18/2020	0.27	0.95	4.76	
PFTeDA	376-06-7	2.38 U	G1991-FS(3)	10.000	11/18/2020	1.03	2.38	4.76	
NMeFOSAA	2355-31-9	2.38 U	G1991-FS(3)	10.000	11/18/2020	0.97	2.38	4.76	
NEtFOSAA	2991-50-6	1.90 U	G1991-FS(3)	10.000	11/18/2020	0.71	1.90	4.76	
PFBS	375-73-5	0.95 U	G1991-FS(3)	10.000	11/18/2020	0.33	0.95	4.76	
PFHxS	355-46-4	1.90 U	G1991-FS(3)	10.000	11/18/2020	0.77	1.90	4.76	
PFOS	1763-23-1	1.90 ~~0.93~~ U	G1991-FS(3)	10.000	11/18/2020	0.66	1.90	4.76	EBL
HFPO-DA	13252-13-6	1.90 U	G1991-FS(3)	10.000	11/18/2020	0.61	1.90	4.76	
Adona	919005-14-4	1.90 U	G1991-FS(3)	10.000	11/18/2020	0.79	1.90	4.76	
11Cl-PF3OUdS	763051-92-9	1.43 U	G1991-FS(3)	10.000	11/18/2020	0.50	1.43	4.76	
9Cl-PF3ONS	756426-58-1	0.95 U	G1991-FS(3)	10.000	11/18/2020	0.46	0.95	4.76	

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

Client ID	PX-H110-SS03P-000H
Battelle ID	G1992-FS
Sample Type	SA
Collection Date	10/24/2020
Extraction Date	11/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	6.12
Matrix	SO
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	G1992-FS(3)	10.000	11/18/2020	0.74	2.08	5.21	
PFHpA	375-85-9	1.56 U	G1992-FS(3)	10.000	11/18/2020	0.53	1.56	5.21	
PFOA	335-67-1	2.08 U	G1992-FS(3)	10.000	11/18/2020	0.64	2.08	5.21	
PFNA	375-95-1	1.04 U	G1992-FS(3)	10.000	11/18/2020	0.51	1.04	5.21	
PFDA	335-76-2	1.04 U	G1992-FS(3)	10.000	11/18/2020	0.48	1.04	5.21	
PFUnA	2058-94-8	1.04 U	G1992-FS(3)	10.000	11/18/2020	0.48	1.04	5.21	
PFDoA	307-55-1	2.08 U	G1992-FS(3)	10.000	11/18/2020	0.64	2.08	5.21	
PFTrDA	72629-94-8	1.04 U	G1992-FS(3)	10.000	11/18/2020	0.29	1.04	5.21	
PFTeDA	376-06-7	2.60 U	G1992-FS(3)	10.000	11/18/2020	1.13	2.60	5.21	
NMeFOSAA	2355-31-9	2.60 U	G1992-FS(3)	10.000	11/18/2020	1.06	2.60	5.21	
NEtFOSAA	2991-50-6	2.08 U	G1992-FS(3)	10.000	11/18/2020	0.78	2.08	5.21	
PFBS	375-73-5	1.04 U	G1992-FS(3)	10.000	11/18/2020	0.36	1.04	5.21	
PFHxS	355-46-4	2.08 U	G1992-FS(3)	10.000	11/18/2020	0.84	2.08	5.21	
PFOS	1763-23-1	2.08 ~~0.73~~ U	G1992-FS(3)	10.000	11/18/2020	0.72	2.08	5.21	EBL
HFPO-DA	13252-13-6	2.08 U	G1992-FS(3)	10.000	11/18/2020	0.67	2.08	5.21	
Adona	919005-14-4	2.08 U	G1992-FS(3)	10.000	11/18/2020	0.86	2.08	5.21	
11Cl-PF3OUdS	763051-92-9	1.56 U	G1992-FS(3)	10.000	11/18/2020	0.54	1.56	5.21	
9Cl-PF3ONS	756426-58-1	1.04 U	G1992-FS(3)	10.000	11/18/2020	0.50	1.04	5.21	

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

Client ID	PX-H110-SB03-0304
Battelle ID	G1993-FS
Sample Type	SA
Collection Date	10/24/2020
Extraction Date	11/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	7.52
Matrix	SO
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	G1993-FS(3)	10.000	11/18/2020	0.73	2.05	5.13
PFHpA	**375-85-9**	**1.54 U**	**G1993-FS(3)**	**10.000**	**11/18/2020**	**0.52**	**1.54**	**5.13**
PFOA	335-67-1	2.05 U	G1993-FS(3)	10.000	11/18/2020	0.63	2.05	5.13
PFNA	**375-95-1**	**1.03 U**	**G1993-FS(3)**	**10.000**	**11/18/2020**	**0.50**	**1.03**	**5.13**
PFDA	335-76-2	1.03 U	G1993-FS(3)	10.000	11/18/2020	0.47	1.03	5.13
PFUnA	**2058-94-8**	**1.03 U**	**G1993-FS(3)**	**10.000**	**11/18/2020**	**0.47**	**1.03**	**5.13**
PFDoA	307-55-1	2.05 U	G1993-FS(3)	10.000	11/18/2020	0.63	2.05	5.13
PFTrDA	**72629-94-8**	**1.03 U**	**G1993-FS(3)**	**10.000**	**11/18/2020**	**0.29**	**1.03**	**5.13**
PFTeDA	376-06-7	2.56 U	G1993-FS(3)	10.000	11/18/2020	1.11	2.56	5.13
NMeFOSAA	**2355-31-9**	**2.56 U**	**G1993-FS(3)**	**10.000**	**11/18/2020**	**1.05**	**2.56**	**5.13**
NEtFOSAA	2991-50-6	2.05 U	G1993-FS(3)	10.000	11/18/2020	0.77	2.05	5.13
PFBS	**375-73-5**	**1.03 U**	**G1993-FS(3)**	**10.000**	**11/18/2020**	**0.36**	**1.03**	**5.13**
PFHxS	355-46-4	2.05 U	G1993-FS(3)	10.000	11/18/2020	0.83	2.05	5.13
PFOS	**1763-23-1**	**2.05 U**	**G1993-FS(3)**	**10.000**	**11/18/2020**	**0.71**	**2.05**	**5.13**
HFPO-DA	13252-13-6	2.05 U	G1993-FS(3)	10.000	11/18/2020	0.66	2.05	5.13
Adona	**919005-14-4**	**2.05 U**	**G1993-FS(3)**	**10.000**	**11/18/2020**	**0.85**	**2.05**	**5.13**
11Cl-PF3OUdS	763051-92-9	1.54 U	G1993-FS(3)	10.000	11/18/2020	0.53	1.54	5.13
9Cl-PF3ONS	**756426-58-1**	**1.03 U**	**G1993-FS(3)**	**10.000**	**11/18/2020**	**0.49**	**1.03**	**5.13**

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-1356
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: December 12, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-B103-EB01-102320-SO	G1934-FS	Water
2	PX-B103-FB01-102220	G1935-FS	Water
3	PX-B103-EB01-102220-GW	G1936-FS	Water
4	PX-B103-WT06-1020	G1937-FS	Water
5	PX-B103-WT02-1020	G1941-FS	Water
6	PX-B103-WT02P-1020	G1942-FS	Water
7	PX-B103-WT01-1020	G1945-FS	Water
8	PX-B103-WT03-1020	G1950-FS	Water
9	PX-B103-EB01-102220-SO	G1951-FS	Water
10	PX B103 WT04-1020	G1956-FS	Water
10MS	PX-B103-WT04-1020MS	G1957-FSMS	Water
10MSD	PX-B103-WT04-1020MSD	G1958-FSMSD	Water
11	PX-B103-WT05-1020	G1960-FS	Water
12	PX-B103-WT08-1020	G1961-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for eight water samples, three aqueous equipment blank samples, and one aqueous field blank sample collected on October 22-23, 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-B103-EB01-102320-SO	None - ND	-	-	-
PX-B103-EB01-102220-SO	None - ND	-	-	-
PX-B103-FB01-102220	None - ND	-	-	-
PX-B103-EB01-102220-GW	None - ND	-	-	-

Surrogate Spike Recoveries

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

Laboratory Fortified Blank (LFB)

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

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

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

EDS Sample ID	Compound	MS %R/MSD %R/RDP	Qualifier
10	PFOA	60%/55%/OK	J
	PFHxS	0%/0%/NC	None - 4X Rule Applies
	PFOS	0%/0%/NC	None - 4X Rule Applies
	HFPO-DA	62%/65%/OK	UJ
	Adona	55%/56%/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.
- Several samples were re-extracted outside of holding times in SDG 20-1527 to verify surrogate deficiencies. Use the original analysis results for reporting purposes.

Field Duplicate Sample Precision

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

Compound	PX-B103-WT02-1020 ng/L	PX-B103-WT02P-1020 ng/L	RPD	Qualifier
PFHxA	87.77	83.13	5%	None
PFHpA	36.39	33.14	9%	
PFOA	99.45	98.36	1%	
PFNA	15.41	13.70	12%	
PFDA	6.09	5.63	8%	
PFUnA	2.00	2.00	0%	
NMeFOSAA	2.93	2.69	9%	
NEtFOSAA	4.84	5.33	10%	
PFBS	20.54	21.53	5%	
PFHxS	276.26	278.92	1%	
PFOS	1753.24	2012.72	14%	

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

Signed: Nancy Weaver Dated: 12/17/20

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-B103-EB01-102320-SO
Battelle ID	G1934-FS
Sample Type	SA
Collection Date	10/23/2020
Extraction Date	10/29/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	AQ
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	G1934-FS(D)	1.000	11/19/2020	0.50	1.42	4.72	
PFHpA	**375-85-9**	**0.94 U**	**G1934-FS(D)**	**1.000**	**11/19/2020**	**0.25**	**0.94**	**4.72**	
PFOA	335-67-1	1.42 U	G1934-FS(D)	1.000	11/19/2020	0.48	1.42	4.72	
PFNA	**375-95-1**	**0.94 U**	**G1934-FS(D)**	**1.000**	**11/19/2020**	**0.29**	**0.94**	**4.72**	
PFDA	335-76-2	0.47 U	G1934-FS(D)	1.000	11/19/2020	0.13	0.47	4.72	
PFUnA	**2058-94-8**	**0.47 U**	**G1934-FS(D)**	**1.000**	**11/19/2020**	**0.21**	**0.47**	**4.72**	
PFDoA	307-55-1	0.47 ~~U~~ UJ	G1934-FS(D)	1.000	11/19/2020	0.18	0.47	4.72	SSL
PFTrDA	**72629-94-8**	**0.47 U**	**G1934-FS(D)**	**1.000**	**11/19/2020**	**0.14**	**0.47**	**4.72**	
PFTeDA	376-06-7	1.89 ~~U~~ UJ	G1934-FS(D)	1.000	11/19/2020	0.69	1.89	4.72	SSL
NMeFOSAA	**2355-31-9**	**0.94 ~~U~~ UJ**	**G1934-FS(D)**	**1.000**	**11/19/2020**	**0.33**	**0.94**	**4.72**	SSL
NEtFOSAA	2991-50-6	0.94 U	G1934-FS(D)	1.000	11/19/2020	0.47	0.94	4.72	
PFBS	**375-73-5**	**0.47 U**	**G1934-FS(D)**	**1.000**	**11/19/2020**	**0.13**	**0.47**	**4.72**	
PFHxS	355-46-4	0.38 U	G1934-FS(D)	1.000	11/19/2020	0.10	0.38	4.72	
PFOS	**1763-23-1**	**0.94 U**	**G1934-FS(D)**	**1.000**	**11/19/2020**	**0.42**	**0.94**	**4.72**	
HFPO-DA	13252-13-6	0.47 U	G1934-FS(D)	1.000	11/19/2020	0.24	0.47	4.72	
Adona	**919005-14-4**	**0.94 U**	**G1934-FS(D)**	**1.000**	**11/19/2020**	**0.25**	**0.94**	**4.72**	
11Cl-PF3OUdS	763051-92-9	0.47 U	G1934-FS(D)	1.000	11/19/2020	0.22	0.47	4.72	
9Cl-PF3ONS	**756426-58-1**	**0.94 U**	**G1934-FS(D)**	**1.000**	**11/19/2020**	**0.25**	**0.94**	**4.72**	

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

Client ID	PX-B103-EB01-102320-SO
Battelle ID	G1934-FS
Sample Type	SA
Collection Date	10/23/2020
Extraction Date	10/29/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	63		G1934-FS(0)	11/19/2020
13C4-PFHpA	63		G1934-FS(0)	11/19/2020
13C8-PFOA	62		G1934-FS(0)	11/19/2020
13C9-PFNA	89		G1934-FS(0)	11/19/2020
13C6-PFDA	69		G1934-FS(0)	11/19/2020
13C7-PFUnA	53		G1934-FS(0)	11/19/2020
13C2-PFDoA	36	N	G1934-FS(0)	11/19/2020
13C2-PFTeDA	31	N	G1934-FS(0)	11/19/2020
d3-MeFOSAA	27	N	G1934-FS(0)	11/19/2020
d5-EtFOSAA	64		G1934-FS(0)	11/19/2020
13C3-PFBS	98		G1934-FS(0)	11/19/2020
13C3-PFHxS	89		G1934-FS(0)	11/19/2020
13C8-PFOS	90		G1934-FS(0)	11/19/2020
13C3-HFPO-DA	59		G1934-FS(0)	11/19/2020

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

Client ID	PX-B103-FB01-102220
Battelle ID	G1935-FS
Sample Type	SA
Collection Date	10/22/2020
Extraction Date	10/29/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	AQ
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	G1935-FS(0)	1.000	11/23/2020	0.48	1.36	4.55
PFHpA	**375-85-9**	**0.91 U**	**G1935-FS(0)**	**1.000**	**11/23/2020**	**0.24**	**0.91**	**4.55**
PFOA	335-67-1	1.36 U	G1935-FS(0)	1.000	11/23/2020	0.46	1.36	4.55
PFNA	**375-95-1**	**0.91 U**	**G1935-FS(0)**	**1.000**	**11/23/2020**	**0.28**	**0.91**	**4.55**
PFDA	335-76-2	0.45 U	G1935-FS(0)	1.000	11/23/2020	0.13	0.45	4.55
PFUnA	**2058-94-8**	**0.45 U**	**G1935-FS(0)**	**1.000**	**11/23/2020**	**0.20**	**0.45**	**4.55**
PFDoA	307-55-1	0.45 U	G1935-FS(0)	1.000	11/23/2020	0.17	0.45	4.55
PFTrDA	**72629-94-8**	**0.45 U**	**G1935-FS(0)**	**1.000**	**11/23/2020**	**0.14**	**0.45**	**4.55**
PFTeDA	376-06-7	1.82 U	G1935-FS(0)	1.000	11/23/2020	0.66	1.82	4.55
NMeFOSAA	**2355-31-9**	**0.91 U**	**G1935-FS(0)**	**1.000**	**11/23/2020**	**0.32**	**0.91**	**4.55**
NEtFOSAA	2991-50-6	0.91 U	G1935-FS(0)	1.000	11/23/2020	0.45	0.91	4.55
PFBS	**375-73-5**	**0.45 U**	**G1935-FS(0)**	**1.000**	**11/23/2020**	**0.13**	**0.45**	**4.55**
PFHxS	355-46-4	0.36 U	G1935-FS(0)	1.000	11/23/2020	0.10	0.36	4.55
PFOS	**1763-23-1**	**0.91 U**	**G1935-FS(0)**	**1.000**	**11/23/2020**	**0.40**	**0.91**	**4.55**
HFPO-DA	13252-13-6	0.45 U	G1935-FS(0)	1.000	11/23/2020	0.23	0.45	4.55
Adona	**919005-14-4**	**0.91 U**	**G1935-FS(0)**	**1.000**	**11/23/2020**	**0.25**	**0.91**	**4.55**
11Cl-PF3OUdS	763051-92-9	0.45 U	G1935-FS(0)	1.000	11/23/2020	0.21	0.45	4.55
9Cl-PF3ONS	**756426-58-1**	**0.91 U**	**G1935-FS(0)**	**1.000**	**11/23/2020**	**0.25**	**0.91**	**4.55**

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3

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

Client ID		PX-B103-EB01-102220-GW						
Battelle ID		G1936-FS						
Sample Type		SA						
Collection Date		10/22/2020						
Extraction Date		10/29/2020						
Analytical Instrument		Sciex 6500+ LC/MS/MS						
% Moisture		NA						
Matrix		AQ						
Sample Size		0.270						
Size Unit-Basis		L						
Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.39 U	G1936-FS(0)	1.000	11/19/2020	0.49	1.39	4.63
PFHpA	375-85-9	0.93 U	G1936-FS(0)	1.000	11/19/2020	0.24	0.93	4.63
PFOA	335-67-1	1.39 U	G1936-FS(0)	1.000	11/19/2020	0.47	1.39	4.63
PFNA	375-95-1	0.93 U	G1936-FS(0)	1.000	11/19/2020	0.29	0.93	4.63
PFDA	335-76-2	0.46 U	G1936-FS(0)	1.000	11/19/2020	0.13	0.46	4.63
PFUnA	2058-94-8	0.46 U	G1936-FS(0)	1.000	11/19/2020	0.20	0.46	4.63
PFDoA	307-55-1	0.46 U	G1936-FS(0)	1.000	11/19/2020	0.18	0.46	4.63
PFTrDA	72629-94-8	0.46 U	G1936-FS(0)	1.000	11/19/2020	0.14	0.46	4.63
PFTeDA	376-06-7	1.85 U	G1936-FS(0)	1.000	11/19/2020	0.68	1.85	4.63
NMeFOSAA	2355-31-9	0.93 U	G1936-FS(0)	1.000	11/19/2020	0.32	0.93	4.63
NEtFOSAA	2991-50-6	0.93 U	G1936-FS(0)	1.000	11/19/2020	0.46	0.93	4.63
PFBS	375-73-5	0.46 U	G1936-FS(0)	1.000	11/19/2020	0.13	0.46	4.63
PFHxS	355-46-4	0.37 U	G1936-FS(0)	1.000	11/19/2020	0.10	0.37	4.63
PFOS	1763-23-1	0.93 U	G1936-FS(0)	1.000	11/19/2020	0.41	0.93	4.63
HFPO-DA	13252-13-6	0.46 U	G1936-FS(0)	1.000	11/19/2020	0.23	0.46	4.63
Adona	919005-14-4	0.93 U	G1936-FS(0)	1.000	11/19/2020	0.25	0.93	4.63
11Cl-PF3OUdS	763051-92-9	0.46 U	G1936-FS(0)	1.000	11/19/2020	0.21	0.46	4.63
9Cl-PF3ONS	756426-58-1	0.93 U	G1936-FS(0)	1.000	11/19/2020	0.25	0.93	4.63

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4

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

Client ID	PX-B103-WT06-1020
Battelle ID	G1937-FS
Sample Type	SA
Collection Date	10/22/2020
Extraction Date	10/29/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	GW
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	352.11 D	G1937-FS-D(3)	5.000	11/20/2020	2.55	7.21	24.04
PFHpA	**375-85-9**	**178.83**	**G1937-FS(0)**	**1.000**	**11/19/2020**	**0.25**	**0.96**	**4.81**
PFOA	335-67-1	419.99 D	G1937-FS-D(3)	5.000	11/20/2020	2.45	7.21	24.04
PFNA	**375-95-1**	**61.64**	**G1937-FS(0)**	**1.000**	**11/19/2020**	**0.30**	**0.96**	**4.81**
PFDA	335-76-2	16.15	G1937-FS(0)	1.000	11/19/2020	0.13	0.48	4.81
PFUnA	**2058-94-8**	**0.48 U**	**G1937-FS(0)**	**1.000**	**11/19/2020**	**0.21**	**0.48**	**4.81**
PFDoA	307-55-1	0.48 U	G1937-FS(0)	1.000	11/19/2020	0.18	0.48	4.81
PFTrDA	**72629-94-8**	**0.48 U**	**G1937-FS(0)**	**1.000**	**11/19/2020**	**0.14**	**0.48**	**4.81**
PFTeDA	376-06-7	1.92 U	G1937-FS(0)	1.000	11/19/2020	0.70	1.92	4.81
NMeFOSAA	**2355-31-9**	**9.94**	**G1937-FS(0)**	**1.000**	**11/19/2020**	**0.34**	**0.96**	**4.81**
NEtFOSAA	2991-50-6	0.96 U	G1937-FS(0)	1.000	11/19/2020	0.48	0.96	4.81
PFBS	**375-73-5**	**64.73**	**G1937-FS(0)**	**1.000**	**11/19/2020**	**0.13**	**0.48**	**4.81**
PFHxS	355-46-4	1374.31 D	G1937-FS-D(5)	25.000	11/20/2020	2.64	9.62	120.19
PFOS	**1763-23-1**	**4784.10 D**	**G1937-FS-D(9)**	**156.250**	**11/22/2020**	**66.11**	**150.24**	**751.20**
HFPO-DA	13252-13-6	0.48 U	G1937-FS(0)	1.000	11/19/2020	0.24	0.48	4.81
Adona	**919005-14-4**	**0.96 U**	**G1937-FS(0)**	**1.000**	**11/19/2020**	**0.26**	**0.96**	**4.81**
11Cl-PF3OUdS	763051-92-9	0.48 U	G1937-FS(0)	1.000	11/19/2020	0.22	0.48	4.81
9Cl-PF3ONS	**756426-58-1**	**0.96 U**	**G1937-FS(0)**	**1.000**	**11/19/2020**	**0.26**	**0.96**	**4.81**

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

Client ID	PX-B103-WT06-1020
Battelle ID	G1937-FS
Sample Type	SA
Collection Date	10/22/2020
Extraction Date	10/29/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	78	D	G1937-FS-D(3)	11/20/2020
13C4-PFHpA	67	D	G1937-FS-D(3)	11/20/2020
13C8-PFOA	79	D	G1937-FS-D(3)	11/20/2020
13C9-PFNA	83	D	G1937-FS-D(9)	11/22/2020
13C6-PFDA	69		G1937-FS(0)	11/19/2020
13C7-PFUnA	195	N	G1937-FS(0)	11/19/2020
13C2-PFDoA	207	N	G1937-FS(0)	11/19/2020
13C2-PFTeDA	209	N	G1937-FS(0)	11/19/2020
d3-MeFOSAA	95	D	G1937-FS-D(9)	11/22/2020
d5-EtFOSAA	88	D	G1937-FS-D(9)	11/22/2020
13C3-PFBS	94	D	G1937-FS-D(9)	11/22/2020
13C3-PFHxS	95	D	G1937-FS-D(9)	11/22/2020
13C8-PFOS	102	D	G1937-FS-D(9)	11/22/2020
13C3-HFPO-DA	79	D	G1937-FS-D(3)	11/20/2020

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

Client ID	PX-B103-WT02-1020
Battelle ID	G1941-FS
Sample Type	SA
Collection Date	10/22/2020
Extraction Date	10/29/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	GW
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	87.77	G1941-FS(0)	1.000	11/19/2020	0.51	1.44	4.81
PFHpA	375-85-9	36.39	G1941-FS(0)	1.000	11/19/2020	0.25	0.96	4.81
PFOA	335-67-1	99.45 D	G1941-FS-D(3)	5.000	11/20/2020	2.45	7.21	24.04
PFNA	375-95-1	15.41	G1941-FS(0)	1.000	11/19/2020	0.30	0.96	4.81
PFDA	335-76-2	6.09	G1941-FS(0)	1.000	11/19/2020	0.13	0.48	4.81
PFUnA	2058-94-8	2.00 J	G1941-FS(0)	1.000	11/19/2020	0.21	0.48	4.81
PFDoA	307-55-1	0.48 U	G1941-FS(0)	1.000	11/19/2020	0.18	0.48	4.81
PFTrDA	72629-94-8	0.48 U	G1941-FS(0)	1.000	11/19/2020	0.14	0.48	4.81
PFTeDA	376-06-7	1.92 U	G1941-FS(0)	1.000	11/19/2020	0.70	1.92	4.81
NMeFOSAA	2355-31-9	2.93 J	G1941-FS(0)	1.000	11/19/2020	0.34	0.96	4.81
NEtFOSAA	2991-50-6	4.84	G1941-FS(0)	1.000	11/19/2020	0.48	0.96	4.81
PFBS	375-73-5	20.54	G1941-FS(0)	1.000	11/19/2020	0.13	0.48	4.81
PFHxS	355-46-4	276.26 D	G1941-FS-D(3)	5.000	11/20/2020	0.53	1.92	24.04
PFOS	1763-23-1	1753.24 D	G1941-FS-D(7)	62.500	11/20/2020	26.44	60.10	300.48
HFPO-DA	13252-13-6	0.48 U	G1941-FS(0)	1.000	11/19/2020	0.24	0.48	4.81
Adona	919005-14-4	0.96 U	G1941-FS(0)	1.000	11/19/2020	0.26	0.96	4.81
11Cl-PF3OUdS	763051-92-9	0.48 U	G1941-FS(0)	1.000	11/19/2020	0.22	0.48	4.81
9Cl-PF3ONS	756426-58-1	0.96 U	G1941-FS(0)	1.000	11/19/2020	0.26	0.96	4.81

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

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Client ID	PX-B103-WT02P-1020
Battelle ID	G1942-FS
Sample Type	SA
Collection Date	10/22/2020
Extraction Date	10/29/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	GW
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	83.13	G1942-FS(0)	1.000	11/19/2020	0.51	1.44	4.81
PFHpA	375-85-9	33.14	G1942-FS(0)	1.000	11/19/2020	0.25	0.96	4.81
PFOA	335-67-1	98.36 D	G1942-FS-D(3)	5.000	11/20/2020	2.45	7.21	24.04
PFNA	375-95-1	13.70	G1942-FS(0)	1.000	11/19/2020	0.30	0.96	4.81
PFDA	335-76-2	5.63	G1942-FS(0)	1.000	11/19/2020	0.13	0.48	4.81
PFUnA	2058-94-8	2.00 J	G1942-FS(0)	1.000	11/19/2020	0.21	0.48	4.81
PFDoA	307-55-1	0.48 U	G1942-FS(0)	1.000	11/19/2020	0.18	0.48	4.81
PFTrDA	72629-94-8	0.48 U	G1942-FS(0)	1.000	11/19/2020	0.14	0.48	4.81
PFTeDA	376-06-7	1.92 U	G1942-FS(0)	1.000	11/19/2020	0.70	1.92	4.81
NMeFOSAA	2355-31-9	2.69 J	G1942-FS(0)	1.000	11/19/2020	0.34	0.96	4.81
NEtFOSAA	2991-50-6	5.33	G1942-FS(0)	1.000	11/19/2020	0.48	0.96	4.81
PFBS	375-73-5	21.53	G1942-FS(0)	1.000	11/19/2020	0.13	0.48	4.81
PFHxS	355-46-4	278.92 D	G1942-FS-D(3)	5.000	11/20/2020	0.53	1.92	24.04
PFOS	1763-23-1	2012.72 D	G1942-FS-D(7)	62.500	11/20/2020	26.44	60.10	300.48
HFPO-DA	13252-13-6	0.48 U	G1942-FS(0)	1.000	11/19/2020	0.24	0.48	4.81
Adona	919005-14-4	0.96 U	G1942-FS(0)	1.000	11/19/2020	0.26	0.96	4.81
11Cl-PF3OUdS	763051-92-9	0.48 U	G1942-FS(0)	1.000	11/19/2020	0.22	0.48	4.81
9Cl-PF3ONS	756426-58-1	0.96 U	G1942-FS(0)	1.000	11/19/2020	0.26	0.96	4.81

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

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Client ID		PX-B103-WT01-1020							
Battelle ID		G1945-FS							
Sample Type		SA							
Collection Date		10/22/2020							
Extraction Date		10/29/2020							
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	473.29	D	G1945-FS-D(5)	25.000	11/20/2020	12.27	34.72	115.74
PFHpA	375-85-9	268.03		G1945-FS(0)	1.000	11/19/2020	0.24	0.93	4.63
PFOA	335-67-1	516.09	D	G1945-FS-D(5)	25.000	11/20/2020	11.81	34.72	115.74
PFNA	375-95-1	169.81		G1945-FS(0)	1.000	11/19/2020	0.29	0.93	4.63
PFDA	335-76-2	70.35		G1945-FS(0)	1.000	11/19/2020	0.13	0.46	4.63
PFUnA	2058-94-8	0.46	U	G1945-FS(0)	1.000	11/19/2020	0.20	0.46	4.63
PFDoA	307-55-1	0.46	U	G1945-FS(0)	1.000	11/19/2020	0.18	0.46	4.63
PFTrDA	72629-94-8	0.46	U	G1945-FS(0)	1.000	11/19/2020	0.14	0.46	4.63
PFTeDA	376-06-7	1.85	U	G1945-FS(0)	1.000	11/19/2020	0.68	1.85	4.63
NMeFOSAA	2355-31-9	35.32		G1945-FS(0)	1.000	11/19/2020	0.32	0.93	4.63
NEtFOSAA	2991-50-6	0.93	U	G1945-FS(0)	1.000	11/19/2020	0.46	0.93	4.63
PFBS	375-73-5	125.98		G1945-FS(0)	1.000	11/19/2020	0.13	0.46	4.63
PFHxS	355-46-4	3067.11	D	G1945-FS-D(7)	62.500	11/20/2020	6.37	23.15	289.35
PFOS	1763-23-1	30405.99	D	G1945-FS-D(9)	781.250	11/23/2020	318.29	723.38	3616.90
HFPO-DA	13252-13-6	0.46	U	G1945-FS(0)	1.000	11/19/2020	0.23	0.46	4.63
Adona	919005-14-4	0.93	U	G1945-FS(0)	1.000	11/19/2020	0.25	0.93	4.63
11Cl-PF3OUdS	763051-92-9	0.46	U	G1945-FS(0)	1.000	11/19/2020	0.21	0.46	4.63
9Cl-PF3ONS	756426-58-1	0.93	U	G1945-FS(0)	1.000	11/19/2020	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-B103-WT01-1020
Battelle ID	G1945-FS
Sample Type	SA
Collection Date	10/22/2020
Extraction Date	10/29/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	85	D	G1945-FS-D(5)	11/20/2020
13C4-PFHpA	**73**	**D**	**G1945-FS-D(5)**	**11/20/2020**
13C8-PFOA	88	D	G1945-FS-D(5)	11/20/2020
13C9-PFNA	**99**	**D**	**G1945-FS-D(9)**	**11/23/2020**
13C6-PFDA	90		G1945-FS(0)	11/19/2020
13C7-PFUnA	**200**	**N**	**G1945-FS(0)**	**11/19/2020**
13C2-PFDoA	213	N	G1945-FS(0)	11/19/2020
13C2-PFTeDA	**224**	**N**	**G1945-FS(0)**	**11/19/2020**
d3-MeFOSAA	90	D	G1945-FS-D(9)	11/23/2020
d5-EtFOSAA	**92**	**D**	**G1945-FS-D(9)**	**11/23/2020**
13C3-PFBS	94	D	G1945-FS-D(9)	11/23/2020
13C3-PFHxS	**99**	**D**	**G1945-FS-D(9)**	**11/23/2020**
13C8-PFOS	98	D	G1945-FS-D(9)	11/23/2020
13C3-HFPO-DA	**66**	**D**	**G1945-FS-D(5)**	**11/20/2020**

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

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Client ID		PX-B103-WT03-1020							
Battelle ID		G1950-FS							
Sample Type		SA							
Collection Date		10/22/2020							
Extraction Date		10/29/2020							
Analytical Instrument		Sciex 6500+ LC/MS/MS							
% Moisture		NA							
Matrix		GW							
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	885.78	D	G1950-FS-D(5)	25.000	11/20/2020	12.74	36.06	120.19
PFHpA	**375-85-9**	**601.78**	**D**	**G1950-FS-D(3)**	**5.000**	**11/20/2020**	**1.25**	**4.81**	**24.04**
PFOA	335-67-1	1379.76	D	G1950-FS-D(5)	25.000	11/20/2020	12.26	36.06	120.19
PFNA	**375-95-1**	**149.75**		**G1950-FS(0)**	**1.000**	**11/19/2020**	**0.30**	**0.96**	**4.81**
PFDA	335-76-2	23.56		G1950-FS(0)	1.000	11/19/2020	0.13	0.48	4.81
PFUnA	**2058-94-8**	**0.47**	**J**	**G1950-FS(0)**	**1.000**	**11/19/2020**	**0.21**	**0.48**	**4.81**
PFDoA	307-55-1	0.48	U	G1950-FS(0)	1.000	11/19/2020	0.18	0.48	4.81
PFTrDA	**72629-94-8**	**0.48**	**U**	**G1950-FS(0)**	**1.000**	**11/19/2020**	**0.14**	**0.48**	**4.81**
PFTeDA	376-06-7	1.92	U	G1950-FS(0)	1.000	11/19/2020	0.70	1.92	4.81
NMeFOSAA	**2355-31-9**	**16.09**		**G1950-FS(0)**	**1.000**	**11/19/2020**	**0.34**	**0.96**	**4.81**
NEtFOSAA	2991-50-6	0.49	J	G1950-FS(0)	1.000	11/19/2020	0.48	0.96	4.81
PFBS	**375-73-5**	**159.09**	**D**	**G1950-FS-D(3)**	**5.000**	**11/20/2020**	**0.67**	**2.40**	**24.04**
PFHxS	355-46-4	4724.39	D	G1950-FS-D(9)	312.500	11/22/2020	33.05	120.19	1502.40
PFOS	**1763-23-1**	**6313.46**	**D**	**G1950-FS-D(9)**	**312.500**	**11/22/2020**	**132.21**	**300.48**	**1502.40**
HFPO-DA	13252-13-6	0.48	U	G1950-FS(0)	1.000	11/19/2020	0.24	0.48	4.81
Adona	**919005-14-4**	**0.96**	**U**	**G1950-FS(0)**	**1.000**	**11/19/2020**	**0.26**	**0.96**	**4.81**
11Cl-PF3OUdS	763051-92-9	0.48	U	G1950-FS(0)	1.000	11/19/2020	0.22	0.48	4.81
9Cl-PF3ONS	**756426-58-1**	**0.96**	**U**	**G1950-FS(0)**	**1.000**	**11/19/2020**	**0.26**	**0.96**	**4.81**

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

Client ID	PX-B103-EB01-102220-SO
Battelle ID	G1951-FS
Sample Type	SA
Collection Date	10/22/2020
Extraction Date	10/29/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	AQ
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	G1951-FS(0)	1.000	11/23/2020	0.50	1.42	4.72
PFHpA	375-85-9	0.94 U	G1951-FS(0)	1.000	11/23/2020	0.25	0.94	4.72
PFOA	335-67-1	1.42 U	G1951-FS(0)	1.000	11/23/2020	0.48	1.42	4.72
PFNA	375-95-1	0.94 U	G1951-FS(0)	1.000	11/23/2020	0.29	0.94	4.72
PFDA	335-76-2	0.47 U	G1951-FS(0)	1.000	11/23/2020	0.13	0.47	4.72
PFUnA	2058-94-8	0.47 U	G1951-FS(0)	1.000	11/23/2020	0.21	0.47	4.72
PFDoA	307-55-1	0.47 U	G1951-FS(0)	1.000	11/23/2020	0.18	0.47	4.72
PFTrDA	72629-94-8	0.47 U	G1951-FS(0)	1.000	11/23/2020	0.14	0.47	4.72
PFTeDA	376-06-7	1.89 U	G1951-FS(0)	1.000	11/23/2020	0.69	1.89	4.72
NMeFOSAA	2355-31-9	0.94 U	G1951-FS(0)	1.000	11/23/2020	0.33	0.94	4.72
NEtFOSAA	2991-50-6	0.94 U	G1951-FS(0)	1.000	11/23/2020	0.47	0.94	4.72
PFBS	375-73-5	0.47 U	G1951-FS(0)	1.000	11/23/2020	0.13	0.47	4.72
PFHxS	355-46-4	0.38 U	G1951-FS(0)	1.000	11/23/2020	0.10	0.38	4.72
PFOS	1763-23-1	0.94 U	G1951-FS(0)	1.000	11/23/2020	0.42	0.94	4.72
HFPO-DA	13252-13-6	0.47 U	G1951-FS(0)	1.000	11/23/2020	0.24	0.47	4.72
Adona	919005-14-4	0.94 U	G1951-FS(0)	1.000	11/23/2020	0.25	0.94	4.72
11Cl-PF3OUdS	763051-92-9	0.47 U	G1951-FS(0)	1.000	11/23/2020	0.22	0.47	4.72
9Cl-PF3ONS	756426-58-1	0.94 U	G1951-FS(0)	1.000	11/23/2020	0.25	0.94	4.72

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

Client ID	PX-B103-WT04-1020
Battelle ID	G1956-FS
Sample Type	SA
Collection Date	10/23/2020
Extraction Date	10/29/2020
Analytical Instrument	Sciex 6500+ 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	93.85 J	G1956-FS(0)	1.000	11/19/2020	0.50	1.42	4.72	SSL
PFHpA	375-85-9	52.17 J	G1956-FS(0)	1.000	11/19/2020	0.25	0.94	4.72	SSL
PFOA	335-67-1	34.94 J	G1956-FS(0)	1.000	11/19/2020	0.48	1.42	4.72	MSL
PFNA	375-95-1	120.01	G1956-FS(0)	1.000	11/19/2020	0.29	0.94	4.72	
PFDA	335-76-2	3.81 J	G1956-FS(0)	1.000	11/19/2020	0.13	0.47	4.72	
PFUnA	2058-94-8	0.47 U	G1956-FS(0)	1.000	11/19/2020	0.21	0.47	4.72	
PFDoA	307-55-1	0.47 U	G1956-FS(0)	1.000	11/19/2020	0.18	0.47	4.72	
PFTrDA	72629-94-8	0.47 U	G1956-FS(0)	1.000	11/19/2020	0.14	0.47	4.72	
PFTeDA	376-06-7	1.89 U	G1956-FS(0)	1.000	11/19/2020	0.69	1.89	4.72	
NMeFOSAA	2355-31-9	0.94 U	G1956-FS(0)	1.000	11/19/2020	0.33	0.94	4.72	
NEtFOSAA	2991-50-6	0.94 U	G1956-FS(0)	1.000	11/19/2020	0.47	0.94	4.72	
PFBS	375-73-5	23.47	G1956-FS(0)	1.000	11/19/2020	0.13	0.47	4.72	
PFHxS	355-46-4	775.96 D	G1956-FS-D(5)	25.000	11/20/2020	2.59	9.43	117.92	
PFOS	1763-23-1	12809.16 D	G1956-FS-D(9)	312.500	11/22/2020	129.72	294.81	1474.06	
HFPO-DA	13252-13-6	0.47 U UJ	G1956-FS(0)	1.000	11/19/2020	0.24	0.47	4.72	MSL
Adona	919005-14-4	0.94 U UJ	G1956-FS(0)	1.000	11/19/2020	0.25	0.94	4.72	MSL
11Cl-PF3OUdS	763051-92-9	0.47 U	G1956-FS(0)	1.000	11/19/2020	0.22	0.47	4.72	
9Cl-PF3ONS	756426-58-1	0.94 U	G1956-FS(0)	1.000	11/19/2020	0.25	0.94	4.72	

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MW 12/12/20

Analyzed by: Schumitz, Denise
Printed: 11/24/2020

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

Client ID	PX-B103-WT04-1020
Battelle ID	G1956-FS
Sample Type	SA
Collection Date	10/23/2020
Extraction Date	10/29/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	42	N	G1956-FS(0)	11/19/2020
13C4-PFHpA	22	N	G1956-FS(0)	11/19/2020
13C8-PFOA	59		G1956-FS(0)	11/19/2020
13C9-PFNA	97	D	G1956-FS-D(9)	11/22/2020
13C6-PFDA	81		G1956-FS(0)	11/19/2020
13C7-PFUnA	93		G1956-FS(0)	11/19/2020
13C2-PFDoA	84		G1956-FS(0)	11/19/2020
13C2-PFTeDA	77		G1956-FS(0)	11/19/2020
d3-MeFOSAA	88	D	G1956-FS-D(9)	11/22/2020
d5-EtFOSAA	84	D	G1956-FS-D(9)	11/22/2020
13C3-PFBS	100	D	G1956-FS-D(9)	11/22/2020
13C3-PFHxS	100	D	G1956-FS-D(9)	11/22/2020
13C8-PFOS	105	D	G1956-FS-D(9)	11/22/2020
13C3-HFPO-DA	78		G1956-FS(0)	11/19/2020

NMW 12/12/20

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

Client ID	PX-B103-WT05-1020
Battelle ID	G1960-FS
Sample Type	SA
Collection Date	10/23/2020
Extraction Date	10/29/2020
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	29.11	G1960-FS(0)	1.000	11/19/2020	0.52	1.47	4.90
PFHpA	**375-85-9**	**10.33**	**G1960-FS(0)**	**1.000**	**11/19/2020**	**0.25**	**0.98**	**4.90**
PFOA	335-67-1	43.39 D	G1960-FS-D(3)	5.000	11/20/2020	2.50	7.35	24.51
PFNA	**375-95-1**	**141.85**	**G1960-FS(0)**	**1.000**	**11/19/2020**	**0.30**	**0.98**	**4.90**
PFDA	335-76-2	1.46 J	G1960-FS(0)	1.000	11/19/2020	0.14	0.49	4.90
PFUnA	**2058-94-8**	**0.49 U**	**G1960-FS(0)**	**1.000**	**11/19/2020**	**0.22**	**0.49**	**4.90**
PFDoA	307-55-1	0.49 U	G1960-FS(0)	1.000	11/19/2020	0.19	0.49	4.90
PFTrDA	**72629-94-8**	**0.49 U**	**G1960-FS(0)**	**1.000**	**11/19/2020**	**0.15**	**0.49**	**4.90**
PFTeDA	376-06-7	1.96 U	G1960-FS(0)	1.000	11/19/2020	0.72	1.96	4.90
NMeFOSAA	**2355-31-9**	**0.98 U**	**G1960-FS(0)**	**1.000**	**11/19/2020**	**0.34**	**0.98**	**4.90**
NEtFOSAA	2991-50-6	0.98 U	G1960-FS(0)	1.000	11/19/2020	0.49	0.98	4.90
PFBS	**375-73-5**	**11.98**	**G1960-FS(0)**	**1.000**	**11/19/2020**	**0.14**	**0.49**	**4.90**
PFHxS	355-46-4	165.14 D	G1960-FS-D(3)	5.000	11/20/2020	0.54	1.96	24.51
PFOS	**1763-23-1**	**8173.38 D**	**G1960-FS-D(9)**	**312.500**	**11/22/2020**	**134.80**	**306.37**	**1531.86**
HFPO-DA	13252-13-6	0.49 U	G1960-FS(0)	1.000	11/19/2020	0.25	0.49	4.90
Adona	**919005-14-4**	**0.98 U**	**G1960-FS(0)**	**1.000**	**11/19/2020**	**0.26**	**0.98**	**4.90**
11Cl-PF3OUdS	763051-92-9	0.49 U	G1960-FS(0)	1.000	11/19/2020	0.23	0.49	4.90
9Cl-PF3ONS	**756426-58-1**	**0.98 U**	**G1960-FS(0)**	**1.000**	**11/19/2020**	**0.26**	**0.98**	**4.90**

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

Client ID	PX-B103-WT08-1020
Battelle ID	G1961-FS
Sample Type	SA
Collection Date	10/23/2020
Extraction Date	10/29/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	GW
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	47.66	G1961-FS(0)	1.000	11/19/2020	0.51	1.44	4.81	
PFHpA	**375-85-9**	**23.30 J**	**G1961-FS(0)**	**1.000**	**11/19/2020**	**0.25**	**0.96**	**4.81**	SSL
PFOA	335-67-1	42.85	G1961-FS(0)	1.000	11/19/2020	0.49	1.44	4.81	
PFNA	**375-95-1**	**95.10**	**G1961-FS(0)**	**1.000**	**11/19/2020**	**0.30**	**0.96**	**4.81**	
PFDA	335-76-2	5.78	G1961-FS(0)	1.000	11/19/2020	0.13	0.48	4.81	
PFUnA	**2058-94-8**	**0.48 U**	**G1961-FS(0)**	**1.000**	**11/19/2020**	**0.21**	**0.48**	**4.81**	
PFDoA	307-55-1	0.48 U	G1961-FS(0)	1.000	11/19/2020	0.18	0.48	4.81	
PFTrDA	**72629-94-8**	**0.48 U**	**G1961-FS(0)**	**1.000**	**11/19/2020**	**0.14**	**0.48**	**4.81**	
PFTeDA	376-06-7	1.92 U	G1961-FS(0)	1.000	11/19/2020	0.70	1.92	4.81	
NMeFOSAA	**2355-31-9**	**0.96 U**	**G1961-FS(0)**	**1.000**	**11/19/2020**	**0.34**	**0.96**	**4.81**	
NEtFOSAA	2991-50-6	0.96 U	G1961-FS(0)	1.000	11/19/2020	0.48	0.96	4.81	
PFBS	**375-73-5**	**7.59**	**G1961-FS(0)**	**1.000**	**11/19/2020**	**0.13**	**0.48**	**4.81**	
PFHxS	355-46-4	358.17	G1961-FS-D(3)	5.000	11/20/2020	0.53	1.92	24.04	
PFOS	**1763-23-1**	**5796.36**	**G1961-FS-D(9)**	**312.500**	**11/22/2020**	**132.21**	**300.48**	**1502.40**	
HFPO-DA	13252-13-6	0.48 U	G1961-FS(0)	1.000	11/19/2020	0.24	0.48	4.81	
Adona	**919005-14-4**	**0.96 U**	**G1961-FS(0)**	**1.000**	**11/19/2020**	**0.26**	**0.96**	**4.81**	
11Cl-PF3OUdS	763051-92-9	0.48 U	G1961-FS(0)	1.000	11/19/2020	0.22	0.48	4.81	
9Cl-PF3ONS	**756426-58-1**	**0.96 U**	**G1961-FS(0)**	**1.000**	**11/19/2020**	**0.26**	**0.96**	**4.81**	

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12

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

Client ID	PX-B103-WT08-1020
Battelle ID	G1961-FS
Sample Type	SA
Collection Date	10/23/2020
Extraction Date	10/29/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	54		G1961-FS(0)	11/19/2020
13C4-PFHpA	43	N	G1961-FS(0)	11/19/2020
13C8-PFOA	63		G1961-FS(0)	11/19/2020
13C9-PFNA	83	D	G1961-FS-D(9)	11/22/2020
13C6-PFDA	84		G1961-FS(0)	11/19/2020
13C7-PFUnA	88		G1961-FS(0)	11/19/2020
13C2-PFDoA	95		G1961-FS(0)	11/19/2020
13C2-PFTeDA	93		G1961-FS(0)	11/19/2020
d3-MeFOSAA	89	D	G1961-FS-D(9)	11/22/2020
d5-EtFOSAA	103	D	G1961-FS-D(9)	11/22/2020
13C3-PFBS	105	D	G1961-FS-D(9)	11/22/2020
13C3-PFHxS	111	D	G1961-FS-D(9)	11/22/2020
13C8-PFOS	101	D	G1961-FS-D(9)	11/22/2020
13C3-HFPO-DA	70		G1961-FS(0)	11/19/2020

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-1357
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: December 12, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-H110-FB01-102320	G1966-FS	Water
2	PX-H110-EB01-102320-GW	G1967-FS	Water
3	PX-H110-WT05-1020	G1971-FS	Water
4	PX-H110-EB01-102320-SO	G1972-FS	Water
5	PX-H110-EB01-102420-SO	G1973-FS	Water
6	PX-H110-WT04-1020	G1976-FS	Water
6MS	PX-H110-WT04-1020MS	G1977-FSMS	Water
6MSD	PX-H110-WT04-1020MSD	G1978-FSMSD	Water
7	PX-H110-SW01-1020	G1982-FS	Water
8	PX-H110-SW01P-1020	G1983-FS	Water
9	PX-H110-WT01-1020	G1986-FS	Water
10	PX-H110-WT02-1020	G1989-FS	Water
11	PX-H110-WT02P-1020	G1990-FS	Water
12	PX-H110-WT03-1020	G1994-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for eight water samples, three aqueous equipment blank samples, and one aqueous field blank sample collected on October 23-24, 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
LE58 IB	11Cl-PF3OUdS	0.37	U	4

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-H110-FB01-102320	None - ND	-	-	-
PX-H110-EB01-102320-GW	NMeFOSAA	0.32	None	Samples ND
PX-H110-EB01-102320-SO	None - ND	-	-	-
PX-H110-EB01-102420-SO	PFHxA	2.06	None	Applies to samples in other data packages
	NMeFOSAA	0.39	None	
	PFOS	0.61	None	

Surrogate Spike Recoveries

- Several samples exhibited low surrogate percent recoveries (%R) for several surrogate compounds including one compound <10%. These compounds were qualified as estimated (J/UJ/X) in each sample. Please refer to the Form Is for specific recoveries and qualifications.

Laboratory Fortified Blank (LFB)

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

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

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

EDS Sample ID	Compound	MS %R/MSD %R/RDP	Qualifier
6	PFTrDA	166%/OK/OK	None - Sample ND
	HFPO-DA	49%/47%/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.
- Several samples were re-extracted outside of holding times in SDG 20-1527 to verify surrogate deficiencies. Use the original analysis results for reporting purposes except for PFTeDA in Sample PX-H110-WT03-1020.

Field Duplicate Sample Precision

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

Compound	PX-H110-SW01-1020 ng/L	PX-H110-SW01P-1020 ng/L	RPD	Qualifier
PFHxA	4.04	4.60	13%	None
PFHpA	1.35	1.81	29%	
PFOA	2.17	3.07	34%	None - <5X LOQ
PFBS	1.15	1.27	10%	None
PFHxS	2.04	4.68	79%	None - <5X LOQ
PFOS	2.61	4.23	47%	

Compound	PX-H110-WT02-1020 ng/L	PX-H110-WT02P-1020 ng/L	RPD	Qualifier
PFHxA	159.71	150.13	6%	None
PFHpA	48.47	51.15	5%	
PFOA	53.55	54.41	2%	
PFNA	4.47	4.09	9%	
PFDA	1.68	1.83	9%	
NEtFOSAA	0.98U	0.99	NC	
PFBS	12.96	12.60	3%	
PFHxS	58.14	63.70	9%	
PFOS	173.91	167.90	4%	

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

Signed: Nancy Weaver Dated: 12/17/20

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-H110-FB01-102320						
Battelle ID		G1966-FS						
Sample Type		SA						
Collection Date		10/23/2020						
Extraction Date		11/02/2020						
Analytical Instrument		Sciex 6500+ LC/MS/MS						
% Moisture		NA						
Matrix		AQ						
Sample Size		0.250						
Size Unit-Basis		L						
Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.50 U	G1966-FS(0)	1.000	11/19/2020	0.53	1.50	5.00
PFHpA	375-85-9	1.00 U	G1966-FS(0)	1.000	11/19/2020	0.26	1.00	5.00
PFOA	335-67-1	1.50 U	G1966-FS(0)	1.000	11/19/2020	0.51	1.50	5.00
PFNA	375-95-1	1.00 U	G1966-FS(0)	1.000	11/19/2020	0.31	1.00	5.00
PFDA	335-76-2	0.50 U	G1966-FS(0)	1.000	11/19/2020	0.14	0.50	5.00
PFUnA	2058-94-8	0.50 U	G1966-FS(0)	1.000	11/19/2020	0.22	0.50	5.00
PFDoA	307-55-1	0.50 U	G1966-FS(0)	1.000	11/19/2020	0.19	0.50	5.00
PFTrDA	72629-94-8	0.50 U	G1966-FS(0)	1.000	11/19/2020	0.15	0.50	5.00
PFTeDA	376-06-7	2.00 U	G1966-FS(0)	1.000	11/19/2020	0.73	2.00	5.00
NMeFOSAA	2355-31-9	1.00 U	G1966-FS(0)	1.000	11/19/2020	0.35	1.00	5.00
NEtFOSAA	2991-50-6	1.00 U	G1966-FS(0)	1.000	11/19/2020	0.50	1.00	5.00
PFBS	375-73-5	0.50 U	G1966-FS(0)	1.000	11/19/2020	0.14	0.50	5.00
PFHxS	355-46-4	0.40 U	G1966-FS(0)	1.000	11/19/2020	0.11	0.40	5.00
PFOS	1763-23-1	1.00 U	G1966-FS(0)	1.000	11/19/2020	0.44	1.00	5.00
HFPO-DA	13252-13-6	0.50 U	G1966-FS(0)	1.000	11/19/2020	0.25	0.50	5.00
Adona	919005-14-4	1.00 U	G1966-FS(0)	1.000	11/19/2020	0.27	1.00	5.00
11Cl-PF3OUdS	763051-92-9	0.50 U	G1966-FS(0)	1.000	11/19/2020	0.23	0.50	5.00
9Cl-PF3ONS	756426-58-1	1.00 U	G1966-FS(0)	1.000	11/19/2020	0.27	1.00	5.00

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2

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

Client ID	PX-H110-EB01-102320-GW
Battelle ID	G1967-FS
Sample Type	SA
Collection Date	10/23/2020
Extraction Date	11/02/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	AQ
Sample Size	0.270
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	1.39 ~~U~~ UJ	G1967-FS(0)	1.000	11/19/2020	0.49	1.39	4.63	SSL
PFHpA	**375-85-9**	**0.93 U**	**G1967-FS(0)**	**1.000**	**11/19/2020**	**0.24**	**0.93**	**4.63**	
PFOA	335-67-1	1.39 ~~U~~ UJ	G1967-FS(0)	1.000	11/19/2020	0.47	1.39	4.63	SSL
PFNA	**375-95-1**	**0.93 U**	**G1967-FS(0)**	**1.000**	**11/19/2020**	**0.29**	**0.93**	**4.63**	
PFDA	335-76-2	0.46 U	G1967-FS(0)	1.000	11/19/2020	0.13	0.46	4.63	
PFUnA	**2058-94-8**	**0.46 U**	**G1967-FS(0)**	**1.000**	**11/19/2020**	**0.20**	**0.46**	**4.63**	
PFDoA	307-55-1	0.46 U	G1967-FS(0)	1.000	11/19/2020	0.18	0.46	4.63	
PFTrDA	**72629-94-8**	**0.46 U**	**G1967-FS(0)**	**1.000**	**11/19/2020**	**0.14**	**0.46**	**4.63**	
PFTeDA	376-06-7	1.85 U	G1967-FS(0)	1.000	11/19/2020	0.68	1.85	4.63	
NMeFOSAA	**2355-31-9**	**0.32 J**	**G1967-FS(0)**	**1.000**	**11/19/2020**	**0.32**	**0.93**	**4.63**	
NEtFOSAA	2991-50-6	0.93 U	G1967-FS(0)	1.000	11/19/2020	0.46	0.93	4.63	
PFBS	**375-73-5**	**0.46 U**	**G1967-FS(0)**	**1.000**	**11/19/2020**	**0.13**	**0.46**	**4.63**	
PFHxS	355-46-4	0.37 U	G1967-FS(0)	1.000	11/19/2020	0.10	0.37	4.63	
PFOS	**1763-23-1**	**0.93 U**	**G1967-FS(0)**	**1.000**	**11/19/2020**	**0.41**	**0.93**	**4.63**	
HFPO-DA	13252-13-6	0.46 U	G1967-FS(0)	1.000	11/19/2020	0.23	0.46	4.63	
Adona	**919005-14-4**	**0.93 U**	**G1967-FS(0)**	**1.000**	**11/19/2020**	**0.25**	**0.93**	**4.63**	
11Cl-PF3OUdS	763051-92-9	0.46 U	G1967-FS(0)	1.000	11/19/2020	0.21	0.46	4.63	
9Cl-PF3ONS	**756426-58-1**	**0.93 U**	**G1967-FS(0)**	**1.000**	**11/19/2020**	**0.25**	**0.93**	**4.63**	

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2

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

Client ID	PX-H110-EB01-102320-GW
Battelle ID	G1967-FS
Sample Type	SA
Collection Date	10/23/2020
Extraction Date	11/02/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	42 N	G1967-FS(0)	11/19/2020
13C4-PFHpA	53	G1967-FS(0)	11/19/2020
13C8-PFOA	46 N	G1967-FS(0)	11/19/2020
13C9-PFNA	79	G1967-FS(0)	11/19/2020
13C6-PFDA	75	G1967-FS(0)	11/19/2020
13C7-PFUnA	87	G1967-FS(0)	11/19/2020
13C2-PFDoA	91	G1967-FS(0)	11/19/2020
13C2-PFTeDA	86	G1967-FS(0)	11/19/2020
d3-MeFOSAA	82	G1967-FS(0)	11/19/2020
d5-EtFOSAA	103	G1967-FS(0)	11/19/2020
13C3-PFBS	103	G1967-FS(0)	11/19/2020
13C3-PFHxS	87	G1967-FS(0)	11/19/2020
13C8-PFOS	85	G1967-FS(0)	11/19/2020
13C3-HFPO-DA	90	G1967-FS(0)	11/19/2020

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

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Client ID		PX-H110-WT05-1020								
Battelle ID		G1971-FS								
Sample Type		SA								
Collection Date		10/23/2020								
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	16.39	J	G1971-FS(0)	1.000	11/19/2020	0.52	1.47	4.90	SSL
PFHpA	**375-85-9**	**6.02**	**J**	**G1971-FS(0)**	**1.000**	**11/19/2020**	**0.25**	**0.98**	**4.90**	SSL
PFOA	335-67-1	15.64		G1971-FS(0)	1.000	11/19/2020	0.50	1.47	4.90	
PFNA	**375-95-1**	**0.92**	**J**	**G1971-FS(0)**	**1.000**	**11/19/2020**	**0.30**	**0.98**	**4.90**	
PFDA	335-76-2	0.49	U	G1971-FS(0)	1.000	11/19/2020	0.14	0.49	4.90	
PFUnA	**2058-94-8**	**0.49**	**U**	**G1971-FS(0)**	**1.000**	**11/19/2020**	**0.22**	**0.49**	**4.90**	
PFDoA	307-55-1	0.49	UJ	G1971-FS(0)	1.000	11/19/2020	0.19	0.49	4.90	SSL
PFTrDA	**72629-94-8**	**0.49**	**U**	**G1971-FS(0)**	**1.000**	**11/19/2020**	**0.15**	**0.49**	**4.90**	
PFTeDA	376-06-7	1.96	UJ	G1971-FS(0)	1.000	11/19/2020	0.72	1.96	4.90	SSL
NMeFOSAA	**2355-31-9**	**0.98**	**U**	**G1971-FS(0)**	**1.000**	**11/19/2020**	**0.34**	**0.98**	**4.90**	
NEtFOSAA	2991-50-6	0.98	U	G1971-FS(0)	1.000	11/19/2020	0.49	0.98	4.90	
PFBS	**375-73-5**	**4.98**		**G1971-FS(0)**	**1.000**	**11/19/2020**	**0.14**	**0.49**	**4.90**	
PFHxS	355-46-4	53.34		G1971-FS(0)	1.000	11/19/2020	0.11	0.39	4.90	
PFOS	**1763-23-1**	**52.52**		**G1971-FS(0)**	**1.000**	**11/19/2020**	**0.43**	**0.98**	**4.90**	
HFPO-DA	13252-13-6	0.49	U	G1971-FS(0)	1.000	11/19/2020	0.25	0.49	4.90	
Adona	**919005-14-4**	**0.98**	**U**	**G1971-FS(0)**	**1.000**	**11/19/2020**	**0.26**	**0.98**	**4.90**	
11Cl-PF3OUdS	763051-92-9	0.49	U	G1971-FS(0)	1.000	11/19/2020	0.23	0.49	4.90	
9Cl-PF3ONS	**756426-58-1**	**0.98**	**U**	**G1971-FS(0)**	**1.000**	**11/19/2020**	**0.26**	**0.98**	**4.90**	

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

Client ID	PX-H110-WT05-1020
Battelle ID	G1971-FS
Sample Type	SA
Collection Date	10/23/2020
Extraction Date	11/02/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	34 N	G1971-FS(0)	11/19/2020
13C4-PFHpA	45 N	G1971-FS(0)	11/19/2020
13C8-PFOA	50	G1971-FS(0)	11/19/2020
13C9-PFNA	68	G1971-FS(0)	11/19/2020
13C6-PFDA	59	G1971-FS(0)	11/19/2020
13C7-PFUnA	53	G1971-FS(0)	11/19/2020
13C2-PFDoA	46 N	G1971-FS(0)	11/19/2020
13C2-PFTeDA	15 N	G1971-FS(0)	11/19/2020
d3-MeFOSAA	52	G1971-FS(0)	11/19/2020
d5-EtFOSAA	64	G1971-FS(0)	11/19/2020
13C3-PFBS	59	G1971-FS(0)	11/19/2020
13C3-PFHxS	68	G1971-FS(0)	11/19/2020
13C8-PFOS	74	G1971-FS(0)	11/19/2020
13C3-HFPO-DA	66	G1971-FS(0)	11/19/2020

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

Client ID		PX-H110-EB01-102320-SO							
Battelle ID		G1972-FS							
Sample Type		SA							
Collection Date		10/23/2020							
Extraction Date		11/02/2020							
Analytical Instrument		Sciex 6500+ LC/MS/MS							
% Moisture		NA							
Matrix		AQ							
Sample Size		0.250							
Size Unit-Basis		L							
Analyte	CAS No.	Result (ng/L)		Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	1.50 U		G1972-FS(0)	1.000	11/19/2020	0.53	1.50	5.00	
PFHpA	375-85-9	1.00 U		G1972-FS(0)	1.000	11/19/2020	0.26	1.00	5.00	
PFOA	335-67-1	1.50 U		G1972-FS(0)	1.000	11/19/2020	0.51	1.50	5.00	
PFNA	375-95-1	1.00 U		G1972-FS(0)	1.000	11/19/2020	0.31	1.00	5.00	
PFDA	335-76-2	0.50 U		G1972-FS(0)	1.000	11/19/2020	0.14	0.50	5.00	
PFUnA	2058-94-8	0.50 U		G1972-FS(0)	1.000	11/19/2020	0.22	0.50	5.00	
PFDoA	307-55-1	0.50 U		G1972-FS(0)	1.000	11/19/2020	0.19	0.50	5.00	
PFTrDA	72629-94-8	0.50 U		G1972-FS(0)	1.000	11/19/2020	0.15	0.50	5.00	
PFTeDA	376-06-7	2.00 ~~U~~ UJ		G1972-FS(0)	1.000	11/19/2020	0.73	2.00	5.00	SSL
NMeFOSAA	2355-31-9	1.00 U		G1972-FS(0)	1.000	11/19/2020	0.35	1.00	5.00	
NEtFOSAA	2991-50-6	1.00 U		G1972-FS(0)	1.000	11/19/2020	0.50	1.00	5.00	
PFBS	375-73-5	0.50 U		G1972-FS(0)	1.000	11/19/2020	0.14	0.50	5.00	
PFHxS	355-46-4	0.40 U		G1972-FS(0)	1.000	11/19/2020	0.11	0.40	5.00	
PFOS	1763-23-1	1.00 U		G1972-FS(0)	1.000	11/19/2020	0.44	1.00	5.00	
HFPO-DA	13252-13-6	0.50 U		G1972-FS(0)	1.000	11/19/2020	0.25	0.50	5.00	
Adona	919005-14-4	1.00 U		G1972-FS(0)	1.000	11/19/2020	0.27	1.00	5.00	
11Cl-PF3OUdS	763051-92-9	0.50 ~~0.37 J~~ U		G1972-FS(0)	1.000	11/19/2020	0.23	0.50	5.00	MBL
9Cl-PF3ONS	756426-58-1	1.00 U		G1972-FS(0)	1.000	11/19/2020	0.27	1.00	5.00	

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

Client ID	PX-H110-EB01-102320-SO
Battelle ID	G1972-FS
Sample Type	SA
Collection Date	10/23/2020
Extraction Date	11/02/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	60	G1972-FS(0)	11/19/2020
13C4-PFHpA	60	G1972-FS(0)	11/19/2020
13C8-PFOA	53	G1972-FS(0)	11/19/2020
13C9-PFNA	86	G1972-FS(0)	11/19/2020
13C6-PFDA	70	G1972-FS(0)	11/19/2020
13C7-PFUnA	61	G1972-FS(0)	11/19/2020
13C2-PFDoA	56	G1972-FS(0)	11/19/2020
13C2-PFTeDA	44 N	G1972-FS(0)	11/19/2020
d3-MeFOSAA	61	G1972-FS(0)	11/19/2020
d5-EtFOSAA	98	G1972-FS(0)	11/19/2020
13C3-PFBS	104	G1972-FS(0)	11/19/2020
13C3-PFHxS	91	G1972-FS(0)	11/19/2020
13C8-PFOS	85	G1972-FS(0)	11/19/2020
13C3-HFPO-DA	58	G1972-FS(0)	11/19/2020

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

Client ID	PX-H110-EB01-102420-SO
Battelle ID	G1973-FS
Sample Type	SA
Collection Date	10/24/2020
Extraction Date	11/02/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	AQ
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	2.06 J	G1973-FS(0)	1.000	11/19/2020	0.52	1.47	4.90	SSL
PFHpA	**375-85-9**	**0.98 U**	**G1973-FS(0)**	**1.000**	**11/19/2020**	**0.25**	**0.98**	**4.90**	
PFOA	335-67-1	1.47 UJ	G1973-FS(0)	1.000	11/19/2020	0.50	1.47	4.90	SSL
PFNA	**375-95-1**	**0.98 U**	**G1973-FS(0)**	**1.000**	**11/19/2020**	**0.30**	**0.98**	**4.90**	
PFDA	335-76-2	0.49 U	G1973-FS(0)	1.000	11/19/2020	0.14	0.49	4.90	
PFUnA	**2058-94-8**	**0.49 U**	**G1973-FS(0)**	**1.000**	**11/19/2020**	**0.22**	**0.49**	**4.90**	
PFDoA	307-55-1	0.49 U	G1973-FS(0)	1.000	11/19/2020	0.19	0.49	4.90	
PFTrDA	**72629-94-8**	**0.49 U**	**G1973-FS(0)**	**1.000**	**11/19/2020**	**0.15**	**0.49**	**4.90**	
PFTeDA	376-06-7	1.96 U	G1973-FS(0)	1.000	11/19/2020	0.72	1.96	4.90	
NMeFOSAA	**2355-31-9**	**0.39 J**	**G1973-FS(0)**	**1.000**	**11/19/2020**	**0.34**	**0.98**	**4.90**	
NEtFOSAA	2991-50-6	0.98 U	G1973-FS(0)	1.000	11/19/2020	0.49	0.98	4.90	
PFBS	**375-73-5**	**0.49 U**	**G1973-FS(0)**	**1.000**	**11/19/2020**	**0.14**	**0.49**	**4.90**	
PFHxS	355-46-4	0.39 U	G1973-FS(0)	1.000	11/19/2020	0.11	0.39	4.90	
PFOS	**1763-23-1**	**0.61 J**	**G1973-FS(0)**	**1.000**	**11/19/2020**	**0.43**	**0.98**	**4.90**	
HFPO-DA	13252-13-6	0.49 U	G1973-FS(0)	1.000	11/19/2020	0.25	0.49	4.90	
Adona	**919005-14-4**	**0.98 U**	**G1973-FS(0)**	**1.000**	**11/19/2020**	**0.26**	**0.98**	**4.90**	
11Cl-PF3OUdS	763051-92-9	0.49 U	G1973-FS(0)	1.000	11/19/2020	0.23	0.49	4.90	
9Cl-PF3ONS	**756426-58-1**	**0.98 U**	**G1973-FS(0)**	**1.000**	**11/19/2020**	**0.26**	**0.98**	**4.90**	

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

Client ID	PX-H110-EB01-102420-SO
Battelle ID	G1973-FS
Sample Type	SA
Collection Date	10/24/2020
Extraction Date	11/02/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	44 N	G1973-FS(0)	11/19/2020
13C4-PFHpA	52	G1973-FS(0)	11/19/2020
13C8-PFOA	45 N	G1973-FS(0)	11/19/2020
13C9-PFNA	81	G1973-FS(0)	11/19/2020
13C6-PFDA	76	G1973-FS(0)	11/19/2020
13C7-PFUnA	84	G1973-FS(0)	11/19/2020
13C2-PFDoA	84	G1973-FS(0)	11/19/2020
13C2-PFTeDA	91	G1973-FS(0)	11/19/2020
d3-MeFOSAA	89	G1973-FS(0)	11/19/2020
d5-EtFOSAA	99	G1973-FS(0)	11/19/2020
13C3-PFBS	101	G1973-FS(0)	11/19/2020
13C3-PFHxS	92	G1973-FS(0)	11/19/2020
13C8-PFOS	82	G1973-FS(0)	11/19/2020
13C3-HFPO-DA	88	G1973-FS(0)	11/19/2020

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

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Client ID		PX-H110-WT04-1020							
Battelle ID		G1976-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		0.250							
Size Unit-Basis		L							
Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	2.77 ~~J~~	G1976-FS(0)	1.000	11/19/2020	0.53	1.50	5.00	SSL
PFHpA	**375-85-9**	**1.13 J**	**G1976-FS(0)**	**1.000**	**11/19/2020**	**0.26**	**1.00**	**5.00**	
PFOA	335-67-1	0.91 J	G1976-FS(0)	1.000	11/19/2020	0.51	1.50	5.00	
PFNA	**375-95-1**	**0.45 J**	**G1976-FS(0)**	**1.000**	**11/19/2020**	**0.31**	**1.00**	**5.00**	
PFDA	335-76-2	1.09 J	G1976-FS(0)	1.000	11/19/2020	0.14	0.50	5.00	
PFUnA	**2058-94-8**	**0.50 U**	**G1976-FS(0)**	**1.000**	**11/19/2020**	**0.22**	**0.50**	**5.00**	
PFDoA	307-55-1	0.50 ~~U~~ UJ	G1976-FS(0)	1.000	11/19/2020	0.19	0.50	5.00	SSL
PFTrDA	**72629-94-8**	**0.50 U**	**G1976-FS(0)**	**1.000**	**11/19/2020**	**0.15**	**0.50**	**5.00**	
PFTeDA	376-06-7	2.00 ~~U~~ UJ	G1976-FS(0)	1.000	11/19/2020	0.73	2.00	5.00	SSL
NMeFOSAA	**2355-31-9**	**1.00 U**	**G1976-FS(0)**	**1.000**	**11/19/2020**	**0.35**	**1.00**	**5.00**	
NEtFOSAA	2991-50-6	1.00 U	G1976-FS(0)	1.000	11/19/2020	0.50	1.00	5.00	
PFBS	**375-73-5**	**1.16 J**	**G1976-FS(0)**	**1.000**	**11/19/2020**	**0.14**	**0.50**	**5.00**	
PFHxS	355-46-4	0.85 J	G1976-FS(0)	1.000	11/19/2020	0.11	0.40	5.00	
PFOS	**1763-23-1**	**22.14**	**G1976-FS(0)**	**1.000**	**11/19/2020**	**0.44**	**1.00**	**5.00**	
HFPO-DA	13252-13-6	0.50 ~~U~~ UJ	G1976-FS(0)	1.000	11/19/2020	0.25	0.50	5.00	MSL
Adona	**919005-14-4**	**1.00 U**	**G1976-FS(0)**	**1.000**	**11/19/2020**	**0.27**	**1.00**	**5.00**	
11Cl-PF3OUdS	763051-92-9	0.37 J	G1976-FS(0)	1.000	11/19/2020	0.23	0.50	5.00	
9Cl-PF3ONS	**756426-58-1**	**0.27 J**	**G1976-FS(0)**	**1.000**	**11/19/2020**	**0.27**	**1.00**	**5.00**	

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

Client ID	PX-H110-WT04-1020
Battelle ID	G1976-FS
Sample Type	SA
Collection Date	10/24/2020
Extraction Date	11/02/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	46 N	G1976-FS(0)	11/19/2020
13C4-PFHpA	50	G1976-FS(0)	11/19/2020
13C8-PFOA	52	G1976-FS(0)	11/19/2020
13C9-PFNA	71	G1976-FS(0)	11/19/2020
13C6-PFDA	64	G1976-FS(0)	11/19/2020
13C7-PFUnA	56	G1976-FS(0)	11/19/2020
13C2-PFDoA	45 N	G1976-FS(0)	11/19/2020
13C2-PFTeDA	20 N	G1976-FS(0)	11/19/2020
d3-MeFOSAA	63	G1976-FS(0)	11/19/2020
d5-EtFOSAA	72	G1976-FS(0)	11/19/2020
13C3-PFBS	73	G1976-FS(0)	11/19/2020
13C3-PFHxS	75	G1976-FS(0)	11/19/2020
13C8-PFOS	72	G1976-FS(0)	11/19/2020
13C3-HFPO-DA	77	G1976-FS(0)	11/19/2020

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

Client ID	PX-H110-SW01-1020
Battelle ID	G1982-FS
Sample Type	SA
Collection Date	10/24/2020
Extraction Date	11/02/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	SW
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	4.04 ~~J~~	G1982-FS(0)	1.000	11/19/2020	0.52	1.47	4.90	SSL
PFHpA	**375-85-9**	**1.35 J**	**G1982-FS(0)**	**1.000**	**11/19/2020**	**0.25**	**0.98**	**4.90**	
PFOA	335-67-1	2.17 J	G1982-FS(0)	1.000	11/19/2020	0.50	1.47	4.90	
PFNA	**375-95-1**	**0.98 U**	**G1982-FS(0)**	**1.000**	**11/19/2020**	**0.30**	**0.98**	**4.90**	
PFDA	335-76-2	0.49 U	G1982-FS(0)	1.000	11/19/2020	0.14	0.49	4.90	
PFUnA	**2058-94-8**	**0.49 U**	**G1982-FS(0)**	**1.000**	**11/19/2020**	**0.22**	**0.49**	**4.90**	
PFDoA	307-55-1	0.49 U	G1982-FS(0)	1.000	11/19/2020	0.19	0.49	4.90	
PFTrDA	**72629-94-8**	**0.49 U**	**G1982-FS(0)**	**1.000**	**11/19/2020**	**0.15**	**0.49**	**4.90**	
PFTeDA	376-06-7	1.96 ~~U~~ UJ	G1982-FS(0)	1.000	11/19/2020	0.72	1.96	4.90	SSL
NMeFOSAA	**2355-31-9**	**0.98 U**	**G1982-FS(0)**	**1.000**	**11/19/2020**	**0.34**	**0.98**	**4.90**	
NEtFOSAA	2991-50-6	0.98 U	G1982-FS(0)	1.000	11/19/2020	0.49	0.98	4.90	
PFBS	**375-73-5**	**1.15 J**	**G1982-FS(0)**	**1.000**	**11/19/2020**	**0.14**	**0.49**	**4.90**	
PFHxS	355-46-4	2.04 J	G1982-FS(0)	1.000	11/19/2020	0.11	0.39	4.90	
PFOS	**1763-23-1**	**2.61 J**	**G1982-FS(0)**	**1.000**	**11/19/2020**	**0.43**	**0.98**	**4.90**	
HFPO-DA	13252-13-6	0.49 U	G1982-FS(0)	1.000	11/19/2020	0.25	0.49	4.90	
Adona	**919005-14-4**	**0.98 U**	**G1982-FS(0)**	**1.000**	**11/19/2020**	**0.26**	**0.98**	**4.90**	
11Cl-PF3OUdS	763051-92-9	0.49 U	G1982-FS(0)	1.000	11/19/2020	0.23	0.49	4.90	
9Cl-PF3ONS	**756426-58-1**	**0.98 U**	**G1982-FS(0)**	**1.000**	**11/19/2020**	**0.26**	**0.98**	**4.90**	

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

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Client ID	PX-H110-SW01-1020
Battelle ID	G1982-FS
Sample Type	SA
Collection Date	10/24/2020
Extraction Date	11/02/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	40 N	G1982-FS(0)	11/19/2020
13C4-PFHpA	56	G1982-FS(0)	11/19/2020
13C8-PFOA	63	G1982-FS(0)	11/19/2020
13C9-PFNA	83	G1982-FS(0)	11/19/2020
13C6-PFDA	70	G1982-FS(0)	11/19/2020
13C7-PFUnA	67	G1982-FS(0)	11/19/2020
13C2-PFDoA	63	G1982-FS(0)	11/19/2020
13C2-PFTeDA	42 N	G1982-FS(0)	11/19/2020
d3-MeFOSAA	97	G1982-FS(0)	11/19/2020
d5-EtFOSAA	98	G1982-FS(0)	11/19/2020
13C3-PFBS	77	G1982-FS(0)	11/19/2020
13C3-PFHxS	84	G1982-FS(0)	11/19/2020
13C8-PFOS	84	G1982-FS(0)	11/19/2020
13C3-HFPO-DA	66	G1982-FS(0)	11/19/2020

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Project Client: CH2M
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Client ID		PX-H110-SW01P-1020							
Battelle ID		G1983-FS							
Sample Type		SA							
Collection Date		10/24/2020							
Extraction Date		11/02/2020							
Analytical Instrument		Sciex 6500+ LC/MS/MS							
% Moisture		NA							
Matrix		SW							
Sample Size		0.250							
Size Unit-Basis		L							
Analyte	CAS No.	Result (ng/L)		Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	4.60 J		G1983-FS(0)	1.000	11/20/2020	0.53	1.50	5.00	SSL
PFHpA	**375-85-9**	**1.81 J**		**G1983-FS(0)**	**1.000**	**11/20/2020**	**0.26**	**1.00**	**5.00**	
PFOA	335-67-1	3.07 J		G1983-FS(0)	1.000	11/20/2020	0.51	1.50	5.00	
PFNA	**375-95-1**	**1.00 U**		**G1983-FS(0)**	**1.000**	**11/20/2020**	**0.31**	**1.00**	**5.00**	
PFDA	335-76-2	0.50 U		G1983-FS(0)	1.000	11/20/2020	0.14	0.50	5.00	
PFUnA	**2058-94-8**	**0.50 U**		**G1983-FS(0)**	**1.000**	**11/20/2020**	**0.22**	**0.50**	**5.00**	
PFDoA	307-55-1	0.50 U		G1983-FS(0)	1.000	11/20/2020	0.19	0.50	5.00	
PFTrDA	**72629-94-8**	**0.50 U**		**G1983-FS(0)**	**1.000**	**11/20/2020**	**0.15**	**0.50**	**5.00**	
PFTeDA	376-06-7	2.00 J UJ		G1983-FS(0)	1.000	11/20/2020	0.73	2.00	5.00	SSL
NMeFOSAA	**2355-31-9**	**1.00 U**		**G1983-FS(0)**	**1.000**	**11/20/2020**	**0.35**	**1.00**	**5.00**	
NEtFOSAA	2991-50-6	1.00 U		G1983-FS(0)	1.000	11/20/2020	0.50	1.00	5.00	
PFBS	**375-73-5**	**1.27 J**		**G1983-FS(0)**	**1.000**	**11/20/2020**	**0.14**	**0.50**	**5.00**	
PFHxS	355-46-4	4.68 J		G1983-FS(0)	1.000	11/20/2020	0.11	0.40	5.00	
PFOS	**1763-23-1**	**4.23 J**		**G1983-FS(0)**	**1.000**	**11/20/2020**	**0.44**	**1.00**	**5.00**	
HFPO-DA	13252-13-6	0.50 U		G1983-FS(0)	1.000	11/20/2020	0.25	0.50	5.00	
Adona	**919005-14-4**	**1.00 U**		**G1983-FS(0)**	**1.000**	**11/20/2020**	**0.27**	**1.00**	**5.00**	
11Cl-PF3OUdS	763051-92-9	0.50 U		G1983-FS(0)	1.000	11/20/2020	0.23	0.50	5.00	
9Cl-PF3ONS	**756426-58-1**	**1.00 U**		**G1983-FS(0)**	**1.000**	**11/20/2020**	**0.27**	**1.00**	**5.00**	

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

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Client ID	PX-H110-SW01P-1020
Battelle ID	G1983-FS
Sample Type	SA
Collection Date	10/24/2020
Extraction Date	11/02/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	41 N	G1983-FS(0)	11/20/2020
13C4-PFHpA	**55**	**G1983-FS(0)**	**11/20/2020**
13C8-PFOA	65	G1983-FS(0)	11/20/2020
13C9-PFNA	**76**	**G1983-FS(0)**	**11/20/2020**
13C6-PFDA	72	G1983-FS(0)	11/20/2020
13C7-PFUnA	**67**	**G1983-FS(0)**	**11/20/2020**
13C2-PFDoA	63	G1983-FS(0)	11/20/2020
13C2-PFTeDA	**48**	**G1983-FS(0)**	**11/20/2020**
d3-MeFOSAA	84	G1983-FS(0)	11/20/2020
d5-EtFOSAA	**92**	**G1983-FS(0)**	**11/20/2020**
13C3-PFBS	71	G1983-FS(0)	11/20/2020
13C3-PFHxS	**72**	**G1983-FS(0)**	**11/20/2020**
13C8-PFOS	73	G1983-FS(0)	11/20/2020
13C3-HFPO-DA	**62**	**G1983-FS(0)**	**11/20/2020**

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

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Client ID	PX-H110-WT01-1020
Battelle ID	G1986-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	7.94 J	G1986-FS(0)	1.000	11/20/2020	0.52	1.47	4.90	SSL
PFHpA	**375-85-9**	**3.02 J**	**G1986-FS(0)**	**1.000**	**11/20/2020**	**0.25**	**0.98**	**4.90**	SSL
PFOA	335-67-1	3.63 J	G1986-FS(0)	1.000	11/20/2020	0.50	1.47	4.90	
PFNA	**375-95-1**	**5.94**	**G1986-FS(0)**	**1.000**	**11/20/2020**	**0.30**	**0.98**	**4.90**	
PFDA	335-76-2	11.23	G1986-FS(0)	1.000	11/20/2020	0.14	0.49	4.90	
PFUnA	**2058-94-8**	**0.49 U**	**G1986-FS(0)**	**1.000**	**11/20/2020**	**0.22**	**0.49**	**4.90**	
PFDoA	307-55-1	0.49 U	G1986-FS(0)	1.000	11/20/2020	0.19	0.49	4.90	
PFTrDA	**72629-94-8**	**0.49 U**	**G1986-FS(0)**	**1.000**	**11/20/2020**	**0.15**	**0.49**	**4.90**	
PFTeDA	376-06-7	1.96 UJ	G1986-FS(0)	1.000	11/20/2020	0.72	1.96	4.90	SSL
NMeFOSAA	**2355-31-9**	**0.98 U**	**G1986-FS(0)**	**1.000**	**11/20/2020**	**0.34**	**0.98**	**4.90**	
NEtFOSAA	2991-50-6	0.98 U	G1986-FS(0)	1.000	11/20/2020	0.49	0.98	4.90	
PFBS	**375-73-5**	**1.87 J**	**G1986-FS(0)**	**1.000**	**11/20/2020**	**0.14**	**0.49**	**4.90**	
PFHxS	355-46-4	3.72 J	G1986-FS(0)	1.000	11/20/2020	0.11	0.39	4.90	
PFOS	**1763-23-1**	**111.14**	**G1986-FS-D(3)**	**5.000**	**11/20/2020**	**2.16**	**4.90**	**24.51**	
HFPO-DA	13252-13-6	0.49 U	G1986-FS(0)	1.000	11/20/2020	0.25	0.49	4.90	
Adona	**919005-14-4**	**0.98 U**	**G1986-FS(0)**	**1.000**	**11/20/2020**	**0.26**	**0.98**	**4.90**	
11Cl-PF3OUdS	763051-92-9	0.49 U	G1986-FS(0)	1.000	11/20/2020	0.23	0.49	4.90	
9Cl-PF3ONS	**756426-58-1**	**0.98 U**	**G1986-FS(0)**	**1.000**	**11/20/2020**	**0.26**	**0.98**	**4.90**	

Isotope Dilution

Analyzed by: Schumitz, Denise
Printed: 11/24/2020
MJ 12/1/20

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

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Client ID	PX-H110-WT01-1020
Battelle ID	G1986-FS
Sample Type	SA
Collection Date	10/24/2020
Extraction Date	11/02/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	42	N	G1986-FS(0)	11/20/2020
13C4-PFHpA	49	N	G1986-FS(0)	11/20/2020
13C8-PFOA	50		G1986-FS(0)	11/20/2020
13C9-PFNA	97	D	G1986-FS-D(3)	11/20/2020
13C6-PFDA	68		G1986-FS(0)	11/20/2020
13C7-PFUnA	60		G1986-FS(0)	11/20/2020
13C2-PFDoA	59		G1986-FS(0)	11/20/2020
13C2-PFTeDA	28	N	G1986-FS(0)	11/20/2020
d3-MeFOSAA	93	D	G1986-FS-D(3)	11/20/2020
d5-EtFOSAA	99	D	G1986-FS-D(3)	11/20/2020
13C3-PFBS	96	D	G1986-FS-D(3)	11/20/2020
13C3-PFHxS	96	D	G1986-FS-D(3)	11/20/2020
13C8-PFOS	88	D	G1986-FS-D(3)	11/20/2020
13C3-HFPO-DA	62		G1986-FS(0)	11/20/2020

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

Client ID		PX-H110-WT02-1020							
Battelle ID		G1989-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	159.71	J	G1989-FS-D(3)	5.000	11/20/2020	2.60	7.35	24.51	
PFHpA	**375-85-9**	**48.47**	**J**	**G1989-FS(0)**	**1.000**	**11/20/2020**	**0.25**	**0.98**	**4.90**	SSL
PFOA	335-67-1	53.55	J	G1989-FS(0)	1.000	11/20/2020	0.50	1.47	4.90	SSL
PFNA	**375-95-1**	**4.47**	**J**	**G1989-FS(0)**	**1.000**	**11/20/2020**	**0.30**	**0.98**	**4.90**	
PFDA	335-76-2	1.68	J	G1989-FS(0)	1.000	11/20/2020	0.14	0.49	4.90	
PFUnA	**2058-94-8**	**0.49**	**U UJ**	**G1989-FS(0)**	**1.000**	**11/20/2020**	**0.22**	**0.49**	**4.90**	SSL
PFDoA	307-55-1	0.49	U UJ	G1989-FS(0)	1.000	11/20/2020	0.19	0.49	4.90	SSL
PFTrDA	**72629-94-8**	**0.49**	**U**	**G1989-FS(0)**	**1.000**	**11/20/2020**	**0.15**	**0.49**	**4.90**	
PFTeDA	376-06-7	1.96	U UJ	G1989-FS(0)	1.000	11/20/2020	0.72	1.96	4.90	SSL
NMeFOSAA	**2355-31-9**	**0.98**	**U**	**G1989-FS(0)**	**1.000**	**11/20/2020**	**0.34**	**0.98**	**4.90**	
NEtFOSAA	2991-50-6	0.98	U	G1989-FS(0)	1.000	11/20/2020	0.49	0.98	4.90	
PFBS	**375-73-5**	**12.96**		**G1989-FS(0)**	**1.000**	**11/20/2020**	**0.14**	**0.49**	**4.90**	
PFHxS	355-46-4	58.14		G1989-FS(0)	1.000	11/20/2020	0.11	0.39	4.90	
PFOS	**1763-23-1**	**173.91**	**J**	**G1989-FS-D(3)**	**5.000**	**11/20/2020**	**2.16**	**4.90**	**24.51**	
HFPO-DA	13252-13-6	0.49	U	G1989-FS(0)	1.000	11/20/2020	0.25	0.49	4.90	
Adona	**919005-14-4**	**0.98**	**U**	**G1989-FS(0)**	**1.000**	**11/20/2020**	**0.26**	**0.98**	**4.90**	
11Cl-PF3OUdS	763051-92-9	0.49	U	G1989-FS(0)	1.000	11/20/2020	0.23	0.49	4.90	
9Cl-PF3ONS	**756426-58-1**	**0.98**	**U**	**G1989-FS(0)**	**1.000**	**11/20/2020**	**0.26**	**0.98**	**4.90**	

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

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Client ID	PX-H110-WT02-1020
Battelle ID	G1989-FS
Sample Type	SA
Collection Date	10/24/2020
Extraction Date	11/02/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	56	D	G1989-FS-D(3)	11/20/2020
13C4-PFHpA	43	N	G1989-FS(0)	11/20/2020
13C8-PFOA	48	N	G1989-FS(0)	11/20/2020
13C9-PFNA	89	D	G1989-FS-D(3)	11/20/2020
13C6-PFDA	53		G1989-FS(0)	11/20/2020
13C7-PFUnA	47	N	G1989-FS(0)	11/20/2020
13C2-PFDoA	37	N	G1989-FS(0)	11/20/2020
13C2-PFTeDA	10	N	G1989-FS(0)	11/20/2020
d3-MeFOSAA	92	D	G1989-FS-D(3)	11/20/2020
d5-EtFOSAA	101	D	G1989-FS-D(3)	11/20/2020
13C3-PFBS	84	D	G1989-FS-D(3)	11/20/2020
13C3-PFHxS	84	D	G1989-FS-D(3)	11/20/2020
13C8-PFOS	85	D	G1989-FS-D(3)	11/20/2020
13C3-HFPO-DA	67		G1989-FS(0)	11/20/2020

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

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Client ID	PX-H110-WT02P-1020
Battelle ID	G1990-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	0.250
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	150.13 D	G1990-FS-D(3)	5.000	11/20/2020	2.65	7.50	25.00	
PFHpA	**375-85-9**	**51.15 J**	**G1990-FS(0)**	**1.000**	**11/20/2020**	**0.26**	**1.00**	**5.00**	SSL
PFOA	335-67-1	54.41	G1990-FS(0)	1.000	11/20/2020	0.51	1.50	5.00	
PFNA	**375-95-1**	**4.09 J**	**G1990-FS(0)**	**1.000**	**11/20/2020**	**0.31**	**1.00**	**5.00**	
PFDA	335-76-2	1.83 J	G1990-FS(0)	1.000	11/20/2020	0.14	0.50	5.00	
PFUnA	**2058-94-8**	**0.50 U**	**G1990-FS(0)**	**1.000**	**11/20/2020**	**0.22**	**0.50**	**5.00**	
PFDoA	307-55-1	0.50 U	G1990-FS(0)	1.000	11/20/2020	0.19	0.50	5.00	
PFTrDA	**72629-94-8**	**0.50 U**	**G1990-FS(0)**	**1.000**	**11/20/2020**	**0.15**	**0.50**	**5.00**	
PFTeDA	376-06-7	2.00 UJ	G1990-FS(0)	1.000	11/20/2020	0.73	2.00	5.00	SSL
NMeFOSAA	**2355-31-9**	**1.00 U**	**G1990-FS(0)**	**1.000**	**11/20/2020**	**0.35**	**1.00**	**5.00**	
NEtFOSAA	2991-50-6	0.99 J	G1990-FS(0)	1.000	11/20/2020	0.50	1.00	5.00	
PFBS	**375-73-5**	**12.60**	**G1990-FS(0)**	**1.000**	**11/20/2020**	**0.14**	**0.50**	**5.00**	
PFHxS	355-46-4	63.70	G1990-FS(0)	1.000	11/20/2020	0.11	0.40	5.00	
PFOS	**1763-23-1**	**164.90 D**	**G1990-FS-D(3)**	**5.000**	**11/20/2020**	**2.20**	**5.00**	**25.00**	
HFPO-DA	13252-13-6	0.50 U	G1990-FS(0)	1.000	11/20/2020	0.25	0.50	5.00	
Adona	**919005-14-4**	**1.00 U**	**G1990-FS(0)**	**1.000**	**11/20/2020**	**0.27**	**1.00**	**5.00**	
11Cl-PF3OUdS	763051-92-9	0.50 U	G1990-FS(0)	1.000	11/20/2020	0.23	0.50	5.00	
9Cl-PF3ONS	**756426-58-1**	**1.00 U**	**G1990-FS(0)**	**1.000**	**11/20/2020**	**0.27**	**1.00**	**5.00**	

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

Client ID	PX-H110-WT02P-1020
Battelle ID	G1990-FS
Sample Type	SA
Collection Date	10/24/2020
Extraction Date	11/02/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	61	G1990-FS-D(3)	11/20/2020
13C4-PFHpA	42	G1990-FS(0)	11/20/2020
13C8-PFOA	50	G1990-FS(0)	11/20/2020
13C9-PFNA	86	G1990-FS-D(3)	11/20/2020
13C6-PFDA	61	G1990-FS(0)	11/20/2020
13C7-PFUnA	59	G1990-FS(0)	11/20/2020
13C2-PFDoA	50	G1990-FS(0)	11/20/2020
13C2-PFTeDA	19	G1990-FS(0)	11/20/2020
d3-MeFOSAA	93	G1990-FS-D(3)	11/20/2020
d5-EtFOSAA	103	G1990-FS-D(3)	11/20/2020
13C3-PFBS	83	G1990-FS-D(3)	11/20/2020
13C3-PFHxS	83	G1990-FS-D(3)	11/20/2020
13C8-PFOS	89	G1990-FS-D(3)	11/20/2020
13C3-HFPO-DA	71	G1990-FS(0)	11/20/2020

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

Client ID		PX-H110-WT03-1020							
Battelle ID		G1994-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		0.250							
Size Unit-Basis		L							
Analyte	CAS No.	Result (ng/L)		Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	19.68	J	G1994-FS(0)	1.000	11/20/2020	0.53	1.50	5.00	SSL
PFHpA	375-85-9	12.83	J	G1994-FS(0)	1.000	11/20/2020	0.26	1.00	5.00	
PFOA	335-67-1	6.54	J	G1994-FS(0)	1.000	11/20/2020	0.51	1.50	5.00	
PFNA	375-95-1	4.95	J	G1994-FS(0)	1.000	11/20/2020	0.31	1.00	5.00	
PFDA	335-76-2	4.07	J	G1994-FS(0)	1.000	11/20/2020	0.14	0.50	5.00	
PFUnA	2058-94-8	0.50 ~~U~~	UJ	G1994-FS(0)	1.000	11/20/2020	0.22	0.50	5.00	SSL
PFDoA	307-55-1	0.50 ~~U~~	UJ	G1994-FS(0)	1.000	11/20/2020	0.19	0.50	5.00	SSL
PFTrDA	72629-94-8	0.50	U	G1994-FS(0)	1.000	11/20/2020	0.15	0.50	5.00	
PFTeDA	376-06-7	2.00 ~~2.00 U~~	UJ	G1994-FS(0)	1.000 ~~1.000~~	11/20/2020	0.73 ~~0.73~~	2.00 ~~2.00~~	5.00 ~~5.00~~	HT
NMeFOSAA	2355-31-9	1.00	U	G1994-FS(0)	1.000	11/20/2020	0.35	1.00	5.00	
NEtFOSAA	2991-50-6	1.00	U	G1994-FS(0)	1.000	11/20/2020	0.50	1.00	5.00	
PFBS	375-73-5	7.54		G1994-FS(0)	1.000	11/20/2020	0.14	0.50	5.00	
PFHxS	355-46-4	43.75		G1994-FS(0)	1.000	11/20/2020	0.11	0.40	5.00	
PFOS	1763-23-1	175.58	D	G1994-FS-D(3)	5.000	11/20/2020	2.20	5.00	25.00	
HFPO-DA	13252-13-6	0.50	U	G1994-FS(0)	1.000	11/20/2020	0.25	0.50	5.00	
Adona	919005-14-4	1.00	U	G1994-FS(0)	1.000	11/20/2020	0.27	1.00	5.00	
11Cl-PF3OUdS	763051-92-9	0.50	U	G1994-FS(0)	1.000	11/20/2020	0.23	0.50	5.00	
9Cl-PF3ONS	756426-58-1	1.00	U	G1994-FS(0)	1.000	11/20/2020	0.27	1.00	5.00	

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

Client ID	PX-H110-WT03-1020
Battelle ID	G1994-FS
Sample Type	SA
Collection Date	10/24/2020
Extraction Date	11/02/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	32	N	G1994-FS(0)	11/20/2020
13C4-PFHpA	38	N	G1994-FS(0)	11/20/2020
13C8-PFOA	46	N	G1994-FS(0)	11/20/2020
13C9-PFNA	102	D	G1994-FS-D(3)	11/20/2020
13C6-PFDA	60		G1994-FS(0)	11/20/2020
13C7-PFUnA	44	N	G1994-FS(0)	11/20/2020
13C2-PFDoA	24	N	G1994-FS(0)	11/20/2020
13C2-PFTeDA	8	N	G1994-FS(0)	11/20/2020
d3-MeFOSAA	105	D	G1994-FS-D(3)	11/20/2020
d5-EtFOSAA	102	D	G1994-FS-D(3)	11/20/2020
13C3-PFBS	106	D	G1994-FS-D(3)	11/20/2020
13C3-PFHxS	102	D	G1994-FS-D(3)	11/20/2020
13C8-PFOS	101	D	G1994-FS-D(3)	11/20/2020
13C3-HFPO-DA	55		G1994-FS(0)	11/20/2020

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-1512
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: December 11, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-H2805-WT02P-1020	G1843-FS	Water
2	PX-B840-WT01-1020	G1852-FS	Water
3	PX-B840-WT03-1020	G1865-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for three water samples collected on October 20-21, 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.

- Several compounds were qualified (X) in one sample due to grossly exceeded holding times.

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

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

Per- and Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

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

Holding Times

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

EDS Sample	Date Sampled	Date Extracted	# of Days	Qualifier
1	10/20/20	11/18/20	29	J/X
2	10/21/20	11/18/20	28	J/UJ
3	10/21/20	11/18/20	28	J/UJ

LC/MS Tuning

- All criteria were met.

Initial Calibration

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

Continuing Calibration

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

Method Blank

- The method blanks exhibited the following contamination.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PB 11/19/20	PFBS	0.17	None	All Samples >5X
	PFHxS	0.17	None	

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-B840-FB01-102120	None - ND	-	-	-
PX-B840-EB01-102120-GW	None - ND	-	-	-

Surrogate Spike Recoveries

- Several samples exhibited low surrogate percent recoveries (%R) for several surrogate compounds. These compounds were already qualified as estimated (J/UJ/X) due to holding time exceedances in each sample. No further qualifications were required.

Laboratory Fortified Blank (LFB)

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

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

- MS/MSD samples were not analyzed.

Internal Standard (IS) Area Performance

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

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- The samples were analyzed at various dilutions due to high concentrations of target compounds. The reporting limits were adjusted accordingly. No action was required.
- These samples were re-extracted outside of holding times to verify surrogate deficiencies in the original analysis. The original analysis results in SDGs 20-1331 and 20-1332 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: 12/17/20

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

use original in SDG 20-1331

Client ID	PX-H2805-WT02P-1020
Battelle ID	G1843-FS1
Sample Type	SA
Collection Date	10/20/2020
Extraction Date	11/18/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	GW
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	9.87	T	G1843-FS1(0)	1.000	11/19/2020	0.51	1.44	4.81	
PFHpA	**375-85-9**	**5.20**	**T**	**G1843-FS1(0)**	**1.000**	**11/19/2020**	**0.25**	**0.96**	**4.81**	
PFOA	335-67-1	17.82	T	G1843-FS1(0)	1.000	11/19/2020	0.49	1.44	4.81	
PFNA	**375-95-1**	**1.06**	**JT**	**G1843-FS1(0)**	**1.000**	**11/19/2020**	**0.30**	**0.96**	**4.81**	
PFDA	335-76-2	0.48	UT	G1843-FS1(0)	1.000	11/19/2020	0.13	0.48	4.81	
PFUnA	**2058-94-8**	**0.48**	**UT**	**G1843-FS1(0)**	**1.000**	**11/19/2020**	**0.21**	**0.48**	**4.81**	
PFDoA	307-55-1	0.48	UT	G1843-FS1(0)	1.000	11/19/2020	0.18	0.48	4.81	
PFTrDA	**72629-94-8**	**0.48**	**UT**	**G1843-FS1(0)**	**1.000**	**11/19/2020**	**0.14**	**0.48**	**4.81**	
PFTeDA	376-06-7	1.92	UT	G1843-FS1(0)	1.000	11/19/2020	0.70	1.92	4.81	
NMeFOSAA	**2355-31-9**	**0.96**	**UT**	**G1843-FS1(0)**	**1.000**	**11/19/2020**	**0.34**	**0.96**	**4.81**	
NEtFOSAA	2991-50-6	0.96	UT	G1843-FS1(0)	1.000	11/19/2020	0.48	0.96	4.81	
PFBS	**375-73-5**	**3.76**	**JT**	**G1843-FS1(0)**	**1.000**	**11/19/2020**	**0.13**	**0.48**	**4.81**	
PFHxS	355-46-4	33.03	T	G1843-FS1(0)	1.000	11/19/2020	0.11	0.38	4.81	
PFOS	**1763-23-1**	**15.85**	**T**	**G1843-FS1(0)**	**1.000**	**11/19/2020**	**0.42**	**0.96**	**4.81**	
HFPO-DA	13252-13-6	0.48	UT	G1843-FS1(0)	1.000	11/19/2020	0.24	0.48	4.81	
Adona	**919005-14-4**	**0.96**	**UT**	**G1843-FS1(0)**	**1.000**	**11/19/2020**	**0.26**	**0.96**	**4.81**	
11Cl-PF3OUdS	763051-92-9	0.48	UT	G1843-FS1(0)	1.000	11/19/2020	0.22	0.48	4.81	
9Cl-PF3ONS	**756426-58-1**	**0.96**	**UT**	**G1843-FS1(0)**	**1.000**	**11/19/2020**	**0.26**	**0.96**	**4.81**	

J
X
J
X
HT

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

Client ID	PX-H2805-WT02P-1020
Battelle ID	G1843-FS1
Sample Type	SA
Collection Date	10/20/2020
Extraction Date	11/18/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

use original

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	77	G1843-FS1(0)	11/19/2020
13C4-PFHpA	85	G1843-FS1(0)	11/19/2020
13C8-PFOA	80	G1843-FS1(0)	11/19/2020
13C9-PFNA	83	G1843-FS1(0)	11/19/2020
13C6-PFDA	79	G1843-FS1(0)	11/19/2020
13C7-PFUnA	75	G1843-FS1(0)	11/19/2020
13C2-PFDoA	57	G1843-FS1(0)	11/19/2020
13C2-PFTeDA	17 M	G1843-FS1(0)	11/19/2020
d3-MeFOSAA	75	G1843-FS1(0)	11/19/2020
d5-EtFOSAA	71	G1843-FS1(0)	11/19/2020
13C3-PFBS	91	G1843-FS1(0)	11/19/2020
13C3-PFHxS	95	G1843-FS1(0)	11/19/2020
13C8-PFOS	92	G1843-FS1(0)	11/19/2020
13C3-HFPO-DA	74	G1843-FS1(0)	11/19/2020

BATTELLE
It can be done

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

use original in SDG 20-1332

Client ID	PX-B840-WT01-1020
Battelle ID	G1852-FS1
Sample Type	SA
Collection Date	10/21/2020
Extraction Date	11/18/2020
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	192.63	TD J	G1852-FS1-D(3)	12.500	11/19/2020	6.50	18.38	61.27	HT
PFHpA	**375-85-9**	**135.39**	**T**	**G1852-FS1(0)**	**1.000**	**11/19/2020**	**0.25**	**0.98**	**4.90**	
PFOA	335-67-1	77.77	T	G1852-FS1(0)	1.000	11/19/2020	0.50	1.47	4.90	
PFNA	**375-95-1**	**44.37**	**T**	**G1852-FS1(0)**	**1.000**	**11/19/2020**	**0.30**	**0.98**	**4.90**	
PFDA	335-76-2	0.41	JT	G1852-FS1(0)	1.000	11/19/2020	0.14	0.49	4.90	
PFUnA	**2058-94-8**	**0.24**	**JT**	**G1852-FS1(0)**	**1.000**	**11/19/2020**	**0.22**	**0.49**	**4.90**	
PFDoA	307-55-1	0.49	UT UJ	G1852-FS1(0)	1.000	11/19/2020	0.19	0.49	4.90	
PFTrDA	**72629-94-8**	**0.49**	**UT**	**G1852-FS1(0)**	**1.000**	**11/19/2020**	**0.15**	**0.49**	**4.90**	
PFTeDA	376-06-7	1.96	UT	G1852-FS1(0)	1.000	11/19/2020	0.72	1.96	4.90	
NMeFOSAA	**2355-31-9**	**0.98**	**UT**	**G1852-FS1(0)**	**1.000**	**11/19/2020**	**0.34**	**0.98**	**4.90**	
NEtFOSAA	2991-50-6	0.98	UT	G1852-FS1(0)	1.000	11/19/2020	0.49	0.98	4.90	
PFBS	**375-73-5**	**17.13**	**T J**	**G1852-FS1(0)**	**1.000**	**11/19/2020**	**0.14**	**0.49**	**4.90**	
PFHxS	355-46-4	3640.75	TD	G1852-FS1-D(5)	62.500	11/19/2020	6.74	24.51	306.37	
PFOS	**1763-23-1**	**10782.62**	**TD**	**G1852-FS1-D(7)**	**312.500**	**11/19/2020**	**134.80**	**306.37**	**1531.86**	
HFPO-DA	13252-13-6	0.49	UT UJ	G1852-FS1(0)	1.000	11/19/2020	0.25	0.49	4.90	
Adona	**919005-14-4**	**0.98**	**UT**	**G1852-FS1(0)**	**1.000**	**11/19/2020**	**0.26**	**0.98**	**4.90**	
11Cl-PF3OUdS	763051-92-9	0.49	UT	G1852-FS1(0)	1.000	11/19/2020	0.23	0.49	4.90	
9Cl-PF3ONS	**756426-58-1**	**0.98**	**UT**	**G1852-FS1(0)**	**1.000**	**11/19/2020**	**0.26**	**0.98**	**4.90**	

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

use original

Client ID	PX-B840-WT01-1020
Battelle ID	G1852-FS1
Sample Type	SA
Collection Date	10/21/2020
Extraction Date	11/18/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	102	D	G1852-FS1-D(3)	11/19/2020
13C4-PFHpA	50		G1852-FS1(0)	11/19/2020
13C8-PFOA	77		G1852-FS1(0)	11/19/2020
13C9-PFNA	30	M	G1852-FS1(0)	11/19/2020
13C6-PFDA	81		G1852-FS1(0)	11/19/2020
13C7-PFUnA	76		G1852-FS1(0)	11/19/2020
13C2-PFDoA	76		G1852-FS1(0)	11/19/2020
13C2-PFTeDA	54		G1852-FS1(0)	11/19/2020
d3-MeFOSAA	86	D	G1852-FS1-D(7)	11/19/2020
d5-EtFOSAA	86	D	G1852-FS1-D(7)	11/19/2020
13C3-PFBS	85	D	G1852-FS1-D(7)	11/19/2020
13C3-PFHxS	82	D	G1852-FS1-D(7)	11/19/2020
13C8-PFOS	96	D	G1852-FS1-D(7)	11/19/2020
13C3-HFPO-DA	78		G1852-FS1(0)	11/19/2020

BATTELLE
It can be done

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

use original in SDG 20-1332

Client ID		PX-B840-WT03-1020								
Battelle ID		G1865-FS1								
Sample Type		SA								
Collection Date		10/21/2020								
Extraction Date		11/18/2020								
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	478.26	TD	G1865-FS1-D(3)	12.500	11/19/2020	6.50	18.38	61.27	HT
PFHpA	**375-85-9**	**46.88**	**T**	**G1865-FS1(0)**	**1.000**	**11/19/2020**	**0.25**	**0.98**	**4.90**	
PFOA	335-67-1	112.26	T	G1865-FS1(0)	1.000	11/19/2020	0.50	1.47	4.90	
PFNA	**375-95-1**	**2.57**	**JT**	**G1865-FS1(0)**	**1.000**	**11/19/2020**	**0.30**	**0.98**	**4.90**	
PFDA	335-76-2	0.49	UT	G1865-FS1(0)	1.000	11/19/2020	0.14	0.49	4.90	
PFUnA	**2058-94-8**	**0.28**	**JT**	**G1865-FS1(0)**	**1.000**	**11/19/2020**	**0.22**	**0.49**	**4.90**	
PFDoA	307-55-1	0.49	UT	G1865-FS1(0)	1.000	11/19/2020	0.19	0.49	4.90	
PFTrDA	**72629-94-8**	**0.49**	**UT**	**G1865-FS1(0)**	**1.000**	**11/19/2020**	**0.15**	**0.49**	**4.90**	
PFTeDA	376-06-7	1.96	UT	G1865-FS1(0)	1.000	11/19/2020	0.72	1.96	4.90	
NMeFOSAA	**2355-31-9**	**0.98**	**UT**	**G1865-FS1(0)**	**1.000**	**11/19/2020**	**0.34**	**0.98**	**4.90**	
NEtFOSAA	2991-50-6	0.98	UT	G1865-FS1(0)	1.000	11/19/2020	0.49	0.98	4.90	
PFBS	**375-73-5**	**295.15**	**TD**	**G1865-FS1-D(3)**	**12.500**	**11/19/2020**	**1.72**	**6.13**	**61.27**	
PFHxS	355-46-4	8422.92	TD	G1865-FS1-D(7)	312.500	11/19/2020	33.70	122.55	1531.86	
PFOS	**1763-23-1**	**10891.89**	**TD**	**G1865-FS1-D(7)**	**312.500**	**11/19/2020**	**134.80**	**306.37**	**1531.86**	
HFPO-DA	13252-13-6	0.30	JT	G1865-FS1(0)	1.000	11/19/2020	0.25	0.49	4.90	
Adona	**919005-14-4**	**0.98**	**UT**	**G1865-FS1(0)**	**1.000**	**11/19/2020**	**0.26**	**0.98**	**4.90**	
11Cl-PF3OUdS	763051-92-9	0.49	UT	G1865-FS1(0)	1.000	11/19/2020	0.23	0.49	4.90	
9Cl-PF3ONS	**756426-58-1**	**0.98**	**UT**	**G1865-FS1(0)**	**1.000**	**11/19/2020**	**0.26**	**0.98**	**4.90**	

BATTELLE
It can be done

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

Use original

Client ID	PX-B840-WT03-1020
Battelle ID	G1865-FS1
Sample Type	SA
Collection Date	10/21/2020
Extraction Date	11/18/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	101	D	G1865-FS1-D(3)	11/19/2020
13C4-PFHpA	29	N	G1865-FS1(0)	11/19/2020
13C8-PFOA	48	N	G1865-FS1(0)	11/19/2020
13C9-PFNA	25	N	G1865-FS1(0)	11/19/2020
13C6-PFDA	59		G1865-FS1(0)	11/19/2020
13C7-PFUnA	58		G1865-FS1(0)	11/19/2020
13C2-PFDoA	48	N	G1865-FS1(0)	11/19/2020
13C2-PFTeDA	19	N	G1865-FS1(0)	11/19/2020
d3-MeFOSAA	83	D	G1865-FS1-D(7)	11/19/2020
d5-EtFOSAA	86	D	G1865-FS1-D(7)	11/19/2020
13C3-PFBS	89	D	G1865-FS1-D(7)	11/19/2020
13C3-PFHxS	91	D	G1865-FS1-D(7)	11/19/2020
13C8-PFOS	96	D	G1865-FS1-D(7)	11/19/2020
13C3-HFPO-DA	59		G1865-FS1(0)	11/19/2020

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-1527
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: December 12, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-B103-EB01-102320-SO	G1934-FS	Water
2	PX-B103-WT04-1020	G1956-FS	Water
3	PX-H110-WT05-1020	G1971-FS	Water
4	PX-H110-WT01-1020	G1986-FS	Water
5	PX-H110-WT03-1020	G1994-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for four water samples and one aqueous equipment blank sample collected on October 23-24, 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.

- Several compounds were qualified (X) in three samples due to grossly exceeded holding times.

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

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

Per- and Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

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

Holding Times

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

EDS Sample	Date Sampled	Date Extracted	# of Days	Qualifier
1	10/23/20	11/21/20	29	J/X
2	10/23/20	11/21/20	29	J/X
3	10/23/20	11/21/20	29	J/X
4	10/24/20	11/21/20	28	J/UJ
5	10/24/20	11/21/20	28	J/UJ

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-H110-FB01-102320	None - ND	-	-	-
PX-B103-FB01-102220	None - ND	-	-	-
PX-H110-EB01-102320-GW	NMeFOSAA	0.32	None	Samples ND
PX-B103-EB01-102220-GW	None - ND	-	-	-

Surrogate Spike Recoveries

- Several samples exhibited low surrogate percent recoveries (%R) for several surrogate compounds. These compounds were already qualified as estimated (J/UJ/X) due to holding time exceedances in each sample. No further qualifications were required.

Laboratory Fortified Blank (LFB)

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

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

- MS/MSD samples were not analyzed.

Internal Standard (IS) Area Performance

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

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- The samples were analyzed at various dilutions due to high concentrations of target compounds. The reporting limits were adjusted accordingly. No action was required.
- These samples were re-extracted outside of holding times to verify surrogate deficiencies in the original analysis. The original analysis results in SDGs 20-1356 and 20-1357 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: 12/17/20

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-B103-EB01-102320-SO							
Battelle ID		G1934-FS1							
Sample Type		SA							
Collection Date		10/23/2020							
Extraction Date		11/21/2020							
Analytical Instrument		Sciex 6500+ LC/MS/MS							
% Moisture		NA							
Matrix		AQ							
Sample Size		0.255							
Size Unit-Basis		L							
Analyte	CAS No.	Result (ng/L)		Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.47 UT		G1934-FS1(0)	1.000	11/23/2020	0.52	1.47	4.90
PFHpA	**375-85-9**	**0.98 UT**		**G1934-FS1(0)**	**1.000**	**11/23/2020**	**0.25**	**0.98**	**4.90**
PFOA	335-67-1	1.47 UT		G1934-FS1(0)	1.000	11/23/2020	0.50	1.47	4.90
PFNA	**375-95-1**	**0.98 UT**		**G1934-FS1(0)**	**1.000**	**11/23/2020**	**0.30**	**0.98**	**4.90**
PFDA	335-76-2	0.49 UT		G1934-FS1(0)	1.000	11/23/2020	0.14	0.49	4.90
PFUnA	**2058-94-8**	**0.49 UT**		**G1934-FS1(0)**	**1.000**	**11/23/2020**	**0.22**	**0.49**	**4.90**
PFDoA	307-55-1	0.49 UT		G1934-FS1(0)	1.000	11/23/2020	0.19	0.49	4.90
PFTrDA	**72629-94-8**	**0.49 UT**		**G1934-FS1(0)**	**1.000**	**11/23/2020**	**0.15**	**0.49**	**4.90**
PFTeDA	376-06-7	1.96 UT		G1934-FS1(0)	1.000	11/23/2020	0.72	1.96	4.90
NMeFOSAA	**2355-31-9**	**0.98 UT**		**G1934-FS1(0)**	**1.000**	**11/23/2020**	**0.34**	**0.98**	**4.90**
NEtFOSAA	2991-50-6	0.98 UT		G1934-FS1(0)	1.000	11/23/2020	0.49	0.98	4.90
PFBS	**375-73-5**	**0.49 UT**		**G1934-FS1(0)**	**1.000**	**11/23/2020**	**0.14**	**0.49**	**4.90**
PFHxS	355-46-4	0.39 UT		G1934-FS1(0)	1.000	11/23/2020	0.11	0.39	4.90
PFOS	**1763-23-1**	**0.98 UT**		**G1934-FS1(0)**	**1.000**	**11/23/2020**	**0.43**	**0.98**	**4.90**
HFPO-DA	13252-13-6	0.49 UT		G1934-FS1(0)	1.000	11/23/2020	0.25	0.49	4.90
Adona	**919005-14-4**	**0.98 UT**		**G1934-FS1(0)**	**1.000**	**11/23/2020**	**0.26**	**0.98**	**4.90**
11Cl-PF3OUdS	763051-92-9	0.49 UT		G1934-FS1(0)	1.000	11/23/2020	0.23	0.49	4.90
9Cl-PF3ONS	**756426-58-1**	**0.98 UT**		**G1934-FS1(0)**	**1.000**	**11/23/2020**	**0.26**	**0.98**	**4.90**

use original in SDG 20-1356

HT

Isotope Dilution

Analyzed by: Schumitz, Denise
Printed: 11/24/2020
MJ 12/1/20

BATTELLE
It can be done

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

Client ID	PX-B103-WT04-1020
Battelle ID	G1956-FS1
Sample Type	SA
Collection Date	10/23/2020
Extraction Date	11/21/2020
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	100.16 T J	G1956-FS1(0)	1.000	11/23/2020	0.47	1.34	4.46
PFHpA	**375-85-9**	**58.25 T**	**G1956-FS1(0)**	**1.000**	**11/23/2020**	**0.23**	**0.89**	**4.46**
PFOA	335-67-1	39.62 T	G1956-FS1(0)	1.000	11/23/2020	0.46	1.34	4.46
PFNA	**375-95-1**	**119.18 T**	**G1956-FS1(0)**	**1.000**	**11/23/2020**	**0.28**	**0.89**	**4.46**
PFDA	335-76-2	3.85 JT J	G1956-FS1(0)	1.000	11/23/2020	0.13	0.45	4.46
PFUnA	**2058-94-8**	**0.45 UT X**	**G1956-FS1(0)**	**1.000**	**11/23/2020**	**0.20**	**0.45**	**4.46**
PFDoA	307-55-1	0.45 UT	G1956-FS1(0)	1.000	11/23/2020	0.17	0.45	4.46
PFTrDA	**72629-94-8**	**0.45 UT**	**G1956-FS1(0)**	**1.000**	**11/23/2020**	**0.13**	**0.45**	**4.46**
PFTeDA	376-06-7	1.79 UT	G1956-FS1(0)	1.000	11/23/2020	0.65	1.79	4.46
NMeFOSAA	**2355-31-9**	**0.89 UT**	**G1956-FS1(0)**	**1.000**	**11/23/2020**	**0.31**	**0.89**	**4.46**
NEtFOSAA	2991-50-6	0.89 UT	G1956-FS1(0)	1.000	11/23/2020	0.45	0.89	4.46
PFBS	**375-73-5**	**21.27 T J**	**G1956-FS1(0)**	**1.000**	**11/23/2020**	**0.13**	**0.45**	**4.46**
PFHxS	355-46-4	880.94 TD	G1956-FS1-D(5)	25.000	11/23/2020	2.46	8.93	111.61
PFOS	**1763-23-1**	**16563.90 TD**	**G1956-FS1-D(9)**	**312.500**	**11/23/2020**	**122.77**	**279.02**	**1395.09**
HFPO-DA	13252-13-6	0.45 UT X	G1956-FS1(0)	1.000	11/23/2020	0.22	0.45	4.46
Adona	**919005-14-4**	**0.89 UT**	**G1956-FS1(0)**	**1.000**	**11/23/2020**	**0.24**	**0.89**	**4.46**
11Cl-PF3OUdS	763051-92-9	0.45 UT	G1956-FS1(0)	1.000	11/23/2020	0.21	0.45	4.46
9Cl-PF3ONS	**756426-58-1**	**0.89 UT**	**G1956-FS1(0)**	**1.000**	**11/23/2020**	**0.24**	**0.89**	**4.46**

BATTELLE
It can be done

2

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

use original

Client ID	PX-B103-WT04-1020
Battelle ID	G1956-FS1
Sample Type	SA
Collection Date	10/23/2020
Extraction Date	11/21/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	50		G1956-FS1(0)	11/23/2020
13C4-PFHpA	28	M	G1956-FS1(0)	11/23/2020
13C8-PFOA	73		G1956-FS1(0)	11/23/2020
13C9-PFNA	91		G1956-FS1-D(9)	11/23/2020
13C6-PFDA	80		G1956-FS1(0)	11/23/2020
13C7-PFUnA	85		G1956-FS1(0)	11/23/2020
13C2-PFDoA	88		G1956-FS1(0)	11/23/2020
13C2-PFTeDA	85		G1956-FS1(0)	11/23/2020
d3-MeFOSAA	79	D	G1956-FS1-D(9)	11/23/2020
d5-EtFOSAA	93	D	G1956-FS1-D(9)	11/23/2020
13C3-PFBS	83	D	G1956-FS1-D(9)	11/23/2020
13C3-PFHxS	91	D	G1956-FS1-D(9)	11/23/2020
13C8-PFOS	92	D	G1956-FS1-D(9)	11/23/2020
13C3-HFPO-DA	100		G1956-FS1(0)	11/23/2020

BATTELLE
It can be done

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

Client ID	PX-H110-WT05-1020
Battelle ID	G1971-FS1
Sample Type	SA
Collection Date	10/23/2020
Extraction Date	11/21/2020
Analytical Instrument	Sciex 6500+ 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	15.79	T J	G1971-FS1(0)	1.000	11/23/2020	0.50	1.42	4.72
PFHpA	**375-85-9**	**5.40**	**T**	**G1971-FS1(0)**	**1.000**	**11/23/2020**	**0.25**	**0.94**	**4.72**
PFOA	335-67-1	12.58	T	G1971-FS1(0)	1.000	11/23/2020	0.48	1.42	4.72
PFNA	**375-95-1**	**0.88**	**JT J**	**G1971-FS1(0)**	**1.000**	**11/23/2020**	**0.29**	**0.94**	**4.72**
PFDA	335-76-2	0.47	UT X	G1971-FS1(0)	1.000	11/23/2020	0.13	0.47	4.72
PFUnA	**2058-94-8**	**0.47**	**UT**	**G1971-FS1(0)**	**1.000**	**11/23/2020**	**0.21**	**0.47**	**4.72**
PFDoA	307-55-1	0.47	UT	G1971-FS1(0)	1.000	11/23/2020	0.18	0.47	4.72
PFTrDA	**72629-94-8**	**0.47**	**UT**	**G1971-FS1(0)**	**1.000**	**11/23/2020**	**0.14**	**0.47**	**4.72**
PFTeDA	376-06-7	1.89	UT	G1971-FS1(0)	1.000	11/23/2020	0.69	1.89	4.72
NMeFOSAA	**2355-31-9**	**0.94**	**UT**	**G1971-FS1(0)**	**1.000**	**11/23/2020**	**0.33**	**0.94**	**4.72**
NEtFOSAA	2991-50-6	0.94	UT	G1971-FS1(0)	1.000	11/23/2020	0.47	0.94	4.72
PFBS	**375-73-5**	**4.63**	**JT J**	**G1971-FS1(0)**	**1.000**	**11/23/2020**	**0.13**	**0.47**	**4.72**
PFHxS	355-46-4	46.98	T	G1971-FS1(0)	1.000	11/23/2020	0.10	0.38	4.72
PFOS	**1763-23-1**	**59.48**	**T**	**G1971-FS1(0)**	**1.000**	**11/23/2020**	**0.42**	**0.94**	**4.72**
HFPO-DA	13252-13-6	0.47	UT X	G1971-FS1(0)	1.000	11/23/2020	0.24	0.47	4.72
Adona	**919005-14-4**	**0.94**	**UT**	**G1971-FS1(0)**	**1.000**	**11/23/2020**	**0.25**	**0.94**	**4.72**
11Cl-PF3OUdS	763051-92-9	0.47	UT	G1971-FS1(0)	1.000	11/23/2020	0.22	0.47	4.72
9Cl-PF3ONS	**756426-58-1**	**0.94**	**UT**	**G1971-FS1(0)**	**1.000**	**11/23/2020**	**0.25**	**0.94**	**4.72**

3

use original in SDG 20-1357

HT

BATTELLE
It can be done

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

3

Client ID	PX-H110-WT05-1020
Battelle ID	G1971-FS1
Sample Type	SA
Collection Date	10/23/2020
Extraction Date	11/21/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS

use original

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	40 N	G1971-FS1(0)	11/23/2020
13C4-PFHpA	59	G1971-FS1(0)	11/23/2020
13C8-PFOA	76	G1971-FS1(0)	11/23/2020
13C9-PFNA	87	G1971-FS1(0)	11/23/2020
13C6-PFDA	81	G1971-FS1(0)	11/23/2020
13C7-PFUnA	69	G1971-FS1(0)	11/23/2020
13C2-PFDoA	60	G1971-FS1(0)	11/23/2020
13C2-PFTeDA	17 N	G1971-FS1(0)	11/23/2020
d3-MeFOSAA	59	G1971-FS1(0)	11/23/2020
d5-EtFOSAA	74	G1971-FS1(0)	11/23/2020
13C3-PFBS	63	G1971-FS1(0)	11/23/2020
13C3-PFHxS	77	G1971-FS1(0)	11/23/2020
13C8-PFOS	75	G1971-FS1(0)	11/23/2020
13C3-HFPO-DA	91	G1971-FS1(0)	11/23/2020

BATTELLE
It can be done

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

4

Client ID	PX-H110-WT01-1020
Battelle ID	G1986-FS1
Sample Type	SA
Collection Date	10/24/2020
Extraction Date	11/21/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	GW
Sample Size	0.265
Size Unit-Basis	L

use original in SDG 20-1357

Analyte	CAS No.	Result (ng/L)		Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	6.01	T J	G1986-FS1(0)	1.000	11/23/2020	0.50	1.42	4.72	HT
PFHpA	**375-85-9**	**2.97**	**JT**	**G1986-FS1(0)**	**1.000**	**11/23/2020**	**0.25**	**0.94**	**4.72**	
PFOA	335-67-1	3.01	JT	G1986-FS1(0)	1.000	11/23/2020	0.48	1.42	4.72	
PFNA	**375-95-1**	**4.45**	**JT**	**G1986-FS1(0)**	**1.000**	**11/23/2020**	**0.29**	**0.94**	**4.72**	
PFDA	335-76-2	10.70	T	G1986-FS1(0)	1.000	11/23/2020	0.13	0.47	4.72	
PFUnA	**2058-94-8**	**0.47**	**UT UJ**	**G1986-FS1(0)**	**1.000**	**11/23/2020**	**0.21**	**0.47**	**4.72**	
PFDoA	307-55-1	0.47	UT	G1986-FS1(0)	1.000	11/23/2020	0.18	0.47	4.72	
PFTrDA	**72629-94-8**	**0.47**	**UT**	**G1986-FS1(0)**	**1.000**	**11/23/2020**	**0.14**	**0.47**	**4.72**	
PFTeDA	376-06-7	1.89	UT	G1986-FS1(0)	1.000	11/23/2020	0.69	1.89	4.72	
NMeFOSAA	**2355-31-9**	**0.94**	**UT**	**G1986-FS1(0)**	**1.000**	**11/23/2020**	**0.33**	**0.94**	**4.72**	
NEtFOSAA	2991-50-6	0.94	UT	G1986-FS1(0)	1.000	11/23/2020	0.47	0.94	4.72	
PFBS	**375-73-5**	**1.18**	**JT J**	**G1986-FS1(0)**	**1.000**	**11/23/2020**	**0.13**	**0.47**	**4.72**	
PFHxS	355-46-4	3.52	JT J	G1986-FS1(0)	1.000	11/23/2020	0.10	0.38	4.72	
PFOS	**1763-23-1**	**112.20**	**TD J**	**G1986-FS1-D(3)**	**5.000**	**11/23/2020**	**2.08**	**4.72**	**23.58**	
HFPO-DA	13252-13-6	0.47	UT UJ	G1986-FS1(0)	1.000	11/23/2020	0.24	0.47	4.72	
Adona	**919005-14-4**	**0.94**	**UT**	**G1986-FS1(0)**	**1.000**	**11/23/2020**	**0.25**	**0.94**	**4.72**	
11Cl-PF3OUdS	763051-92-9	0.47	UT	G1986-FS1(0)	1.000	11/23/2020	0.22	0.47	4.72	
9Cl-PF3ONS	**756426-58-1**	**0.94**	**UT**	**G1986-FS1(0)**	**1.000**	**11/23/2020**	**0.25**	**0.94**	**4.72**	

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It can be done

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

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Client ID	PX-H110-WT01-1020
Battelle ID	G1986-FS1
Sample Type	SA
Collection Date	10/24/2020
Extraction Date	11/21/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS

use original

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	51		G1986-FS1(0)	11/23/2020
13C4-PFHpA	**62**		**G1986-FS1(0)**	**11/23/2020**
13C8-PFOA	69		G1986-FS1(0)	11/23/2020
13C9-PFNA	**84**	β	**G1986-FS1-D(3)**	**11/23/2020**
13C6-PFDA	75		G1986-FS1(0)	11/23/2020
13C7-PFUnA	**64**		**G1986-FS1(0)**	**11/23/2020**
13C2-PFDoA	65		G1986-FS1(0)	11/23/2020
13C2-PFTeDA	**37**	N	**G1986-FS1(0)**	**11/23/2020**
d3-MeFOSAA	77	D	G1986-FS1-D(3)	11/23/2020
d5-EtFOSAA	**82**	D	**G1986-FS1-D(3)**	**11/23/2020**
13C3-PFBS	87	D	G1986-FS1-D(3)	11/23/2020
13C3-PFHxS	**84**	D	**G1986-FS1-D(3)**	**11/23/2020**
13C8-PFOS	88	D	G1986-FS1-D(3)	11/23/2020
13C3-HFPO-DA	**87**		**G1986-FS1(0)**	**11/23/2020**

BATTELLE
it can be done

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

Client ID	PX-H110-WT03-1020
Battelle ID	G1994-FS1
Sample Type	SA
Collection Date	10/24/2020
Extraction Date	11/21/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	GW
Sample Size	0.250
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	16.60 T	G1994-FS1(0)	1.000	11/23/2020	0.53	1.50	5.00
PFHpA	375-85-9	9.70 T	G1994-FS1(0)	1.000	11/23/2020	0.26	1.00	5.00
PFOA	335-67-1	5.34 T	G1994-FS1(0)	1.000	11/23/2020	0.51	1.50	5.00
PFNA	375-95-1	4.15 JT	G1994-FS1(0)	1.000	11/23/2020	0.31	1.00	5.00
PFDA	335-76-2	3.80 JT	G1994-FS1(0)	1.000	11/23/2020	0.14	0.50	5.00
PFUnA	2058-94-8	0.50 UT	G1994-FS1(0)	1.000	11/23/2020	0.22	0.50	5.00
PFDoA	307-55-1	0.50 UT	G1994-FS1(0)	1.000	11/23/2020	0.19	0.50	5.00
PFTrDA	72629-94-8	0.50 UT	G1994-FS1(0)	1.000	11/23/2020	0.15	0.50	5.00
PFTeDA	376-06-7	2.00 UT	G1994-FS1(0)	1.000	11/23/2020	0.73	2.00	5.00
NMeFOSAA	2355-31-9	1.00 UT	G1994-FS1(0)	1.000	11/23/2020	0.35	1.00	5.00
NEtFOSAA	2991-50-6	1.00 UT	G1994-FS1(0)	1.000	11/23/2020	0.50	1.00	5.00
PFBS	375-73-5	7.56 T	G1994-FS1(0)	1.000	11/23/2020	0.14	0.50	5.00
PFHxS	355-46-4	38.09 T	G1994-FS1(0)	1.000	11/23/2020	0.11	0.40	5.00
PFOS	1763-23-1	182.59 TD	G1994-FS1-D(3)	5.000	11/23/2020	2.20	5.00	25.00
HFPO-DA	13252-13-6	0.50 UT	G1994-FS1(0)	1.000	11/23/2020	0.25	0.50	5.00
Adona	919005-14-4	1.00 UT	G1994-FS1(0)	1.000	11/23/2020	0.27	1.00	5.00
11Cl-PF3OUdS	763051-92-9	0.50 UT	G1994-FS1(0)	1.000	11/23/2020	0.23	0.50	5.00
9Cl-PF3ONS	756426-58-1	1.00 UT	G1994-FS1(0)	1.000	11/23/2020	0.27	1.00	5.00

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use original in 20-1357 except PFTeDA

J
UJ
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UJ
HT

BATTELLE
It can be done

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

5

use original

Client ID	PX-H110-WT03-1020
Battelle ID	G1994-FS1
Sample Type	SA
Collection Date	10/24/2020
Extraction Date	11/21/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	49	N	G1994-FS1(0)	11/23/2020
13C4-PFHpA	**69**		**G1994-FS1(0)**	**11/23/2020**
13C8-PFOA	78		G1994-FS1(0)	11/23/2020
13C9-PFNA	**94**	D	**G1994-FS1-D(3)**	**11/23/2020**
13C6-PFDA	64		G1994-FS1(0)	11/23/2020
13C7-PFUnA	**43**	N	**G1994-FS1(0)**	**11/23/2020**
13C2-PFDoA	22	N	G1994-FS1(0)	11/23/2020
13C2-PFTeDA	**8**	N	**G1994-FS1(0)**	**11/23/2020**
d3-MeFOSAA	76	D	G1994-FS1-D(3)	11/23/2020
d5-EtFOSAA	**84**	D	**G1994-FS1-D(3)**	**11/23/2020**
13C3-PFBS	91	D	G1994-FS1-D(3)	11/23/2020
13C3-PFHxS	**96**	D	**G1994-FS1-D(3)**	**11/23/2020**
13C8-PFOS	106	D	G1994-FS1-D(3)	11/23/2020
13C3-HFPO-DA	**101**		**G1994-FS1(0)**	**11/23/2020**

Appendix D
Laboratory Analytical Data

Table D-1. Soil PFAS Analytical Data
Building 103, Hangar 110, Hangar 2835, Hangar 2805, Building 840
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	PAX PFAS SO Values	PX-B103-SO01			PX-B103-SO02		PX-B103-SO03	
Sample ID		PX-B103-SS01-000H	PX-B103-SB01-0304	PX-B103-SB01P-0304	PX-B103-SS02-000H	PX-B103-SB02-0304	PX-B103-SS03-000H	PX-B103-SB03-0304
Sample Date		10/22/20	10/22/20	10/22/20	10/22/20	10/22/20	10/22/20	10/22/20
Chemical Name								
Per- and Polyfluoroalkyl Substances (ng/g)								
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	2.25 U	2.11 U	2.2 U	2.56 U	2.08 U	2.4 U	1.9 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	1.12 U	1.05 U	1.1 U	1.28 U	1.04 U	1.2 U	0.95 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	1.69 U	1.58 U	1.65 U	1.92 U	1.56 U	1.8 U	1.43 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	2.25 U	2.11 U	2.2 U	2.56 U	2.08 U	2.4 U	1.9 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	2.81 U	2.63 U	2.75 U	3.21 U	2.6 U	2.99 U	2.38 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	2.25 U	2.11 U	2.2 U	2.56 U	2.08 U	2.4 U	1.9 U
Perfluorooctanesulfonic Acid (PFOS)	130	**73.33**	**31.04**	**30.26**	**30.58**	**16.81**	**51.5 J**	**229.53**
Perfluoroundecanoic Acid (PFUnA)	--	**1.51 J**	1.05 U	1.1 U	**0.6 J**	1.04 U	**2.2 J**	0.95 U
Perfluorohexanoic Acid (PFHxA)	--	**1.18 J**	2.11 U	2.2 U	**0.92 J**	2.08 U	**1.43 J**	1.9 U
Perfluorododecanoic Acid (PFDoA)	--	2.25 U	2.11 U	2.2 U	2.56 U	2.08 U	2.4 U	1.9 U
Perfluorooctanoic Acid (PFOA)	130	**2 J**	2.11 U	2.2 U	**0.91 J**	2.08 U	**2.57 J**	**2.26 J**
Perfluorodecanoic Acid (PFDA)	--	**0.53 J**	1.05 U	1.1 U	1.28 U	1.04 U	**0.74 J**	**0.98 J**
Perfluorohexanesulfonic Acid (PFHxS)	--	**3.95 J**	**1 J**	**0.92 J**	**2.42 J**	**2.13 J**	**4.98 J**	**5.67**
Perfluorobutanesulfonic Acid (PFBS)	1,900	1.12 U	1.05 U	1.1 U	1.28 U	1.04 U	1.2 U	0.95 U
Perfluoroheptanoic Acid (PFHpA)	--	1.69 U	1.58 U	1.65 U	1.92 U	1.56 U	**0.97 J**	**0.5 J**
Perfluorononanoic Acid (PFNA)	--	**0.85 J**	1.05 U	1.1 U	1.28 U	1.04 U	**1.34 J**	**5.04**
Perfluorotetradecanoic Acid (PFTeDA)	--	2.81 U	2.63 U	2.75 U	3.21 U	2.6 U	2.99 U	2.38 U
Perfluorotridecanoic Acid (PFTrDA)	--	1.12 U	1.05 U	1.1 U	1.28 U	1.04 U	1.2 U	0.95 U

Notes:

Exceeds one or more criteria

Bold indicates detections

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

U - The material was analyzed for, but not detected
ng/g - nanograms per gram
µg/kg - micrograms per kilogram
ng/g = µg/kg

Table D-1. Soil PFAS Analytical Data
Building 103, Hangar 110, Hangar 2835, Hangar 2805, Building 840
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	**PAX PFAS SO Values**	PX-B103-SO04		PX-B103-SO05			PX-B840-SO01		
Sample ID		PX-B103-SS04-000H	PX-B103-SB04-0304	PX-B103-SS05-000H	PX-B103-SS05P-000H	PX-B103-SB05-0304	PX-B840-SS01-000H	PX-B840-SB01-0304	PX-B840-SB01P-0304
Sample Date		10/23/20	10/23/20	10/23/20	10/23/20	10/23/20	10/21/20	10/21/20	10/21/20
Chemical Name									
Per- and Polyfluoroalkyl Substances (ng/g)									
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	2.45 U	2.06 U	2.04 U	2.08 U	2.11 U	2.25 U	2.41 U	2.63 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	1.23 U	1.03 U	1.02 U	1.04 U	1.05 U	1.12 U	1.2 U	1.32 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	1.84 U	1.55 U	1.53 U	1.56 U	1.58 U	1.69 U	1.81 U	1.97 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	2.45 U	2.06 U	2.04 U	2.08 U	2.11 U	2.25 U	2.41 U	2.63 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	3.07 U	2.58 U	2.55 U	2.6 U	2.63 U	2.81 U	3.01 U	3.29 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	2.45 U	2.06 U	2.04 U	2.08 U	2.11 U	2.25 U	2.41 U	2.63 U
Perfluorooctanesulfonic Acid (PFOS)	130	**105.32**	**7.38**	**90.82 J**	**154.98 J**	**6.76**	**16.33**	2.41 U	2.63 U
Perfluoroundecanoic Acid (PFUnA)	--	**0.69 J**	1.03 U	1.02 U	1.04 U	1.05 U	1.12 U	1.2 U	1.32 U
Perfluorohexanoic Acid (PFHxA)	--	**1.2 J**	2.06 U	2.04 U	2.08 U	2.11 U	2.25 U	2.41 U	2.63 U
Perfluorododecanoic Acid (PFDoA)	--	2.45 U	2.06 U	2.04 U	2.08 U	2.11 U	2.25 U	2.41 U	2.63 U
Perfluorooctanoic Acid (PFOA)	130	**1.4 J**	2.06 U	2.04 U	2.08 U	2.11 U	2.25 U	2.41 U	2.63 U
Perfluorodecanoic Acid (PFDA)	--	1.23 U	1.03 U	1.02 U	1.04 U	1.05 U	1.12 U	1.2 U	1.32 U
Perfluorohexanesulfonic Acid (PFHxS)	--	**2.48 J**	2.06 U	2.04 U	2.08 U	2.11 U	**0.96 J**	**2.58 J**	**2.24 J**
Perfluorobutanesulfonic Acid (PFBS)	1,900	1.23 U	1.03 U	1.02 U	1.04 U	1.05 U	1.12 U	1.2 U	1.32 U
Perfluoroheptanoic Acid (PFHpA)	--	1.84 U	1.55 U	1.53 U	1.56 U	1.58 U	1.69 U	1.81 U	1.97 U
Perfluorononanoic Acid (PFNA)	--	**0.7 J**	1.03 U	1.02 U	1.04 U	1.05 U	1.12 U	1.2 U	1.32 U
Perfluorotetradecanoic Acid (PFTeDA)	--	3.07 U	2.58 U	2.55 U	2.6 U	2.63 U	2.81 U	3.01 U	3.29 U
Perfluorotridecanoic Acid (PFTrDA)	--	1.23 U	1.03 U	1.02 U	1.04 U	1.05 U	1.12 U	1.2 U	1.32 U

Notes:

Exceeds one or more criteria

Bold indicates detections

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

U - The material was analyzed for, but not detected
ng/g - nanograms per gram
µg/kg - micrograms per kilogram
ng/g = µg/kg

Table D-1. Soil PFAS Analytical Data
Building 103, Hangar 110, Hangar 2835, Hangar 2805, Building 840
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	**PAX PFAS SO Values**	PX-B840-SO02		PX-B840-SO03		PX-B840-SO04	
Sample ID		PX-B840-SS02-000H	PX-B840-SB02-0304	PX-B840-SS03-000H	PX-B840-SB03-0304	PX-B840-SS04-000H	PX-B840-SB04-0304
Sample Date		10/21/20	10/21/20	10/21/20	10/21/20	10/21/20	10/21/20
Chemical Name							
Per- and Polyfluoroalkyl Substances (ng/g)							
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	2.52 U	2.3 U	2.42 U	2.29 U	2.34 U	2.09 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	1.26 U	1.15 U	1.21 U	1.14 U	1.17 U	1.05 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	1.89 U	1.72 U	1.82 U	1.71 U	1.75 U	1.57 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	2.52 U	2.3 U	2.42 U	2.29 U	2.34 U	2.09 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	3.14 U	2.87 U	3.03 U	2.86 U	2.92 U	2.62 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	2.52 U	2.3 U	2.42 U	2.29 U	2.34 U	2.09 U
Perfluorooctanesulfonic Acid (PFOS)	130	**1.13 J**	2.3 U	**19.16**	**37.48**	**5.3 J**	**0.82 J**
Perfluoroundecanoic Acid (PFUnA)	--	1.26 U	1.15 U	1.21 U	1.14 U	1.17 U	1.05 U
Perfluorohexanoic Acid (PFHxA)	--	2.52 U	2.3 U	2.42 U	2.29 U	**1.07 J**	2.09 U
Perfluorododecanoic Acid (PFDoA)	--	2.52 U	2.3 U	2.42 U	2.29 U	2.34 U	2.09 U
Perfluorooctanoic Acid (PFOA)	130	2.52 U	2.3 U	2.42 U	2.29 U	**0.88 J**	2.09 U
Perfluorodecanoic Acid (PFDA)	--	1.26 U	1.15 U	1.21 U	1.14 U	1.17 U	1.05 U
Perfluorohexanesulfonic Acid (PFHxS)	--	2.52 U	2.3 U	**2.07 J**	**1.09 J**	**1.08 J**	2.09 U
Perfluorobutanesulfonic Acid (PFBS)	1,900	1.26 U	1.15 U	1.21 U	1.14 U	1.17 U	1.05 U
Perfluoroheptanoic Acid (PFHpA)	--	1.89 U	1.72 U	1.82 U	1.71 U	1.75 U	1.57 U
Perfluorononanoic Acid (PFNA)	--	1.26 U	1.15 U	1.21 U	1.14 U	1.17 U	1.05 U
Perfluorotetradecanoic Acid (PFTeDA)	--	3.14 U	2.87 U	3.03 U	2.86 U	2.92 U	2.62 U
Perfluorotridecanoic Acid (PFTrDA)	--	1.26 U	1.15 U	1.21 U	1.14 U	1.17 U	1.05 U

Notes:

Exceeds one or more criteria

Bold indicates detections

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

U - The material was analyzed for, but not detected
ng/g - nanograms per gram
µg/kg - micrograms per kilogram
ng/g = µg/kg

Table D-1. Soil PFAS Analytical Data
Building 103, Hangar 110, Hangar 2835, Hangar 2805, Building 840
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	**PAX PFAS SO Values**	PX-B840-SO05			PX-B840-SO06		PX-B840-SO07	
Sample ID		PX-B840-SS05-000H	PX-B840-SS05P-000H	PX-B840-SB05-0304	PX-B840-SS06-000H	PX-B840-SB06-0304	PX-B840-SS07-000H	PX-B840-SB07-0304
Sample Date		10/21/20	10/21/20	10/21/20	10/21/20	10/21/20	10/21/20	10/21/20
Chemical Name								
Per- and Polyfluoroalkyl Substances (ng/g)								
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	2.33 U	2.5 U	2.38 U	2.5 U	2.29 U	2.4 U	2.53 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	1.16 U	1.25 U	1.19 U	1.25 U	1.14 U	1.2 U	1.27 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	1.74 U	1.88 U	1.79 U	1.88 U	1.71 U	1.8 U	1.9 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	2.33 U	2.5 U	2.38 U	2.5 U	2.29 U	2.4 U	2.53 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	2.91 U	3.13 U	2.98 U	3.13 U	2.86 U	2.99 U	3.16 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	2.33 U	2.5 U	2.38 U	2.5 U	2.29 U	2.4 U	2.53 U
Perfluorooctanesulfonic Acid (PFOS)	130	**9.46**	**10.84**	2.38 U	**20.85**	**13.62**	**23.14**	**2.87 J**
Perfluoroundecanoic Acid (PFUnA)	--	1.16 U	1.25 U	1.19 U	1.25 U	1.14 U	1.2 U	1.27 U
Perfluorohexanoic Acid (PFHxA)	--	**2.43 J**	**2.18 J**	2.38 U	2.5 U	2.29 U	2.4 U	2.53 U
Perfluorododecanoic Acid (PFDoA)	--	2.33 U	2.5 U	2.38 U	2.5 U	2.29 U	2.4 U	2.53 U
Perfluorooctanoic Acid (PFOA)	130	**3.88 J**	**3.65 J**	2.38 U	2.5 U	2.29 U	2.4 U	2.53 U
Perfluorodecanoic Acid (PFDA)	--	1.16 U	1.25 U	1.19 U	1.25 U	1.14 U	1.2 U	1.27 U
Perfluorohexanesulfonic Acid (PFHxS)	--	**2.94 J**	**2.98 J**	2.38 U	**1.57 J**	2.29 U	2.4 U	2.53 U
Perfluorobutanesulfonic Acid (PFBS)	1,900	1.16 U	1.25 U	1.19 U	1.25 U	1.14 U	1.2 U	1.27 U
Perfluoroheptanoic Acid (PFHpA)	--	1.74 U	1.88 U	1.79 U	1.88 U	1.71 U	1.8 U	1.9 U
Perfluorononanoic Acid (PFNA)	--	1.16 U	1.25 U	1.19 U	1.25 U	1.14 U	1.2 U	1.27 U
Perfluorotetradecanoic Acid (PFTeDA)	--	2.91 U	3.13 U	2.98 U	3.13 U	2.86 U	2.99 U	3.16 U
Perfluorotridecanoic Acid (PFTrDA)	--	1.16 U	1.25 U	1.19 U	1.25 U	1.14 U	1.2 U	1.27 U

Notes:

Exceeds one or more criteria

Bold indicates detections

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

U - The material was analyzed for, but not detected
ng/g - nanograms per gram
µg/kg - micrograms per kilogram
ng/g = µg/kg

Table D-1. Soil PFAS Analytical Data
Building 103, Hangar 110, Hangar 2835, Hangar 2805, Building 840
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	**PAX PFAS SO Values**	PX-H110-SO01			PX-H110-SO02		PX-H110-SO03		
Sample ID		PX-H110-SS01-000H	PX-H110-SB01-0304	PX-H110-SB01P-0304	PX-H110-SS02-000H	PX-H110-SB02-0304	PX-H110-SS03-000H	PX-H110-SS03P-000H	PX-H110-SB03-0304
Sample Date		10/24/20	10/24/20	10/24/20	10/24/20	10/24/20	10/24/20	10/24/20	10/24/20
Chemical Name									
Per- and Polyfluoroalkyl Substances (ng/g)									
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	2.26 U	2.14 U	2.05 U	2.33 U	2.29 U	1.9 U	2.08 U	2.05 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	1.13 U	1.07 U	1.03 U	1.16 U	1.14 U	0.95 U	1.04 U	1.03 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	1.69 U	1.6 U	1.54 U	1.74 U	1.71 U	1.43 U	1.56 U	1.54 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	2.26 U	2.14 U	2.05 U	2.33 U	2.29 U	1.9 U	2.08 U	2.05 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	2.82 U	2.67 U	2.56 U	2.91 U	2.86 U	2.38 U	2.6 U	2.56 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	2.26 U	2.14 U	2.05 U	2.33 U	2.29 U	1.9 U	2.08 U	2.05 U
Perfluorooctanesulfonic Acid (PFOS)	130	2.26 U	2.14 U	2.05 U	2.33 U	2.29 U	1.9 U	2.08 U	2.05 U
Perfluoroundecanoic Acid (PFUnA)	--	1.13 U	1.07 U	1.03 U	1.16 U	1.14 U	0.95 U	1.04 U	1.03 U
Perfluorohexanoic Acid (PFHxA)	--	2.26 U	2.14 U	2.05 U	2.33 U	2.29 U	1.9 U	2.08 U	2.05 U
Perfluorododecanoic Acid (PFDoA)	--	2.26 U	2.14 U	2.05 U	2.33 U	2.29 U	1.9 U	2.08 U	2.05 U
Perfluorooctanoic Acid (PFOA)	130	2.26 U	2.14 U	2.05 U	2.33 U	2.29 U	1.9 U	2.08 U	2.05 U
Perfluorodecanoic Acid (PFDA)	--	1.13 U	1.07 U	1.03 U	1.16 U	1.14 U	0.95 U	1.04 U	1.03 U
Perfluorohexanesulfonic Acid (PFHxS)	--	2.26 U	2.14 U	2.05 U	2.33 U	2.29 U	1.9 U	2.08 U	2.05 U
Perfluorobutanesulfonic Acid (PFBS)	1,900	1.13 U	1.07 U	1.03 U	1.16 U	1.14 U	0.95 U	1.04 U	1.03 U
Perfluoroheptanoic Acid (PFHpA)	--	1.69 U	1.6 U	1.54 U	1.74 U	1.71 U	1.43 U	1.56 U	1.54 U
Perfluorononanoic Acid (PFNA)	--	1.13 U	1.07 U	1.03 U	1.16 U	1.14 U	0.95 U	1.04 U	1.03 U
Perfluorotetradecanoic Acid (PFTeDA)	--	2.82 U	2.67 U	2.56 U	2.91 U	2.86 U	2.38 U	2.6 U	2.56 U
Perfluorotridecanoic Acid (PFTrDA)	--	1.13 U	1.07 U	1.03 U	1.16 U	1.14 U	0.95 U	1.04 U	1.03 U

Notes:

Exceeds one or more criteria

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µg/kg - micrograms per kilogram
ng/g = µg/kg

Table D-1. Soil PFAS Analytical Data
Building 103, Hangar 110, Hangar 2835, Hangar 2805, Building 840
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	**PAX PFAS SO Values**	PX-H110-SO04		PX-H110-SO05		PX-H2805-SO01		
Sample ID		PX-H110-SS04-000H	PX-H110-SB04-0304	PX-H110-SS05-000H	PX-H110-SB05-0304	PX-H2805-SS01-000H	PX-H2805-SB01-0304	PX-H2805-SB01P-0304
Sample Date		10/24/20	10/24/20	10/23/20	10/23/20	10/20/20	10/20/20	10/20/20
Chemical Name								
Per- and Polyfluoroalkyl Substances (ng/g)								
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	2.04 U	2.48 U	2.52 U	2.14 U	2.03 U	2.48 U	2.29 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	1.02 U	1.24 U	1.26 U	1.07 U	1.02 U	1.24 U	1.14 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	1.53 U	1.86 U	1.89 U	1.6 U	1.52 U	1.86 U	1.71 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	2.04 U	2.48 U	2.52 U	2.14 U	2.03 U	2.48 U	2.29 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	2.55 U	3.11 U	3.14 U	2.67 U	2.54 U	3.11 U	2.86 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	2.04 U	2.48 U	2.52 U	2.14 U	2.03 U	2.48 U	2.29 U
Perfluorooctanesulfonic Acid (PFOS)	130	2.04 U	2.48 U	**5.3 J**	2.14 U	**1.04 J**	2.48 U	2.29 U
Perfluoroundecanoic Acid (PFUnA)	--	1.02 U	1.24 U	1.26 U	1.07 U	1.02 U	1.24 U	1.14 U
Perfluorohexanoic Acid (PFHxA)	--	2.04 U	2.48 U	2.52 U	2.14 U	2.03 U	2.48 U	2.29 U
Perfluorododecanoic Acid (PFDoA)	--	2.04 U	2.48 U	2.52 U	2.14 U	2.03 U	2.48 U	2.29 U
Perfluorooctanoic Acid (PFOA)	130	2.04 U	2.48 U	**0.85 J**	2.14 U	2.03 U	2.48 U	2.29 U
Perfluorodecanoic Acid (PFDA)	--	1.02 U	1.24 U	1.26 U	1.07 U	1.02 U	1.24 U	1.14 U
Perfluorohexanesulfonic Acid (PFHxS)	--	2.04 U	2.48 U	**1.89 J**	2.14 U	2.03 U	2.48 U	2.29 U
Perfluorobutanesulfonic Acid (PFBS)	1,900	1.02 U	1.24 U	1.26 U	1.07 U	1.02 U	1.24 U	1.14 U
Perfluoroheptanoic Acid (PFHpA)	--	1.53 U	1.86 U	1.89 U	1.6 U	1.52 U	1.86 U	1.71 U
Perfluorononanoic Acid (PFNA)	--	1.02 U	1.24 U	1.26 U	1.07 U	1.02 U	1.24 U	1.14 U
Perfluorotetradecanoic Acid (PFTeDA)	--	2.55 U	3.11 U	3.14 U	2.67 U	2.54 U	3.11 U	2.86 U
Perfluorotridecanoic Acid (PFTrDA)	--	1.02 U	1.24 U	1.26 U	1.07 U	1.02 U	1.24 U	1.14 U

Notes:

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U - The material was analyzed for, but not detected
ng/g - nanograms per gram
µg/kg - micrograms per kilogram
ng/g = µg/kg

Table D-1. Soil PFAS Analytical Data
Building 103, Hangar 110, Hangar 2835, Hangar 2805, Building 840
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	**PAX PFAS SO Values**	PX-H2805-SO02		PX-H2805-SO03		PX-H2805-SO04	
Sample ID		PX-H2805-SS02-000H	PX-H2805-SB02-0304	PX-H2805-SS03-000H	PX-H2805-SB03-0304	PX-H2805-SS04-000H	PX-H2805-SB04-0304
Sample Date		10/20/20	10/20/20	10/20/20	10/20/20	10/20/20	10/20/20
Chemical Name							
Per- and Polyfluoroalkyl Substances (ng/g)							
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	2.31 U	2.2 U	2.29 U	2.04 U	2.17 U	2.29 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	1.16 U	1.1 U	1.14 U	1.02 U	1.09 U	1.14 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	1.73 U	1.65 U	1.71 U	1.53 U	1.63 U	1.71 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	2.31 U	2.2 U	2.29 U	2.04 U	2.17 U	2.29 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	2.89 U	2.75 U	2.86 U	2.55 U	2.72 U	2.86 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	2.31 U	2.2 U	2.29 U	2.04 U	2.17 U	2.29 U
Perfluorooctanesulfonic Acid (PFOS)	130	**0.82 J**	2.2 U	2.29 U	2.04 U	**0.95 J**	2.29 U
Perfluoroundecanoic Acid (PFUnA)	--	1.16 U	1.1 U	1.14 U	1.02 U	1.09 U	1.14 U
Perfluorohexanoic Acid (PFHxA)	--	2.31 U	2.2 U	2.29 U	2.04 U	2.17 U	2.29 U
Perfluorododecanoic Acid (PFDoA)	--	2.31 U	2.2 U	2.29 U	2.04 U	2.17 U	2.29 U
Perfluorooctanoic Acid (PFOA)	130	2.31 U	2.2 U	2.29 U	2.04 U	2.17 U	2.29 U
Perfluorodecanoic Acid (PFDA)	--	1.16 U	1.1 U	1.14 U	1.02 U	1.09 U	1.14 U
Perfluorohexanesulfonic Acid (PFHxS)	--	2.31 U	2.2 U	2.29 U	2.04 U	2.17 U	2.29 U
Perfluorobutanesulfonic Acid (PFBS)	1,900	1.16 U	1.1 U	1.14 U	1.02 U	1.09 U	1.14 U
Perfluoroheptanoic Acid (PFHpA)	--	1.73 U	1.65 U	1.71 U	1.53 U	1.63 U	1.71 U
Perfluorononanoic Acid (PFNA)	--	1.16 U	1.1 U	1.14 U	1.02 U	1.09 U	1.14 U
Perfluorotetradecanoic Acid (PFTeDA)	--	2.89 U	2.75 U	2.86 U	2.55 U	2.72 U	2.86 U
Perfluorotridecanoic Acid (PFTrDA)	--	1.16 U	1.1 U	1.14 U	1.02 U	1.09 U	1.14 U

Notes:

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µg/kg - micrograms per kilogram
ng/g = µg/kg

Table D-1. Soil PFAS Analytical Data
Building 103, Hangar 110, Hangar 2835, Hangar 2805, Building 840
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	PAX PFAS SO Values	PX-H2805-SO05			PX-H2805-SO06		PX-H2805-SO07	
Sample ID		PX-H2805-SS05-000H	PX-H2805-SS05P-000H	PX-H2805-SB05-0304	PX-H2805-SS06-000H	PX-H2805-SB06-0304	PX-H2805-SS07-000H	PX-H2805-SB07-0304
Sample Date		10/20/20	10/20/20	10/20/20	10/20/20	10/20/20	10/20/20	10/20/20
Chemical Name								
Per- and Polyfluoroalkyl Substances (ng/g)								
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	2.16 U	2.31 U	2.48 U	2.04 U	2.15 U	2.14 U	2.06 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	1.08 U	1.16 U	1.24 U	1.02 U	1.08 U	1.07 U	1.03 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	1.62 U	1.73 U	1.86 U	1.53 U	1.61 U	1.6 U	1.55 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	2.16 U	2.31 U	2.48 U	2.04 U	2.15 U	2.14 U	2.06 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	2.7 U	2.89 U	3.11 U	2.55 U	2.69 U	2.67 U	2.58 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	2.16 U	2.31 U	2.48 U	2.04 U	2.15 U	2.14 U	2.06 U
Perfluorooctanesulfonic Acid (PFOS)	130	2.16 U	2.31 U	2.48 U	2.04 U	2.15 U	**1.99 J**	2.06 U
Perfluoroundecanoic Acid (PFUnA)	--	1.08 U	1.16 U	1.24 U	1.02 U	1.08 U	1.07 U	1.03 U
Perfluorohexanoic Acid (PFHxA)	--	2.16 U	2.31 U	2.48 U	2.04 U	2.15 U	2.14 U	2.06 U
Perfluorododecanoic Acid (PFDoA)	--	2.16 U	2.31 U	2.48 U	2.04 U	2.15 U	2.14 U	2.06 U
Perfluorooctanoic Acid (PFOA)	130	2.16 U	2.31 U	2.48 U	2.04 U	2.15 U	2.14 U	2.06 U
Perfluorodecanoic Acid (PFDA)	--	1.08 U	1.16 U	1.24 U	1.02 U	1.08 U	1.07 U	1.03 U
Perfluorohexanesulfonic Acid (PFHxS)	--	2.16 U	2.31 U	2.48 U	2.04 U	2.15 U	2.14 U	2.06 U
Perfluorobutanesulfonic Acid (PFBS)	1,900	1.08 U	1.16 U	1.24 U	1.02 U	1.08 U	1.07 U	1.03 U
Perfluoroheptanoic Acid (PFHpA)	--	1.62 U	1.73 U	1.86 U	1.53 U	1.61 U	1.6 U	1.55 U
Perfluorononanoic Acid (PFNA)	--	**0.63 J**	**1.2 J**	1.24 U	1.02 U	1.08 U	1.07 U	1.03 U
Perfluorotetradecanoic Acid (PFTeDA)	--	2.7 U	2.89 U	3.11 U	2.55 U	2.69 U	2.67 U	2.58 U
Perfluorotridecanoic Acid (PFTrDA)	--	1.08 U	1.16 U	1.24 U	1.02 U	1.08 U	1.07 U	1.03 U

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µg/kg - micrograms per kilogram
ng/g = µg/kg

Table D-1. Soil PFAS Analytical Data
Building 103, Hangar 110, Hangar 2835, Hangar 2805, Building 840
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	**PAX PFAS SO Values**	PX-H2835-SO01			PX-H2835-SO02		PX-H2835-SO03	
Sample ID		PX-H2835-SS01-000H	PX-H2835-SB01-0304	PX-H2835-SB01P-0304	PX-H2835-SS02-000H	PX-H2835-SB02-0304	PX-H2835-SS03-000H	PX-H2835-SB03-0304
Sample Date		09/11/20	09/11/20	09/11/20	09/11/20	09/11/20	09/11/20	09/11/20
Chemical Name								
Per- and Polyfluoroalkyl Substances (ng/g)								
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	2.38 U	2.16 U	2.65 U	2.29 U	2.38 U	2.33 U	2.22 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	1.19 U	1.08 U	1.32 U	1.14 U	1.19 U	1.16 U	1.11 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	1.79 U	1.62 U	1.99 U	1.71 U	1.79 U	1.74 U	1.67 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	2.38 U	2.16 U	2.65 U	2.29 U	2.38 U	2.33 U	2.22 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	2.98 U	2.7 U	3.31 U	2.86 U	2.98 U	2.91 U	2.78 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	2.38 U	2.16 U	2.65 U	2.29 U	2.38 U	2.33 U	2.22 U
Perfluorooctanesulfonic Acid (PFOS)	130	**1.01 J**	2.16 U	2.65 U	**1.74 J**	2.38 U	**3.53 J**	2.22 U
Perfluoroundecanoic Acid (PFUnA)	--	1.19 U	1.08 U	1.32 U	1.14 U	1.19 U	**0.69 J**	1.11 U
Perfluorohexanoic Acid (PFHxA)	--	2.38 U	2.16 U	2.65 U	2.29 U	2.38 U	2.33 U	2.22 U
Perfluorododecanoic Acid (PFDoA)	--	2.38 U	2.16 U	2.65 U	2.29 U	2.38 U	2.33 U	2.22 U
Perfluorooctanoic Acid (PFOA)	130	2.38 U	2.16 U	2.65 U	2.29 U	2.38 U	**0.97 J**	2.22 U
Perfluorodecanoic Acid (PFDA)	--	1.19 U	1.08 U	1.32 U	1.14 U	1.19 U	**0.87 J**	1.11 U
Perfluorohexanesulfonic Acid (PFHxS)	--	2.38 U	2.16 U	2.65 U	2.29 U	2.38 U	**1.36 J**	2.22 U
Perfluorobutanesulfonic Acid (PFBS)	1,900	1.19 U	1.08 U	1.32 U	1.14 U	1.19 U	1.16 U	1.11 U
Perfluoroheptanoic Acid (PFHpA)	--	1.79 U	1.62 U	1.99 U	1.71 U	1.79 U	1.74 U	1.67 U
Perfluorononanoic Acid (PFNA)	--	1.19 U	1.08 U	1.32 U	1.14 U	1.19 U	1.16 U	1.11 U
Perfluorotetradecanoic Acid (PFTeDA)	--	2.98 U	2.7 U	3.31 U	2.86 U	2.98 U	2.91 U	2.78 U
Perfluorotridecanoic Acid (PFTrDA)	--	1.19 U	1.08 U	1.32 U	1.14 U	1.19 U	1.16 U	1.11 U

Notes:

Exceeds one or more criteria

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µg/kg - micrograms per kilogram
ng/g = µg/kg

Table D-1. Soil PFAS Analytical Data
Building 103, Hangar 110, Hangar 2835, Hangar 2805, Building 840
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	**PAX PFAS SO Values**	PX-H2835-SO04	
Sample ID		PX-H2835-SS04-000H	PX-H2835-SB04-0304
Sample Date		09/11/20	09/11/20
Chemical Name			
Per- and Polyfluoroalkyl Substances (ng/g)			
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	2.5 U	2.21 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	1.25 U	1.1 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	1.88 U	1.66 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	2.5 U	2.21 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	3.13 U	2.76 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	2.5 U	2.21 U
Perfluorooctanesulfonic Acid (PFOS)	130	2.5 U	2.21 U
Perfluoroundecanoic Acid (PFUnA)	--	**6.03 J**	1.1 U
Perfluorohexanoic Acid (PFHxA)	--	**1.1 J**	2.21 U
Perfluorododecanoic Acid (PFDoA)	--	**6.89**	2.21 U
Perfluorooctanoic Acid (PFOA)	130	**2.35 J**	**0.88 J**
Perfluorodecanoic Acid (PFDA)	--	**7.89**	**1.22 J**
Perfluorohexanesulfonic Acid (PFHxS)	--	2.5 U	2.21 U
Perfluorobutanesulfonic Acid (PFBS)	1,900	1.25 U	1.1 U
Perfluoroheptanoic Acid (PFHpA)	--	**1.3 J**	**0.61 J**
Perfluorononanoic Acid (PFNA)	--	**1.37 J**	**0.86 J**
Perfluorotetradecanoic Acid (PFTeDA)	--	**1.71 J**	2.76 U
Perfluorotridecanoic Acid (PFTrDA)	--	**1.97 J**	1.1 U

Notes:

Exceeds one or more criteria

Bold indicates detections

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

U - The material was analyzed for, but not detected
ng/g - nanograms per gram
µg/kg - micrograms per kilogram
ng/g = µg/kg

Table D-2. Groundwater PFAS Analytical Data
Building 103, Hangar 110, Hangar 2835, Hangar 2805, Building 840
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	PAX PFAS GW Values	PX-B103-WT01	PX-B103-WT02		PX-B103-WT03	PX-B103-WT04	PX-B103-WT05	PX-B103-WT06	PX-B103-WT08
Sample ID		PX-B103-WT01-1020	PX-B103-WT02-1020	PX-B103-WT02P-1020	PX-B103-WT03-1020	PX-B103-WT04-1020	PX-B103-WT05-1020	PX-B103-WT06-1020	PX-B103-WT08-1020
Sample Date		10/22/20	10/22/20	10/22/20	10/22/20	10/23/20	10/23/20	10/22/20	10/23/20
Chemical Name									
Per- and Polyfluoroalkyl Substances (ng/L)									
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	0.93 U	0.96 U	0.96 U	0.96 U	0.94 UJ	0.98 U	0.96 U	0.96 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	0.93 U	0.96 U	0.96 U	0.96 U	0.94 U	0.98 U	0.96 U	0.96 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	0.46 U	0.48 U	0.48 U	0.48 U	0.47 U	0.49 U	0.48 U	0.48 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	0.93 U	**4.84**	**5.33**	**0.49 J**	0.94 U	0.98 U	0.96 U	0.96 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	**35.32**	**2.93 J**	**2.69 J**	**16.09**	0.94 U	0.98 U	**9.94**	0.96 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	0.46 U	0.48 U	0.48 U	0.48 U	0.47 UJ	0.49 U	0.48 U	0.48 U
Perfluorooctanesulfonic Acid (PFOS)	40	**30,405.99**	**1,753.24**	**2,012.72**	**6,313.46**	**12,809.16**	**8,173.38**	**4,784.10**	**5,796.36**
Perfluoroundecanoic Acid (PFUnA)	--	0.46 U	**2 J**	**2 J**	**0.47 J**	0.47 U	0.49 U	0.48 U	0.48 U
Perfluorohexanoic Acid (PFHxA)	--	**473.29**	**87.77**	**83.13**	**885.78**	**93.85 J**	**29.11**	**352.11**	**47.66**
Perfluorododecanoic Acid (PFDoA)	--	0.46 U	0.48 U	0.48 U	0.48 U	0.47 U	0.49 U	0.48 U	0.48 U
Perfluorooctanoic Acid (PFOA)	40	**516.09**	**99.45**	**98.36**	**1,379.76**	**34.94 J**	**43.39**	**419.99**	**42.85**
Perfluorodecanoic Acid (PFDA)	--	**70.35**	**6.09**	**5.63**	**23.56**	**3.81 J**	**1.46 J**	**16.15**	**5.78**
Perfluorohexanesulfonic Acid (PFHxS)	--	**3,067.11**	**276.26**	**278.92**	**4,724.39**	**775.96**	**165.14**	**1,374.31**	**358.17**
Perfluorobutanesulfonic Acid (PFBS)	600	**125.98**	**20.54**	**21.53**	**159.09**	**23.47**	**11.98**	**64.73**	**7.59**
Perfluoroheptanoic Acid (PFHpA)	--	**268.03**	**36.39**	**33.14**	**601.78**	**52.17 J**	**10.33**	**178.83**	**23.3 J**
Perfluorononanoic Acid (PFNA)	--	**169.81**	**15.41**	**13.7**	**149.75**	**120.01**	**141.85**	**61.64**	**95.1**
Perfluorotetradecanoic Acid (PFTeDA)	--	1.85 U	1.92 U	1.92 U	1.92 U	1.89 U	1.96 U	1.92 U	1.92 U
Perfluorotridecanoic Acid (PFTrDA)	--	0.46 U	0.48 U	0.48 U	0.48 U	0.47 U	0.49 U	0.48 U	0.48 U

Notes:

Exceeds one or more criteria

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ng/L - nanograms per liter

Table D-2. Groundwater PFAS Analytical Data
Building 103, Hangar 110, Hangar 2835, Hangar 2805, Building 840
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	**PAX PFAS GW Values**	PX-B840-WT01	PX-B840-WT02		PX-B840-WT03	PX-B840-WT04	PX-H110-WT01	PX-H110-WT02	
Sample ID		PX-B840-WT01-1020	PX-B840-WT02-1020	PX-B840-WT02P-1020	PX-B840-WT03-1020	PX-B840-WT04-1020	PX-H110-WT01-1020	PX-H110-WT02-1020	PX-H110-WT02P-1020
Sample Date		10/21/20	10/21/20	10/21/20	10/21/20	10/21/20	10/24/20	10/24/20	10/24/20
Chemical Name									
Per- and Polyfluoroalkyl Substances (ng/L)									
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	0.96 U	0.94 U	0.93 U	0.98 U	0.93 U	0.98 U	0.98 U	1 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	0.96 U	0.94 U	0.93 U	0.98 U	0.93 U	0.98 U	0.98 U	1 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	0.48 U	0.47 U	0.46 U	0.49 U	0.46 U	0.49 U	0.49 U	0.5 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	0.96 U	0.94 U	0.93 U	0.98 U	0.93 U	0.98 U	0.98 U	**0.99 J**
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	0.96 U	0.94 U	0.93 U	0.98 U	0.93 U	0.98 U	0.98 U	1 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	0.48 U	0.47 U	0.46 U	**0.35 J**	0.46 U	0.49 U	0.49 U	0.5 U
Perfluorooctanesulfonic Acid (PFOS)	40	**9,620.95**	**5**	**5.74**	**10,655.80**	**36.21**	**111.14**	**173.91**	**164.9**
Perfluoroundecanoic Acid (PFUnA)	--	0.48 U	0.47 U	0.46 U	0.49 U	0.46 U	0.49 U	0.49 UJ	0.5 U
Perfluorohexanoic Acid (PFHxA)	--	**229.4**	**1.96 J**	**1.82 J**	**690.05**	**6.89**	**7.94 J**	**159.71**	**150.13**
Perfluorododecanoic Acid (PFDoA)	--	0.48 U	0.47 U	0.46 U	0.49 U	0.46 U	0.49 U	0.49 UJ	0.5 U
Perfluorooctanoic Acid (PFOA)	40	**79.98**	**1.84 J**	**1.79 J**	**99.66**	**9.12**	**3.63 J**	**53.55 J**	**54.41**
Perfluorodecanoic Acid (PFDA)	--	**0.38 J**	0.47 U	0.46 U	0.49 U	0.46 U	**11.23**	**1.68 J**	**1.83 J**
Perfluorohexanesulfonic Acid (PFHxS)	--	**3,533.65**	**10.4**	**10.88**	**7,441.08**	**34.19**	**3.72 J**	**58.14**	**63.7**
Perfluorobutanesulfonic Acid (PFBS)	600	**17.48**	**1.94 J**	**2.05 J**	**265.29**	**3.36 J**	**1.87 J**	**12.96**	**12.6**
Perfluoroheptanoic Acid (PFHpA)	--	**135.41**	**0.44 J**	**0.51 J**	**40.03**	**1.28 J**	**3.02 J**	**48.47 J**	**51.15 J**
Perfluorononanoic Acid (PFNA)	--	**43.5 J**	0.94 U	0.93 U	**1.92 J**	0.93 U	**5.94**	**4.47 J**	**4.09 J**
Perfluorotetradecanoic Acid (PFTeDA)	--	1.92 U	1.89 U	1.85 U	1.96 UJ	1.85 UJ	1.96 UJ	1.96 UJ	2 UJ
Perfluorotridecanoic Acid (PFTrDA)	--	0.48 U	0.47 U	0.46 U	0.49 U	0.46 U	0.49 U	0.49 U	0.5 U

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Table D-2. Groundwater PFAS Analytical Data
Building 103, Hangar 110, Hangar 2835, Hangar 2805, Building 840
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	**PAX PFAS GW Values**	PX-H110-WT03	PX-H110-WT04	PX-H110-WT05	PX-H2805-WT01	PX-H2805-WT02		PX-H2805-WT03	PX-H2805-WT04
Sample ID		PX-H110-WT03-1020	PX-H110-WT04-1020	PX-H110-WT05-1020	PX-H2805-WT01-1020	PX-H2805-WT02-1020	PX-H2805-WT02P-1020	PX-H2805-WT03-1020	PX-H2805-WT04-1020
Sample Date		10/24/20	10/24/20	10/23/20	10/20/20	10/20/20	10/20/20	10/20/20	10/20/20
Chemical Name									
Per- and Polyfluoroalkyl Substances (ng/L)									
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	1 U	1 U	0.98 U	1 U	0.98 U	0.98 U	0.98 U	0.94 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	1 U	**0.27 J**	0.98 U	1 U	0.98 U	0.98 U	0.98 U	0.94 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	0.5 U	**0.37 J**	0.49 U	0.5 U	0.49 U	0.49 U	0.49 U	0.47 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	1 U	1 U	0.98 U	1 U	0.98 U	0.98 U	0.98 U	0.94 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	1 U	1 U	0.98 U	1 U	0.98 U	0.98 U	0.98 U	0.94 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	0.5 U	0.5 UJ	0.49 U	0.5 U	0.49 U	0.49 U	0.49 U	0.47 U
Perfluorooctanesulfonic Acid (PFOS)	40	**175.58**	**22.14**	**52.52**	**8.22**	**16.13**	**16.06**	**20.01**	**10.57**
Perfluoroundecanoic Acid (PFUnA)	--	0.5 UJ	0.5 U	0.49 U	0.5 U	0.49 U	0.49 U	0.49 U	0.47 U
Perfluorohexanoic Acid (PFHxA)	--	**19.68 J**	**2.77 J**	**16.39 J**	**64.59**	**15.49**	**14.53**	**131.54 J**	**20.53**
Perfluorododecanoic Acid (PFDoA)	--	0.5 UJ	0.5 UJ	0.49 UJ	0.5 U	0.49 U	0.49 U	0.49 U	0.47 U
Perfluorooctanoic Acid (PFOA)	40	**6.54 J**	**0.91 J**	**15.64**	**130.92**	**27.46**	**30.69**	**52.37**	**23.06**
Perfluorodecanoic Acid (PFDA)	--	**4.07 J**	**1.09 J**	0.49 U	0.5 U	0.49 U	0.49 U	0.49 U	**1.03 J**
Perfluorohexanesulfonic Acid (PFHxS)	--	**43.75**	**0.85 J**	**53.34**	**61.45**	**61.28**	**66.19**	**24.06**	**15.74**
Perfluorobutanesulfonic Acid (PFBS)	600	**7.54**	**1.16 J**	**4.98**	**7.09**	**6.46**	**6.03**	**78.67 J**	**2.73 J**
Perfluoroheptanoic Acid (PFHpA)	--	**12.83 J**	**1.13 J**	**6.02 J**	**39.45**	**7.72**	**7.71**	**44.77**	**18.02**
Perfluorononanoic Acid (PFNA)	--	**4.95 J**	**0.45 J**	**0.92 J**	**1.53 J**	**1.01 J**	**0.99 J**	**2.12 J**	**4.63 J**
Perfluorotetradecanoic Acid (PFTeDA)	--	2 UJ	2 UJ	1.96 UJ	2 U	1.96 U	1.96 UJ	1.96 UJ	1.89 U
Perfluorotridecanoic Acid (PFTrDA)	--	0.5 U	0.5 U	0.49 U	0.5 U	0.49 U	0.49 U	0.49 U	0.47 U

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Table D-2. Groundwater PFAS Analytical Data
Building 103, Hangar 110, Hangar 2835, Hangar 2805, Building 840
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	PAX PFAS GW Values	PX-H2805-WT05	PX-H2805-WT06	PX-H2805-WT07	PX-H2835-WT01	PX-H2835-WT02		PX-H2835-WT03	PX-H2835-WT04
Sample ID		PX-H2805-WT05-1020	PX-H2805-WT06-1020	PX-H2805-WT07-1020	PX-H2835-WT01-0920	PX-H2835-WT02-0920	PX-H2835-WT02P-0920	PX-H2835-WT03-0920	PX-H2835-WT04-0920
Sample Date		10/20/20	10/20/20	10/20/20	09/11/20	09/11/20	09/11/20	09/11/20	09/11/20
Chemical Name									
Per- and Polyfluoroalkyl Substances (ng/L)									
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	0.96 U	0.98 U	0.96 U	0.91 U	0.91 U	0.91 U	0.93 U	0.91 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	0.96 U	0.98 U	0.96 U	0.91 U	0.91 U	0.91 U	0.93 U	0.91 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	0.48 U	0.49 U	0.48 U	0.45 U	0.45 U	0.45 U	0.46 U	0.45 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	0.96 U	0.98 U	0.96 U	0.91 U	0.91 U	0.91 U	0.93 U	0.91 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	0.96 U	0.98 U	0.96 U	0.91 U	0.91 U	0.91 U	0.93 U	0.91 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	0.48 U	0.49 U	0.48 U	0.45 U	0.45 U	0.45 U	0.46 U	0.45 UJ
Perfluorooctanesulfonic Acid (PFOS)	40	**10.07**	**15.39**	**18.4**	**4.45 J**	**17.09**	**16.26**	**57.44**	**98.55**
Perfluoroundecanoic Acid (PFUnA)	--	0.48 U	0.49 U	0.51 U	0.45 U	**0.76 J**	**0.7 J**	**0.2 J**	**1.48 J**
Perfluorohexanoic Acid (PFHxA)	--	**561.83**	**31.13**	**8.81**	**1.02 J**	**38.47 J**	**39.97 J**	**314.34**	**183.45**
Perfluorododecanoic Acid (PFDoA)	--	0.48 U	0.49 U	0.48 U	0.45 U	0.45 U	0.45 U	0.46 U	0.45 U
Perfluorooctanoic Acid (PFOA)	40	**49.43**	**37.84**	**18.36**	**1.82 J**	**37.71**	**34.35**	**451.26**	**200.84**
Perfluorodecanoic Acid (PFDA)	--	**1.99 J**	**1.98 J**	**0.82 J**	0.45 U	**6.91**	**6.51**	**49.64**	**55.6**
Perfluorohexanesulfonic Acid (PFHxS)	--	**5.02**	**24.21**	**9.43**	**14.75**	**8.18**	**8.29**	**178.03**	**21.75**
Perfluorobutanesulfonic Acid (PFBS)	600	**4.71 J**	**1.99 J**	**1.53 J**	**1.17 J**	**5.52**	**5.24**	**3.33 J**	**5.44**
Perfluoroheptanoic Acid (PFHpA)	--	**148.06**	**23.06**	**6.39**	**0.48 J**	**53.61 J**	**54.57**	**469.87**	**361.88**
Perfluorononanoic Acid (PFNA)	--	**8.99**	**6.45**	**2.35 J**	0.91 U	**15.11**	**16.11**	**254.06**	**196.47**
Perfluorotetradecanoic Acid (PFTeDA)	--	1.92 U	1.96 U	1.92 U	1.82 U	1.82 U	1.82 U	1.85 U	1.82 U
Perfluorotridecanoic Acid (PFTrDA)	--	0.48 U	0.49 U	0.48 U	0.45 U	0.45 U	0.45 U	0.46 U	0.45 U

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Table D-2. Groundwater PFAS Analytical Data
Building 103, Hangar 110, Hangar 2835, Hangar 2805, Building 840
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	**PAX PFAS GW Values**	PX-H2835-WT05	PX-H2835-WT06
Sample ID		PX-H2835-WT05-0920	PX-H2835-WT06-0920
Sample Date		09/11/20	09/11/20
Chemical Name			
Per- and Polyfluoroalkyl Substances (ng/L)			
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	0.93 U	0.93 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	0.93 U	0.93 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	0.46 U	0.46 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	0.93 U	0.93 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	0.93 U	0.93 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	0.46 U	0.46 U
Perfluorooctanesulfonic Acid (PFOS)	40	**2 J**	**3.92 J**
Perfluoroundecanoic Acid (PFUnA)	--	0.46 U	0.46 U
Perfluorohexanoic Acid (PFHxA)	--	**1.04 J**	**16.11 J**
Perfluorododecanoic Acid (PFDoA)	--	0.46 U	0.46 U
Perfluorooctanoic Acid (PFOA)	40	**0.86 J**	**8.73**
Perfluorodecanoic Acid (PFDA)	--	0.46 U	**0.42 J**
Perfluorohexanesulfonic Acid (PFHxS)	--	**3.49 J**	**8.45**
Perfluorobutanesulfonic Acid (PFBS)	600	**0.74 J**	**3.83 J**
Perfluoroheptanoic Acid (PFHpA)	--	**0.29 J**	**13.44**
Perfluorononanoic Acid (PFNA)	--	0.93 U	**3.89 J**
Perfluorotetradecanoic Acid (PFTeDA)	--	1.85 UJ	1.85 U
Perfluorotridecanoic Acid (PFTrDA)	--	0.46 U	0.46 U

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Table D-3. Surface Water PFAS Analytical Data
Hangar 110
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	PAX PFAS SW Values	PX-H110-SDSW01	
Sample ID		PX-H110-SW01-1020	PX-H110-SW01P-1020
Sample Date		10/24/20	10/24/20
Chemical Name			
Per- and Polyfluoroalkyl Substances (ng/L)			
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	0.98 U	1 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	0.98 U	1 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	0.49 U	0.5 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	0.98 U	1 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	0.98 U	1 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	0.49 U	0.5 U
Perfluorooctanesulfonic Acid (PFOS)	400	**2.61 J**	**4.23 J**
Perfluoroundecanoic Acid (PFUnA)	--	0.49 U	0.5 U
Perfluorohexanoic Acid (PFHxA)	--	**4.04 J**	**4.6 J**
Perfluorododecanoic Acid (PFDoA)	--	0.49 U	0.5 U
Perfluorooctanoic Acid (PFOA)	400	**2.17 J**	**3.07 J**
Perfluorodecanoic Acid (PFDA)	--	0.49 U	0.5 U
Perfluorohexanesulfonic Acid (PFHxS)	--	**2.04 J**	**4.68 J**
Perfluorobutanesulfonic Acid (PFBS)	6,000	**1.15 J**	**1.27 J**
Perfluoroheptanoic Acid (PFHpA)	--	**1.35 J**	**1.81 J**
Perfluorononanoic Acid (PFNA)	--	0.98 U	1 U
Perfluorotetradecanoic Acid (PFTeDA)	--	1.96 UJ	2 UJ
Perfluorotridecanoic Acid (PFTrDA)	--	0.49 U	0.5 U

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Table D-4. Sediment PFAS Analytical Data
Hangar 110
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	**PAX PFAS SD Values**	PX-H110-SDSW01		PX-H110-SDSW02
Sample ID		PX-H110-SD01-000H	PX-H110-SD01P-000H	PX-H110-SD02-000H
Sample Date		10/24/20	10/24/20	10/23/20
Chemical Name				
Per- and Polyfluoroalkyl Substances (ng/g)				
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	2.37 U	2.44 U	2.23 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	1.18 U	1.22 U	1.12 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	1.78 U	1.83 U	1.68 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	2.37 U	2.44 U	2.23 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	2.96 U	3.05 U	2.79 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	2.37 U	2.44 U	2.23 U
Perfluorooctanesulfonic Acid (PFOS)	1,300	2.37 U	2.44 U	2.23 U
Perfluoroundecanoic Acid (PFUnA)	--	1.18 U	1.22 U	1.12 U
Perfluorohexanoic Acid (PFHxA)	--	2.37 U	2.44 U	2.23 U
Perfluorododecanoic Acid (PFDoA)	--	2.37 U	2.44 U	2.23 U
Perfluorooctanoic Acid (PFOA)	1,300	2.37 U	2.44 U	2.23 U
Perfluorodecanoic Acid (PFDA)	--	1.18 U	1.22 U	1.12 U
Perfluorohexanesulfonic Acid (PFHxS)	--	2.37 U	2.44 U	2.23 U
Perfluorobutanesulfonic Acid (PFBS)	19,000	1.18 U	1.22 U	1.12 U
Perfluoroheptanoic Acid (PFHpA)	--	1.78 U	1.83 U	1.68 U
Perfluorononanoic Acid (PFNA)	--	1.18 U	1.22 U	1.12 U
Perfluorotetradecanoic Acid (PFTeDA)	--	2.96 U	3.05 U	2.79 U
Perfluorotridecanoic Acid (PFTrDA)	--	1.18 U	1.22 U	1.12 U

Notes:

Exceeds one or more criteria

Bold indicates detections

U - The material was analyzed for, but not detected

ng/g - nanograms per gram

µg/kg - micrograms per kilogram

ng/g = µg/kg

Appendix E
2020 Drinking Water Consumer Confidence Report

2020 Drinking Water Consumer Confidence Report

Naval Air Station Patuxent River, Maryland

Public Water System Identification (PWSID) MD0180022

Este informe contiene información muy importante sobre el agua que usted bebe. Tradúzcalo ó hable con alguien que lo entienda bien.

Naval Air Station Patuxent River (NASPR) is pleased to present this year's Annual Water Quality Report (Consumer Confidence Report) as required by the Safe Drinking Water Act (SDWA). This report is designed to provide details about where your water comes from, what it contains, and how it compares to standards set by regulatory agencies. This report is a snapshot of last year's water quality. We are committed to providing you with information because informed customers are our best allies. Last year, as in years past, your tap water met all U.S. Environmental Protection Agency (EPA) and state drinking water health standards. The Naval Air Station Patuxent River (NASPR) vigilantly safeguards its water supplies and once again we are proud to report that our system has not violated a maximum contaminant level (MCL) or any other water quality standard.

Throughout the report, BLUE text reflects required information by the EPA or Maryland Department of the Environment (MDE).

Where does my water come from?

The NASPR water that is being delivered to you is pumped from the Piney Point-Nanjemoy, Patapsco, and Aquia Aquifers, which are groundwater sources in St. Mary's County, Maryland. The recharge zone for these aquifers is a broad area approximately 25-75 miles north and northeast from our source. Your water is treated by chlorination, accomplished by injecting chlorine into the water supply. Chlorine kills bacteria and other microbes and prevents the spread of waterborne diseases. The water is chlorinated to ensure it is delivered safely to your building or residence.

Source Water

MDE's Water Supply Program has conducted a Source Water Assessment (SWA) for NASPR. The susceptibility analysis of this report is based on a review of the existing water quality data for each water system, the presence of potential sources of contamination in the individual assessment areas, well integrity, and aquifer characteristics. It was determined that the NASPR water supply is not susceptible to contaminants originating at the land surface due to the protected nature of the confined aquifers. The wells pumping from the Aquia aquifer are susceptible to naturally occurring arsenic. The susceptibility of the water to radon-222, a naturally occurring element, will depend on the final MCL that is adopted for this contaminant. Due to security risks, distribution and access to the SWA is restricted. For further information, you may contact the MDE Water Supply Program at (410) 537-3702.

Why are there contaminants in my drinking water?

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline at (800) 426-4791. The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Microbial contaminants: such as viruses and bacteria, that may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.

Inorganic contaminants: such as salts and metals, which can be naturally occurring or result from urban storm water runoff, industrial, or domestic wastewater discharges, oil and gas production, mining, or farming.

Pesticides and herbicides: which may come from a variety of sources such as agriculture, urban storm water runoff, and residential uses.

Organic chemical contaminants: including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff, and septic systems.

Radioactive contaminants: which can be naturally occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, the EPA prescribes regulations that limit the amount of certain contaminants in water provided by public water systems. The Food and Drug Administration (FDA) regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

Important Health Information

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. The EPA and Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Water Drinking Hotline (800-426-4791).

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. NASPR is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead.

While your drinking water meets EPA standards for arsenic, it does contain low levels of arsenic. EPA's standard balances the current understanding of arsenic's possible health effects against the costs of removing arsenic from drinking water. EPA continues to research the health effects of low levels of arsenic, which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects such as skin damage and circulatory problems.

Water Quality Data

In order to ensure that tap water is safe to drink, the EPA prescribes regulations which limit the amount of contaminants in water provided by public water systems. The table below lists all of the drinking water contaminants that we detected during the calendar year of this report. Although many more contaminants were tested, only those substances listed below were found in your water. All sources of drinking water contain some naturally occurring contaminants. At low levels, these substances are generally not harmful in our drinking water. Removing all contaminants would be extremely expensive, and in most cases, would not provide increased protection of public health. A few naturally occurring minerals may actually improve the taste of drinking water and have nutritional value at low levels. Unless otherwise noted, the data presented in this table is from testing done in the calendar year of the report. The EPA or the State requires us to monitor for certain contaminants less than once per year because the concentrations of these contaminants do not vary significantly from year to year, or the system is not considered vulnerable to this type of contamination. As such, some of our data, though representative, may be more than one year old. In this table, you will find terms and abbreviations that might not be familiar to you. To help you better understand these terms, we have provided the definitions below.

Definitions

Term	Definition
ppm	milligrams per liter or parts per million - or one ounce in 7,350 gallons of water
ppb	micrograms per liter or parts per billion - or one ounce in 7,350,000 gallons of water
pCi/L	Picocuries per liter (a measure of radioactivity)
NA	Not applicable
mrem	Millirems per year(a measure of radiation absorption by the body)
MCLG	Maximum Contaminant Level Goal: The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
MCL	Maximum Contaminant Level: The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
TT	Treatment Technique: A required process intended to reduce the level of a contaminant in drinking water.
AL	Action Level: The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.
MRDLG	Maximum Residual Disinfection Level Goal. The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
MRDL	Maximum Residual Disinfectant Level. The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
Average	Regulatory compliance with some MCLs are based on running annual average of monthly samples.
Level 1 Assessment	A Level 1 assessment is a study of the water system to identify potential problems and determine (if possible) why total coliform bacteria have been found in our water system
Level 2 Assessment	A Level 2 assessment is a very detailed study of the water system to identify potential problems and determine (if possible) why an E. coli MCL violation occurred and/or why total coliform bacteria have been found in our water system on multiple occasions.
LOD	Limit of Detection: Lowest quantity or concentration of a component that can be reliably detected with a given analytical method.

2020 Water Quality Data

Contaminants	MCLG or MRDLG	MCL, TT, or MRDL	Highest Level Detected	Range		Sample Date	Violation	Typical Source
				Low	High			
Disinfectants & Disinfection By-Products								
(There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants)								
Chlorine (as Cl2) (ppm)	4	4	0.8	0.7	0.8	2020	No	Water additive used to control microbes.
Haloacetic Acids (HAA5) (ppb)	NA	60	1	0	3.7	2020	No	By-product of drinking water disinfection.
TTHMs [Total Trihalomethanes] (ppb)	NA	80	3	0	9.4	2020	No	By-product of drinking water disinfection.
Inorganic Contaminants								
Arsenic (ppb)	0	10	8	0	9	2020	No	Erosion of natural deposits; Runoff from orchards; Runoff from glass and electronics production wastes.

Contaminants	MCLG or MRDLG	MCL, TT, or MRDL	Highest Level Detected	Range		Sample Date	Violation	Typical Source
				Low	High			
Fluoride (ppm)	4	4	0.63	0.45	0.63	2020	No	Erosion of natural deposits; Water additive which promotes strong teeth; Discharge from fertilizer and aluminum factories.
Barium (ppm)	2	2	0.006	0	0.006	2020	No	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits.

Contaminants	MCLG	AL	90th Percentile	Sample Date	# Samples Exceeding AL	Exceeds AL	Typical Source
Inorganic Contaminants							
Copper - action level at consumer taps (mg/L)	1.3	1.3	0.07 mg/L	2019	0	No	Corrosion of household plumbing systems; Erosion of natural deposits; Leaching from wood preservatives.
Lead – action level at consumer taps (mg/L)	0	.015	0.002	2019	0	No	Corrosion of household plumbing systems; erosion of natural deposits.

What are per- and polyfluoroalkyl substances and where do they come from?

Per- and polyfluoroalkyl substances (PFAS) are a group of thousands of man-made chemicals. PFAS have been used in a variety of industries and consumer products around the globe, including in the United States, since the 1940s. PFAS have been used to make coatings and products that are used as oil and water repellents for carpets, clothing, paper packaging for food, and cookware. They are also contained in some foams (aqueous film-forming foam or AFFF) used for fighting petroleum fires at airfields and in industrial fire suppression processes because they rapidly extinguish fires, saving lives and protecting property. PFAS chemicals are persistent in the environment and some are persistent in the human body – meaning they do not break down and they can accumulate over time.

Is there a regulation for PFAS in drinking water?

There is currently no established federal water quality regulation for PFAS compounds. In May 2016, the EPA established a health advisory (HA) level at 70 parts per trillion (ppt) for individual or combined concentrations of perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS). Both chemicals are types of PFAS. Out of an abundance of caution for your safety, the Department of Defense's (DoD) PFAS testing and response actions go beyond the EPA's Safe Drinking Water Act requirements. In 2020 the DoD promulgated a policy to monitor drinking water for PFAS at all service owned and operated water systems at a minimum of every three years. The EPA's health advisory states that if water sampling results confirm that drinking water contains PFOA and PFOS at individual or combined concentrations greater than 70 ppt, water systems should quickly undertake additional sampling to assess the level, scope, and localized source of contamination to inform next steps.

Has NASPR tested its water for PFAS?

Yes. In December 2020 drinking water samples were collected from NASPR. Results were below Limit of Detection (LOD). We are pleased to report that drinking water testing results were below the MRL for all 18 PFAS compounds covered by the sampling method, including PFOA and PFOS. This means that PFAS were not detected in your water system. In accordance with DoD policy, the water system will be resampled every three years for your continued protection. https://www.cnic.navy.mil/om/base_support/environmental/water_quality/Testing_for_Perfluorochemicals.html.

Water Conservation Tips

Did you know that the average U.S. household uses approximately 400 gallons of water per day or 100 gallons per person per day? Luckily, there are many low-cost and no-cost ways to conserve water. Small changes can make a big difference - try one today and soon it will become second nature.

- Take short showers - a 5-minute shower uses 4 to 5 gallons of water compared to up to 50 gallons for a bath.
- Shut off water while brushing your teeth, washing your hair, and shaving to save up to 500 gallons a month.
- Use a water-efficient showerhead. They're inexpensive, easy to install, and can save you up to 750 gallons a month.
- Run your clothes washer and dishwasher only when they are full. You can save up to 1,000 gallons a month.
- Water plants only when necessary.
- Fix leaky toilets and faucets. Faucet washers are inexpensive and take only a few minutes to replace. To check your toilet for a leak, place a few drops of food coloring in the tank and wait. If it seeps into the toilet bowl without flushing, you have a leak. Fixing it or replacing it with a new, more efficient model can save up to 1,000 gallons a month.
- Adjust sprinklers so only your lawn is watered. Apply water only as fast as the soil can absorb it and during the cooler parts of the day to reduce evaporation.
- Teach your kids about water conservation to ensure a future generation that uses water wisely. Make it a family effort to reduce next month's water bill!
- Visit www.epa.gov/watersense for more information.

Source Water Protection Tips

Protection of drinking water is everyone's responsibility. You can help protect your community's drinking water source in several ways:

- Eliminate excess use of lawn and garden fertilizers and pesticides - they contain hazardous chemicals that can reach your drinking water source.
- Pick up after your pets.
- If you have your own septic system, properly maintain your system to reduce leaching to water sources or consider connecting to a public water system.
- Dispose of chemicals properly; take used motor oil to a recycling center.
- Volunteer in your community. Find a watershed or wellhead protection organization in your community and volunteer to help. If there are no active groups, consider starting one. Use the EPA's Adopt Your Watershed to locate groups in your community, or visit the Watershed Information Network's How to Start a Watershed Team.
- Organize a storm drain-stenciling project with your local government or water supplier. Stencil a message next to the street drain reminding people to "Dump No Waste - Drains to River" or "Protect Your Water." Produce and distribute a flyer for households to remind residents that storm drains dump directly into your local water body.

How can I get involved?

The NASPR works diligently to provide top quality drinking water to every tap. As residents, employees, and caretakers here, please help us protect our water sources. We welcome your suggestions to help maintain our high quality level of drinking water as well as to conserve water throughout the Station.

If you have questions or concerns please call or email the Naval Facilities Engineering Command, Public Works Department, Environmental Division Direction:

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