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

Final

Basewide Site Inspection Report
Per- and Polyfluoroalkyl Substances
Building 2385 – Hazardous Materials Storage Facility
Building 102 – Marine Aviation Detachment
Building 1669 – "Hush House" – Aircraft Engine Test Cell

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

September 2021

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

Final

Basewide Site Inspection Report
Per- and Polyfluoroalkyl Substances
Building 2385 – Hazardous Materials Storage Facility
Building 102 – Marine Aviation Detachment
Building 1669 – "Hush House" – Aircraft Engine Test Cell

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

September 2021

Prepared for NAVFAC Washington
by CH2M HILL, Inc.
Herndon, Virginia
Contract N62470-16-D-9000
CTO 4256

Executive Summary

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

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

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

Historical research and interviews with fire department and installation personnel completed for the Preliminary Assessment (PA) report for PFAS at NAS Patuxent River (CH2M, 2018) identified 16 areas of interest (AOIs) at the installation requiring additional investigation for PFAS. This PFAS SI report is focused on three of these AOIs: Building 2385 – Hazardous Materials Storage Facility (Building 2385), which is located within Environmental Restoration (ER) Program Site 9; Building 102 – Marine Aviation Detachment (Building 102); and Building 1669 – "Hush House" – Aircraft Engine Test Cell (Building 1669). Based on the PA and subsequent SAP, the field investigation for the SI at these three AOIs was conducted in July 2020. This effort consisted of the installation of shallow temporary piezometers and co-located soil borings at locations where AFFF may have been used or released, collection of soil (surface and subsurface) and groundwater samples to determine whether PFAS releases occurred, and collection of depth to water measurements at the newly installed temporary piezometers and existing monitoring wells to estimate the direction of groundwater flow in the surficial aquifer. The field investigation for the SI was performed in general accordance with the SAP (CH2M, 2020).

Laboratory analysis of soil samples collected at Building 2385 indicated that perfluorooctanoic acid (PFOA) and/or perfluorooctanesulfonic acid (PFOS) were present in samples from two soil borings. PFOA was detected at one surface soil sample location but no subsurface soil sample locations, although the lone detected PFOA concentration did not exceed the corresponding PAL. PFOS was detected at two surface soil sample locations and one subsurface soil sample location, with all three detected PFOS concentrations exceeding the corresponding PAL. Perfluorobutanesulfonic acid (PFBS) was not detected in soil samples at Building 2385. Laboratory analysis of groundwater samples collected at Building 2385 indicated that PFOA, PFOS, and PFBS were each present in samples from seven monitoring wells, with detected PFOA concentrations exceeding the corresponding PAL at one groundwater sample location and detected PFOS concentrations exceeding the corresponding PAL at five groundwater sample locations. None of the detected PFBS concentrations exceeded the corresponding PAL at Building 2385.

Laboratory analysis of soil samples collected at Building 102 indicated that PFOA and/or PFOS were present in samples from four soil borings. PFOA was detected at two surface soil sample locations but no subsurface soil sample locations. PFOS was detected at four surface soil sample locations and one subsurface soil sample location. None of the detected PFOA and PFOS concentrations exceeded the corresponding PALs. PFBS was not

---

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

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

detected in soil samples at Building 102. Laboratory analysis of grab groundwater samples collected at Building 102 indicated that PFOA, PFOS, and PFBS were each present in samples from six temporary piezometers, with detected PFOA concentrations exceeding the corresponding PAL at three grab groundwater sample locations and detected PFOS concentrations exceeding the corresponding PAL at five grab groundwater sample locations. None of the detected PFBS concentrations exceeded the corresponding PAL at Building 102.

Laboratory analysis of soil samples collected at Building 1669 indicated that PFOA, PFOS, and PFBS were not detected in soil at the site. Laboratory analysis of grab groundwater samples collected at Building 1669 indicated that PFOA, PFOS, and PFBS were each present in samples from seven 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 one grab groundwater sample location. None of the detected PFBS concentrations exceeded the corresponding PAL at Building 1669.

Groundwater flow is predominantly to the south-southeast at Building 2385 in the direction of Supply Pond and Supply Stream, to the north-northwest at Building 102 in the direction of the Patuxent River with radial flow components to the southwest and north-northeast, and to the northeast at Building 1669 in the direction of the Chesapeake Bay. 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 three identified AOIs where AFFF was reportedly released. It is recommended that Remedial Investigations (RIs) are conducted at Building 2385, Building 102, and Building 1669 to fully delineate the nature and extent of PFAS releases and assess potential human health and ecological risks. The RIs should include the collection and analysis of representative environmental media at each AOI, including the installation and sampling of permanent monitoring wells. Based on the resulting data, conceptual site models should be developed, including discussions of the fate and transport of PFAS at the AOIs. Further, quantitative human health risk assessments should be performed to evaluate risks to human health associated with potential exposure to PFAS detected in environmental media at the AOIs, and an ecological risk screening should be performed. Potential risks associated with PFAS should be evaluated within the applicable DoD, Navy, and/or USEPA policy, guidance, or directives using the state-of-the-science toxicological information available and current at the time the RI report is prepared.

Contents

Appendixes

Tables

Figures

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 102	Building 102 – Marine Aviation Detachment
Building 1669	Building 1669 – "Hush House" – Aircraft Engine Test Cell
Building 2385	Building 2385 – Hazardous Materials Storage Facility
CH2M	CH2M HILL, Inc.
CSM	conceptual site model
DoD	Department of Defense
DPT	direct-push technology
ER	Environmental Restoration
ERS	ecological risk screening
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
MILSPEC	Military Specification
mS/cm	millisiemen(s) per centimeter
msl	mean sea level
mV	millivolt(s)
NAS	Naval Air Station
NAVFAC	Naval Facilities Engineering Systems Command
Navy	Department of the Navy
ng/L	nanogram(s) per liter
NTU	nephelometric turbidity unit(s)
ORP	oxidation-reduction potential
PA	Preliminary Assessment
PAL	project action limit
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
QSM	Quality Systems Manual
RI	Remedial Investigation
SAP	Sampling and Analysis Plan

SI	Site Inspection
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]

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

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

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

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

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

- **Appendix A** – Survey Data
- **Appendix B** – Investigation-Derived Waste Analytical Data, Waste Profiles, and Disposal Manifests
- **Appendix C** – Data Quality Assessment
- **Appendix D** – Laboratory Analytical Data

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

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

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 three of these AOIs (**Figure 2-2**): Building 2385 – Hazardous Materials Storage Facility, which is located within Environmental Restoration (ER) Program Site 9; Building 102 – Marine Aviation Detachment; and Building 1669 – "Hush House" – Aircraft Engine Test Cell. 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 2385 Background

Building 2385 (within ER Program Site 9) is located in the northwestern portion of the installation, near the West Patuxent River basin (**Figures 2-2** and **2-3**). It is a building where hazardous materials, including AFFF concentrate, are received and stored. It is equipped with a 600-gallon-capacity AFFF fire-suppression system because flammable materials may be stored in the building. The system is charged with 3M 3 percent AFFF concentrate and was installed in 1996. Floor grates within the building and the AFFF system room lead to an open-topped, concrete holding structure in the northeastern corner of the building to capture any spills (CH2M, 2018).

Several known releases have occurred at this building. A release of approximately 50 gallons of AFFF concentrate occurred in May 2013 near the test connection valves (on the exterior of the building). This release occurred in the front of the building and travelled through the parking lot and infiltrated into the ground through surrounding stormwater ditches and drains heading downhill toward ER Program Site 9. In March 2016, an inadvertent release of approximately 10 gallons occurred because of mechanical failure. This release occurred within the AFFF system storage room itself, and all the AFFF concentrate drained into the floor drain and was conveyed to the concrete holding structure. Occasional releases during routine system testing and maintenance also have occurred, although the number of incidents is unknown; the volumes released are estimated to be minimal. These releases reportedly were confined to the area of cobbles beneath the test connection valves. The total amount of AFFF concentrate released during these incidents is estimated to be less than 80 gallons (CH2M, 2018).

While Building 2385 stores many different types of materials, the pertinent material to this investigation is AFFF. The building is known to store approximately 4,100 gallons of Ansulite 3 percent AFFF concentrate, 1,800 gallons of 3M 3 percent AFFF concentrate, and 10 gallons of 3M 6 percent AFFF concentrate. The AFFF fire-suppression system was supplied with 3M 3 percent AFFF concentrate in 1996. Currently, all buildings at NAS Patuxent River

with AFFF systems and AFFF storage have been tested for the presence of perfluorooctanoic acid (PFOA)/PFAS and anything above the current Military Specification (MILSPEC) standards (<800 parts per billion) has been removed, disposed, system rinsed, and new MILSPEC approved AFFF has been substituted (CH2M, 2018).

2.1.2 Building 102 Background

Building 102, currently the Marine Aviation Detachment, was formerly one of NAS Patuxent River's fire departments. Building 102 is located in the central portion of the installation near Taxiway Alpha (**Figures 2-2** and **2-4**). The fire house was built for World War II around 1945 and was used through the 1970s. Its use changed from a fire station to the Marine Aviation Detachment in the mid-1980s. Fire extinguisher training was reportedly conducted here with protein foam. During the PA, a historical photograph (circa 1970) showed a wheeled fire extinguisher being used on a shipping container. These older extinguishers were known to carry only protein foam and not AFFF. In another historical photograph (circa 1970), AFFF appeared to have been sprayed onto the grassy area adjacent to the building from a new yellow crash truck as a demonstration of its capabilities. A former firefighter stated the newer yellow crash trucks contained AFFF at the time (early 1970s) while the older red crash trucks contained protein foam. The releases were reportedly not contained and were allowed to seep into the grassy area (CH2M, 2018).

2.1.3 Building 1669 Background

Building 1669 is located in the south-central portion of the installation, south of Taxiway Alpha (**Figures 2-2** and **2-5**). Building 1669 was built in 1980 and used as a testing area for aircraft engines. The facility is protected by an 1,800-gallon-capacity fire-suppression system, charged with 3 percent AFFF concentrate (manufacturer unknown). The system was initially installed in 1978, at which time a 6 percent AFFF formulation was used. The system was reportedly switched to 3 percent concentrate in the mid-2000s (CH2M, 2018).

The following information was provided by facility personnel during the site interviews regarding potential releases at Building 1669 in 1991, mid-2000s, 2007, and 2010:

- A release of an unknown quantity of AFFF concentrate occurred on an unknown date, and spilled onto the ground, including the unpaved cut-out area to the southeast of the building. The impacted soil was excavated and disposed of offsite. It is likely that this event occurred prior to 1991.
- A release of up to 500 gallons of AFFF concentrate occurred in the mid-2000s, prior to the switch to 3 percent foam concentrate. This release reportedly went to a nearby oil-water separator, which leads to St. Mary's County Metropolitan Commission.
- An all-water release (no AFFF concentrate) occurred in 2007. The AFFF part of the system had been shut off for repairs so when the system was activated, only water was released. It is possible that AFFF residuals in the water went through the piping.
- In 2010, a pipe ruptured in the AFFF system; however, because the pipe rupture was located before the AFFF concentrate tank, only water was released from the system.

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 mean sea level (msl) but are typically less than 20 feet above msl. In the southwestern part of the installation, the land rises to an upland plateau, where elevations range from 40 to 120 feet above msl.

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

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

Surface water drainage features are shown on the site layouts for Building 2385, Building 102, and Building 1669. As shown on **Figures 2-3** through **2-5**, the approximate surface water flow is generally to the west and south around Building 2385, to the south away from Building 102, and to low-lying areas on the southern and eastern sides of Building 1669.

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**.

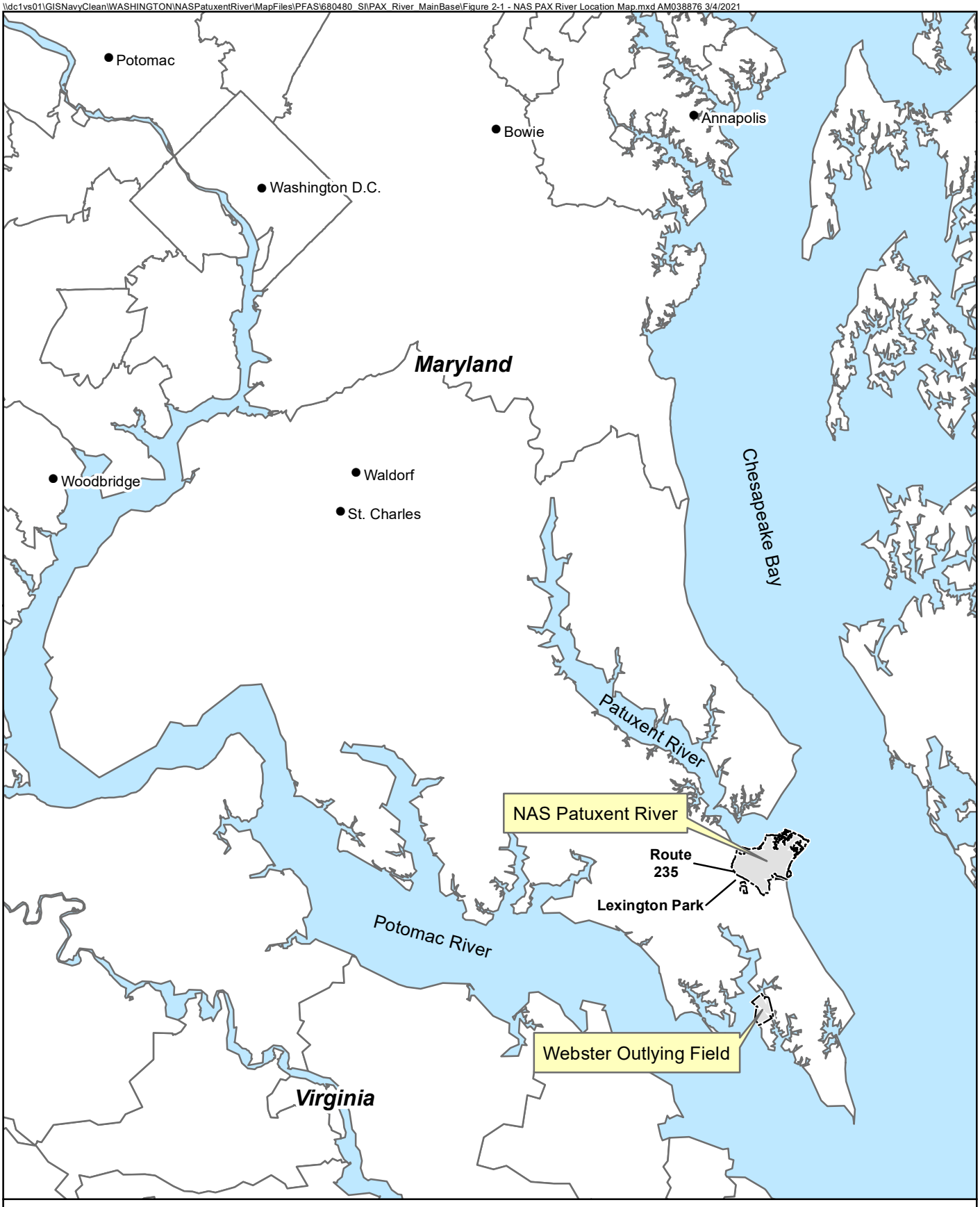
2.2.7 Drinking Water

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 (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

[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.

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.



Legend
- Cities
- Installation Boundary

N

0 22,500 45,000
Feet

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

ch2m

\\dc1vs01\GISNavyClean\WASHINGTON\NASPatuxentRiver\MapFiles\PFAS\680480_SI\PAX_River_MainBase\Figure 2-2 - Priority Sites PAX.mxd AM038876 9/22/2021

HARPER'S CREEK
Patuxent River
Hog Point
PEARSON CREEK
Fishing Point
Cedar Point
Taxiway Charlie
GOOSE CREEK
East Patuxent Basin
West Patuxent Basin
Bronson Road
VTOL Pad
Taxiway Bravo
BUILDING 2385, HAZARDOUS MATERIALS STORAGE FACILITY
Runway 02-20
BUILDING 102, MARINE AVIATION DETACHMENT
Runway 06-24
Taxiway Alpha
Taxiway Echo
Chesapeake Bay
Gate 1
BUILDING 1669- "HUSH HOUSE"- AIRCRAFT ENGINE TEST CELL
Chesapeake Bay Basin
Gate 2
Route 235
Gate 3
HOLTON POND (POND #3)
PINE HILL RUN

Legend

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

N

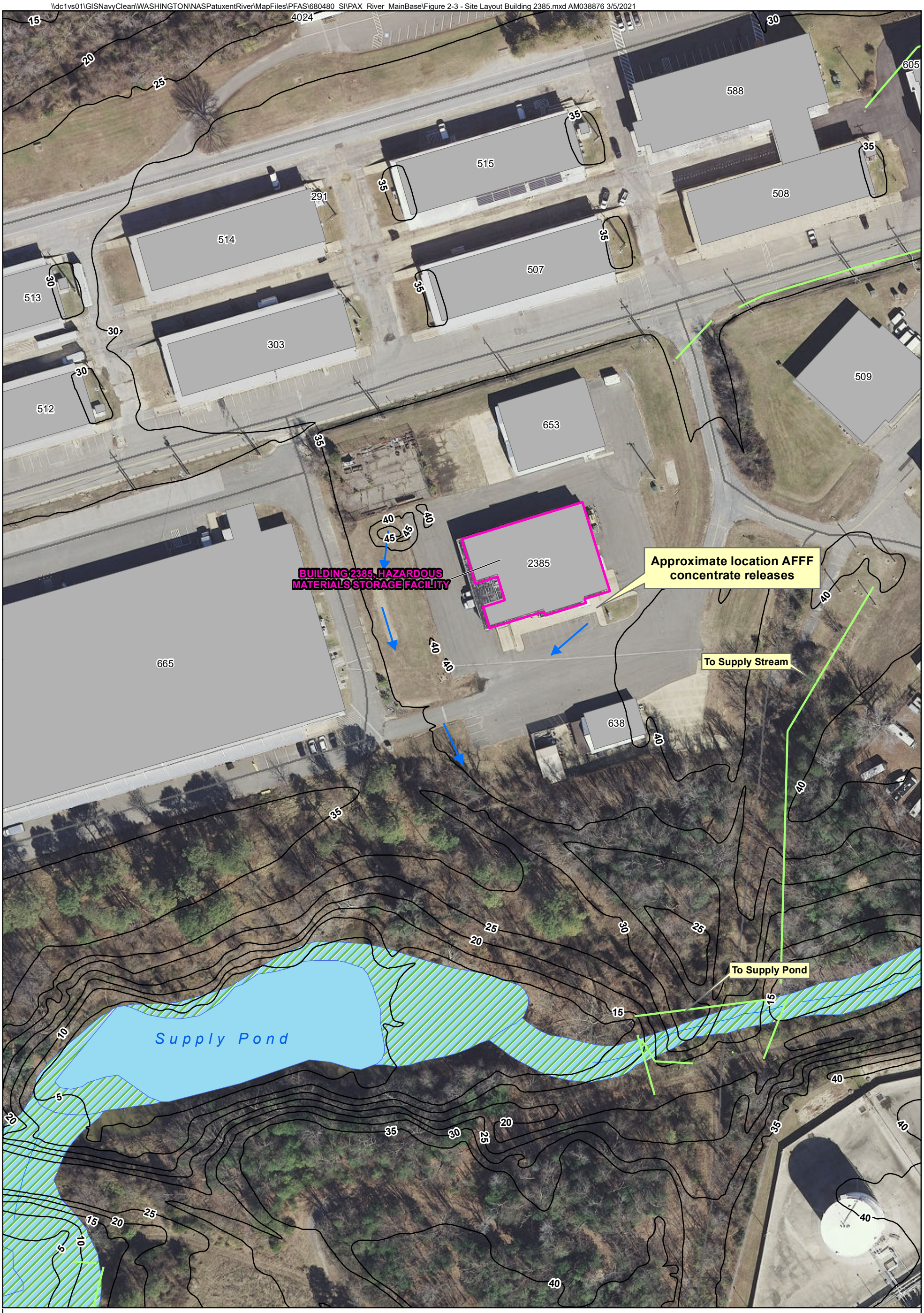
0 1,500 3,000 Feet

Imagery Source: Esri 2017

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\Figure 2-3 - Site Layout Building 2385.mxd AM038876 3/5/2021



Legend

- Confirmed PFAS Release Area
- Stormwater
- Surface Water Centerline
- Elevation Contour 5 ft
- Secondary Road
- Approximate Surface Water Flow Direction
- Water Body
- Wetland Area
- Building

N

0 100 200 Feet

Figure 2-3
Site Layout for Building 2385 - Hazardous Materials Storage Facility
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\Figure 2-4 - Site Layout Building 102.mxd AM038876 3/5/2021

Legend

- Suspected PFAS Release Area
- Stormwater
- Approximate Surface Water Flow Direction
- Elevation Contour 5 ft
- Primary Road
- Secondary Road
- Building

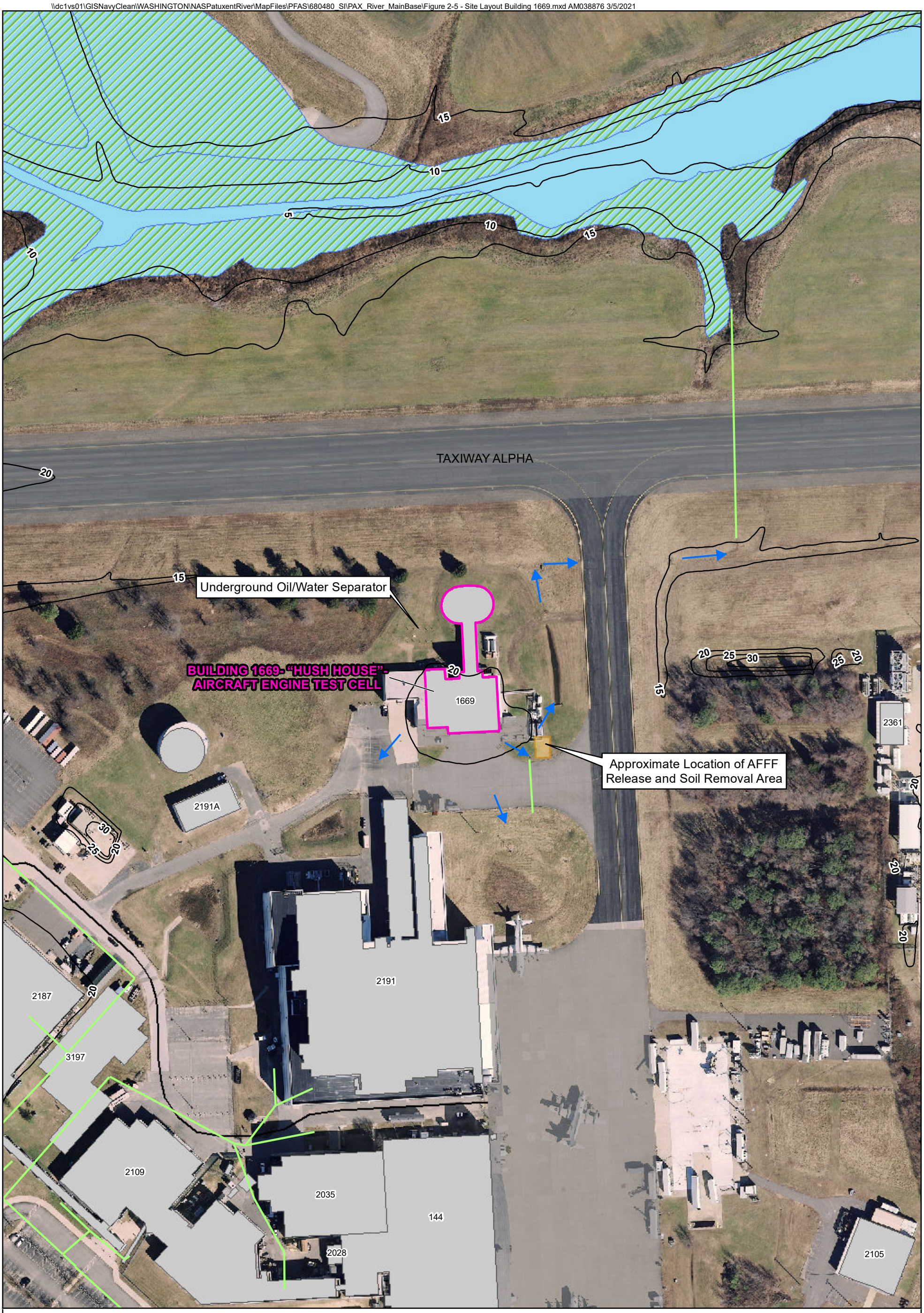
N

0 100 200 Feet

Figure 2-4
Site Layout for Building 102 - Marine Aviation Detachment
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\Figure 2-5 - Site Layout Building 1669.mxd AM038876 3/5/2021



Legend

- Confirmed PFAS Release Area
- Approximate Surface Water Flow Direction
- Stormwater
- Elevation Contour 5 ft
- Primary Road
- Approximate Location of AFFF Release
- Water Body
- Wetland Area
- Building

N

0 150 300 Feet

Figure 2-5
Site Layout for Building 1669 - "Hush House" - Aircraft Engine Test Cell
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 July 2020 at Building 2385, Building 102, and Building 1669. 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
- Groundwater sampling from existing monitoring wells
- Water level surveys at the newly installed temporary piezometers and existing monitoring wells

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 102 on July 28 and 29, 2020, and five borings were advanced at Building 1669 on July 28, 2020. For the purpose of only collecting co-located surface and subsurface soil samples, six borings were advanced at Building 2385 on July 7, 2020. For the purpose of only installing temporary piezometers for grab groundwater sampling, two additional borings were advanced at Building 102 on July 29, 2020, and two additional borings were advanced at Building 1669 on July 28, 2020. Soil boring locations at Building 2385, Building 102, and Building 1669 are shown on **Figures 3-1** through **3-3**, 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 July 2020, surface and subsurface soil samples were collected from six borings at Building 2385, four borings at Building 102, and five borings at Building 1669. 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 purpose of collecting grab groundwater samples in addition to measuring groundwater elevations, six temporary piezometers were installed at Building 102 and seven temporary piezometers were installed at Building 1669. All temporary piezometers were installed to a depth of 15 feet bgs and constructed with a 10-foot screened interval to the total depth. No temporary piezometers were installed at Building 2385 because seven existing monitoring wells from ER Program Site 9 were used for groundwater sampling and groundwater elevation monitoring. Groundwater sample locations at Building 2385, Building 102, and Building 1669 are shown on **Figures 3-1** through **3-3**, 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 102 (August 18, 2020) and Building 1669 (September 11, 2020).

3.6 Groundwater Elevation Measurement

Groundwater elevation surveys were conducted in July 2020 for seven existing monitoring wells at ER Program Site 9 (Building 2385). An electronic water-level indicator was used to measure the depth to water from the surveyed marking on the top of the well casing to the nearest 0.01 foot. Groundwater elevation measurements were also taken in July 2020 at six temporary piezometers prior to grab groundwater sampling at Building 102 and seven temporary piezometers prior to grab groundwater sampling at Building 1669. Based on the measured groundwater elevations provided in **Table 3-1**, groundwater contour maps were prepared for Building 2385, Building 102, and Building 1669, as presented on **Figures 3-1** through **3-3**. As shown, groundwater flow at Building 2385 is predominantly to the south-southeast in the direction of Supply Pond and Supply Stream. While groundwater flow at Building 102 is predominantly to the north-northwest in the direction of the Patuxent River, this area appears to be on a possible groundwater divide, with some flow to the southwest in the direction of Holton Pond and some flow to the north-northeast in the direction of the Patuxent River. Groundwater flow at Building 1669 is predominantly to the northeast in the direction of the Chesapeake Bay.

3.7 Groundwater Sampling

In July 2020, groundwater samples were collected from seven existing monitoring wells at Building 2385 (within ER Program Site 9); grab groundwater samples were collected from six temporary piezometers at Building 102 and seven temporary piezometers at Building 1669. 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 monitoring wells and 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 monitoring well and temporary piezometer using a YSI water quality meter and flow-through cell to prevent the purged groundwater from contacting the atmosphere during parameter measurement. Purging continued for approximately 20 minutes with two sets of water quality readings collected 5 minutes apart, after which groundwater samples were collected directly into laboratory-provided sample bottles. The final set of water quality parameters recorded before sample collection is presented in **Table 3-2**. Groundwater samples and grab groundwater samples were collected in accordance with the SOPs included in the SAP (CH2M, 2020) and analyzed

for the 18 PFAS listed in USEPA Drinking Water Method 537.1 using LC-MS/MS compliant with the DoD QSM Version 5.3 Table B-15. Groundwater analytical results are discussed in detail in **Section 4**.

3.8 Surveying

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

For soil borings advanced for the purpose of only collecting co-located surface and subsurface soil samples (Building 2385), horizontal coordinates were obtained using a Trimble® R1 global positioning system receiver and connected tablet.

3.9 Quality Assurance and Quality Control

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

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

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

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

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

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

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

3.10 Decontamination Procedures

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

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

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

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

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

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

3.11 Investigation-Derived Waste Management

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

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

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

3.12 Data Quality Assessment

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

As shown in **Appendix C,** the data set was deemed to be 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. Monitoring Well and Temporary Piezometer Construction Details and Groundwater Elevations (July 2020)

Basewide PFAS Site Inspection Report

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

Monitoring Well/ 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 2385 – Hazardous Materials Storage Facility								
PX-S09-MW-05	--	20	33.61	5	20	33.61	10.41 [d]	23.20
PX-S09-MW-07	--	17.7	33.45	7	17	33.45	9.06 [d]	24.39
PX-SO9-MW-36	10/31/2017	34	40.33	24	34	40.16	19.54 [d]	20.62
PX-SO9-MW-37	10/31/2017	28	37.13	18	28	36.85	14.99 [d]	21.86
PX-SO9-MW-39	11/1/2017	25	31.85	15	25	34.85	17.71 [d]	17.14
PX-SO9-MW-40	11/1/2017	30	38.37	20	30	41.28	23.37 [d]	17.91
PX-SO9-MW-42	3/13/2018	24	37.87	14	24	37.79	15.54 [d]	22.55
Building 102 – Marine Aviation Detachment								
PX-B102-WT01	7/29/2020	15	45.26	5	15	45.67	11.04 [e]	34.63
PX-B102-WT02	7/29/2020	15	45.03	5	15	45.52	10.99 [e]	34.53
PX-B102-WT03	7/28/2020	15	44.39	5	15	44.61	10.01 [e]	34.60
PX-B102-WT04	7/29/2020	15	43.82	5	15	44.02	9.41 [e]	34.61
PX-B102-WT05	7/29/2020	15	43.60	5	15	43.85	9.15 [e]	34.70
PX-B102-WT06	7/29/2020	15	44.60	5	15	45.20	10.96 [e]	34.24
Building 1669 – "Hush House" – Aircraft Engine Test Cell								
PX-B1669-WT01	7/28/2020	15	18.74	5	15	18.97	7.26 [f]	11.71
PX-B1669-WT02	7/28/2020	15	19.65	5	15	19.92	no measurement taken	
PX-B1669-WT03	7/28/2020	15	19.36	5	15	19.53	8.23 [f]	11.30
PX-B1669-WT04	7/28/2020	15	17.59	5	15	17.83	6.35 [f]	11.48
PX-B1669-WT05	7/28/2020	15	18.23	5	15	18.48	7.13 [f]	11.35
PX-B1669-WT06	7/28/2020	15	15.71	5	15	15.84	4.64 [f]	11.20
PX-B1669-WT07	7/28/2020	15	14.93	5	15	15.18	4.32 [f]	10.86

Notes:

-- not available

[a] feet below ground surface

[b] feet above North American Vertical Datum of 1988

[c] feet below top of casing elevation

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

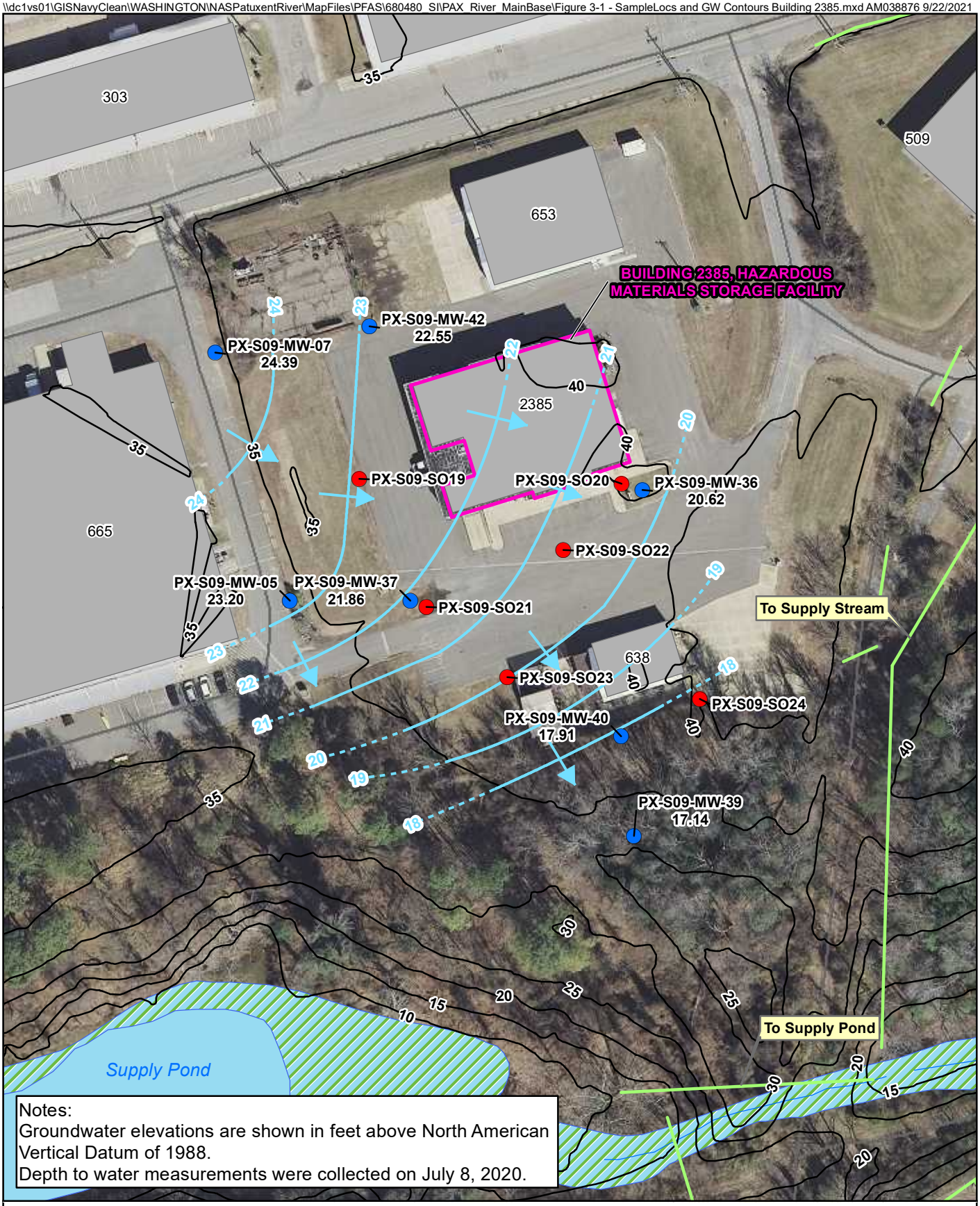
[e] depth to water measurement collected on August 18, 2020 prior to abandonment

[f] depth to water measurement collected on July 28, 2020

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

Monitoring Well/ Piezometer	Date Sampled	Temperature (°C)	pH (standard units)	Specific Conductance (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)
Building 2385 – Hazardous Materials Storage Facility							
PX-SO9-MW05	7/8/2020	20.2	5.32	0.049	54.3	4.55	222.6
PX-SO9-MW07	7/8/2020	21.2	5.99	0.181	52.1	3.82	107.8
PX-SO9-MW36	7/7/2020	20.8	5.71	0.431	9.8	2.21	48.0
PX-SO9-MW37	7/8/2020	21.3	7.32	0.218	30.5	6.88	123.6
PX-SO9-MW39	7/8/2020	16.5	6.16	0.533	38.26	5.23	183.5
PX-SO9-MW40	7/8/2020	19.5	5.90	0.605	51.9	5.28	175.5
PX-SO9-MW42	7/8/2020	21.8	6.08	0.346	177	7.03	144.4
Building 102 – Marine Aviation Detachment							
PX-B102-WT01	7/29/2020	20.6	5.54	0.636	above range	6.20	6.5
PX-B102-WT02	7/29/2020	22.8	5.96	0.981	270	5.80	66.3
PX-B102-WT03	7/28/2020	25.1	6.77	0.086	above range	6.90	111.2
PX-B102-WT04	7/29/2020	24.6	6.21	0.452	above range	6.60	49.1
PX-B102-WT05	7/29/2020	23.1	5.87	0.306	above range	5.80	22.5
PX-B102-WT06	7/29/2020	22.6	5.85	0.713	536	6.50	58.0
Building 1669 – "Hush House" – Aircraft Engine Test Cell							
PX-B1669-WT01	7/28/2020	29.3	6.37	0.001	325	3.10	-11.1
PX-B1669-WT02	7/28/2020	32.6	6.13	0.001	516	4.70	42.7
PX-B1669-WT03	7/28/2020	28.3	5.95	0.001	57.0	4.40	64.0
PX-B1669-WT04	7/28/2020	26.2	6.34	0.043	316	5.20	47.5
PX-B1669-WT05	7/28/2020	21.5	5.60	0.053	159	6.00	79.5
PX-B1669-WT06	7/28/2020	23.0	5.70	0.036	935	3.00	48.0
PX-B1669-WT07	7/28/2020	25.1	5.74	0.001	above range	3.20	52.3

Notes:
°C = degree(s) Celsius
mg/L = milligram(s) per liter
mS/cm = millisiemen(s) per centimeter
mV = millivolt(s)
NTU = nephelometric turbidity unit(s)
ORP = oxidation-reduction potential



Legend

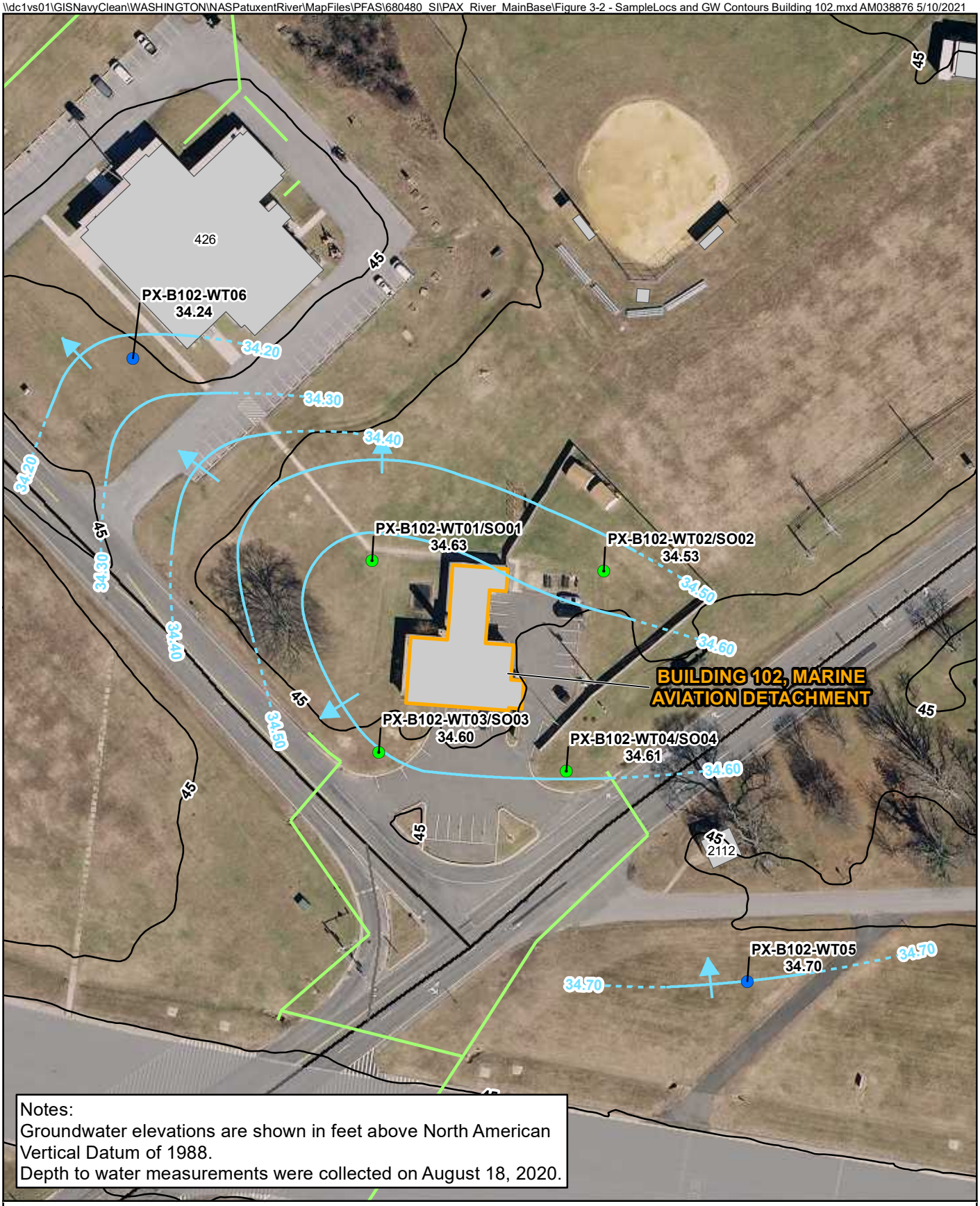
- Groundwater Sample Location
- Surface/Subsurface Soil Sample Location
- Confirmed PFAS Release Area
- Groundwater Contour (dashed where inferred)
- Groundwater Flow Direction
- Stormwater Utility line
- Elevation Contour 5 ft
- Water Body
- Wetland Area
- Building Area

N

0 50 100 Feet

Figure 3-1
Sample Locations and Groundwater Contours for
Building 2385 Hazardous Materials Storage Facility
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

ch2m:



Notes:
Groundwater elevations are shown in feet above North American Vertical Datum of 1988.
Depth to water measurements were collected on August 18, 2020.

Legend

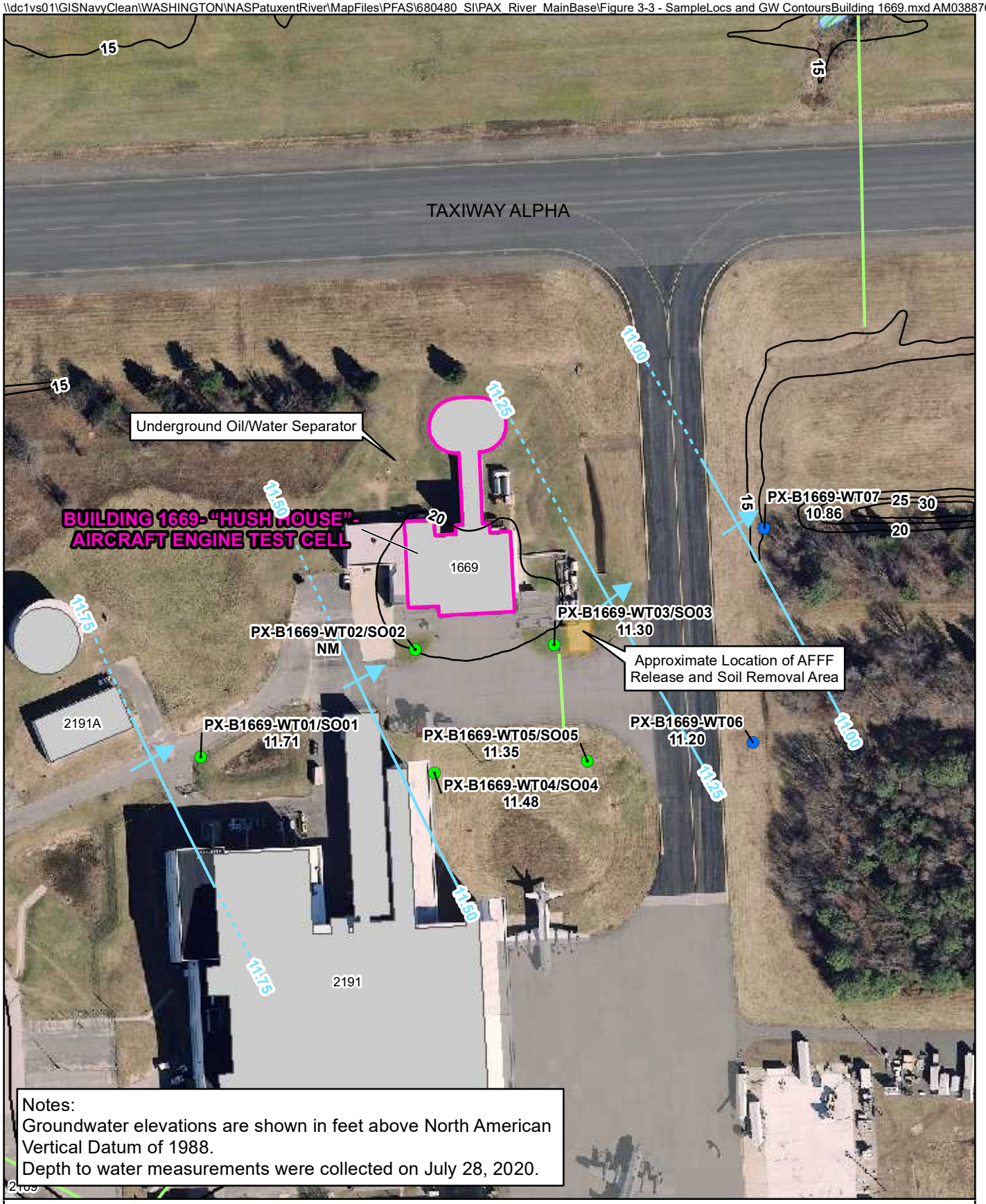
- Co-located Groundwater and Soil Sample Location
- Groundwater Sample Location
- Suspected PFAS Release Area
- Groundwater Contour (dashed where inferred)
- Groundwater Flow Direction
- Stormwater
- Elevation Contour 5 ft
- Building

N

0 50 100 Feet

Figure 3-2
Sample Locations and Groundwater Contours for
Building 102 - Marine Aviation Detachment
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

ch2m



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
- Approximate Location of AFFF Release

N

0 75 150 Feet

Figure 3-3
Sample Locations and Groundwater Contours for
Building 1669 - "Hush House"- Aircraft Engine Test Cell
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

ch2m

SECTION 4

Investigation Results

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

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

Laboratory analytical results for soil and groundwater samples collected at Building 2385, Building 102, and Building 1669 are summarized in **Tables 4-1** and **4-2,** respectively. **Tables 4-1** and **4-2** present data screened against the PALs for PFOA, PFOS, and PFBS; **Appendix D** presents data for all 18 PFAS analyzed, including PFOA, PFOS, and PFBS. **Figures 4-1** through **4-3** show PFOA, PFOS, and PFBS concentrations for each of the soil and groundwater sample locations at Building 2385, Building 102, and Building 1669.

4.1 Soil

4.1.1 Soil Analytical Results for Building 2385

Results of surface and subsurface soil samples collected from the six soil borings at Building 2385 (within ER Program Site 9) are presented on **Figure 4-1** and in **Table 4-1**. Analysis indicated the following:

- PFOA and PFOS were detected in site soil. PFBS was not detected in site soil.
- PFOA was detected at one surface soil sample location (PX-S09-SS20) at an estimated concentration of 0.73 J µg/kg, which is below the PAL of 130 µg/kg. There were no detections of PFOA in subsurface soil.
- PFOS was detected at two surface soil sample locations (PX-S09-SS20 at a concentration of 354.73 µg/kg and PX-S09-SS21 at a concentration of 249.68 µg/kg) in exceedance of the PAL of 130 µg/kg. PFOS was detected at one subsurface soil sample location (PX-S09-SB20) at a concentration of 846.55 µg/kg also in exceedance of the PAL.

4.1.2 Soil Analytical Results for Building 102

Results of surface and subsurface soil samples collected from the four soil borings at Building 102 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 two surface soil sample locations (PX-B102-SS01 and PX-B102-SS04) at estimated concentrations of 1.29 J µg/kg and 0.81 J µg/kg, respectively. Neither of the PFOA detections exceeded the PAL of 130 µg/kg.
- PFOS was detected at all four surface soil sample locations (PX-B102-SS01 through PX-B102-SS04) and one subsurface soil sample location (PX-B102-SB04), with concentrations ranging from 2.73 J µg/kg (estimated) to 25.87 µg/kg. None of the PFOS detections exceeded the PAL of 130 µg/kg.

4.1.3 Soil Analytical Results for Building 1669

Results of surface and subsurface soil samples collected from the five soil borings at Building 1669 are presented on **Figure 4-3** and in **Table 4-1**. Analysis indicated the following:

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

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 and existing monitoring well following purging and immediately prior to sampling. The final water quality parameters recorded before sample collection at all three AOIs (Building 2385, Building 102, and Building 1669) are presented in **Table 3-2**.

Measured pH values were generally acidic at these three sites, ranging between 5.32 (PX-S09-MW05) and 7.32 (PX-S09-MW37). Measured ORP values, which provide an indication of the potential for redox conditions in groundwater, ranged between -11.1 mV (PX-B1669-WT01) and 222.6 mV (PX-S09-MW05); these values are indicative of primarily oxidizing conditions. Temperature readings ranged between 16.5°C (PX-S09-MW39) and 32.6°C (PX-B1669-WT02). Specific conductance values, which provide an indication of the concentration of total dissolved solids within groundwater, ranged between 0.001 mS/cm (several sample locations at Building 1669) and 0.981 mS/cm (PX-B102-WT02); 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 9.8 NTU (PX-S09-MW36) to above the range of the instrument (greater than 1,000 NTU) at multiple sample locations at Building 102 and at PX-B1669-WT07. Measured dissolved oxygen values, which provide an indication of the oxidative state of the subsurface environment, ranged between 2.21 mg/L (PX-S09-MW36) and 7.03 mg/L (PX-S09-MW42); these values are indicative of aerobic conditions.

4.2.2 Groundwater Analytical Results for Building 2385

Results of groundwater samples collected from the seven existing monitoring wells at Building 2385 (within ER Program Site 9) 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 groundwater sample locations, with concentrations ranging from 2.99 J ng/L (estimated) at PX-S09-MW07 to 156.31 ng/L at PX-S09-MW36. The PFOA concentration at PX-S09-MW36 was the only detection that exceeded the PAL of 40 ng/L.
- PFOS was detected at all seven groundwater sample locations, with the concentrations ranging from 10.63 ng/L at PX-S09-MW42 to 1,953.56 ng/L at PX-S09-MW36. PFOS detections exceeded the PAL of 40 ng/L at five of the seven groundwater sample locations.
- PFBS was detected at all seven groundwater sample locations, with concentrations ranging from 1.46 J ng/L (estimated) at PX-S09-MW07 to 536.24 ng/L at PX-S09-MW36. None of the PFBS detections exceeded the PAL of 600 ng/L.

4.2.3 Groundwater Analytical Results for Building 102

Results of groundwater samples collected from the six temporary piezometers at Building 102 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 six grab groundwater sample locations, with concentrations ranging from 2.54 J ng/L (estimated) at PX-B102-WT05 to 118.65 ng/L at PX-B102-WT01. PFOA detections exceeded the PAL of 40 ng/L at three of the six grab groundwater sample locations.
- PFOS was detected at all six grab groundwater sample locations, with the concentrations ranging from 12.47 ng/L at PX-B102-WT05 to 447.92 ng/L at PX-B102-WT03. PFOS detections exceeded the PAL of 40 ng/L at five of the six grab groundwater sample locations.
- PFBS was detected at all six grab groundwater sample locations, with concentrations ranging from 1.95 J ng/L (estimated) at PX-B102-WT05 to 63.45 J ng/L (estimated) at PX-B102-WT04. None of the PFBS detections exceeded the PAL of 600 ng/L.

4.2.4 Groundwater Analytical Results for Building 1669

Results of groundwater samples collected from the seven temporary piezometers at Building 1669 are presented on **Figure 4-3** and in **Table 4-2**. Analysis indicated the following:

- PFOA, PFOS, and PFBS were detected in site groundwater.
- PFOA was detected at all seven grab groundwater sample locations, with concentrations ranging from 5.56 ng/L at PX-B1669-WT07 to 87.72 ng/L at PX-B1669-WT02. PFOA detections exceeded the PAL of 40 ng/L at one of the seven grab groundwater sample locations.
- PFOS was detected at all seven grab groundwater sample locations, with the concentrations ranging from 5 J ng/L (estimated) at PX-B1669-WT01 to 53.2 ng/L at PX-B1669-WT03. PFOS detections exceeded the PAL of 40 ng/L at one of the seven grab groundwater sample locations.
- PFBS was detected at all seven grab groundwater sample locations, with estimated concentrations ranging from 0.25 J ng/L at PX-B1669-WT04 to 3.88 J ng/L at PX-B1669-WT03. None of the PFBS detections exceeded the PAL of 600 ng/L.

Table 4-1. Soil Analytical Data for PFOA, PFOS, and PFBS (July 2020)
Basewide PFAS Site Inspection Report
NAS Patuxent River, 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 2385 – Hazardous Materials Storage Facility				
SURFACE SOIL				
PX-S09-SS19	7/7/2020	2.19 U	2.19 U	1.09 U
PX-S09-SS20	7/7/2020	**0.73 J**	**354.73**	1.08 U
PX-S09-SS21	7/7/2020	2.34 U	**249.68**	1.17 U
PX-S09-SS22	7/7/2020	2.31 U	2.31 U	1.16 U
PX-S09-SS23	7/7/2020	2.23 U [b]	3.34 U	1.12 U [b]
PX-S09-SS24	7/7/2020	2.41 U	4.49 U	1.2 U
SUBSURFACE SOIL				
PX-S09-SB19	7/7/2020	2.38 U	2.38 U	1.19 U
PX-S09-SB20	7/7/2020	2.26 U	**846.55**	1.13 U
PX-S09-SB21	7/7/2020	2.52 U	108.91 U	1.26 U
PX-S09-SB22	7/7/2020	2.08 U	2.08 U	1.04 U
PX-S09-SB23	7/7/2020	2.33 U	2.33 U	1.16 U
PX-S09-SB24	7/7/2020	2.15 U	2.15 U	1.08 U
Building 102 – Marine Aviation Detachment				
SURFACE SOIL				
PX-B102-SS01	7/29/2020	**1.29 J**	**8.05**	1.19 U
PX-B102-SS02	7/29/2020	2 U	**2.73 J**	1 U
PX-B102-SS03	7/28/2020	2.16 U	**5.37 J**	1.08 U
PX-B102-SS04	7/29/2020	**0.81 J** [b]	**25.87** [b]	1.07 U
SUBSURFACE SOIL				
PX-B102-SB01	7/29/2020	2.16 U [b]	2.16 U [b]	1.08 U [b]
PX-B102-SB02	7/29/2020	2.26 U	2.26 U	1.13 U
PX-B102-SB03	7/28/2020	2.12 U	2.12 U	1.06 U
PX-B102-SB04	7/29/2020	2 U	**3.03 J**	1 U
Building 1669 – "Hush House" – Aircraft Engine Test Cell				
SURFACE SOIL				
PX-B1669-SS01	7/28/2020	2.27 U	2.27 U	1.14 U
PX-B1669-SS02	7/28/2020	2.44 U	2.44 U	1.22 U
PX-B1669-SS03	7/28/2020	2.25 U	2.62 U	1.12 U
PX-B1669-SS04	7/28/2020	2.06 U	2.06 U	1.03 U
PX-B1669-SS05	7/28/2020	2.35 U	2.35 U	1.18 U

Table 4-1. Soil Analytical Data for PFOA, PFOS, and PFBS (July 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 1669 – "Hush House" – Aircraft Engine Test Cell (continued)				
SUBSURFACE SOIL				
PX-B1669-SB01	7/28/2020	2.5 U [b]	2.5 U [b]	1.25 U [b]
PX-B1669-SB02	7/28/2020	2.09 U	2.09 U	1.05 U
PX-B1669-SB03	7/28/2020	2.4 U	2.4 U	1.2 U
PX-B1669-SB04	7/28/2020	2.41 U	2.41 U	1.2 U
PX-B1669-SB05	7/28/2020	2.08 U	2.08 U	1.04 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 (July 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 2385 – Hazardous Materials Storage Facility				
GROUNDWATER				
PX-S09-MW05	7/8/2020	**28.62**	**589.49**	**84.2**
PX-S09-MW07	7/8/2020	**2.99 J**	**11.32**	**1.46 J** [b]
PX-S09-MW36	7/7/2020	**156.31**	**1,953.56**	**536.24**
PX-S09-MW37	7/8/2020	**19.01**	**346.86**	**23.9**
PX-S09-MW39	7/8/2020	**16.4**	**122.04**	**104.76**
PX-S09-MW40	7/8/2020	**17.56**	**230.42**	**144.24**
PX-S09-MW42	7/8/2020	**3.16 J**	**10.63**	**2.78 J**
Building 102 – Marine Aviation Detachment				
GRAB GROUNDWATER				
PX-B102-WT01	7/29/2020	**118.65**	**150.35**	**16.85**
PX-B102-WT02	7/29/2020	**24.17** [b]	**186.09** [b]	**3.47 J** [b]
PX-B102-WT03	7/28/2020	**50.68**	**447.92**	**14.76**
PX-B102-WT04	7/29/2020	**45.19**	**227.91**	**63.45 J**
PX-B102-WT05	7/29/2020	**2.54 J**	**12.47**	**1.95 J**
PX-B102-WT06	7/29/2020	**35.56**	**159.11**	**4.4 J**
Building 1669 – "Hush House" – Aircraft Engine Test Cell				
GRAB GROUNDWATER				
PX-B1669-WT01	7/28/2020	**9.73**	**5 J**	**1.91 J**
PX-B1669-WT02	7/28/2020	**87.72** [b]	**24.3 J**	**1.38 J**
PX-B1669-WT03	7/28/2020	**29.68**	**53.2**	**3.88 J**
PX-B1669-WT04	7/28/2020	**14.39**	**7.26**	**0.25 J**
PX-B1669-WT05	7/28/2020	**12.58**	**7.32**	**0.71 J**
PX-B1669-WT06	7/28/2020	**21.98**	**38.48**	**1.46 J**
PX-B1669-WT07	7/28/2020	**5.56**	**18.66**	**1.22 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.

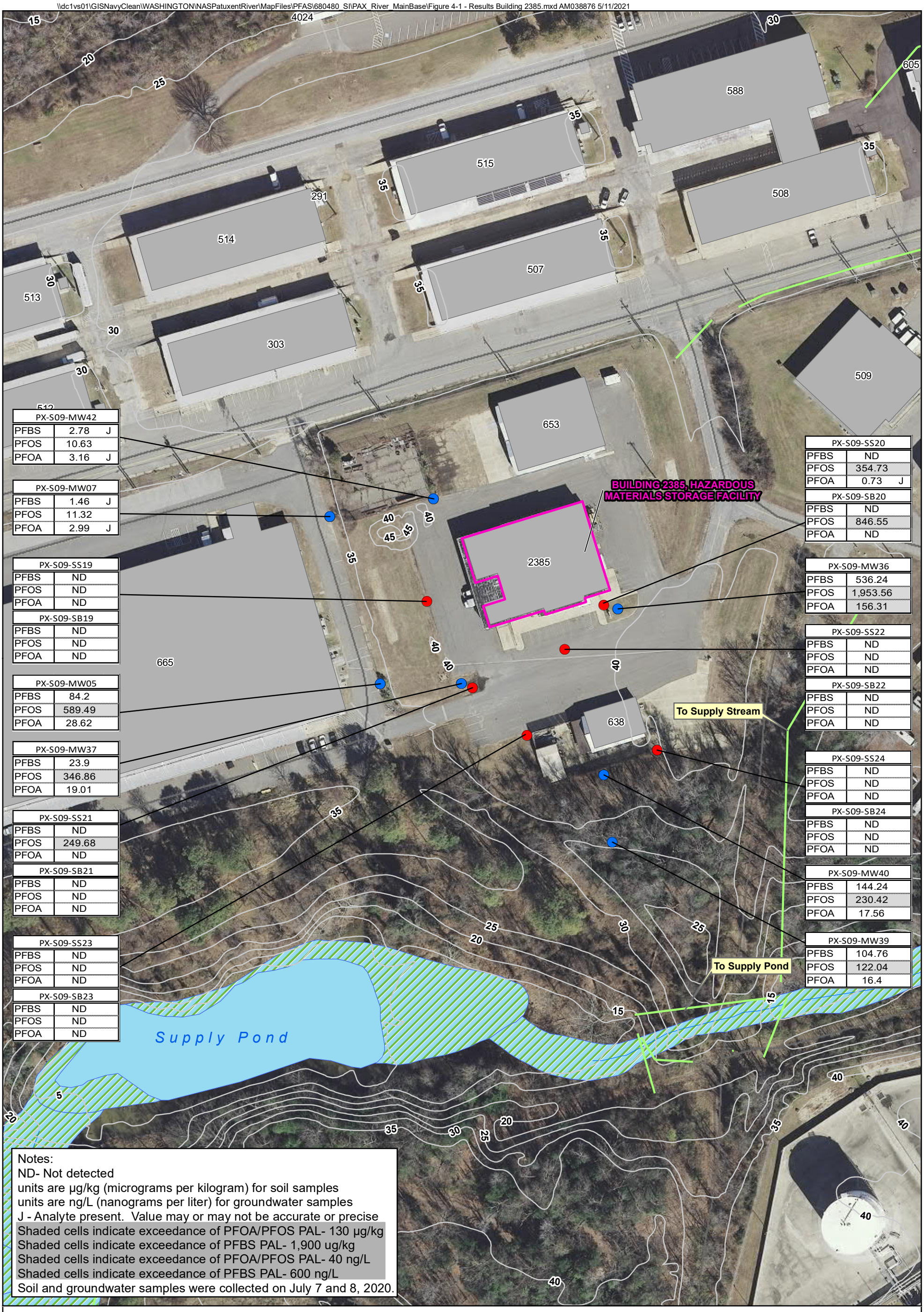
J = Analyte present. Reported value may or may not be accurate or precise.

RI = Remedial Investigation

SI = Site Inspection

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

\\dc1vs01\GISNavyClean\WASHINGTON\NASPatuxentRiver\MapFiles\PFAS\680480_SI\PAX_River_MainBase\Figure 4-1 - Results Building 2385.mxd AM038876 5/11/2021



Notes:
ND- Not detected
units are µg/kg (micrograms per kilogram) for soil samples
units are ng/L (nanograms per liter) for groundwater samples
J - Analyte present. Value may or may not be accurate or precise
Shaded cells indicate exceedance of PFOA/PFOS PAL- 130 µg/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 July 7 and 8, 2020.

Legend

- Groundwater Sample Location
- Surface/Subsurface Soil Sample Location
- Confirmed PFAS Release Area
- Stormwater
- Surface Water Centerline
- Elevation Contour 5 ft
- Water Body
- Wetland Area
- Building

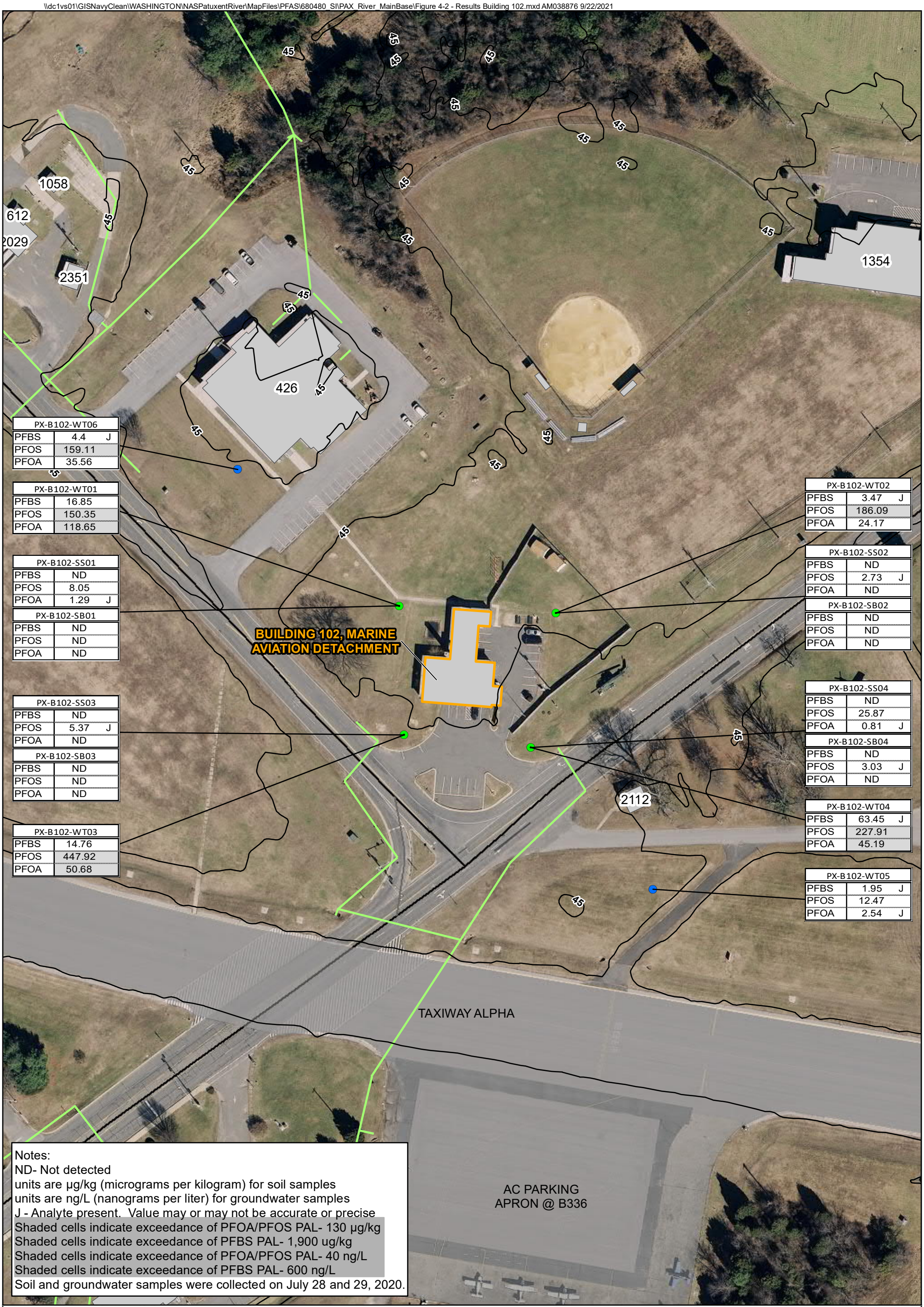
N

0 100 200 Feet

Figure 4-1
PFOA, PFOS, and PFBS Concentrations for
Building 2385 - Hazardous Materials Storage Facility
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\Figure 4-2 - Results Building 102.mxd AM038876 9/22/2021



PX-B102-WT06		
PFBS	4.4	J
PFOS	159.11	
PFOA	35.56	

PX-B102-WT01	
PFBS	16.85
PFOS	150.35
PFOA	118.65

PX-B102-SS01		
PFBS	ND	
PFOS	8.05	
PFOA	1.29	J

PX-B102-SB01	
PFBS	ND
PFOS	ND
PFOA	ND

PX-B102-SS03		
PFBS	ND	
PFOS	5.37	J
PFOA	ND	

PX-B102-SB03	
PFBS	ND
PFOS	ND
PFOA	ND

PX-B102-WT03	
PFBS	14.76
PFOS	447.92
PFOA	50.68

PX-B102-WT02		
PFBS	3.47	J
PFOS	186.09	
PFOA	24.17	

PX-B102-SS02		
PFBS	ND	
PFOS	2.73	J
PFOA	ND	

PX-B102-SB02	
PFBS	ND
PFOS	ND
PFOA	ND

PX-B102-SS04		
PFBS	ND	
PFOS	25.87	
PFOA	0.81	J

PX-B102-SB04		
PFBS	ND	
PFOS	3.03	J
PFOA	ND	

PX-B102-WT04		
PFBS	63.45	J
PFOS	227.91	
PFOA	45.19	

PX-B102-WT05		
PFBS	1.95	J
PFOS	12.47	
PFOA	2.54	J

Notes:
ND- Not detected
units are µg/kg (micrograms per kilogram) for soil samples
units are ng/L (nanograms per liter) for groundwater samples
J - Analyte present. Value may or may not be accurate or precise
Shaded cells indicate exceedance of PFOA/PFOS PAL- 130 µg/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 July 28 and 29, 2020.

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

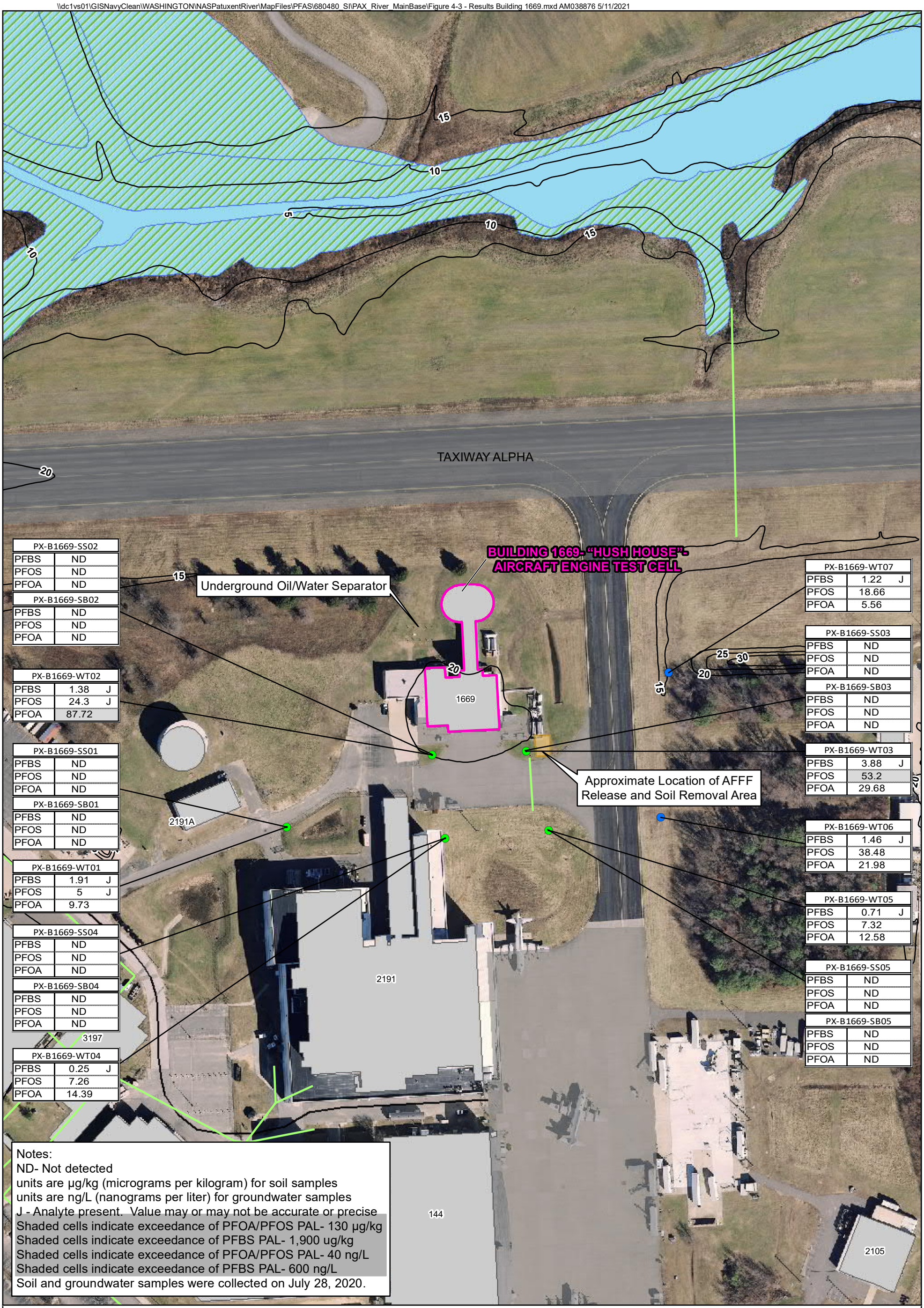
N

0 100 200 Feet

Figure 4-2
PFOA, PFOS, and PFBS Concentrations for
Building 102- Marine Aviation Detachment
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\Figure 4-3 - Results Building 1669.mxd AM038876 5/11/2021



Notes:
ND- Not detected
units are µg/kg (micrograms per kilogram) for soil samples
units are ng/L (nanograms per liter) for groundwater samples
J - Analyte present. Value may or may not be accurate or precise
Shaded cells indicate exceedance of PFOA/PFOS PAL- 130 µg/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 July 28, 2020.

Legend

- Co-located Groundwater and Soil Sample Location
- Groundwater Sample Location
- Confirmed PFAS Release Area
- Stormwater
- Elevation Contour 5 ft
- Approximate Location of AFFF Release
- Water Body
- Wetland Area
- Building

N

0 150 300 Feet

Figure 4-3
PFOA, PFOS, and PFBS Concentrations for
Building 1669 - "Hush House" - Aircraft Engine Test Cell
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 2385, Building 102, and Building 1669 at NAS Patuxent River.

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

Objective	Results
Determine whether PFAS (if present) were detected at concentrations that exceed the PALs for soil and groundwater.	Building 2385: • 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 groundwater samples collected from existing monitoring wells. Building 102: • 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. Building 1669: • PFOA, PFOS, and PFBS were not detected in site soil. • PFOA, PFOS, and PFBS were detected in site groundwater; detected concentrations of PFOA and PFOS were less than one order of magnitude above 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 2385: • Groundwater flow is predominantly to the south-southeast in the direction of Supply Pond and Supply Stream, 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 102: • Groundwater flow is predominantly to the north-northwest in the direction of the Patuxent River with radial flow components to the southwest and north-northeast, and there is the potential for migration of PFAS in those directions. 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 1669: • Groundwater flow is predominantly to the northeast in the direction of the Chesapeake Bay, 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 2385, Building 102, and Building 1669:

1. Collect additional soil samples at each site to better define the extent of PFOA, PFOS, and PFBS in soil.
2. Install permanent monitoring wells at each site to better define the extent of PFOA, PFOS, and PFBS in groundwater. New monitoring wells will also provide additional groundwater elevation data, which will help to refine the groundwater flow direction estimates developed in the SI field investigation.
3. Soil and groundwater samples will be analyzed for PFAS in accordance with Navy guidance, which will be updated as new USEPA and DoD guidance and directives are issued.
4. After the collection of additional soil data at Building 2385, and potentially at Building 102, consider performing lysimeter testing to evaluate the potential for soil to leach to groundwater above unacceptable risk levels at each site.
5. Based on data collected during the RIs, develop the conceptual site model (CSM) for each site. Each CSM will incorporate information to fully define the fate and transport of PFAS at NAS Patuxent River.
6. Perform a quantitative human health risk assessment (HHRA) at each site. Each HHRA will evaluate potential risks to human health associated with exposure to PFAS detected in soil and groundwater.
7. Perform an ecological risk screening (ERS) at each site. Each ERS will be conducted within the applicable DoD, Navy, and/or USEPA policy, guidance, or directives using the state-of-the-science toxicological information available and current at the time the RI report is prepared.

SECTION 6

References

Chappelle, F.H. and D.D. Drummond. 1983. *Hydrogeology, Digital Simulation, and Geochemistry of the Aquia and Piney-Point-Nanjemoy Aquifer System in Southern Maryland*. Maryland Geological Survey, Report of Investigations No. 38.

CH2M HILL, Inc. (CH2M). 1998. *Remedial Investigation, Naval Air Station Patuxent River, Site 1, Fishing Point Landfill and Site 12, Rifle Range Landfill, NAS Patuxent River, Patuxent River, Maryland*. Final. July.

CH2M HILL, Inc. (CH2M). 2014. *Remedial Investigation at Sites 4 and 5, Volume 3 of 10—Operable Unit 1 (Area 4A) Soil and Sediment, Naval Air Station Patuxent River, St. Mary's County, Maryland*. Final. September.

CH2M HILL, Inc. (CH2M). 2018. *Preliminary Assessment Report for Per- and Polyfluoroalkyl Substances (PFAS), Naval Air Station Patuxent River, St. Mary's County, Maryland.* Final. July.

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

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

Department of Defense (DoD). 2019b. *Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program*. October.

Department of Defense (DoD). 2020. *Per- and Polyfluoroalkyl Substances Sampling of Department of Defense Drinking Water Systems*. March.

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

McCartan, L. 1989. *Geologic Map of St. Mary's County*. Maryland Department of Natural Resources. Baltimore, Maryland.

Rose, A., St. Mary's County Health Department. 1998. Personal communication (letter) to R. Tarr, NAS Patuxent River. December 1.

U.S. Environmental Protection Agency (USEPA). 2012. *Third Unregulated Contaminant Monitoring Rule*. 77-FR 26071. May.

U.S. Environmental Protection Agency (USEPA). 2021. *Regional Screening Level Summary Table*. May.

U.S. Geological Survey (USGS). 2001. *Hydrogeology and Ground-Water Quality of the Piney Point-Nanjemoy and Aquia Aquifers, Naval Air Station Patuxent River and Webster Outlying Field, St. Mary's County, Maryland*. Water Resources Investigation Report 2001-4029.

U.S. Geological Survey (USGS). 2007. *Hydrogeology of the Piney Point-Nanjemoy, Aquia, and Upper Patapsco Aquifers, Naval Air Station Patuxent River and Webster Outlying Field, St. Mary's County, Maryland, 2000-06.* Scientific Investigation Report 2006-5266.

Appendix A
Survey Data

PROJECT: Survey Services
Contract: CLEAN 9000 CTO-4304
NAVAL AIR STATION PATUXENT
CALIFORNIA, MARYLAND
Date: August 26, 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-B102-WT01	224095.127	1475574.348	45.26	45.67	MW
PX-B102-WT02	224087.089	1475748.15	45.03	45.52	MW
PX-B102-WT03	223951.482	1475579.532	44.39	44.61	MW
PX-B102-WT04	223937.286	1475720.206	43.82	44.02	MW
PX-B102-WT05	223779.672	1475855.886	43.60	43.85	MW
PX-B102-WT06	224246.714	1475395.069	44.60	45.20	MW
PX-B1669-WT01	222217.802	1481753.282	18.74	18.97	MW
PX-B1669-WT02	222337.833	1481995.621	19.65	19.92	MW
PX-B1669-WT03	222344.078	1482151.905	19.36	19.53	MW
PX-B1669-WT04	222199.056	1482016.99	17.59	17.83	MW
PX-B1669-WT05	222212.383	1482189.358	18.23	18.48	MW
PX-B1669-WT06	222233.731	1482376.201	15.71	15.84	MW
PX-B1669-WT07	222475.083	1482388.837	14.93	15.18	MW
PX-ETA-WT01	218914.778	1484750.32	8.22	8.45	MW
PX-ETA-WT02	218812.016	1484717.611	8.70	8.96	MW
PX-ETA-WT03	218843.145	1484803.882	7.70	8.01	MW
PX-ETA-WT04	218781.296	1484829.146	7.06	7.39	MW
PX-ETA-WT05	218782.08	1485009.243	5.86	6.17	MW
PX-ETA-WT06	218635.327	1484875.492	6.88	7.40	MW
PX-ETA-WT07	218918.3816	1484525.406	10.59	10.94	MW
PX-H2905-WT01	222152.865	1479484.52	31.66	31.97	MW
PX-H2905-WT02	222164.029	1479658.164	31.76	32.23	MW
PX-H2905-WT03	221993.818	1479457.545	30.85	31.08	MW
PX-H2905-WT04	222047.002	1479675.968	31.88	32.14	MW
PX-H2905-WT05	221915.588	1479590.154	31.39	31.73	MW
PX-H2905-WT06	221740.097	1479824.116	26.50	26.78	MW
PX-H2905-WT07	222346.408	1479371.711	29.51	29.80	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

80 0 80 160
1 inch = 80 ft.

Scale 1"=60'

Hanger 2905, Building 1669, Building 102 and Buildings 215 and 217

Survey Services for Location of Piezometer
CLEAN 9000 CTO-JU40

Naval Air Station Patuxent
California, Maryland

FILENAME
NSA_UXO-02.dwg

REV: September 09, 2020
DATE: August 27, 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 2385, 102, and 1669, Naval Air Station Patuxent River, St. Mary's County, Maryland

DATE: March 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 July 2020 during the PFAS SI at Buildings 2385, 102, and 1669.

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
20-0766
20-0767
20-0775
20-0784
20-0861
20-0862
20-0863
20-0878
20-0879
20-0979
20-0994

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

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

qualifier to these data. The definitions of the primary qualifiers are presented below. The secondary qualifiers are listed in **Attachment 1**.

2.0 Validation Flag Definitions

The following primary qualifiers were used to qualify the data:

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

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

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

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

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

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

3.0 Quality Control Measures

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

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

4.0 Quality Control Review

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

4.1 Holding Time

All holding time requirements were met.

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

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

- **MS/MSD:**
  - Spiked sample PX-B102-WT04-0720 exhibited low recoveries in the MS/MSD for perfluorobutanesulfonic acid (PFBS).
- **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-B1669-WT02-0720 and field duplicate PX-B1669-WT02P-0720 did not meet field duplicate precision criteria for several target analytes.

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

4.4 Analytical Blanks

- Perfluorodecanoic acid (PFDA) and n-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA) were detected in the method blank for SDG 20-0766.
- Several target analytes were detected in equipment blank PX-S09-EB01-070720-SO.
- Perfluoroheptanoic acid (PFHpA) was detected in equipment blank PX-S09-EB01-070820.

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 possible 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 July 2020 PFAS SI sampling events for Buildings 2385, 102, and 1669 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-S09-MW36-0720	REG	PFAS_QSM5.3	Perfluorodecanoic Acid (PFDA)	0.24	J	0.46	U	NG_L	MBL
PX-S09-SB20-0203	REG	PFAS_QSM5.3	Perfluorohexanoic Acid (PFHxA)	1.76	J	2.26	U	NG_G	EBL
PX-S09-SB20-0203	REG	PFAS_QSM5.3	Perfluorohexanesulfonic acid (PFHxS)	17.95		17.95	U	NG_G	EBL
PX-S09-SB20-0203	REG	PFAS_QSM5.3	Perfluorobutanesulfonic acid (PFBS)	0.63	J	1.13	U	NG_G	EBL
PX-S09-SB21-0304	REG	PFAS_QSM5.3	Perfluorooctane Sulfonate (PFOS)	108.91		108.91	U	NG_G	EBL
PX-S09-SB21-0304	REG	PFAS_QSM5.3	Perfluorohexanesulfonic acid (PFHxS)	9.55		9.55	U	NG_G	EBL
PX-S09-SB21-0304	REG	PFAS_QSM5.3	Perfluorobutanesulfonic acid (PFBS)	0.55	J	1.26	U	NG_G	EBL
PX-S09-SS20-000H	REG	PFAS_QSM5.3	Perfluorohexanoic Acid (PFHxA)	1.7	J	2.16	U	NG_G	EBL
PX-S09-SS20-000H	REG	PFAS_QSM5.3	Perfluorohexanesulfonic acid (PFHxS)	19.61		19.61	U	NG_G	EBL
PX-S09-SS20-000H	REG	PFAS_QSM5.3	Perfluorobutanesulfonic acid (PFBS)	0.58	J	1.08	U	NG_G	EBL
PX-S09-SS21-000H	REG	PFAS_QSM5.3	Perfluorohexanoic Acid (PFHxA)	1.02	J	2.34	U	NG_G	EBL
PX-S09-SS21-000H	REG	PFAS_QSM5.3	Perfluorohexanesulfonic acid (PFHxS)	17.48		17.48	U	NG_G	EBL
PX-S09-SS21-000H	REG	PFAS_QSM5.3	Perfluorobutanesulfonic acid (PFBS)	0.65	J	1.17	U	NG_G	EBL
PX-S09-SS23-000H	REG	PFAS_QSM5.3	Perfluorooctane Sulfonate (PFOS)	3.34	J	3.34	U	NG_G	EBL
PX-S09-SS23P-000H	FD	PFAS_QSM5.3	Perfluorooctane Sulfonate (PFOS)	2.19	J	2.23	U	NG_G	EBL
PX-S09-SS24-000H	REG	PFAS_QSM5.3	Perfluorooctane Sulfonate (PFOS)	4.49	J	4.49	U	NG_G	EBL
PX-S09-EB01-070720-SO	EB	PFAS_QSM5.3	N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA)	0.83	U	0.83	UJ	NG_L	SSL
PX-S09-EB01-070720-SO	EB	PFAS_QSM5.3	Perfluorododecanoic Acid (PFDoA)	0.42	U	0.42	UJ	NG_L	SSL
PX-S09-MW07-0720	REG	PFAS_QSM5.3	Perfluoroheptanoic acid (PFHpA)	1.26	J	1.26	U	NG_L	EBL
PX-S09-MW07P-0720	FD	PFAS_QSM5.3	Perfluoroheptanoic acid (PFHpA)	1.43	J	1.43	U	NG_L	EBL
PX-S09-MW42-0720	REG	PFAS_QSM5.3	Perfluoroheptanoic acid (PFHpA)	1.87	J	1.87	U	NG_L	EBL
PX-B1669-EB01-072820-GW	EB	PFAS_QSM5.3	N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA)	0.98	U	0.98	UJ	NG_L	SSL
PX-B1669-WT01-0720	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	2	U	2	UJ	NG_L	SSL
PX-B1669-WT02-0720	REG	PFAS_QSM5.3	Perfluorooctane Sulfonate (PFOS)	24.3		24.3	J	NG_L	FD
PX-B1669-WT02-0720	REG	PFAS_QSM5.3	Perfluorohexanoic Acid (PFHxA)	58.27		58.27	J	NG_L	FD
PX-B1669-WT02-0720	REG	PFAS_QSM5.3	Perfluorohexanesulfonic acid (PFHxS)	11.18		11.18	J	NG_L	FD
PX-B1669-WT02-0720	REG	PFAS_QSM5.3	Perfluoroheptanoic acid (PFHpA)	94.45		94.45	J	NG_L	FD
PX-B1669-WT02-0720	REG	PFAS_QSM5.3	Perfluorononanoic acid (PFNA)	36.11		36.11	J	NG_L	FD
PX-B1669-WT02P-0720	FD	PFAS_QSM5.3	Perfluorooctane Sulfonate (PFOS)	15.05		15.05	J	NG_L	FD
PX-B1669-WT02P-0720	FD	PFAS_QSM5.3	N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA)	0.96	U	0.96	UJ	NG_L	SSL
PX-B1669-WT02P-0720	FD	PFAS_QSM5.3	Perfluorohexanoic Acid (PFHxA)	86.16		86.16	J	NG_L	FD
PX-B1669-WT02P-0720	FD	PFAS_QSM5.3	Perfluorohexanesulfonic acid (PFHxS)	6.92		6.92	J	NG_L	FD
PX-B1669-WT02P-0720	FD	PFAS_QSM5.3	Perfluoroheptanoic acid (PFHpA)	125.1	D	125.1	J	NG_L	FD
PX-B1669-WT02P-0720	FD	PFAS_QSM5.3	Perfluorononanoic acid (PFNA)	57.47		57.47	J	NG_L	FD
PX-B1669-WT02P-0720	FD	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	1.92	U	1.92	UJ	NG_L	SSL
PX-B1669-WT06-0720	REG	PFAS_QSM5.3	N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA)	0.94	U	0.94	UJ	NG_L	SSL
PX-B1669-WT06-0720	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	1.89	U	1.89	UJ	NG_L	SSL
PX-B1669-WT07-0720	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	1.89	U	1.89	UJ	NG_L	SSL
PX-B1669-SS03-000H	REG	PFAS_QSM5.3	Perfluorooctane Sulfonate (PFOS)	2.62	J	2.62	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-B1669-SS04-000H	REG	PFAS_QSM5.3	Perfluorooctane Sulfonate (PFOS)	1.13	J	2.06	U	NG_G	EBL
PX-B1669-SS05P-000H	FD	PFAS_QSM5.3	Perfluorooctane Sulfonate (PFOS)	0.82	J	2.31	U	NG_G	EBL
PX-B102-WT02-0720	REG	PFAS_QSM5.3	Perfluoroundecanoic Acid (PFUnA)	0.49	U	0.49	UJ	NG_L	SSL
PX-B102-WT02-0720	REG	PFAS_QSM5.3	Perfluorododecanoic Acid (PFDoA)	0.49	U	0.49	UJ	NG_L	SSL
PX-B102-WT02-0720	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	1.96	U	1.96	UJ	NG_L	SSL
PX-B102-WT03-0720	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	1.85	U	1.85	UJ	NG_L	SSL
PX-B102-WT04-0720	REG	PFAS_QSM5.3	Perfluorobutanesulfonic acid (PFBS)	63.45		63.45	J	NG_L	MSL
PX-B102-WT04-0720	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	1.96	U	1.96	UJ	NG_L	SSL
PX-B102-WT05-0720	REG	PFAS_QSM5.3	Perfluorododecanoic Acid (PFDoA)	0.5	U	0.5	UJ	NG_L	SSL
PX-B102-WT05-0720	REG	PFAS_QSM5.3	Perfluorotetradecanoic Acid (PFTeDA)	2	U	2	UJ	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: 20-0766
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, CTO-JU14, Maryland
Date: September 26, 2020

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

A Stage 2B/4 data validation was performed on the analytical data for three water samples, one aqueous equipment blank sample, and one aqueous field blank sample collected on July 6-7, 2020 by CH2M HILL at the NAS Patuxent River site in Maryland. The samples were analyzed under the Analysis of Poly and Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis	*Method References*
PFAS	Battelle SOP 5-369-08

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

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

The following data quality indicators were reviewed for this report:

Organics

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

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

Data Usability Assessment

There were no serious deficiencies of data.

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

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

Per- and Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

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

Holding Times

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

LC/MS Tuning

- All criteria were met.

Initial Calibration

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

Continuing Calibration

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

Method Blank

- The method blanks exhibited the following contamination.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
LB87 IB	PFDA	0.23	U	1, 3, 4, 5
	NEtFOSAA	0.59	None	All Samples ND

Field QC Blank

- Field QC sample results are summarized below.

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

Surrogate Spike Recoveries

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

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

Laboratory Fortified Blank (LFB)

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

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

- MS/MSD samples were not analyzed.

Internal Standard (IS) Area Performance

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

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate samples were not collected.

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

Signed: Nancy Weaver Dated: 10/2/20

Nancy Weaver
Senior Chemist

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

BATTELLE
It can be done

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

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

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

MBL

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

BATTELLE
It can be done

2

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

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

NW 9/26/20

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

BATTELLE
It can be done

3

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

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

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

BATTELLE
It can be done

4

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

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

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

NW 9/26/20

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

BATTELLE
It can be done

4

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

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

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

NW 9/26/20

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

BATTELLE
It can be done

5

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

Client ID	PX-S09-MW36-0720
Battelle ID	H6920-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/14/2020
Analytical Instrument	Sciex 6500+ LC/MS/MS
% Moisture	NA
Matrix	WATER
Sample Size	0.270
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	676.51 D	H6920-FS-D(7)	31.250	8/4/2020	15.34	43.40	144.68
PFHpA	**375-85-9**	**96.69 D**	**H6920-FS-D(3)**	**5.000**	**8/4/2020**	**1.20**	**4.63**	**23.15**
PFOA	335-67-1	156.31 D	H6920-FS-D(5)	12.500	8/4/2020	5.90	17.36	57.87
PFNA	**375-95-1**	**1.35 J**	**H6920-FS(0)**	**1.000**	**8/4/2020**	**0.29**	**0.93**	**4.63**
PFDA	335-76-2	0.24 U	H6920-FS(0)	1.000	8/4/2020	0.13	0.46	4.63
PFUnA	**2058-94-8**	**0.46 U**	**H6920-FS(0)**	**1.000**	**8/4/2020**	**0.20**	**0.46**	**4.63**
PFDoA	307-55-1	0.46 U	H6920-FS(0)	1.000	8/4/2020	0.18	0.46	4.63
PFTrDA	**72629-94-8**	**0.46 U**	**H6920-FS(0)**	**1.000**	**8/4/2020**	**0.14**	**0.46**	**4.63**
PFTeDA	376-06-7	1.85 U	H6920-FS(0)	1.000	8/4/2020	0.68	1.85	4.63
NMeFOSAA	**2355-31-9**	**0.93 U**	**H6920-FS(0)**	**1.000**	**8/4/2020**	**0.32**	**0.93**	**4.63**
NEtFOSAA	2991-50-6	0.93 U	H6920-FS(0)	1.000	8/4/2020	0.46	0.93	4.63
PFBS	**375-73-5**	**536.24 D**	**H6920-FS-D(7)**	**31.250**	**8/4/2020**	**4.05**	**14.47**	**144.68**
PFHxS	355-46-4	2966.20 D	H6920-FS-D(9)	78.125	8/4/2020	7.96	28.94	361.69
PFOS	**1763-23-1**	**1953.56 D**	**H6920-FS-D(9)**	**78.125**	**8/4/2020**	**31.83**	**72.34**	**361.69**
HFPO-DA	13252-13-6	0.46 U	H6920-FS(0)	1.000	8/4/2020	0.23	0.46	4.63
Adona	**919005-14-4**	**0.93 U**	**H6920-FS(0)**	**1.000**	**8/4/2020**	**0.25**	**0.93**	**4.63**
11Cl-PF3OUdS	763051-92-9	0.46 U	H6920-FS(0)	1.000	8/4/2020	0.21	0.46	4.63
9Cl-PF3ONS	**756426-58-1**	**0.93 U**	**H6920-FS(0)**	**1.000**	**8/4/2020**	**0.25**	**0.93**	**4.63**

0.46 ~~0.24~~ U

MBL

NW 9/26/20

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

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

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

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

A Stage 2B/4 data validation was performed on the analytical data for eighteen soil samples collected on July 6-7, 2020 by CH2M HILL at the NAS Patuxent River site in Maryland. The samples were analyzed under the Analysis of Poly and Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis	*Method References*
PFAS	Battelle SOP 5-369-08

The data have been validated according to the protocols and quality control (QC) requirements of the analytical methods, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, Webster Field Annex, Naval Air Station Patuxent River,

Maryland, April 2020, the Final Basewide Per- and Polyfluoroalkyl Substances (PFAS) Site Inspection Sampling and Analysis Plan, St. Mary's County, Naval Air Station Patuxent River, Maryland, April 2020, and the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

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

The following data quality indicators were reviewed for this report:

Organics

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

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

Data Usability Assessment

There were no serious deficiencies of data.

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

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

Per- and Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

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

Holding Times

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

LC/MS Tuning

- All criteria were met.

Initial Calibration

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

Continuing Calibration

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

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-SS09-EB01-070720-SO	PFHxA	0.92	U	4, 5, 6
	PFHpA	0.67	None	All Samples ND
	PFBS	0.40	U	4, 5, 6, 7
	PFHxS	4.77	U	4, 5, 6, 7
	PFOS	26.66	U	7, 10, 11, 13
PX-WF-CTMCA-EB01-070720	None - ND	-	-	-

Surrogate Spike Recoveries

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

Laboratory Fortified Blank (LFB)

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

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

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

MS/MSD Sample	Compound	MS %R/MSD %R/RPD	Qualifier	Affected Samples
6	PFOS	465%/310%/40	None	4X Rule Applies

Internal Standard (IS) Area Performance

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

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

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

Field Duplicate Sample Precision

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

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

Compound	PX-S09-SS23-000H ng/g	PX-S09-SS23P-000H ng/g	RPD	Qualifier
None	ND	ND	-	-

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

Signed: Nancy Weaver Dated: 10/21/20

Nancy Weaver
Senior Chemist

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

BATTELLE
It can be done

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

Client ID	PX-S09-SS19-000H
Battelle ID	H6896-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	10.12
Matrix	SOIL
Sample Size	1.83
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.19 U	H6896-FS(3)	10.000	7/22/2020	0.78	2.19	5.46
PFHpA	375-85-9	1.64 U	H6896-FS(3)	10.000	7/22/2020	0.56	1.64	5.46
PFOA	335-67-1	2.19 U	H6896-FS(3)	10.000	7/22/2020	0.67	2.19	5.46
PFNA	375-95-1	1.09 U	H6896-FS(3)	10.000	7/22/2020	0.54	1.09	5.46
PFDA	335-76-2	1.09 U	H6896-FS(3)	10.000	7/22/2020	0.50	1.09	5.46
PFUnA	2058-94-8	1.09 U	H6896-FS(3)	10.000	7/22/2020	0.50	1.09	5.46
PFDoA	307-55-1	2.19 U	H6896-FS(3)	10.000	7/22/2020	0.67	2.19	5.46
PFTrDA	72629-94-8	1.09 U	H6896-FS(3)	10.000	7/22/2020	0.31	1.09	5.46
PFTeDA	376-06-7	2.73 U	H6896-FS(3)	10.000	7/22/2020	1.18	2.73	5.46
NMeFOSAA	2355-31-9	2.73 U	H6896-FS(3)	10.000	7/22/2020	1.11	2.73	5.46
NEtFOSAA	2991-50-6	2.19 U	H6896-FS(3)	10.000	7/22/2020	0.82	2.19	5.46
PFBS	375-73-5	1.09 U	H6896-FS(3)	10.000	7/22/2020	0.38	1.09	5.46
PFHxS	355-46-4	2.19 U	H6896-FS(3)	10.000	7/22/2020	0.89	2.19	5.46
PFOS	1763-23-1	2.19 U	H6896-FS(3)	10.000	7/22/2020	0.75	2.19	5.46
HFPO-DA	13252-13-6	2.19 U	H6896-FS(3)	10.000	7/22/2020	0.70	2.19	5.46
Adona	919005-14-4	2.19 U	H6896-FS(3)	10.000	7/22/2020	0.91	2.19	5.46
11Cl-PF3OUdS	763051-92-9	1.64 U	H6896-FS(3)	10.000	7/22/2020	0.57	1.64	5.46
9Cl-PF3ONS	756426-58-1	1.09 U	H6896-FS(3)	10.000	7/22/2020	0.52	1.09	5.46

MW 9/26/20

BATTELLE
It can be done

2

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

Client ID	PX-S09-SB19-0304
Battelle ID	H6897-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	11.79
Matrix	SOIL
Sample Size	1.68
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.38 U	H6897-FS(3)	10.000	7/22/2020	0.85	2.38	5.95
PFHpA	375-85-9	1.79 U	H6897-FS(3)	10.000	7/22/2020	0.61	1.79	5.95
PFOA	335-67-1	2.38 U	H6897-FS(3)	10.000	7/22/2020	0.73	2.38	5.95
PFNA	375-95-1	1.19 U	H6897-FS(3)	10.000	7/22/2020	0.58	1.19	5.95
PFDA	335-76-2	1.19 U	H6897-FS(3)	10.000	7/22/2020	0.55	1.19	5.95
PFUnA	2058-94-8	1.19 U	H6897-FS(3)	10.000	7/22/2020	0.55	1.19	5.95
PFDoA	307-55-1	2.38 U	H6897-FS(3)	10.000	7/22/2020	0.73	2.38	5.95
PFTrDA	72629-94-8	1.19 U	H6897-FS(3)	10.000	7/22/2020	0.33	1.19	5.95
PFTeDA	376-06-7	2.98 U	H6897-FS(3)	10.000	7/22/2020	1.29	2.98	5.95
NMeFOSAA	2355-31-9	2.98 U	H6897-FS(3)	10.000	7/22/2020	1.21	2.98	5.95
NEtFOSAA	2991-50-6	2.38 U	H6897-FS(3)	10.000	7/22/2020	0.89	2.38	5.95
PFBS	375-73-5	1.19 U	H6897-FS(3)	10.000	7/22/2020	0.42	1.19	5.95
PFHxS	355-46-4	2.38 U	H6897-FS(3)	10.000	7/22/2020	0.96	2.38	5.95
PFOS	1763-23-1	2.38 U	H6897-FS(3)	10.000	7/22/2020	0.82	2.38	5.95
HFPO-DA	13252-13-6	2.38 U	H6897-FS(3)	10.000	7/22/2020	0.76	2.38	5.95
Adona	919005-14-4	2.38 U	H6897-FS(3)	10.000	7/22/2020	0.99	2.38	5.95
11Cl-PF3OUdS	763051-92-9	1.79 U	H6897-FS(3)	10.000	7/22/2020	0.62	1.79	5.95
9Cl-PF3ONS	756426-58-1	1.19 U	H6897-FS(3)	10.000	7/22/2020	0.57	1.19	5.95

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

BATTELLE
It can be done

3

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

Client ID	PX-S09-SB19P-0304
Battelle ID	H6898-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	10.93
Matrix	SOIL
Sample Size	1.74
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.30 U	H6898-FS(3)	10.000	7/22/2020	0.82	2.30	5.75
PFHpA	375-85-9	1.72 U	H6898-FS(3)	10.000	7/22/2020	0.59	1.72	5.75
PFOA	335-67-1	2.30 U	H6898-FS(3)	10.000	7/22/2020	0.70	2.30	5.75
PFNA	375-95-1	1.15 U	H6898-FS(3)	10.000	7/22/2020	0.56	1.15	5.75
PFDA	335-76-2	1.15 U	H6898-FS(3)	10.000	7/22/2020	0.53	1.15	5.75
PFUnA	2058-94-8	1.15 U	H6898-FS(3)	10.000	7/22/2020	0.53	1.15	5.75
PFDoA	307-55-1	2.30 U	H6898-FS(3)	10.000	7/22/2020	0.70	2.30	5.75
PFTrDA	72629-94-8	1.15 U	H6898-FS(3)	10.000	7/22/2020	0.32	1.15	5.75
PFTeDA	376-06-7	2.87 U	H6898-FS(3)	10.000	7/22/2020	1.24	2.87	5.75
NMeFOSAA	2355-31-9	2.87 U	H6898-FS(3)	10.000	7/22/2020	1.17	2.87	5.75
NEtFOSAA	2991-50-6	2.30 U	H6898-FS(3)	10.000	7/22/2020	0.86	2.30	5.75
PFBS	375-73-5	1.15 U	H6898-FS(3)	10.000	7/22/2020	0.40	1.15	5.75
PFHxS	355-46-4	2.30 U	H6898-FS(3)	10.000	7/22/2020	0.93	2.30	5.75
PFOS	1763-23-1	2.30 U	H6898-FS(3)	10.000	7/22/2020	0.79	2.30	5.75
HFPO-DA	13252-13-6	2.30 U	H6898-FS(3)	10.000	7/22/2020	0.74	2.30	5.75
Adona	919005-14-4	2.30 U	H6898-FS(3)	10.000	7/22/2020	0.95	2.30	5.75
11Cl-PF3OUdS	763051-92-9	1.72 U	H6898-FS(3)	10.000	7/22/2020	0.60	1.72	5.75
9Cl-PF3ONS	756426-58-1	1.15 U	H6898-FS(3)	10.000	7/22/2020	0.55	1.15	5.75

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

BATTELLE
It can be done

4

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

Client ID	PX-S09-SS20-000H
Battelle ID	H6899-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	14.42
Matrix	SOIL
Sample Size	1.85
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	2.16 ~~1.70~~ J U	H6899-FS(3)	10.000	7/22/2020	0.77	2.16	5.41	EBL
PFHpA	375-85-9	1.62 U	H6899-FS(3)	10.000	7/22/2020	0.55	1.62	5.41	
PFOA	335-67-1	0.73 J	H6899-FS(3)	10.000	7/22/2020	0.66	2.16	5.41	
PFNA	375-95-1	1.08 U	H6899-FS(3)	10.000	7/22/2020	0.53	1.08	5.41	
PFDA	335-76-2	1.08 U	H6899-FS(3)	10.000	7/22/2020	0.50	1.08	5.41	
PFUnA	2058-94-8	1.08 U	H6899-FS(3)	10.000	7/22/2020	0.50	1.08	5.41	
PFDoA	307-55-1	2.16 U	H6899-FS(3)	10.000	7/22/2020	0.66	2.16	5.41	
PFTrDA	72629-94-8	1.08 U	H6899-FS(3)	10.000	7/22/2020	0.30	1.08	5.41	
PFTeDA	376-06-7	2.70 U	H6899-FS(3)	10.000	7/22/2020	1.17	2.70	5.41	
NMeFOSAA	2355-31-9	2.70 U	H6899-FS(3)	10.000	7/22/2020	1.10	2.70	5.41	
NEtFOSAA	2991-50-6	2.16 U	H6899-FS(3)	10.000	7/22/2020	0.81	2.16	5.41	
PFBS	375-73-5	1.08 ~~0.58~~ J U	H6899-FS(3)	10.000	7/22/2020	0.38	1.08	5.41	EBL
PFHxS	355-46-4	19.61 4	H6899-FS(3)	10.000	7/22/2020	0.88	2.16	5.41	EBL
PFOS	1763-23-1	354.73 D	H6899-FS-D(5)	50.000	7/22/2020	3.73	10.81	27.03	
HFPO-DA	13252-13-6	2.16 U	H6899-FS(3)	10.000	7/22/2020	0.69	2.16	5.41	
Adona	919005-14-4	2.16 U	H6899-FS(3)	10.000	7/22/2020	0.90	2.16	5.41	
11Cl-PF3OUdS	763051-92-9	1.62 U	H6899-FS(3)	10.000	7/22/2020	0.56	1.62	5.41	
9Cl-PF3ONS	756426-58-1	1.08 U	H6899-FS(3)	10.000	7/22/2020	0.52	1.08	5.41	

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

BATTELLE
It can be done

5

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

Client ID	PX-S09-SB20-0203
Battelle ID	H6900-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	12.66
Matrix	SOIL
Sample Size	1.77
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	2.26 ~~1.76~~ J u	H6900-FS(3)	10.000	7/22/2020	0.80	2.26	5.65	EBL
PFHpA	375-85-9	1.69 U	H6900-FS(3)	10.000	7/22/2020	0.58	1.69	5.65	
PFOA	335-67-1	2.26 U	H6900-FS(3)	10.000	7/22/2020	0.69	2.26	5.65	
PFNA	375-95-1	1.13 U	H6900-FS(3)	10.000	7/22/2020	0.55	1.13	5.65	
PFDA	335-76-2	1.13 U	H6900-FS(3)	10.000	7/22/2020	0.52	1.13	5.65	
PFUnA	2058-94-8	1.13 U	H6900-FS(3)	10.000	7/22/2020	0.52	1.13	5.65	
PFDoA	307-55-1	2.26 U	H6900-FS(3)	10.000	7/22/2020	0.69	2.26	5.65	
PFTrDA	72629-94-8	1.13 U	H6900-FS(3)	10.000	7/22/2020	0.32	1.13	5.65	
PFTeDA	376-06-7	2.82 U	H6900-FS(3)	10.000	7/22/2020	1.22	2.82	5.65	
NMeFOSAA	2355-31-9	2.82 U	H6900-FS(3)	10.000	7/22/2020	1.15	2.82	5.65	
NEtFOSAA	2991-50-6	2.26 U	H6900-FS(3)	10.000	7/22/2020	0.85	2.26	5.65	
PFBS	375-73-5	1.13 ~~0.63~~ J u	H6900-FS(3)	10.000	7/22/2020	0.40	1.13	5.65	EBL
PFHxS	355-46-4	17.95 u	H6900-FS(3)	10.000	7/22/2020	0.92	2.26	5.65	EBL
PFOS	1763-23-1	846.55 D	H6900-FS-D(5)	250.000	7/22/2020	19.49	56.50	141.24	
HFPO-DA	13252-13-6	2.26 U	H6900-FS(3)	10.000	7/22/2020	0.72	2.26	5.65	
Adona	919005-14-4	2.26 U	H6900-FS(3)	10.000	7/22/2020	0.94	2.26	5.65	
11Cl-PF3OUdS	763051-92-9	1.69 U	H6900-FS(3)	10.000	7/22/2020	0.59	1.69	5.65	
9Cl-PF3ONS	756426-58-1	1.13 U	H6900-FS(3)	10.000	7/22/2020	0.54	1.13	5.65	

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

BATTELLE
It can be done

6

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

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

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

NW 9/26/20

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

BATTELLE
It can be done

7

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

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

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

NW 9/26/20

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

BATTELLE
It can be done

8

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

Client ID	PX-S09-SS22-000H
Battelle ID	H6905-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	7.27
Matrix	SOIL
Sample Size	1.73
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.31 U	H6905-FS(3)	10.000	7/22/2020	0.82	2.31	5.78
PFHpA	375-85-9	1.73 U	H6905-FS(3)	10.000	7/22/2020	0.59	1.73	5.78
PFOA	335-67-1	2.31 U	H6905-FS(3)	10.000	7/22/2020	0.71	2.31	5.78
PFNA	375-95-1	1.16 U	H6905-FS(3)	10.000	7/22/2020	0.57	1.16	5.78
PFDA	335-76-2	1.16 U	H6905-FS(3)	10.000	7/22/2020	0.53	1.16	5.78
PFUnA	2058-94-8	1.16 U	H6905-FS(3)	10.000	7/22/2020	0.53	1.16	5.78
PFDoA	307-55-1	2.31 U	H6905-FS(3)	10.000	7/22/2020	0.71	2.31	5.78
PFTrDA	72629-94-8	1.16 U	H6905-FS(3)	10.000	7/22/2020	0.32	1.16	5.78
PFTeDA	376-06-7	2.89 U	H6905-FS(3)	10.000	7/22/2020	1.25	2.89	5.78
NMeFOSAA	2355-31-9	2.89 U	H6905-FS(3)	10.000	7/22/2020	1.18	2.89	5.78
NEtFOSAA	2991-50-6	2.31 U	H6905-FS(3)	10.000	7/22/2020	0.87	2.31	5.78
PFBS	375-73-5	1.16 U	H6905-FS(3)	10.000	7/22/2020	0.40	1.16	5.78
PFHxS	355-46-4	2.31 U	H6905-FS(3)	10.000	7/22/2020	0.94	2.31	5.78
PFOS	1763-23-1	2.31 U	H6905-FS(3)	10.000	7/22/2020	0.80	2.31	5.78
HFPO-DA	13252-13-6	2.31 U	H6905-FS(3)	10.000	7/22/2020	0.74	2.31	5.78
Adona	919005-14-4	2.31 U	H6905-FS(3)	10.000	7/22/2020	0.96	2.31	5.78
11Cl-PF3OUdS	763051-92-9	1.73 U	H6905-FS(3)	10.000	7/22/2020	0.60	1.73	5.78
9Cl-PF3ONS	756426-58-1	1.16 U	H6905-FS(3)	10.000	7/22/2020	0.55	1.16	5.78

NW 9/26/20

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

BATTELLE
It can be done

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

9

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

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

BATTELLE
It can be done

10

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

Client ID	PX-S09-SS23-000H
Battelle ID	H6908-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	12.82
Matrix	SOIL
Sample Size	1.83
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.19 U	H6908-FS(3)	10.000	7/22/2020	0.78	2.19	5.46
PFHpA	**375-85-9**	**1.64 U**	**H6908-FS(3)**	**10.000**	**7/22/2020**	**0.56**	**1.64**	**5.46**
PFOA	335-67-1	2.19 U	H6908-FS(3)	10.000	7/22/2020	0.67	2.19	5.46
PFNA	**375-95-1**	**1.09 U**	**H6908-FS(3)**	**10.000**	**7/22/2020**	**0.54**	**1.09**	**5.46**
PFDA	335-76-2	1.09 U	H6908-FS(3)	10.000	7/22/2020	0.50	1.09	5.46
PFUnA	**2058-94-8**	**1.09 U**	**H6908-FS(3)**	**10.000**	**7/22/2020**	**0.50**	**1.09**	**5.46**
PFDoA	307-55-1	2.19 U	H6908-FS(3)	10.000	7/22/2020	0.67	2.19	5.46
PFTrDA	**72629-94-8**	**1.09 U**	**H6908-FS(3)**	**10.000**	**7/22/2020**	**0.31**	**1.09**	**5.46**
PFTeDA	376-06-7	2.73 U	H6908-FS(3)	10.000	7/22/2020	1.18	2.73	5.46
NMeFOSAA	**2355-31-9**	**2.73 U**	**H6908-FS(3)**	**10.000**	**7/22/2020**	**1.11**	**2.73**	**5.46**
NEtFOSAA	2991-50-6	2.19 U	H6908-FS(3)	10.000	7/22/2020	0.82	2.19	5.46
PFBS	**375-73-5**	**1.09 U**	**H6908-FS(3)**	**10.000**	**7/22/2020**	**0.38**	**1.09**	**5.46**
PFHxS	355-46-4	2.19 U	H6908-FS(3)	10.000	7/22/2020	0.89	2.19	5.46
PFOS	**1763-23-1**	**3.34 U**	**H6908-FS(3)**	**10.000**	**7/22/2020**	**0.75**	**2.19**	**5.46**
HFPO-DA	13252-13-6	2.19 U	H6908-FS(3)	10.000	7/22/2020	0.70	2.19	5.46
Adona	**919005-14-4**	**2.19 U**	**H6908-FS(3)**	**10.000**	**7/22/2020**	**0.91**	**2.19**	**5.46**
11Cl-PF3OUdS	763051-92-9	1.64 U	H6908-FS(3)	10.000	7/22/2020	0.57	1.64	5.46
9Cl-PF3ONS	**756426-58-1**	**1.09 U**	**H6908-FS(3)**	**10.000**	**7/22/2020**	**0.52**	**1.09**	**5.46**

EBL

MW 9/26/20

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

BATTELLE
It can be done

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

11

Client ID	PX-S09-SS23P-000H
Battelle ID	H6909-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	16.81
Matrix	SOIL
Sample Size	1.79
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	2.23 U	H6909-FS(3)	10.000	7/22/2020	0.79	2.23	5.59	
PFHpA	**375-85-9**	**1.68 U**	**H6909-FS(3)**	**10.000**	**7/22/2020**	**0.57**	**1.68**	**5.59**	
PFOA	335-67-1	2.23 U	H6909-FS(3)	10.000	7/22/2020	0.68	2.23	5.59	
PFNA	**375-95-1**	**1.12 U**	**H6909-FS(3)**	**10.000**	**7/22/2020**	**0.55**	**1.12**	**5.59**	
PFDA	335-76-2	1.12 U	H6909-FS(3)	10.000	7/22/2020	0.51	1.12	5.59	
PFUnA	**2058-94-8**	**1.12 U**	**H6909-FS(3)**	**10.000**	**7/22/2020**	**0.51**	**1.12**	**5.59**	
PFDoA	307-55-1	2.23 U	H6909-FS(3)	10.000	7/22/2020	0.68	2.23	5.59	
PFTrDA	**72629-94-8**	**1.12 U**	**H6909-FS(3)**	**10.000**	**7/22/2020**	**0.31**	**1.12**	**5.59**	
PFTeDA	376-06-7	2.79 U	H6909-FS(3)	10.000	7/22/2020	1.21	2.79	5.59	
NMeFOSAA	**2355-31-9**	**2.79 U**	**H6909-FS(3)**	**10.000**	**7/22/2020**	**1.14**	**2.79**	**5.59**	
NEtFOSAA	2991-50-6	2.23 U	H6909-FS(3)	10.000	7/22/2020	0.84	2.23	5.59	
PFBS	**375-73-5**	**1.12 U**	**H6909-FS(3)**	**10.000**	**7/22/2020**	**0.39**	**1.12**	**5.59**	
PFHxS	355-46-4	2.23 U	H6909-FS(3)	10.000	7/22/2020	0.91	2.23	5.59	
PFOS	**1763-23-1**	2.23 ~~2.19~~ U	**H6909-FS(3)**	**10.000**	**7/22/2020**	**0.77**	**2.23**	**5.59**	EBL
HFPO-DA	13252-13-6	2.23 U	H6909-FS(3)	10.000	7/22/2020	0.72	2.23	5.59	
Adona	**919005-14-4**	**2.23 U**	**H6909-FS(3)**	**10.000**	**7/22/2020**	**0.93**	**2.23**	**5.59**	
11Cl-PF3OUdS	763051-92-9	1.68 U	H6909-FS(3)	10.000	7/22/2020	0.58	1.68	5.59	
9Cl-PF3ONS	**756426-58-1**	**1.12 U**	**H6909-FS(3)**	**10.000**	**7/22/2020**	**0.54**	**1.12**	**5.59**	

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

BATTELLE
It can be done

12

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

Client ID	PX-S09-SB23-0304
Battelle ID	H6910-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	16.93
Matrix	SOIL
Sample Size	1.72
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.33 U	H6910-FS(3)	10.000	7/22/2020	0.83	2.33	5.81
PFHpA	375-85-9	1.74 U	H6910-FS(3)	10.000	7/22/2020	0.59	1.74	5.81
PFOA	335-67-1	2.33 U	H6910-FS(3)	10.000	7/22/2020	0.71	2.33	5.81
PFNA	375-95-1	1.16 U	H6910-FS(3)	10.000	7/22/2020	0.57	1.16	5.81
PFDA	335-76-2	1.16 U	H6910-FS(3)	10.000	7/22/2020	0.53	1.16	5.81
PFUnA	2058-94-8	1.16 U	H6910-FS(3)	10.000	7/22/2020	0.53	1.16	5.81
PFDoA	307-55-1	2.33 U	H6910-FS(3)	10.000	7/22/2020	0.71	2.33	5.81
PFTrDA	72629-94-8	1.16 U	H6910-FS(3)	10.000	7/22/2020	0.33	1.16	5.81
PFTeDA	376-06-7	2.91 U	H6910-FS(3)	10.000	7/22/2020	1.26	2.91	5.81
NMeFOSAA	2355-31-9	2.91 U	H6910-FS(3)	10.000	7/22/2020	1.19	2.91	5.81
NEtFOSAA	2991-50-6	2.33 U	H6910-FS(3)	10.000	7/22/2020	0.87	2.33	5.81
PFBS	375-73-5	1.16 U	H6910-FS(3)	10.000	7/22/2020	0.41	1.16	5.81
PFHxS	355-46-4	2.33 U	H6910-FS(3)	10.000	7/22/2020	0.94	2.33	5.81
PFOS	1763-23-1	2.33 U	H6910-FS(3)	10.000	7/22/2020	0.80	2.33	5.81
HFPO-DA	13252-13-6	2.33 U	H6910-FS(3)	10.000	7/22/2020	0.74	2.33	5.81
Adona	919005-14-4	2.33 U	H6910-FS(3)	10.000	7/22/2020	0.97	2.33	5.81
11Cl-PF3OUdS	763051-92-9	1.74 U	H6910-FS(3)	10.000	7/22/2020	0.60	1.74	5.81
9Cl-PF3ONS	756426-58-1	1.16 U	H6910-FS(3)	10.000	7/22/2020	0.56	1.16	5.81

NW 9/26/20

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

BATTELLE
It can be done

13

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

Client ID	PX-S09-SS24-000H
Battelle ID	H6911-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	19.22
Matrix	SOIL
Sample Size	1.66
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	2.41 U	H6911-FS(3)	10.000	7/22/2020	0.86	2.41	6.02	
PFHpA	**375-85-9**	**1.81 U**	**H6911-FS(3)**	**10.000**	**7/22/2020**	**0.61**	**1.81**	**6.02**	
PFOA	335-67-1	2.41 U	H6911-FS(3)	10.000	7/22/2020	0.73	2.41	6.02	
PFNA	**375-95-1**	**1.20 U**	**H6911-FS(3)**	**10.000**	**7/22/2020**	**0.59**	**1.20**	**6.02**	
PFDA	335-76-2	1.20 U	H6911-FS(3)	10.000	7/22/2020	0.55	1.20	6.02	
PFUnA	**2058-94-8**	**1.20 U**	**H6911-FS(3)**	**10.000**	**7/22/2020**	**0.55**	**1.20**	**6.02**	
PFDoA	307-55-1	2.41 U	H6911-FS(3)	10.000	7/22/2020	0.73	2.41	6.02	
PFTrDA	**72629-94-8**	**1.20 U**	**H6911-FS(3)**	**10.000**	**7/22/2020**	**0.34**	**1.20**	**6.02**	
PFTeDA	376-06-7	3.01 U	H6911-FS(3)	10.000	7/22/2020	1.30	3.01	6.02	
NMeFOSAA	**2355-31-9**	**3.01 U**	**H6911-FS(3)**	**10.000**	**7/22/2020**	**1.23**	**3.01**	**6.02**	
NEtFOSAA	2991-50-6	2.41 U	H6911-FS(3)	10.000	7/22/2020	0.90	2.41	6.02	
PFBS	**375-73-5**	**1.20 U**	**H6911-FS(3)**	**10.000**	**7/22/2020**	**0.42**	**1.20**	**6.02**	
PFHxS	355-46-4	2.41 U	H6911-FS(3)	10.000	7/22/2020	0.98	2.41	6.02	
PFOS	**1763-23-1**	**4.49 Y U**	**H6911-FS(3)**	**10.000**	**7/22/2020**	**0.83**	**2.41**	**6.02**	EBL
HFPO-DA	13252-13-6	2.41 U	H6911-FS(3)	10.000	7/22/2020	0.77	2.41	6.02	
Adona	**919005-14-4**	**2.41 U**	**H6911-FS(3)**	**10.000**	**7/22/2020**	**1.00**	**2.41**	**6.02**	
11Cl-PF3OUdS	763051-92-9	1.81 U	H6911-FS(3)	10.000	7/22/2020	0.63	1.81	6.02	
9Cl-PF3ONS	**756426-58-1**	**1.20 U**	**H6911-FS(3)**	**10.000**	**7/22/2020**	**0.58**	**1.20**	**6.02**	

MJ 9/26/20

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

BATTELLE
It can be done

14

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

Client ID	PX-S09-SB24-0304
Battelle ID	H6912-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	11.08
Matrix	SOIL
Sample Size	1.86
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.15 U	H6912-FS(3)	10.000	7/22/2020	0.76	2.15	5.38
PFHpA	**375-85-9**	**1.61 U**	**H6912-FS(3)**	**10.000**	**7/22/2020**	**0.55**	**1.61**	**5.38**
PFOA	335-67-1	2.15 U	H6912-FS(3)	10.000	7/22/2020	0.66	2.15	5.38
PFNA	**375-95-1**	**1.08 U**	**H6912-FS(3)**	**10.000**	**7/22/2020**	**0.53**	**1.08**	**5.38**
PFDA	335-76-2	1.08 U	H6912-FS(3)	10.000	7/22/2020	0.49	1.08	5.38
PFUnA	**2058-94-8**	**1.08 U**	**H6912-FS(3)**	**10.000**	**7/22/2020**	**0.49**	**1.08**	**5.38**
PFDoA	307-55-1	2.15 U	H6912-FS(3)	10.000	7/22/2020	0.66	2.15	5.38
PFTrDA	**72629-94-8**	**1.08 U**	**H6912-FS(3)**	**10.000**	**7/22/2020**	**0.30**	**1.08**	**5.38**
PFTeDA	376-06-7	2.69 U	H6912-FS(3)	10.000	7/22/2020	1.16	2.69	5.38
NMeFOSAA	**2355-31-9**	**2.69 U**	**H6912-FS(3)**	**10.000**	**7/22/2020**	**1.10**	**2.69**	**5.38**
NEtFOSAA	2991-50-6	2.15 U	H6912-FS(3)	10.000	7/22/2020	0.81	2.15	5.38
PFBS	**375-73-5**	**1.08 U**	**H6912-FS(3)**	**10.000**	**7/22/2020**	**0.38**	**1.08**	**5.38**
PFHxS	355-46-4	2.15 U	H6912-FS(3)	10.000	7/22/2020	0.87	2.15	5.38
PFOS	**1763-23-1**	**2.15 U**	**H6912-FS(3)**	**10.000**	**7/22/2020**	**0.74**	**2.15**	**5.38**
HFPO-DA	13252-13-6	2.15 U	H6912-FS(3)	10.000	7/22/2020	0.69	2.15	5.38
Adona	**919005-14-4**	**2.15 U**	**H6912-FS(3)**	**10.000**	**7/22/2020**	**0.89**	**2.15**	**5.38**
11Cl-PF3OUdS	763051-92-9	1.61 U	H6912-FS(3)	10.000	7/22/2020	0.56	1.61	5.38
9Cl-PF3ONS	**756426-58-1**	**1.08 U**	**H6912-FS(3)**	**10.000**	**7/22/2020**	**0.52**	**1.08**	**5.38**

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

BATTELLE
It can be done

15

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

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

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

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

BATTELLE
It can be done

16

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

Client ID	PX-WF-CTMCA-SB02-0304
Battelle ID	H6914-FS
Sample Type	SA
Collection Date	07/06/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	16.13
Matrix	SOIL
Sample Size	1.75
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.29 U	H6914-FS(3)	10.000	7/22/2020	0.81	2.29	5.71
PFHpA	**375-85-9**	**1.71 U**	**H6914-FS(3)**	**10.000**	**7/22/2020**	**0.58**	**1.71**	**5.71**
PFOA	335-67-1	2.29 U	H6914-FS(3)	10.000	7/22/2020	0.70	2.29	5.71
PFNA	**375-95-1**	**1.14 U**	**H6914-FS(3)**	**10.000**	**7/22/2020**	**0.56**	**1.14**	**5.71**
PFDA	335-76-2	1.14 U	H6914-FS(3)	10.000	7/22/2020	0.53	1.14	5.71
PFUnA	**2058-94-8**	**1.14 U**	**H6914-FS(3)**	**10.000**	**7/22/2020**	**0.53**	**1.14**	**5.71**
PFDoA	307-55-1	2.29 U	H6914-FS(3)	10.000	7/22/2020	0.70	2.29	5.71
PFTrDA	**72629-94-8**	**1.14 U**	**H6914-FS(3)**	**10.000**	**7/22/2020**	**0.32**	**1.14**	**5.71**
PFTeDA	376-06-7	2.86 U	H6914-FS(3)	10.000	7/22/2020	1.23	2.86	5.71
NMeFOSAA	**2355-31-9**	**2.86 U**	**H6914-FS(3)**	**10.000**	**7/22/2020**	**1.17**	**2.86**	**5.71**
NEtFOSAA	2991-50-6	2.29 U	H6914-FS(3)	10.000	7/22/2020	0.86	2.29	5.71
PFBS	**375-73-5**	**1.14 U**	**H6914-FS(3)**	**10.000**	**7/22/2020**	**0.40**	**1.14**	**5.71**
PFHxS	355-46-4	2.29 U	H6914-FS(3)	10.000	7/22/2020	0.93	2.29	5.71
PFOS	**1763-23-1**	**2.29 U**	**H6914-FS(3)**	**10.000**	**7/22/2020**	**0.79**	**2.29**	**5.71**
HFPO-DA	13252-13-6	2.29 U	H6914-FS(3)	10.000	7/22/2020	0.73	2.29	5.71
Adona	**919005-14-4**	**2.29 U**	**H6914-FS(3)**	**10.000**	**7/22/2020**	**0.95**	**2.29**	**5.71**
11Cl-PF3OUdS	763051-92-9	1.71 U	H6914-FS(3)	10.000	7/22/2020	0.59	1.71	5.71
9Cl-PF3ONS	**756426-58-1**	**1.14 U**	**H6914-FS(3)**	**10.000**	**7/22/2020**	**0.55**	**1.14**	**5.71**

BATTELLE
It can be done

17

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

Client ID	PX-WF-CTMCA-SS07-000H
Battelle ID	H6915-FS
Sample Type	SA
Collection Date	07/06/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	8.82
Matrix	SOIL
Sample Size	1.82
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.10 J	H6915-FS(3)	10.000	7/22/2020	0.78	2.20	5.49
PFHpA	375-85-9	1.65 U	H6915-FS(3)	10.000	7/22/2020	0.56	1.65	5.49
PFOA	335-67-1	1.71 J	H6915-FS(3)	10.000	7/22/2020	0.67	2.20	5.49
PFNA	375-95-1	0.99 J	H6915-FS(3)	10.000	7/22/2020	0.54	1.10	5.49
PFDA	335-76-2	1.10 U	H6915-FS(3)	10.000	7/22/2020	0.51	1.10	5.49
PFUnA	2058-94-8	1.10 U	H6915-FS(3)	10.000	7/22/2020	0.51	1.10	5.49
PFDoA	307-55-1	2.20 U	H6915-FS(3)	10.000	7/22/2020	0.67	2.20	5.49
PFTrDA	72629-94-8	1.10 U	H6915-FS(3)	10.000	7/22/2020	0.31	1.10	5.49
PFTeDA	376-06-7	2.75 U	H6915-FS(3)	10.000	7/22/2020	1.19	2.75	5.49
NMeFOSAA	2355-31-9	2.75 U	H6915-FS(3)	10.000	7/22/2020	1.12	2.75	5.49
NEtFOSAA	2991-50-6	2.20 U	H6915-FS(3)	10.000	7/22/2020	0.82	2.20	5.49
PFBS	375-73-5	1.10 U	H6915-FS(3)	10.000	7/22/2020	0.38	1.10	5.49
PFHxS	355-46-4	7.52	H6915-FS(3)	10.000	7/22/2020	0.89	2.20	5.49
PFOS	1763-23-1	123.45	H6915-FS-D(5)	50.000	7/22/2020	3.79	10.99	27.47
HFPO-DA	13252-13-6	2.20 U	H6915-FS(3)	10.000	7/22/2020	0.70	2.20	5.49
Adona	919005-14-4	2.20 U	H6915-FS(3)	10.000	7/22/2020	0.91	2.20	5.49
11Cl-PF3OUdS	763051-92-9	1.65 U	H6915-FS(3)	10.000	7/22/2020	0.57	1.65	5.49
9Cl-PF3ONS	756426-58-1	1.10 U	H6915-FS(3)	10.000	7/22/2020	0.53	1.10	5.49

MW 9/26/20

BATTELLE
It can be done

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

18

Client ID	PX-WF-CTMCA-SB07-0304
Battelle ID	H6916-FS
Sample Type	SA
Collection Date	07/06/2020
Extraction Date	07/09/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	17.93
Matrix	SOIL
Sample Size	1.75
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.29 U	H6916-FS(3)	10.000	7/22/2020	0.81	2.29	5.71
PFHpA	375-85-9	1.71 U	H6916-FS(3)	10.000	7/22/2020	0.58	1.71	5.71
PFOA	335-67-1	2.29 U	H6916-FS(3)	10.000	7/22/2020	0.70	2.29	5.71
PFNA	375-95-1	1.14 U	H6916-FS(3)	10.000	7/22/2020	0.56	1.14	5.71
PFDA	335-76-2	1.14 U	H6916-FS(3)	10.000	7/22/2020	0.53	1.14	5.71
PFUnA	2058-94-8	1.14 U	H6916-FS(3)	10.000	7/22/2020	0.53	1.14	5.71
PFDoA	307-55-1	2.29 U	H6916-FS(3)	10.000	7/22/2020	0.70	2.29	5.71
PFTrDA	72629-94-8	1.14 U	H6916-FS(3)	10.000	7/22/2020	0.32	1.14	5.71
PFTeDA	376-06-7	2.86 U	H6916-FS(3)	10.000	7/22/2020	1.23	2.86	5.71
NMeFOSAA	2355-31-9	2.86 U	H6916-FS(3)	10.000	7/22/2020	1.17	2.86	5.71
NEtFOSAA	2991-50-6	2.29 U	H6916-FS(3)	10.000	7/22/2020	0.86	2.29	5.71
PFBS	375-73-5	1.14 U	H6916-FS(3)	10.000	7/22/2020	0.40	1.14	5.71
PFHxS	355-46-4	3.14 J	H6916-FS(3)	10.000	7/22/2020	0.93	2.29	5.71
PFOS	1763-23-1	4.67 J	H6916-FS(3)	10.000	7/22/2020	0.79	2.29	5.71
HFPO-DA	13252-13-6	2.29 U	H6916-FS(3)	10.000	7/22/2020	0.73	2.29	5.71
Adona	919005-14-4	2.29 U	H6916-FS(3)	10.000	7/22/2020	0.95	2.29	5.71
11Cl-PF3OUdS	763051-92-9	1.71 U	H6916-FS(3)	10.000	7/22/2020	0.59	1.71	5.71
9Cl-PF3ONS	756426-58-1	1.14 U	H6916-FS(3)	10.000	7/22/2020	0.55	1.14	5.71

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

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

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

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

A Stage 2B/4 data validation was performed on the analytical data for six water samples, four aqueous equipment blank samples, and one aqueous field blank sample collected on July 7-8, 2020 by CH2M HILL at the NAS Patuxent River site in Maryland. The samples were analyzed under the Analysis of Poly and Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis	*Method References*
PFAS	Battelle SOP 5-369-08

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

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

The following data quality indicators were reviewed for this report:

Organics

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

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

Data Usability Assessment

There were no serious deficiencies of data.

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

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

Per- and Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

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

Holding Times

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

LC/MS Tuning

- All criteria were met.

Initial Calibration

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

Continuing Calibration

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

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-WF-B8076-EB01-070720-SO	PFHpA	0.21	None	Applies to other packages
	PFHxS	0.15	None	
	PFOS	2.04	None	
PX-WF-CTMCA-EB01-GW	None - ND	-	-	-
PX-SS09-EB01-070720-SO	PFHxA	0.92	None	Applies to other packages
	PFHpA	0.67	None	
	PFBS	0.40	None	
	PFHxS	4.77	None	
	PFOS	26.66	None	
PX-S09-FB01-070820	None - ND	-	-	-
PX-S09-EB01-070820	PFHpA	0.38	U	1, 2, 5, 6, 9
PX-WF-FB01-070720	None - ND	-	-	-

Surrogate Spike Recoveries

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

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

Laboratory Fortified Blank (LFB)

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

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

- MS/MSD samples were not analyzed.

Internal Standard (IS) Area Performance

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

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

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

Field Duplicate Sample Precision

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

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

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

Signed: Nancy Weaver Dated: 10/2/20

Nancy Weaver
Senior Chemist

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

BATTELLE
It can be done

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

Client ID	PX-WF-B8076-EB01-070720-SO
Battelle ID	H7058-FS
Sample Type	SA
Collection Date	07/07/2020
Extraction Date	07/14/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	QC
Sample Size	0.305
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.23 U	H7058-FS(0)	1.000	8/3/2020	0.43	1.23	4.10
PFHpA	**375-85-9**	0.82 ~~0.21~~ U	**H7058-FS(0)**	**1.000**	**8/3/2020**	**0.21**	**0.82**	**4.10**
PFOA	335-67-1	1.23 U	H7058-FS(0)	1.000	8/3/2020	0.42	1.23	4.10
PFNA	**375-95-1**	**0.82 U**	**H7058-FS(0)**	**1.000**	**8/3/2020**	**0.25**	**0.82**	**4.10**
PFDA	335-76-2	0.41 U	H7058-FS(0)	1.000	8/3/2020	0.11	0.41	4.10
PFUnA	**2058-94-8**	**0.41 U**	**H7058-FS(0)**	**1.000**	**8/3/2020**	**0.18**	**0.41**	**4.10**
PFDoA	307-55-1	0.41 U	H7058-FS(0)	1.000	8/3/2020	0.16	0.41	4.10
PFTrDA	**72629-94-8**	**0.41 U**	**H7058-FS(0)**	**1.000**	**8/3/2020**	**0.12**	**0.41**	**4.10**
PFTeDA	376-06-7	1.64 U	H7058-FS(0)	1.000	8/3/2020	0.60	1.64	4.10
NMeFOSAA	**2355-31-9**	**0.82 U**	**H7058-FS(0)**	**1.000**	**8/3/2020**	**0.29**	**0.82**	**4.10**
NEtFOSAA	2991-50-6	0.82 U	H7058-FS(0)	1.000	8/3/2020	0.41	0.82	4.10
PFBS	**375-73-5**	**0.41 U**	**H7058-FS(0)**	**1.000**	**8/3/2020**	**0.11**	**0.41**	**4.10**
PFHxS	355-46-4	0.15 J	H7058-FS(0)	1.000	8/3/2020	0.09	0.33	4.10
PFOS	**1763-23-1**	**2.04 J**	**H7058-FS(0)**	**1.000**	**8/3/2020**	**0.36**	**0.82**	**4.10**
HFPO-DA	13252-13-6	0.41 U	H7058-FS(0)	1.000	8/3/2020	0.20	0.41	4.10
Adona	**919005-14-4**	**0.82 U**	**H7058-FS(0)**	**1.000**	**8/3/2020**	**0.22**	**0.82**	**4.10**
11Cl-PF3OUdS	763051-92-9	0.41 U	H7058-FS(0)	1.000	8/3/2020	0.19	0.41	4.10
9Cl-PF3ONS	**756426-58-1**	**0.82 U**	**H7058-FS(0)**	**1.000**	**8/3/2020**	**0.22**	**0.82**	**4.10**

EB L

NW 9/26/20

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

BATTELLE
It can be done

2

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

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

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

0.86

MW 9/26/20

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

BATTELLE
It can be done

3

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

Client ID		PX-WF-CTMCA-EB01-GW						
Battelle ID		H7060-FS						
Sample Type		SA						
Collection Date		07/07/2020						
Extraction Date		07/14/2020						
Analytical Instrument		Sciex 5500 LC/MS/MS						
% Moisture		NA						
Matrix		QC						
Sample Size		0.285						
Size Unit-Basis		L						
Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.32 U	H7060-FS(0)	1.000	8/3/2020	0.46	1.32	4.39
PFHpA	**375-85-9**	**0.88 U**	**H7060-FS(0)**	**1.000**	**8/3/2020**	**0.23**	**0.88**	**4.39**
PFOA	335-67-1	1.32 U	H7060-FS(0)	1.000	8/3/2020	0.45	1.32	4.39
PFNA	**375-95-1**	**0.88 U**	**H7060-FS(0)**	**1.000**	**8/3/2020**	**0.27**	**0.88**	**4.39**
PFDA	335-76-2	0.44 U	H7060-FS(0)	1.000	8/3/2020	0.12	0.44	4.39
PFUnA	**2058-94-8**	**0.44 U**	**H7060-FS(0)**	**1.000**	**8/3/2020**	**0.19**	**0.44**	**4.39**
PFDoA	307-55-1	0.44 U	H7060-FS(0)	1.000	8/3/2020	0.17	0.44	4.39
PFTrDA	**72629-94-8**	**0.44 U**	**H7060-FS(0)**	**1.000**	**8/3/2020**	**0.13**	**0.44**	**4.39**
PFTeDA	376-06-7	1.75 U	H7060-FS(0)	1.000	8/3/2020	0.64	1.75	4.39
NMeFOSAA	**2355-31-9**	**0.88 U**	**H7060-FS(0)**	**1.000**	**8/3/2020**	**0.31**	**0.88**	**4.39**
NEtFOSAA	2991-50-6	0.88 U	H7060-FS(0)	1.000	8/3/2020	0.44	0.88	4.39
PFBS	**375-73-5**	**0.44 U**	**H7060-FS(0)**	**1.000**	**8/3/2020**	**0.12**	**0.44**	**4.39**
PFHxS	355-46-4	0.35 U	H7060-FS(0)	1.000	8/3/2020	0.10	0.35	4.39
PFOS	**1763-23-1**	**0.88 U**	**H7060-FS(0)**	**1.000**	**8/3/2020**	**0.39**	**0.88**	**4.39**
HFPO-DA	13252-13-6	0.44 U	H7060-FS(0)	1.000	8/3/2020	0.22	0.44	4.39
Adona	**919005-14-4**	**0.88 U**	**H7060-FS(0)**	**1.000**	**8/3/2020**	**0.24**	**0.88**	**4.39**
11Cl-PF3OUdS	763051-92-9	0.44 U	H7060-FS(0)	1.000	8/3/2020	0.20	0.44	4.39
9Cl-PF3ONS	**756426-58-1**	**0.88 U**	**H7060-FS(0)**	**1.000**	**8/3/2020**	**0.24**	**0.88**	**4.39**

BATTELLE
It can be done

4

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

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

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

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

BATTELLE
It can be done

4

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

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

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

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

BATTELLE
It can be done

5

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

Client ID	PX-S09-MW07-0720
Battelle ID	H7087-FS
Sample Type	SA
Collection Date	07/08/2020
Extraction Date	07/14/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	GW
Sample Size	0.275
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	1.86 J	H7087-FS(0)	1.000	8/4/2020	0.48	1.36	4.55	
PFHpA	**375-85-9**	**1.26 J U**	**H7087-FS(0)**	**1.000**	**8/4/2020**	**0.24**	**0.91**	**4.55**	EBL
PFOA	335-67-1	2.99 J	H7087-FS(0)	1.000	8/4/2020	0.46	1.36	4.55	
PFNA	**375-95-1**	**0.87 J**	**H7087-FS(0)**	**1.000**	**8/4/2020**	**0.28**	**0.91**	**4.55**	
PFDA	335-76-2	0.45 U	H7087-FS(0)	1.000	8/4/2020	0.13	0.45	4.55	
PFUnA	**2058-94-8**	**0.45 U**	**H7087-FS(0)**	**1.000**	**8/4/2020**	**0.20**	**0.45**	**4.55**	
PFDoA	307-55-1	0.45 U	H7087-FS(0)	1.000	8/4/2020	0.17	0.45	4.55	
PFTrDA	**72629-94-8**	**0.45 U**	**H7087-FS(0)**	**1.000**	**8/4/2020**	**0.14**	**0.45**	**4.55**	
PFTeDA	376-06-7	1.82 U	H7087-FS(0)	1.000	8/4/2020	0.66	1.82	4.55	
NMeFOSAA	**2355-31-9**	**0.91 U**	**H7087-FS(0)**	**1.000**	**8/4/2020**	**0.32**	**0.91**	**4.55**	
NEtFOSAA	2991-50-6	0.91 U	H7087-FS(0)	1.000	8/4/2020	0.45	0.91	4.55	
PFBS	**375-73-5**	**1.36 J**	**H7087-FS(0)**	**1.000**	**8/4/2020**	**0.13**	**0.45**	**4.55**	
PFHxS	355-46-4	4.28 J	H7087-FS(0)	1.000	8/4/2020	0.10	0.36	4.55	
PFOS	**1763-23-1**	**11.32**	**H7087-FS(0)**	**1.000**	**8/4/2020**	**0.40**	**0.91**	**4.55**	
HFPO-DA	13252-13-6	0.45 U	H7087-FS(0)	1.000	8/4/2020	0.23	0.45	4.55	
Adona	**919005-14-4**	**0.91 U**	**H7087-FS(0)**	**1.000**	**8/4/2020**	**0.25**	**0.91**	**4.55**	
11Cl-PF3OUdS	763051-92-9	0.45 U	H7087-FS(0)	1.000	8/4/2020	0.21	0.45	4.55	
9Cl-PF3ONS	**756426-58-1**	**0.91 U**	**H7087-FS(0)**	**1.000**	**8/4/2020**	**0.25**	**0.91**	**4.55**	

NW 9/26/20

BATTELLE
It can be done

6

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

Client ID	PX-S09-MW07P-0720
Battelle ID	H7088-FS
Sample Type	SA
Collection Date	07/08/2020
Extraction Date	07/14/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	GW
Sample Size	0.280
Size Unit-Basis	L

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

EBL

NW 9/26/20

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

BATTELLE
It can be done

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

7

Client ID		PX-S09-MW05-0720							
Battelle ID		H7089-FS							
Sample Type		SA							
Collection Date		07/08/2020							
Extraction Date		07/14/2020							
Analytical Instrument		Sciex 5500 LC/MS/MS							
% Moisture		NA							
Matrix		GW							
Sample Size		0.255							
Size Unit-Basis		L							
Analyte	CAS No.	Result (ng/L)		Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	178.33	D	H7089-FS-D(3)	5.000	8/4/2020	2.60	7.35	24.51
PFHpA	375-85-9	57.54		H7089-FS(0)	1.000	8/4/2020	0.25	0.98	4.90
PFOA	335-67-1	28.62		H7089-FS(0)	1.000	8/4/2020	0.50	1.47	4.90
PFNA	375-95-1	2.22	J	H7089-FS(0)	1.000	8/4/2020	0.30	0.98	4.90
PFDA	335-76-2	1.76	J	H7089-FS(0)	1.000	8/4/2020	0.14	0.49	4.90
PFUnA	2058-94-8	1.49	J	H7089-FS(0)	1.000	8/4/2020	0.22	0.49	4.90
PFDoA	307-55-1	0.61	J	H7089-FS(0)	1.000	8/4/2020	0.19	0.49	4.90
PFTrDA	72629-94-8	0.49	U	H7089-FS(0)	1.000	8/4/2020	0.15	0.49	4.90
PFTeDA	376-06-7	1.96	U	H7089-FS(0)	1.000	8/4/2020	0.72	1.96	4.90
NMeFOSAA	2355-31-9	0.98	U	H7089-FS(0)	1.000	8/4/2020	0.34	0.98	4.90
NEtFOSAA	2991-50-6	0.98	U	H7089-FS(0)	1.000	8/4/2020	0.49	0.98	4.90
PFBS	375-73-5	84.20		H7089-FS(0)	1.000	8/4/2020	0.14	0.49	4.90
PFHxS	355-46-4	514.64	D	H7089-FS-D(5)	25.000	8/4/2020	2.70	9.80	122.55
PFOS	1763-23-1	589.49	D	H7089-FS-D(5)	25.000	8/4/2020	10.78	24.51	122.55
HFPO-DA	13252-13-6	0.49	U	H7089-FS(0)	1.000	8/4/2020	0.25	0.49	4.90
Adona	919005-14-4	0.98	U	H7089-FS(0)	1.000	8/4/2020	0.26	0.98	4.90
11Cl-PF3OUdS	763051-92-9	0.49	U	H7089-FS(0)	1.000	8/4/2020	0.23	0.49	4.90
9Cl-PF3ONS	756426-58-1	0.98	U	H7089-FS(0)	1.000	8/4/2020	0.26	0.98	4.90

NW 9/26/20

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

BATTELLE
It can be done

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

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

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

BATTELLE
It can be done

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

9

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

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

NW 9/26/20

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

BATTELLE
It can be done

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

10

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

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

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

BATTELLE
It can be done

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

11

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

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

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

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

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

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

A Stage 2B/4 data validation was performed on the analytical data for five water samples collected on July 8-9, 2020 by CH2M HILL at the NAS Patuxent River site in Maryland. The samples were analyzed under the Analysis of Poly and Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis	*Method References*
PFAS	Battelle SOP 5-369-08

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

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

The following data quality indicators were reviewed for this report:

Organics

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

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

Data Usability Assessment

There were no serious deficiencies of data.

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

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

Per- and Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

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

Holding Times

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

LC/MS Tuning

- All criteria were met.

Initial Calibration

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

Continuing Calibration

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

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-S09-FB01-070820	None - ND	-	-	-
PX-S09-EB01-070820	PFHpA	0.38	U	5
PX-WF-CTMCA-FB01-070920	None - ND	-	-	-
PX-WF-CTMCA-EB02-070920	None - ND	-	-	-

Surrogate Spike Recoveries

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

EDS Sample	Surrogate	%R	Qualifier
3	PFTeDA	29%	UJ

Laboratory Fortified Blank (LFB)

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

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

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

EDS Sample ID	Compound	MS %R/MSD %R/RDP	Qualifier
2	PFHxA	OK/70%/37.2	None - 4X Rule Applies
	PFHxS	OK/139%/OK	None - 4X Rule Applies
	PFOS	OK/162%/85.5	None - 4X Rule Applies

Internal Standard (IS) Area Performance

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

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

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

Field Duplicate Sample Precision

- Field duplicate samples were not collected.

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

Signed: Nancy Weaver Dated: 10/2/20

Nancy Weaver
Senior Chemist

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

BATTELLE
It can be done

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

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

BATTELLE
It can be done

2

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

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

BATTELLE
It can be done

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

3

Client ID	PX-WF-CTMCA-WT03-0720
Battelle ID	H7153-FS
Sample Type	SA
Collection Date	07/09/2020
Extraction Date	07/17/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	GW
Sample Size	0.270
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	5.58	H7153-FS(0)	1.000	8/4/2020	0.49	1.39	4.63	
PFHpA	**375-85-9**	**6.48**	**H7153-FS(0)**	**1.000**	**8/4/2020**	**0.24**	**0.93**	**4.63**	
PFOA	335-67-1	1.01 J	H7153-FS(0)	1.000	8/4/2020	0.47	1.39	4.63	
PFNA	**375-95-1**	**0.93 U**	**H7153-FS(0)**	**1.000**	**8/4/2020**	**0.29**	**0.93**	**4.63**	
PFDA	335-76-2	0.46 U	H7153-FS(0)	1.000	8/4/2020	0.13	0.46	4.63	
PFUnA	**2058-94-8**	**0.46 U**	**H7153-FS(0)**	**1.000**	**8/4/2020**	**0.20**	**0.46**	**4.63**	
PFDoA	307-55-1	0.46 U	H7153-FS(0)	1.000	8/4/2020	0.18	0.46	4.63	
PFTrDA	**72629-94-8**	**0.46 U**	**H7153-FS(0)**	**1.000**	**8/4/2020**	**0.14**	**0.46**	**4.63**	
PFTeDA	376-06-7	1.85 ~~J~~ UJ	H7153-FS(0)	1.000	8/4/2020	0.68	1.85	4.63	SSL
NMeFOSAA	**2355-31-9**	**0.93 U**	**H7153-FS(0)**	**1.000**	**8/4/2020**	**0.32**	**0.93**	**4.63**	
NEtFOSAA	2991-50-6	0.93 U	H7153-FS(0)	1.000	8/4/2020	0.46	0.93	4.63	
PFBS	**375-73-5**	**5.59**	**H7153-FS(0)**	**1.000**	**8/4/2020**	**0.13**	**0.46**	**4.63**	
PFHxS	355-46-4	87.88	H7153-FS(0)	1.000	8/4/2020	0.10	0.37	4.63	
PFOS	**1763-23-1**	**18.25**	**H7153-FS(0)**	**1.000**	**8/4/2020**	**0.41**	**0.93**	**4.63**	
HFPO-DA	13252-13-6	0.46 U	H7153-FS(0)	1.000	8/4/2020	0.23	0.46	4.63	
Adona	**919005-14-4**	**0.93 U**	**H7153-FS(0)**	**1.000**	**8/4/2020**	**0.25**	**0.93**	**4.63**	
11Cl-PF3OUdS	763051-92-9	0.46 U	H7153-FS(0)	1.000	8/4/2020	0.21	0.46	4.63	
9Cl-PF3ONS	**756426-58-1**	**0.93 U**	**H7153-FS(0)**	**1.000**	**8/4/2020**	**0.25**	**0.93**	**4.63**	

BATTELLE
It can be done

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

3

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

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

BATTELLE
It can be done

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

4

Client ID		PX-WF-CTMCA-WT05-0720						
Battelle ID		H7154-FS						
Sample Type		SA						
Collection Date		07/09/2020						
Extraction Date		07/17/2020						
Analytical Instrument		Sciex 5500 LC/MS/MS						
% Moisture		NA						
Matrix		GW						
Sample Size		0.270						
Size Unit-Basis		L						
Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	47.13	H7154-FS(0)	1.000	8/4/2020	0.49	1.39	4.63
PFHpA	375-85-9	16.35	H7154-FS(0)	1.000	8/4/2020	0.24	0.93	4.63
PFOA	335-67-1	5.38	H7154-FS(0)	1.000	8/4/2020	0.47	1.39	4.63
PFNA	375-95-1	0.41 J	H7154-FS(0)	1.000	8/4/2020	0.29	0.93	4.63
PFDA	335-76-2	0.46 U	H7154-FS(0)	1.000	8/4/2020	0.13	0.46	4.63
PFUnA	2058-94-8	0.46 U	H7154-FS(0)	1.000	8/4/2020	0.20	0.46	4.63
PFDoA	307-55-1	0.46 U	H7154-FS(0)	1.000	8/4/2020	0.18	0.46	4.63
PFTrDA	72629-94-8	0.46 U	H7154-FS(0)	1.000	8/4/2020	0.14	0.46	4.63
PFTeDA	376-06-7	1.85 U	H7154-FS(0)	1.000	8/4/2020	0.68	1.85	4.63
NMeFOSAA	2355-31-9	0.93 U	H7154-FS(0)	1.000	8/4/2020	0.32	0.93	4.63
NEtFOSAA	2991-50-6	0.93 U	H7154-FS(0)	1.000	8/4/2020	0.46	0.93	4.63
PFBS	375-73-5	21.56	H7154-FS(0)	1.000	8/4/2020	0.13	0.46	4.63
PFHxS	355-46-4	33.75	H7154-FS(0)	1.000	8/4/2020	0.10	0.37	4.63
PFOS	1763-23-1	22.36	H7154-FS(0)	1.000	8/4/2020	0.41	0.93	4.63
HFPO-DA	13252-13-6	0.46 U	H7154-FS(0)	1.000	8/4/2020	0.23	0.46	4.63
Adona	919005-14-4	0.93 U	H7154-FS(0)	1.000	8/4/2020	0.25	0.93	4.63
11Cl-PF3OUdS	763051-92-9	0.46 U	H7154-FS(0)	1.000	8/4/2020	0.21	0.46	4.63
9Cl-PF3ONS	756426-58-1	0.93 U	H7154-FS(0)	1.000	8/4/2020	0.25	0.93	4.63

BATTELLE
It can be done

5

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

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

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

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-0861
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, St. Mary's County, CTO-JU14, Maryland
Date: September 28, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-B1669-EB01-072820-SO	H7698-FS	Water
2	PX-B1669-WT05-0720	H7704-FS	Water
3	PX-B1669-WT07-0720	H7705-FS	Water
4	PX-B1669-WT06-0720	H7706-FS	Water
5	PX-B1669-WT03-0720	H7707-FS	Water
6	PX-B1669-WT02-0720	H7708-FS	Water
7	PX-B1669-WT02P-0720	H7709-FS	Water
8	PX-B1669-WT04-0720	H7710-FS	Water
8MS	PX-B1669-WT04-0720MS	H7711-FS	Water
8MSD	PX-B1669-WT04-0720MSD	H7712-FS	Water
9	PX-B1669-WT01-0720	H7713-FS	Water
10	PS-B1669-FB01-072820	H7714-FS	Water
11	PS-B1669-EB01-072820-GW	H7715-FS	Water
12	PX-B102-FB01-072820	H7716-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for eight water samples, two aqueous equipment blank samples, and two aqueous field blank samples collected on July 28, 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-B1669-EB01-072820-SO	PFOS	0.70	None	To be applied to other packages
PX-B1669-FB01-072820	None - ND	-	-	-
PX-B1669-EB01-072820-GW	None - ND	-	-	-
PX-B102-FB01-072820	None - ND	-	-	-

Surrogate Spike Recoveries

- Several samples exhibited low surrogate percent recoveries (%R) for several surrogate compounds. These compounds were qualified as estimated (J/UJ) in each sample. Please refer to the Surrogate Form 2s at the end of the DVR for specific recoveries and qualifications.

Laboratory Fortified Blank (LFB)

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

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

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

Internal Standard (IS) Area Performance

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

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

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

Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was unacceptable for five compounds. These results were qualified as estimated (J).

Compound	PX-B1669-WT02-0720 ng/L	PX-B1669-WT02P-0720 ng/L	RPD	Qualifier
PFHxA	58.27	86.16	39%	J
PFHpA	94.45	125.10	28%	
PFOA	70.60	87.72	22%	None
PFNA	36.11	57.47	46%	J
PFDA	2.39	4.31	57%	None - <5X LOQ
PFBS	1.38	1.17	16%	None
PFHxS	11.18	6.92	47%	J
PFOS	24.30	15.05	47%	

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

Signed: Nancy Weaver Dated: 10/2/20

Nancy Weaver
Senior Chemist

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

BATTELLE
It can be done

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

Client ID		PX-B1669-EB01-072820-SO						
Battelle ID		H7698-FS						
Sample Type		SA						
Collection Date		07/28/2020						
Extraction Date		07/30/2020						
Analytical Instrument		Sciex 5500 LC/MS/MS						
% Moisture		NA						
Matrix		W						
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	H7698-FS(0)	1.000	8/19/2020	0.51	1.44	4.81
PFHpA	375-85-9	0.96 U	H7698-FS(0)	1.000	8/19/2020	0.25	0.96	4.81
PFOA	335-67-1	1.44 U	H7698-FS(0)	1.000	8/19/2020	0.49	1.44	4.81
PFNA	375-95-1	0.96 U	H7698-FS(0)	1.000	8/19/2020	0.30	0.96	4.81
PFDA	335-76-2	0.48 U	H7698-FS(0)	1.000	8/19/2020	0.13	0.48	4.81
PFUnA	2058-94-8	0.48 U	H7698-FS(0)	1.000	8/19/2020	0.21	0.48	4.81
PFDoA	307-55-1	0.48 U	H7698-FS(0)	1.000	8/19/2020	0.18	0.48	4.81
PFTrDA	72629-94-8	0.48 U	H7698-FS(0)	1.000	8/19/2020	0.14	0.48	4.81
PFTeDA	376-06-7	1.92 U	H7698-FS(0)	1.000	8/19/2020	0.70	1.92	4.81
NMeFOSAA	2355-31-9	0.96 U	H7698-FS(0)	1.000	8/19/2020	0.34	0.96	4.81
NEtFOSAA	2991-50-6	0.96 U	H7698-FS(0)	1.000	8/19/2020	0.48	0.96	4.81
PFBS	375-73-5	0.48 U	H7698-FS(0)	1.000	8/19/2020	0.13	0.48	4.81
PFHxS	355-46-4	0.38 U	H7698-FS(0)	1.000	8/19/2020	0.11	0.38	4.81
PFOS	1763-23-1	0.70 J	H7698-FS(0)	1.000	8/19/2020	0.42	0.96	4.81
HFPO-DA	13252-13-6	0.48 U	H7698-FS(0)	1.000	8/19/2020	0.24	0.48	4.81
Adona	919005-14-4	0.96 U	H7698-FS(0)	1.000	8/19/2020	0.26	0.96	4.81
11Cl-PF3OUdS	763051-92-9	0.48 U	H7698-FS(0)	1.000	8/19/2020	0.22	0.48	4.81
9Cl-PF3ONS	756426-58-1	0.96 U	H7698-FS(0)	1.000	8/19/2020	0.26	0.96	4.81

MW 9/28/20

Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

BATTELLE
It can be done

2

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

Client ID		PX-B1669-WT05-0720						
Battelle ID		H7704-FS						
Sample Type		SA						
Collection Date		07/28/2020						
Extraction Date		07/30/2020						
Analytical Instrument		Sciex 5500 LC/MS/MS						
% Moisture		NA						
Matrix		W						
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	6.02	H7704-FS(0)	1.000	8/19/2020	0.53	1.50	5.00
PFHpA	375-85-9	6.78	H7704-FS(0)	1.000	8/19/2020	0.26	1.00	5.00
PFOA	335-67-1	12.58	H7704-FS(0)	1.000	8/19/2020	0.51	1.50	5.00
PFNA	375-95-1	1.68 J	H7704-FS(0)	1.000	8/19/2020	0.31	1.00	5.00
PFDA	335-76-2	0.50 U	H7704-FS(0)	1.000	8/19/2020	0.14	0.50	5.00
PFUnA	2058-94-8	0.50 U	H7704-FS(0)	1.000	8/19/2020	0.22	0.50	5.00
PFDoA	307-55-1	0.50 U	H7704-FS(0)	1.000	8/19/2020	0.19	0.50	5.00
PFTrDA	72629-94-8	0.50 U	H7704-FS(0)	1.000	8/19/2020	0.15	0.50	5.00
PFTeDA	376-06-7	2.00 U	H7704-FS(0)	1.000	8/19/2020	0.73	2.00	5.00
NMeFOSAA	2355-31-9	1.00 U	H7704-FS(0)	1.000	8/19/2020	0.35	1.00	5.00
NEtFOSAA	2991-50-6	1.00 U	H7704-FS(0)	1.000	8/19/2020	0.50	1.00	5.00
PFBS	375-73-5	0.71 J	H7704-FS(0)	1.000	8/19/2020	0.14	0.50	5.00
PFHxS	355-46-4	3.61 J	H7704-FS(0)	1.000	8/19/2020	0.11	0.40	5.00
PFOS	1763-23-1	7.32	H7704-FS(0)	1.000	8/19/2020	0.44	1.00	5.00
HFPO-DA	13252-13-6	0.50 U	H7704-FS(0)	1.000	8/19/2020	0.25	0.50	5.00
Adona	919005-14-4	1.00 U	H7704-FS(0)	1.000	8/19/2020	0.27	1.00	5.00
11Cl-PF3OUdS	763051-92-9	0.50 U	H7704-FS(0)	1.000	8/19/2020	0.23	0.50	5.00
9Cl-PF3ONS	756426-58-1	1.00 U	H7704-FS(0)	1.000	8/19/2020	0.27	1.00	5.00

MW 9/28/20

Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

BATTELLE
it can be done

3

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

Client ID	PX-B1669-WT07-0720
Battelle ID	H7705-FS
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	07/30/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	W
Sample Size	0.265
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	3.79 J	H7705-FS(0)	1.000	8/20/2020	0.50	1.42	4.72	
PFHpA	**375-85-9**	**2.11 J**	**H7705-FS(0)**	**1.000**	**8/20/2020**	**0.25**	**0.94**	**4.72**	
PFOA	335-67-1	5.56	H7705-FS(0)	1.000	8/20/2020	0.48	1.42	4.72	
PFNA	**375-95-1**	**1.43 J**	**H7705-FS(0)**	**1.000**	**8/20/2020**	**0.29**	**0.94**	**4.72**	
PFDA	335-76-2	0.40 J	H7705-FS(0)	1.000	8/20/2020	0.13	0.47	4.72	
PFUnA	**2058-94-8**	**0.47 U**	**H7705-FS(0)**	**1.000**	**8/20/2020**	**0.21**	**0.47**	**4.72**	
PFDoA	307-55-1	0.47 U	H7705-FS(0)	1.000	8/20/2020	0.18	0.47	4.72	
PFTrDA	**72629-94-8**	**0.47 U**	**H7705-FS(0)**	**1.000**	**8/20/2020**	**0.14**	**0.47**	**4.72**	
PFTeDA	376-06-7	1.89 ~~J~~ UJ	H7705-FS(0)	1.000	8/20/2020	0.69	1.89	4.72	SSL
NMeFOSAA	**2355-31-9**	**0.94 U**	**H7705-FS(0)**	**1.000**	**8/20/2020**	**0.33**	**0.94**	**4.72**	
NEtFOSAA	2991-50-6	0.94 U	H7705-FS(0)	1.000	8/20/2020	0.47	0.94	4.72	
PFBS	**375-73-5**	**1.22 J**	**H7705-FS(0)**	**1.000**	**8/20/2020**	**0.13**	**0.47**	**4.72**	
PFHxS	355-46-4	7.79	H7705-FS(0)	1.000	8/20/2020	0.10	0.38	4.72	
PFOS	**1763-23-1**	**18.66**	**H7705-FS(0)**	**1.000**	**8/20/2020**	**0.42**	**0.94**	**4.72**	
HFPO-DA	13252-13-6	0.47 U	H7705-FS(0)	1.000	8/20/2020	0.24	0.47	4.72	
Adona	**919005-14-4**	**0.94 U**	**H7705-FS(0)**	**1.000**	**8/20/2020**	**0.25**	**0.94**	**4.72**	
11Cl-PF3OUdS	763051-92-9	0.47 U	H7705-FS(0)	1.000	8/20/2020	0.22	0.47	4.72	
9Cl-PF3ONS	**756426-58-1**	**0.94 U**	**H7705-FS(0)**	**1.000**	**8/20/2020**	**0.25**	**0.94**	**4.72**	

NW 9/28/20
Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

BATTELLE
It can be done

3

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

Client ID	PX-B1669-WT07-0720
Battelle ID	H7705-FS
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	07/30/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	88	H7705-FS(0)	8/20/2020
13C4-PFHpA	88	H7705-FS(0)	8/20/2020
13C8-PFOA	82	H7705-FS(0)	8/20/2020
13C9-PFNA	78	H7705-FS(0)	8/20/2020
13C6-PFDA	73	H7705-FS(0)	8/20/2020
13C7-PFUnA	67	H7705-FS(0)	8/20/2020
13C2-PFDoA	59	H7705-FS(0)	8/20/2020
13C2-PFTeDA	34	H7705-FS(0)	8/20/2020
d3-MeFOSAA	54	H7705-FS(0)	8/20/2020
d5-EtFOSAA	73	H7705-FS(0)	8/20/2020
13C3-PFBS	106	H7705-FS(0)	8/20/2020
13C3-PFHxS	100	H7705-FS(0)	8/20/2020
13C8-PFOS	92	H7705-FS(0)	8/20/2020
13C3-HFPO-DA	79	H7705-FS(0)	8/20/2020

NW 9/28/20

Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

BATTELLE
It can be done

4

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

Client ID	PX-B1669-WT06-0720
Battelle ID	H7706-FS
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	07/30/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	W
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	15.99	H7706-FS(0)	1.000	8/20/2020	0.50	1.42	4.72	
PFHpA	**375-85-9**	**16.35**	**H7706-FS(0)**	**1.000**	**8/20/2020**	**0.25**	**0.94**	**4.72**	
PFOA	335-67-1	21.98	H7706-FS(0)	1.000	8/20/2020	0.48	1.42	4.72	
PFNA	**375-95-1**	**7.46**	**H7706-FS(0)**	**1.000**	**8/20/2020**	**0.29**	**0.94**	**4.72**	
PFDA	335-76-2	0.68 J	H7706-FS(0)	1.000	8/20/2020	0.13	0.47	4.72	
PFUnA	**2058-94-8**	**0.47 U**	**H7706-FS(0)**	**1.000**	**8/20/2020**	**0.21**	**0.47**	**4.72**	
PFDoA	307-55-1	0.47 U	H7706-FS(0)	1.000	8/20/2020	0.18	0.47	4.72	
PFTrDA	**72629-94-8**	**0.47 U**	**H7706-FS(0)**	**1.000**	**8/20/2020**	**0.14**	**0.47**	**4.72**	
PFTeDA	376-06-7	1.89 ~~J~~ UJ	H7706-FS(0)	1.000	8/20/2020	0.69	1.89	4.72	SSL
NMeFOSAA	**2355-31-9**	**0.94 ~~J~~ UJ**	**H7706-FS(0)**	**1.000**	**8/20/2020**	**0.33**	**0.94**	**4.72**	SSL
NEtFOSAA	2991-50-6	0.94 U	H7706-FS(0)	1.000	8/20/2020	0.47	0.94	4.72	
PFBS	**375-73-5**	**1.46 J**	**H7706-FS(0)**	**1.000**	**8/20/2020**	**0.13**	**0.47**	**4.72**	
PFHxS	355-46-4	19.14	H7706-FS(0)	1.000	8/20/2020	0.10	0.38	4.72	
PFOS	**1763-23-1**	**38.48**	**H7706-FS(0)**	**1.000**	**8/20/2020**	**0.42**	**0.94**	**4.72**	
HFPO-DA	13252-13-6	0.47 U	H7706-FS(0)	1.000	8/20/2020	0.24	0.47	4.72	
Adona	**919005-14-4**	**0.94 U**	**H7706-FS(0)**	**1.000**	**8/20/2020**	**0.25**	**0.94**	**4.72**	
11Cl-PF3OUdS	763051-92-9	0.47 U	H7706-FS(0)	1.000	8/20/2020	0.22	0.47	4.72	
9Cl-PF3ONS	**756426-58-1**	**0.94 U**	**H7706-FS(0)**	**1.000**	**8/20/2020**	**0.25**	**0.94**	**4.72**	

MJ 9/28/20
Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

BATTELLE
It can be done

4

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

Client ID	PX-B1669-WT06-0720
Battelle ID	H7706-FS
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	07/30/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	61	H7706-FS(0)	8/20/2020
13C4-PFHpA	**65**	**H7706-FS(0)**	**8/20/2020**
13C8-PFOA	63	H7706-FS(0)	8/20/2020
13C9-PFNA	**61**	**H7706-FS(0)**	**8/20/2020**
13C6-PFDA	52	H7706-FS(0)	8/20/2020
13C7-PFUnA	**56**	**H7706-FS(0)**	**8/20/2020**
13C2-PFDoA	51	H7706-FS(0)	8/20/2020
13C2-PFTeDA	**40** N	**H7706-FS(0)**	**8/20/2020**
d3-MeFOSAA	42 N	H7706-FS(0)	8/20/2020
d5-EtFOSAA	**56**	**H7706-FS(0)**	**8/20/2020**
13C3-PFBS	77	H7706-FS(0)	8/20/2020
13C3-PFHxS	**73**	**H7706-FS(0)**	**8/20/2020**
13C8-PFOS	70	H7706-FS(0)	8/20/2020
13C3-HFPO-DA	**56**	**H7706-FS(0)**	**8/20/2020**

NW 9/28/20

Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

BATTELLE
It can be done

5

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

Client ID	PX-B1669-WT03-0720
Battelle ID	H7707-FS
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	07/30/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	W
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	42.02	H7707-FS(0)	1.000	8/20/2020	0.50	1.42	4.72
PFHpA	**375-85-9**	**23.33**	**H7707-FS(0)**	**1.000**	**8/20/2020**	**0.25**	**0.94**	**4.72**
PFOA	335-67-1	29.68	H7707-FS(0)	1.000	8/20/2020	0.48	1.42	4.72
PFNA	**375-95-1**	**9.71**	**H7707-FS(0)**	**1.000**	**8/20/2020**	**0.29**	**0.94**	**4.72**
PFDA	335-76-2	2.20 J	H7707-FS(0)	1.000	8/20/2020	0.13	0.47	4.72
PFUnA	**2058-94-8**	**0.91 J**	**H7707-FS(0)**	**1.000**	**8/20/2020**	**0.21**	**0.47**	**4.72**
PFDoA	307-55-1	0.47 U	H7707-FS(0)	1.000	8/20/2020	0.18	0.47	4.72
PFTrDA	**72629-94-8**	**0.47 U**	**H7707-FS(0)**	**1.000**	**8/20/2020**	**0.14**	**0.47**	**4.72**
PFTeDA	376-06-7	1.89 U	H7707-FS(0)	1.000	8/20/2020	0.69	1.89	4.72
NMeFOSAA	**2355-31-9**	**0.94 U**	**H7707-FS(0)**	**1.000**	**8/20/2020**	**0.33**	**0.94**	**4.72**
NEtFOSAA	2991-50-6	0.94 U	H7707-FS(0)	1.000	8/20/2020	0.47	0.94	4.72
PFBS	**375-73-5**	**3.88 J**	**H7707-FS(0)**	**1.000**	**8/20/2020**	**0.13**	**0.47**	**4.72**
PFHxS	355-46-4	29.16	H7707-FS(0)	1.000	8/20/2020	0.10	0.38	4.72
PFOS	**1763-23-1**	**53.20**	**H7707-FS(0)**	**1.000**	**8/20/2020**	**0.42**	**0.94**	**4.72**
HFPO-DA	13252-13-6	0.47 U	H7707-FS(0)	1.000	8/20/2020	0.24	0.47	4.72
Adona	**919005-14-4**	**0.94 U**	**H7707-FS(0)**	**1.000**	**8/20/2020**	**0.25**	**0.94**	**4.72**
11Cl-PF3OUdS	763051-92-9	0.47 U	H7707-FS(0)	1.000	8/20/2020	0.22	0.47	4.72
9Cl-PF3ONS	**756426-58-1**	**0.94 U**	**H7707-FS(0)**	**1.000**	**8/20/2020**	**0.25**	**0.94**	**4.72**

NW 9/28/20
Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

BATTELLE
It can be done

6

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

Client ID	PX-B1669-WT02-0720
Battelle ID	H7708-FS
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	07/30/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	W
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	58.27 J	H7708-FS(0)	1.000	8/20/2020	0.52	1.47	4.90	FD
PFHpA	375-85-9	94.45 J	H7708-FS(0)	1.000	8/20/2020	0.25	0.98	4.90	FD
PFOA	335-67-1	70.60	H7708-FS(0)	1.000	8/20/2020	0.50	1.47	4.90	
PFNA	375-95-1	36.11 J	H7708-FS(0)	1.000	8/20/2020	0.30	0.98	4.90	FD
PFDA	335-76-2	2.39 J	H7708-FS(0)	1.000	8/20/2020	0.14	0.49	4.90	
PFUnA	2058-94-8	0.49 U	H7708-FS(0)	1.000	8/20/2020	0.22	0.49	4.90	
PFDoA	307-55-1	0.49 U	H7708-FS(0)	1.000	8/20/2020	0.19	0.49	4.90	
PFTrDA	72629-94-8	0.49 U	H7708-FS(0)	1.000	8/20/2020	0.15	0.49	4.90	
PFTeDA	376-06-7	1.96 U	H7708-FS(0)	1.000	8/20/2020	0.72	1.96	4.90	
NMeFOSAA	2355-31-9	0.98 U	H7708-FS(0)	1.000	8/20/2020	0.34	0.98	4.90	
NEtFOSAA	2991-50-6	0.98 U	H7708-FS(0)	1.000	8/20/2020	0.49	0.98	4.90	
PFBS	375-73-5	1.38 J	H7708-FS(0)	1.000	8/20/2020	0.14	0.49	4.90	
PFHxS	355-46-4	11.18 J	H7708-FS(0)	1.000	8/20/2020	0.11	0.39	4.90	FD
PFOS	1763-23-1	24.30 J	H7708-FS(0)	1.000	8/20/2020	0.43	0.98	4.90	FD
HFPO-DA	13252-13-6	0.49 U	H7708-FS(0)	1.000	8/20/2020	0.25	0.49	4.90	
Adona	919005-14-4	0.98 U	H7708-FS(0)	1.000	8/20/2020	0.26	0.98	4.90	
11Cl-PF3OUdS	763051-92-9	0.49 U	H7708-FS(0)	1.000	8/20/2020	0.23	0.49	4.90	
9Cl-PF3ONS	756426-58-1	0.98 U	H7708-FS(0)	1.000	8/20/2020	0.26	0.98	4.90	

MJ 9/28/20
Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

BATTELLE
It can be done

7

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

Client ID		PX-B1669-WT02P-0720							
Battelle ID		H7709-FS							
Sample Type		SA							
Collection Date		07/28/2020							
Extraction Date		07/30/2020							
Analytical Instrument		Sciex 5500 LC/MS/MS							
% Moisture		NA							
Matrix		W							
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	86.16	J	H7709-FS(0)	1.000	8/20/2020	0.51	1.44	4.81	FD
PFHpA	**375-85-9**	**125.10**	**D J**	**H7709-FS-D(3)**	**5.000**	**8/20/2020**	**1.25**	**4.81**	**24.04**	FD
PFOA	335-67-1	87.72	D	H7709-FS-D(3)	5.000	8/20/2020	2.45	7.21	24.04	
PFNA	**375-95-1**	**57.47**	**J**	**H7709-FS(0)**	**1.000**	**8/20/2020**	**0.30**	**0.96**	**4.81**	FD
PFDA	335-76-2	4.31	J	H7709-FS(0)	1.000	8/20/2020	0.13	0.48	4.81	
PFUnA	**2058-94-8**	**0.48**	**U**	**H7709-FS(0)**	**1.000**	**8/20/2020**	**0.21**	**0.48**	**4.81**	
PFDoA	307-55-1	0.48	U	H7709-FS(0)	1.000	8/20/2020	0.18	0.48	4.81	
PFTrDA	**72629-94-8**	**0.48**	**U**	**H7709-FS(0)**	**1.000**	**8/20/2020**	**0.14**	**0.48**	**4.81**	
PFTeDA	376-06-7	1.92	~~U~~ UJ	H7709-FS(0)	1.000	8/20/2020	0.70	1.92	4.81	SSL
NMeFOSAA	**2355-31-9**	**0.96**	**~~U~~ UJ**	**H7709-FS(0)**	**1.000**	**8/20/2020**	**0.34**	**0.96**	**4.81**	SSL
NEtFOSAA	2991-50-6	0.96	U	H7709-FS(0)	1.000	8/20/2020	0.48	0.96	4.81	
PFBS	**375-73-5**	**1.17**	**J**	**H7709-FS(0)**	**1.000**	**8/20/2020**	**0.13**	**0.48**	**4.81**	
PFHxS	355-46-4	6.92	J	H7709-FS(0)	1.000	8/20/2020	0.11	0.38	4.81	FD
PFOS	**1763-23-1**	**15.05**	**J**	**H7709-FS(0)**	**1.000**	**8/20/2020**	**0.42**	**0.96**	**4.81**	FD
HFPO-DA	13252-13-6	0.48	U	H7709-FS(0)	1.000	8/20/2020	0.24	0.48	4.81	
Adona	**919005-14-4**	**0.96**	**U**	**H7709-FS(0)**	**1.000**	**8/20/2020**	**0.26**	**0.96**	**4.81**	
11Cl-PF3OUdS	763051-92-9	0.48	U	H7709-FS(0)	1.000	8/20/2020	0.22	0.48	4.81	
9Cl-PF3ONS	**756426-58-1**	**0.96**	**U**	**H7709-FS(0)**	**1.000**	**8/20/2020**	**0.26**	**0.96**	**4.81**	

MW 9/28/20
Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

7

BATTELLE
It can be done

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

Client ID	PX-B1669-WT02P-0720
Battelle ID	H7709-FS
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	07/30/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	94	D	H7709-FS-D(3)	8/20/2020
13C4-PFHpA	**96**	**D**	**H7709-FS-D(3)**	**8/20/2020**
13C8-PFOA	96	D	H7709-FS-D(3)	8/20/2020
13C9-PFNA	**93**	**D**	**H7709-FS-D(3)**	**8/20/2020**
13C6-PFDA	58		H7709-FS(0)	8/20/2020
13C7-PFUnA	**59**		**H7709-FS(0)**	**8/20/2020**
13C2-PFDoA	51		H7709-FS(0)	8/20/2020
13C2-PFTeDA	**38**	**N**	**H7709-FS(0)**	**8/20/2020**
d3-MeFOSAA	45	N	H7709-FS(0)	8/20/2020
d5-EtFOSAA	**60**		**H7709-FS(0)**	**8/20/2020**
13C3-PFBS	91		H7709-FS(0)	8/20/2020
13C3-PFHxS	**91**		**H7709-FS(0)**	**8/20/2020**
13C8-PFOS	85		H7709-FS(0)	8/20/2020
13C3-HFPO-DA	**93**	**D**	**H7709-FS-D(3)**	**8/20/2020**

NW 9/28/20
Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

8

BATTELLE
It can be done

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

Client ID		PX-B1669-WT04-0720							
Battelle ID		H7710-FS							
Sample Type		SA							
Collection Date		07/28/2020							
Extraction Date		07/30/2020							
Analytical Instrument		Sciex 5500 LC/MS/MS							
% Moisture		NA							
Matrix		W							
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	7.46	H7710-FS(0)	1.000	8/20/2020	0.50	1.42	4.72
PFHpA	375-85-9	13.43	H7710-FS(0)	1.000	8/20/2020	0.25	0.94	4.72
PFOA	335-67-1	14.39	H7710-FS(0)	1.000	8/20/2020	0.48	1.42	4.72
PFNA	375-95-1	15.18	H7710-FS(0)	1.000	8/20/2020	0.29	0.94	4.72
PFDA	335-76-2	4.98	H7710-FS(0)	1.000	8/20/2020	0.13	0.47	4.72
PFUnA	2058-94-8	0.74 J	H7710-FS(0)	1.000	8/20/2020	0.21	0.47	4.72
PFDoA	307-55-1	0.47 U	H7710-FS(0)	1.000	8/20/2020	0.18	0.47	4.72
PFTrDA	72629-94-8	0.47 U	H7710-FS(0)	1.000	8/20/2020	0.14	0.47	4.72
PFTeDA	376-06-7	1.89 U	H7710-FS(0)	1.000	8/20/2020	0.69	1.89	4.72
NMeFOSAA	2355-31-9	0.94 U	H7710-FS(0)	1.000	8/20/2020	0.33	0.94	4.72
NEtFOSAA	2991-50-6	0.94 U	H7710-FS(0)	1.000	8/20/2020	0.47	0.94	4.72
PFBS	375-73-5	0.25 J	H7710-FS(0)	1.000	8/20/2020	0.13	0.47	4.72
PFHxS	355-46-4	0.68 J	H7710-FS(0)	1.000	8/20/2020	0.10	0.38	4.72
PFOS	1763-23-1	7.26	H7710-FS(0)	1.000	8/20/2020	0.42	0.94	4.72
HFPO-DA	13252-13-6	0.32 J	H7710-FS(0)	1.000	8/20/2020	0.24	0.47	4.72
Adona	919005-14-4	0.94 U	H7710-FS(0)	1.000	8/20/2020	0.25	0.94	4.72
11Cl-PF3OUdS	763051-92-9	0.47 U	H7710-FS(0)	1.000	8/20/2020	0.22	0.47	4.72
9Cl-PF3ONS	756426-58-1	0.94 U	H7710-FS(0)	1.000	8/20/2020	0.25	0.94	4.72

NW 9/28/20
Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

BATTELLE
It can be done

9

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

Client ID		PX-B1669-WT01-0720							
Battelle ID		H7713-FS							
Sample Type		SA							
Collection Date		07/28/2020							
Extraction Date		07/30/2020							
Analytical Instrument		Sciex 5500 LC/MS/MS							
% Moisture		NA							
Matrix		W							
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	19.50		H7713-FS(0)	1.000	8/20/2020	0.53	1.50	5.00
PFHpA	**375-85-9**	**8.88**		**H7713-FS(0)**	**1.000**	**8/20/2020**	**0.26**	**1.00**	**5.00**
PFOA	335-67-1	9.73		H7713-FS(0)	1.000	8/20/2020	0.51	1.50	5.00
PFNA	**375-95-1**	**2.13**	**J**	**H7713-FS(0)**	**1.000**	**8/20/2020**	**0.31**	**1.00**	**5.00**
PFDA	335-76-2	0.17	J	H7713-FS(0)	1.000	8/20/2020	0.14	0.50	5.00
PFUnA	**2058-94-8**	**0.50**	**U**	**H7713-FS(0)**	**1.000**	**8/20/2020**	**0.22**	**0.50**	**5.00**
PFDoA	307-55-1	0.50	U	H7713-FS(0)	1.000	8/20/2020	0.19	0.50	5.00
PFTrDA	**72629-94-8**	**0.50**	**U**	**H7713-FS(0)**	**1.000**	**8/20/2020**	**0.15**	**0.50**	**5.00**
PFTeDA	376-06-7	2.00	U J	H7713-FS(0)	1.000	8/20/2020	0.73	2.00	5.00
NMeFOSAA	**2355-31-9**	**1.00**	**U**	**H7713-FS(0)**	**1.000**	**8/20/2020**	**0.35**	**1.00**	**5.00**
NEtFOSAA	2991-50-6	1.00	U	H7713-FS(0)	1.000	8/20/2020	0.50	1.00	5.00
PFBS	**375-73-5**	**1.91**	**J**	**H7713-FS(0)**	**1.000**	**8/20/2020**	**0.14**	**0.50**	**5.00**
PFHxS	355-46-4	5.07		H7713-FS(0)	1.000	8/20/2020	0.11	0.40	5.00
PFOS	**1763-23-1**	**5.00**	**J**	**H7713-FS(0)**	**1.000**	**8/20/2020**	**0.44**	**1.00**	**5.00**
HFPO-DA	13252-13-6	0.50	U	H7713-FS(0)	1.000	8/20/2020	0.25	0.50	5.00
Adona	**919005-14-4**	**1.00**	**U**	**H7713-FS(0)**	**1.000**	**8/20/2020**	**0.27**	**1.00**	**5.00**
11Cl-PF3OUdS	763051-92-9	0.50	U	H7713-FS(0)	1.000	8/20/2020	0.23	0.50	5.00
9Cl-PF3ONS	**756426-58-1**	**1.00**	**U**	**H7713-FS(0)**	**1.000**	**8/20/2020**	**0.27**	**1.00**	**5.00**

SSL

NW 9/28/20
Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

BATTELLE
It can be done

9

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

Client ID	PX-B1669-WT01-0720
Battelle ID	H7713-FS
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	07/30/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	72	H7713-FS(0)	8/20/2020
13C4-PFHpA	77	H7713-FS(0)	8/20/2020
13C8-PFOA	73	H7713-FS(0)	8/20/2020
13C9-PFNA	72	H7713-FS(0)	8/20/2020
13C6-PFDA	75	H7713-FS(0)	8/20/2020
13C7-PFUnA	77	H7713-FS(0)	8/20/2020
13C2-PFDoA	67	H7713-FS(0)	8/20/2020
13C2-PFTeDA	48	H7713-FS(0)	8/20/2020
d3-MeFOSAA	56	H7713-FS(0)	8/20/2020
d5-EtFOSAA	81	H7713-FS(0)	8/20/2020
13C3-PFBS	99	H7713-FS(0)	8/20/2020
13C3-PFHxS	89	H7713-FS(0)	8/20/2020
13C8-PFOS	81	H7713-FS(0)	8/20/2020
13C3-HFPO-DA	69	H7713-FS(0)	8/20/2020

NW 9/28/20
Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

BATTELLE
It can be done

10

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

Client ID	PX-B1669-FB01-072820
Battelle ID	H7714-FS
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	07/30/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	W
Sample Size	0.235
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.60 U	H7714-FS(0)	1.000	8/20/2020	0.56	1.60	5.32
PFHpA	375-85-9	1.06 U	H7714-FS(0)	1.000	8/20/2020	0.28	1.06	5.32
PFOA	335-67-1	1.60 U	H7714-FS(0)	1.000	8/20/2020	0.54	1.60	5.32
PFNA	375-95-1	1.06 U	H7714-FS(0)	1.000	8/20/2020	0.33	1.06	5.32
PFDA	335-76-2	0.53 U	H7714-FS(0)	1.000	8/20/2020	0.15	0.53	5.32
PFUnA	2058-94-8	0.53 U	H7714-FS(0)	1.000	8/20/2020	0.23	0.53	5.32
PFDoA	307-55-1	0.53 U	H7714-FS(0)	1.000	8/20/2020	0.20	0.53	5.32
PFTrDA	72629-94-8	0.53 U	H7714-FS(0)	1.000	8/20/2020	0.16	0.53	5.32
PFTeDA	376-06-7	2.13 U	H7714-FS(0)	1.000	8/20/2020	0.78	2.13	5.32
NMeFOSAA	2355-31-9	1.06 U	H7714-FS(0)	1.000	8/20/2020	0.37	1.06	5.32
NEtFOSAA	2991-50-6	1.06 U	H7714-FS(0)	1.000	8/20/2020	0.53	1.06	5.32
PFBS	375-73-5	0.53 U	H7714-FS(0)	1.000	8/20/2020	0.15	0.53	5.32
PFHxS	355-46-4	0.43 U	H7714-FS(0)	1.000	8/20/2020	0.12	0.43	5.32
PFOS	1763-23-1	1.06 U	H7714-FS(0)	1.000	8/20/2020	0.47	1.06	5.32
HFPO-DA	13252-13-6	0.53 U	H7714-FS(0)	1.000	8/20/2020	0.27	0.53	5.32
Adona	919005-14-4	1.06 U	H7714-FS(0)	1.000	8/20/2020	0.29	1.06	5.32
11Cl-PF3OUdS	763051-92-9	0.53 U	H7714-FS(0)	1.000	8/20/2020	0.24	0.53	5.32
9Cl-PF3ONS	756426-58-1	1.06 U	H7714-FS(0)	1.000	8/20/2020	0.29	1.06	5.32

BATTELLE
It can be done

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

Client ID	PX-B1669-EB01-072820-GW
Battelle ID	H7715-FS
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	07/30/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	W
Sample Size	0.255
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	1.47 U	H7715-FS(0)	1.000	8/20/2020	0.52	1.47	4.90	
PFHpA	**375-85-9**	**0.98 U**	**H7715-FS(0)**	**1.000**	**8/20/2020**	**0.25**	**0.98**	**4.90**	
PFOA	335-67-1	1.47 U	H7715-FS(0)	1.000	8/20/2020	0.50	1.47	4.90	
PFNA	**375-95-1**	**0.98 U**	**H7715-FS(0)**	**1.000**	**8/20/2020**	**0.30**	**0.98**	**4.90**	
PFDA	335-76-2	0.49 U	H7715-FS(0)	1.000	8/20/2020	0.14	0.49	4.90	
PFUnA	**2058-94-8**	**0.49 U**	**H7715-FS(0)**	**1.000**	**8/20/2020**	**0.22**	**0.49**	**4.90**	
PFDoA	307-55-1	0.49 U	H7715-FS(0)	1.000	8/20/2020	0.19	0.49	4.90	
PFTrDA	**72629-94-8**	**0.49 U**	**H7715-FS(0)**	**1.000**	**8/20/2020**	**0.15**	**0.49**	**4.90**	
PFTeDA	376-06-7	1.96 U	H7715-FS(0)	1.000	8/20/2020	0.72	1.96	4.90	
NMeFOSAA	**2355-31-9**	**0.98 U**	**H7715-FS(0)**	**1.000**	**8/20/2020**	**0.34**	**0.98**	**4.90**	SSL
NEtFOSAA	2991-50-6	0.98 U	H7715-FS(0)	1.000	8/20/2020	0.49	0.98	4.90	
PFBS	**375-73-5**	**0.49 U**	**H7715-FS(0)**	**1.000**	**8/20/2020**	**0.14**	**0.49**	**4.90**	
PFHxS	355-46-4	0.39 U	H7715-FS(0)	1.000	8/20/2020	0.11	0.39	4.90	
PFOS	**1763-23-1**	**0.98 U**	**H7715-FS(0)**	**1.000**	**8/20/2020**	**0.43**	**0.98**	**4.90**	
HFPO-DA	13252-13-6	0.49 U	H7715-FS(0)	1.000	8/20/2020	0.25	0.49	4.90	
Adona	**919005-14-4**	**0.98 U**	**H7715-FS(0)**	**1.000**	**8/20/2020**	**0.26**	**0.98**	**4.90**	
11Cl-PF3OUdS	763051-92-9	0.49 U	H7715-FS(0)	1.000	8/20/2020	0.23	0.49	4.90	
9Cl-PF3ONS	**756426-58-1**	**0.98 U**	**H7715-FS(0)**	**1.000**	**8/20/2020**	**0.26**	**0.98**	**4.90**	

NW 9/28/20
Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

BATTELLE
It can be done

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

11

Client ID	PX-B1669-EB01-072820-GW
Battelle ID	H7715-FS
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	07/30/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	83	H7715-FS(0)	8/20/2020
13C4-PFHpA	88	H7715-FS(0)	8/20/2020
13C8-PFOA	88	H7715-FS(0)	8/20/2020
13C9-PFNA	92	H7715-FS(0)	8/20/2020
13C6-PFDA	88	H7715-FS(0)	8/20/2020
13C7-PFUnA	93	H7715-FS(0)	8/20/2020
13C2-PFDoA	89	H7715-FS(0)	8/20/2020
13C2-PFTeDA	90	H7715-FS(0)	8/20/2020
d3-MeFOSAA	39 N	H7715-FS(0)	8/20/2020
d5-EtFOSAA	98	H7715-FS(0)	8/20/2020
13C3-PFBS	80	H7715-FS(0)	8/20/2020
13C3-PFHxS	84	H7715-FS(0)	8/20/2020
13C8-PFOS	86	H7715-FS(0)	8/20/2020
13C3-HFPO-DA	85	H7715-FS(0)	8/20/2020

MW 9/28/20
Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

BATTELLE
It can be done

12

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

Client ID	PX-B102-FB01-072820
Battelle ID	H7716-FS
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	07/30/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	W
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	H7716-FS(0)	1.000	8/20/2020	0.51	1.44	4.81
PFHpA	375-85-9	0.96 U	H7716-FS(0)	1.000	8/20/2020	0.25	0.96	4.81
PFOA	335-67-1	1.44 U	H7716-FS(0)	1.000	8/20/2020	0.49	1.44	4.81
PFNA	375-95-1	0.96 U	H7716-FS(0)	1.000	8/20/2020	0.30	0.96	4.81
PFDA	335-76-2	0.48 U	H7716-FS(0)	1.000	8/20/2020	0.13	0.48	4.81
PFUnA	2058-94-8	0.48 U	H7716-FS(0)	1.000	8/20/2020	0.21	0.48	4.81
PFDoA	307-55-1	0.48 U	H7716-FS(0)	1.000	8/20/2020	0.18	0.48	4.81
PFTrDA	72629-94-8	0.48 U	H7716-FS(0)	1.000	8/20/2020	0.14	0.48	4.81
PFTeDA	376-06-7	1.92 U	H7716-FS(0)	1.000	8/20/2020	0.70	1.92	4.81
NMeFOSAA	2355-31-9	0.96 U	H7716-FS(0)	1.000	8/20/2020	0.34	0.96	4.81
NEtFOSAA	2991-50-6	0.96 U	H7716-FS(0)	1.000	8/20/2020	0.48	0.96	4.81
PFBS	375-73-5	0.48 U	H7716-FS(0)	1.000	8/20/2020	0.13	0.48	4.81
PFHxS	355-46-4	0.38 U	H7716-FS(0)	1.000	8/20/2020	0.11	0.38	4.81
PFOS	1763-23-1	0.96 U	H7716-FS(0)	1.000	8/20/2020	0.42	0.96	4.81
HFPO-DA	13252-13-6	0.48 U	H7716-FS(0)	1.000	8/20/2020	0.24	0.48	4.81
Adona	919005-14-4	0.96 U	H7716-FS(0)	1.000	8/20/2020	0.26	0.96	4.81
11Cl-PF3OUdS	763051-92-9	0.48 U	H7716-FS(0)	1.000	8/20/2020	0.22	0.48	4.81
9Cl-PF3ONS	756426-58-1	0.96 U	H7716-FS(0)	1.000	8/20/2020	0.26	0.96	4.81

NW 9/24/20
Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-0862
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, St. Mary's County, CTO-JU14, Maryland
Date: September 28, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-B102-EB01-072820-GW	H7717-FS	Water
2	PX-H2905-WT05-0720	H7718-FS	Water
3	PX-H2905-WT06-0720	H7719-FS	Water
4	PX-H2905-WT07-0720	H7720-FS	Water
5	PX-H2905-WT01-0720	H7721-FS	Water
6	PX-H2905-WT02-0720	H7722-FS	Water
7	PX-H2905-WT02P-0720	H7723-FS	Water
8	PX-H2905-WT04-0720	H7724-FS	Water
8MS	PX-H2905-WT04-0720MS	H7725-FSMS	Water
8MSD	PX-H2905-WT04-0720MSD	H7726-FSMSD	Water
9	PX-H2905-FB01-072720	H7727-FS	Water
10	PX-H2905-EB01-072720-GW	H7728-FS	Water
11	PX-H2905-WT03-0720	H7729-FS	Water
12	PX-H2905-EB01-072720-SO	H7744-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 July 27, 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
LC33 IB	Adona	0.30	U	8

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-B102-EB01-072820-GW	None - ND	-	-	-
PX-H2905-FB01-072720	None - ND	-	-	-
PX-H2905-EB01-072720-GW	None - ND	-	-	-
PX-H2905-EB01-072720-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 Surrogate Form 2s at the end of the DVR for specific recoveries and qualifications.

Laboratory Fortified Blank (LFB)

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

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

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

EDS Sample ID	Compound	MS %R/MSD %R/RDP	Qualifier
8	PFHxA	531%/0%/200	None - 4X Rule Applies

Internal Standard (IS) Area Performance

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

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- The samples were analyzed at 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-H2905-WT02-0720 ng/L	PX-H2905-WT02P-0720 ng/L	RPD	Qualifier
PFHxA	13.82	14.99	8%	None
PFHpA	7.17	7.74	8%	
PFOA	13.15	13.52	3%	
PFNA	2.46	2.43	1%	
PFDA	0.46U	0.14	NC	
PFBS	1.99	2.52	24%	
PFHxS	21.80	21.88	0%	
PFOS	41.73	46.10	10%	

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

Signed: Nancy Weaver Dated: 10/2/20

Nancy Weaver
Senior Chemist

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

BATTELLE
It can be done

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

Client ID	PX-B102-EB01-072820-GW
Battelle ID	H7717-FS
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	08/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	W
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	H7717-FS(0)	1.000	8/20/2020	0.51	1.44	4.81
PFHpA	375-85-9	0.96 U	H7717-FS(0)	1.000	8/20/2020	0.25	0.96	4.81
PFOA	335-67-1	1.44 U	H7717-FS(0)	1.000	8/20/2020	0.49	1.44	4.81
PFNA	375-95-1	0.96 U	H7717-FS(0)	1.000	8/20/2020	0.30	0.96	4.81
PFDA	335-76-2	0.48 U	H7717-FS(0)	1.000	8/20/2020	0.13	0.48	4.81
PFUnA	2058-94-8	0.48 U	H7717-FS(0)	1.000	8/20/2020	0.21	0.48	4.81
PFDoA	307-55-1	0.48 U	H7717-FS(0)	1.000	8/20/2020	0.18	0.48	4.81
PFTrDA	72629-94-8	0.48 U	H7717-FS(0)	1.000	8/20/2020	0.14	0.48	4.81
PFTeDA	376-06-7	1.92 U	H7717-FS(0)	1.000	8/20/2020	0.70	1.92	4.81
NMeFOSAA	2355-31-9	0.96 U	H7717-FS(0)	1.000	8/20/2020	0.34	0.96	4.81
NEtFOSAA	2991-50-6	0.96 U	H7717-FS(0)	1.000	8/20/2020	0.48	0.96	4.81
PFBS	375-73-5	0.48 U	H7717-FS(0)	1.000	8/20/2020	0.13	0.48	4.81
PFHxS	355-46-4	0.38 U	H7717-FS(0)	1.000	8/20/2020	0.11	0.38	4.81
PFOS	1763-23-1	0.96 U	H7717-FS(0)	1.000	8/20/2020	0.42	0.96	4.81
HFPO-DA	13252-13-6	0.48 U	H7717-FS(0)	1.000	8/20/2020	0.24	0.48	4.81
Adona	919005-14-4	0.96 U	H7717-FS(0)	1.000	8/20/2020	0.26	0.96	4.81
11Cl-PF3OUdS	763051-92-9	0.48 U	H7717-FS(0)	1.000	8/20/2020	0.22	0.48	4.81
9Cl-PF3ONS	756426-58-1	0.96 U	H7717-FS(0)	1.000	8/20/2020	0.26	0.96	4.81

NW 9/28/20
Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

BATTELLE
It can be done

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

Client ID		PX-H2905-WT05-0720							
Battelle ID		H7718-FS							
Sample Type		SA							
Collection Date		07/27/2020							
Extraction Date		08/04/2020							
Analytical Instrument		Sciex 5500 LC/MS/MS							
% Moisture		NA							
Matrix		W							
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	25.99		H7718-FS(0)	1.000	8/20/2020	0.51	1.44	4.81	
PFHpA	**375-85-9**	**15.00**	J	**H7718-FS(0)**	**1.000**	**8/20/2020**	**0.25**	**0.96**	**4.81**	SSL
PFOA	335-67-1	28.54		H7718-FS(0)	1.000	8/20/2020	0.49	1.44	4.81	
PFNA	**375-95-1**	**4.84**		**H7718-FS(0)**	**1.000**	**8/20/2020**	**0.30**	**0.96**	**4.81**	
PFDA	335-76-2	0.46	J	H7718-FS(0)	1.000	8/20/2020	0.13	0.48	4.81	
PFUnA	**2058-94-8**	**0.48**	U	**H7718-FS(0)**	**1.000**	**8/20/2020**	**0.21**	**0.48**	**4.81**	
PFDoA	307-55-1	0.48	U	H7718-FS(0)	1.000	8/20/2020	0.18	0.48	4.81	
PFTrDA	**72629-94-8**	**0.48**	U	**H7718-FS(0)**	**1.000**	**8/20/2020**	**0.14**	**0.48**	**4.81**	
PFTeDA	376-06-7	1.92	J UJ	H7718-FS(0)	1.000	8/20/2020	0.70	1.92	4.81	SSL
NMeFOSAA	**2355-31-9**	**0.96**	J UJ	**H7718-FS(0)**	**1.000**	**8/20/2020**	**0.34**	**0.96**	**4.81**	SSL
NEtFOSAA	2991-50-6	0.96	U	H7718-FS(0)	1.000	8/20/2020	0.48	0.96	4.81	
PFBS	**375-73-5**	**3.49**	J	**H7718-FS(0)**	**1.000**	**8/20/2020**	**0.13**	**0.48**	**4.81**	
PFHxS	355-46-4	31.45		H7718-FS(0)	1.000	8/20/2020	0.11	0.38	4.81	
PFOS	**1763-23-1**	**85.18**		**H7718-FS(0)**	**1.000**	**8/20/2020**	**0.42**	**0.96**	**4.81**	
HFPO-DA	13252-13-6	0.48	U	H7718-FS(0)	1.000	8/20/2020	0.24	0.48	4.81	
Adona	**919005-14-4**	**0.96**	U	**H7718-FS(0)**	**1.000**	**8/20/2020**	**0.26**	**0.96**	**4.81**	
11Cl-PF3OUdS	763051-92-9	0.48	U	H7718-FS(0)	1.000	8/20/2020	0.22	0.48	4.81	
9Cl-PF3ONS	**756426-58-1**	**0.96**	U	**H7718-FS(0)**	**1.000**	**8/20/2020**	**0.26**	**0.96**	**4.81**	

MW 9/28/20
Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

BATTELLE
It can be done

2

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

Client ID	PX-H2905-WT05-0720
Battelle ID	H7718-FS
Sample Type	SA
Collection Date	07/27/2020
Extraction Date	08/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	59	H7718-FS(0)	8/20/2020
13C4-PFHpA	**45 N**	**H7718-FS(0)**	**8/20/2020**
13C8-PFOA	65	H7718-FS(0)	8/20/2020
13C9-PFNA	**58**	**H7718-FS(0)**	**8/20/2020**
13C6-PFDA	64	H7718-FS(0)	8/20/2020
13C7-PFUnA	**57**	**H7718-FS(0)**	**8/20/2020**
13C2-PFDoA	50	H7718-FS(0)	8/20/2020
13C2-PFTeDA	**40 N**	**H7718-FS(0)**	**8/20/2020**
d3-MeFOSAA	48 N	H7718-FS(0)	8/20/2020
d5-EtFOSAA	**59**	**H7718-FS(0)**	**8/20/2020**
13C3-PFBS	76	H7718-FS(0)	8/20/2020
13C3-PFHxS	**67**	**H7718-FS(0)**	**8/20/2020**
13C8-PFOS	67	H7718-FS(0)	8/20/2020
13C3-HFPO-DA	**52**	**H7718-FS(0)**	**8/20/2020**

NW 9/28/20

Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

BATTELLE
It can be done

3

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

Client ID		PX-H2905-WT06-0720							
Battelle ID		H7719-FS							
Sample Type		SA							
Collection Date		07/27/2020							
Extraction Date		08/04/2020							
Analytical Instrument		Sciex 5500 LC/MS/MS							
% Moisture		NA							
Matrix		W							
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	113.83		H7719-FS(0)	1.000	8/20/2020	0.50	1.42	4.72	
PFHpA	**375-85-9**	**51.02**		**H7719-FS(0)**	**1.000**	**8/20/2020**	**0.25**	**0.94**	**4.72**	
PFOA	335-67-1	69.77		H7719-FS(0)	1.000	8/20/2020	0.48	1.42	4.72	
PFNA	**375-95-1**	**4.84**		**H7719-FS(0)**	**1.000**	**8/20/2020**	**0.29**	**0.94**	**4.72**	
PFDA	335-76-2	0.78	J	H7719-FS(0)	1.000	8/20/2020	0.13	0.47	4.72	
PFUnA	**2058-94-8**	**0.47**	**U**	**H7719-FS(0)**	**1.000**	**8/20/2020**	**0.21**	**0.47**	**4.72**	
PFDoA	307-55-1	0.47	U UJ	H7719-FS(0)	1.000	8/20/2020	0.18	0.47	4.72	SSL
PFTrDA	**72629-94-8**	**0.47**	**U**	**H7719-FS(0)**	**1.000**	**8/20/2020**	**0.14**	**0.47**	**4.72**	
PFTeDA	376-06-7	1.89	U UJ	H7719-FS(0)	1.000	8/20/2020	0.69	1.89	4.72	SSL
NMeFOSAA	**2355-31-9**	**0.94**	**U UJ**	**H7719-FS(0)**	**1.000**	**8/20/2020**	**0.33**	**0.94**	**4.72**	
NEtFOSAA	2991-50-6	0.94	U UJ	H7719-FS(0)	1.000	8/20/2020	0.47	0.94	4.72	
PFBS	**375-73-5**	**13.39**		**H7719-FS(0)**	**1.000**	**8/20/2020**	**0.13**	**0.47**	**4.72**	
PFHxS	355-46-4	47.24		H7719-FS(0)	1.000	8/20/2020	0.10	0.38	4.72	
PFOS	**1763-23-1**	**34.61**		**H7719-FS(0)**	**1.000**	**8/20/2020**	**0.42**	**0.94**	**4.72**	
HFPO-DA	13252-13-6	1.22	J	H7719-FS(0)	1.000	8/20/2020	0.24	0.47	4.72	
Adona	**919005-14-4**	**0.94**	**U**	**H7719-FS(0)**	**1.000**	**8/20/2020**	**0.25**	**0.94**	**4.72**	
11Cl-PF3OUdS	763051-92-9	0.47	U	H7719-FS(0)	1.000	8/20/2020	0.22	0.47	4.72	
9Cl-PF3ONS	**756426-58-1**	**0.94**	**U**	**H7719-FS(0)**	**1.000**	**8/20/2020**	**0.25**	**0.94**	**4.72**	

MW 9/28/20
Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

BATTELLE
it can be done

3

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

Client ID	PX-H2905-WT06-0720
Battelle ID	H7719-FS
Sample Type	SA
Collection Date	07/27/2020
Extraction Date	08/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	67		H7719-FS(0)	8/20/2020
13C4-PFHpA	**82**		**H7719-FS(0)**	**8/20/2020**
13C8-PFOA	83		H7719-FS(0)	8/20/2020
13C9-PFNA	**78**		**H7719-FS(0)**	**8/20/2020**
13C6-PFDA	78		H7719-FS(0)	8/20/2020
13C7-PFUnA	**67**		**H7719-FS(0)**	**8/20/2020**
13C2-PFDoA	41	N	H7719-FS(0)	8/20/2020
13C2-PFTeDA	**11**	N	**H7719-FS(0)**	**8/20/2020**
d3-MeFOSAA	32	N	H7719-FS(0)	8/20/2020
d5-EtFOSAA	**33**	N	**H7719-FS(0)**	**8/20/2020**
13C3-PFBS	79		H7719-FS(0)	8/20/2020
13C3-PFHxS	**94**		**H7719-FS(0)**	**8/20/2020**
13C8-PFOS	73		H7719-FS(0)	8/20/2020
13C3-HFPO-DA	**63**		**H7719-FS(0)**	**8/20/2020**

MW 9/28/20
Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

BATTELLE
It can be done

4

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

Client ID	PX-H2905-WT07-0720
Battelle ID	H7720-FS
Sample Type	SA
Collection Date	07/27/2020
Extraction Date	08/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	W
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	12.23	H7720-FS(0)	1.000	8/20/2020	0.51	1.44	4.81
PFHpA	**375-85-9**	**6.15**	**H7720-FS(0)**	**1.000**	**8/20/2020**	**0.25**	**0.96**	**4.81**
PFOA	335-67-1	11.92	H7720-FS(0)	1.000	8/20/2020	0.49	1.44	4.81
PFNA	**375-95-1**	**1.54 J**	**H7720-FS(0)**	**1.000**	**8/20/2020**	**0.30**	**0.96**	**4.81**
PFDA	335-76-2	0.55 J	H7720-FS(0)	1.000	8/20/2020	0.13	0.48	4.81
PFUnA	**2058-94-8**	**0.48 U**	**H7720-FS(0)**	**1.000**	**8/20/2020**	**0.21**	**0.48**	**4.81**
PFDoA	307-55-1	0.48 U	H7720-FS(0)	1.000	8/20/2020	0.18	0.48	4.81
PFTrDA	**72629-94-8**	**0.48 U**	**H7720-FS(0)**	**1.000**	**8/20/2020**	**0.14**	**0.48**	**4.81**
PFTeDA	376-06-7	1.92 ~~J~~ UJ	H7720-FS(0)	1.000	8/20/2020	0.70	1.92	4.81
NMeFOSAA	**2355-31-9**	**0.96 ~~J~~ UJ**	**H7720-FS(0)**	**1.000**	**8/20/2020**	**0.34**	**0.96**	**4.81**
NEtFOSAA	2991-50-6	0.96 U	H7720-FS(0)	1.000	8/20/2020	0.48	0.96	4.81
PFBS	**375-73-5**	**2.54 J**	**H7720-FS(0)**	**1.000**	**8/20/2020**	**0.13**	**0.48**	**4.81**
PFHxS	355-46-4	25.77	H7720-FS(0)	1.000	8/20/2020	0.11	0.38	4.81
PFOS	**1763-23-1**	**38.09**	**H7720-FS(0)**	**1.000**	**8/20/2020**	**0.42**	**0.96**	**4.81**
HFPO-DA	13252-13-6	0.48 U	H7720-FS(0)	1.000	8/20/2020	0.24	0.48	4.81
Adona	**919005-14-4**	**0.96 U**	**H7720-FS(0)**	**1.000**	**8/20/2020**	**0.26**	**0.96**	**4.81**
11Cl-PF3OUdS	763051-92-9	0.48 U	H7720-FS(0)	1.000	8/20/2020	0.22	0.48	4.81
9Cl-PF3ONS	**756426-58-1**	**0.96 U**	**H7720-FS(0)**	**1.000**	**8/20/2020**	**0.26**	**0.96**	**4.81**

SSL
SSL

MJ 9/28/20

Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

BATTELLE
It can be done

4

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

Client ID	PX-H2905-WT07-0720
Battelle ID	H7720-FS
Sample Type	SA
Collection Date	07/27/2020
Extraction Date	08/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	60	H7720-FS(0)	8/20/2020
13C4-PFHpA	**58**	**H7720-FS(0)**	**8/20/2020**
13C8-PFOA	57	H7720-FS(0)	8/20/2020
13C9-PFNA	**58**	**H7720-FS(0)**	**8/20/2020**
13C6-PFDA	54	H7720-FS(0)	8/20/2020
13C7-PFUnA	**59**	**H7720-FS(0)**	**8/20/2020**
13C2-PFDoA	51	H7720-FS(0)	8/20/2020
13C2-PFTeDA	**31** N	**H7720-FS(0)**	**8/20/2020**
d3-MeFOSAA	47 N	H7720-FS(0)	8/20/2020
d5-EtFOSAA	**52**	**H7720-FS(0)**	**8/20/2020**
13C3-PFBS	71	H7720-FS(0)	8/20/2020
13C3-PFHxS	**68**	**H7720-FS(0)**	**8/20/2020**
13C8-PFOS	59	H7720-FS(0)	8/20/2020
13C3-HFPO-DA	**55**	**H7720-FS(0)**	**8/20/2020**

NW 9/28/20

Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

BATTELLE
It can be done

5

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

Client ID		PX-H2905-WT01-0720							
Battelle ID		H7721-FS							
Sample Type		SA							
Collection Date		07/27/2020							
Extraction Date		08/04/2020							
Analytical Instrument		Sciex 5500 LC/MS/MS							
% Moisture		NA							
Matrix		W							
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	23.06		H7721-FS(0)	1.000	8/20/2020	0.51	1.44	4.81
PFHpA	375-85-9	12.69		H7721-FS(0)	1.000	8/20/2020	0.25	0.96	4.81
PFOA	335-67-1	24.17		H7721-FS(0)	1.000	8/20/2020	0.49	1.44	4.81
PFNA	375-95-1	5.00		H7721-FS(0)	1.000	8/20/2020	0.30	0.96	4.81
PFDA	335-76-2	0.20	J	H7721-FS(0)	1.000	8/20/2020	0.13	0.48	4.81
PFUnA	2058-94-8	0.48	U	H7721-FS(0)	1.000	8/20/2020	0.21	0.48	4.81
PFDoA	307-55-1	0.48	U	H7721-FS(0)	1.000	8/20/2020	0.18	0.48	4.81
PFTrDA	72629-94-8	0.48	U	H7721-FS(0)	1.000	8/20/2020	0.14	0.48	4.81
PFTeDA	376-06-7	1.92	U	H7721-FS(0)	1.000	8/20/2020	0.70	1.92	4.81
NMeFOSAA	2355-31-9	0.96	U	H7721-FS(0)	1.000	8/20/2020	0.34	0.96	4.81
NEtFOSAA	2991-50-6	0.96	U	H7721-FS(0)	1.000	8/20/2020	0.48	0.96	4.81
PFBS	375-73-5	3.63	J	H7721-FS(0)	1.000	8/20/2020	0.13	0.48	4.81
PFHxS	355-46-4	38.21		H7721-FS(0)	1.000	8/20/2020	0.11	0.38	4.81
PFOS	1763-23-1	99.65	Ø	H7721-FS-D(3)	5.000	8/20/2020	2.12	4.81	24.04
HFPO-DA	13252-13-6	0.48	U	H7721-FS(0)	1.000	8/20/2020	0.24	0.48	4.81
Adona	919005-14-4	0.96	U	H7721-FS(0)	1.000	8/20/2020	0.26	0.96	4.81
11Cl-PF3OUdS	763051-92-9	0.48	U	H7721-FS(0)	1.000	8/20/2020	0.22	0.48	4.81
9Cl-PF3ONS	756426-58-1	0.96	U	H7721-FS(0)	1.000	8/20/2020	0.26	0.96	4.81

BATTELLE
It can be done

6

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

Client ID	PX-H2905-WT02-0720
Battelle ID	H7722-FS
Sample Type	SA
Collection Date	07/27/2020
Extraction Date	08/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	W
Sample Size	0.270
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	13.82	H7722-FS(0)	1.000	8/20/2020	0.49	1.39	4.63
PFHpA	375-85-9	7.17	H7722-FS(0)	1.000	8/20/2020	0.24	0.93	4.63
PFOA	335-67-1	13.15	H7722-FS(0)	1.000	8/20/2020	0.47	1.39	4.63
PFNA	375-95-1	2.46 J	H7722-FS(0)	1.000	8/20/2020	0.29	0.93	4.63
PFDA	335-76-2	0.46 U	H7722-FS(0)	1.000	8/20/2020	0.13	0.46	4.63
PFUnA	2058-94-8	0.46 U	H7722-FS(0)	1.000	8/20/2020	0.20	0.46	4.63
PFDoA	307-55-1	0.46 U	H7722-FS(0)	1.000	8/20/2020	0.18	0.46	4.63
PFTrDA	72629-94-8	0.46 U	H7722-FS(0)	1.000	8/20/2020	0.14	0.46	4.63
PFTeDA	376-06-7	1.85 ~~J~~ UJ	H7722-FS(0)	1.000	8/20/2020	0.68	1.85	4.63
NMeFOSAA	2355-31-9	0.93 ~~J~~ UJ	H7722-FS(0)	1.000	8/20/2020	0.32	0.93	4.63
NEtFOSAA	2991-50-6	0.93 ~~J~~ UJ	H7722-FS(0)	1.000	8/20/2020	0.46	0.93	4.63
PFBS	375-73-5	1.99 J	H7722-FS(0)	1.000	8/20/2020	0.13	0.46	4.63
PFHxS	355-46-4	21.80	H7722-FS(0)	1.000	8/20/2020	0.10	0.37	4.63
PFOS	1763-23-1	41.73	H7722-FS(0)	1.000	8/20/2020	0.41	0.93	4.63
HFPO-DA	13252-13-6	0.46 U	H7722-FS(0)	1.000	8/20/2020	0.23	0.46	4.63
Adona	919005-14-4	0.93 U	H7722-FS(0)	1.000	8/20/2020	0.25	0.93	4.63
11Cl-PF3OUdS	763051-92-9	0.46 U	H7722-FS(0)	1.000	8/20/2020	0.21	0.46	4.63
9Cl-PF3ONS	756426-58-1	0.93 U	H7722-FS(0)	1.000	8/20/2020	0.25	0.93	4.63

SSL

MW 9/28/20

Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

BATTELLE
It can be done

6

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

Client ID	PX-H2905-WT02-0720
Battelle ID	H7722-FS
Sample Type	SA
Collection Date	07/27/2020
Extraction Date	08/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	66		H7722-FS(0)	8/20/2020
13C4-PFHpA	65		H7722-FS(0)	8/20/2020
13C8-PFOA	64		H7722-FS(0)	8/20/2020
13C9-PFNA	63		H7722-FS(0)	8/20/2020
13C6-PFDA	61		H7722-FS(0)	8/20/2020
13C7-PFUnA	60		H7722-FS(0)	8/20/2020
13C2-PFDoA	51		H7722-FS(0)	8/20/2020
13C2-PFTeDA	36	N	H7722-FS(0)	8/20/2020
d3-MeFOSAA	49	N	H7722-FS(0)	8/20/2020
d5-EtFOSAA	49	N	H7722-FS(0)	8/20/2020
13C3-PFBS	74		H7722-FS(0)	8/20/2020
13C3-PFHxS	67		H7722-FS(0)	8/20/2020
13C8-PFOS	67		H7722-FS(0)	8/20/2020
13C3-HFPO-DA	64		H7722-FS(0)	8/20/2020

MW 9/28/20
Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

BATTELLE
It can be done

7

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

Client ID	PX-H2905-WT02P-0720
Battelle ID	H7723-FS
Sample Type	SA
Collection Date	07/27/2020
Extraction Date	08/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	W
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	14.99	H7723-FS(0)	1.000	8/20/2020	0.51	1.44	4.81
PFHpA	**375-85-9**	**7.74**	**H7723-FS(0)**	**1.000**	**8/20/2020**	**0.25**	**0.96**	**4.81**
PFOA	335-67-1	13.52	H7723-FS(0)	1.000	8/20/2020	0.49	1.44	4.81
PFNA	**375-95-1**	**2.43 J**	**H7723-FS(0)**	**1.000**	**8/20/2020**	**0.30**	**0.96**	**4.81**
PFDA	335-76-2	0.14 J	H7723-FS(0)	1.000	8/20/2020	0.13	0.48	4.81
PFUnA	**2058-94-8**	**0.48 U**	**H7723-FS(0)**	**1.000**	**8/20/2020**	**0.21**	**0.48**	**4.81**
PFDoA	307-55-1	0.48 U	H7723-FS(0)	1.000	8/20/2020	0.18	0.48	4.81
PFTrDA	**72629-94-8**	**0.48 U**	**H7723-FS(0)**	**1.000**	**8/20/2020**	**0.14**	**0.48**	**4.81**
PFTeDA	376-06-7	1.92 ~~J~~ UJ	H7723-FS(0)	1.000	8/20/2020	0.70	1.92	4.81
NMeFOSAA	**2355-31-9**	**0.96 ~~J~~ UJ**	**H7723-FS(0)**	**1.000**	**8/20/2020**	**0.34**	**0.96**	**4.81**
NEtFOSAA	2991-50-6	0.96 ~~J~~ UJ	H7723-FS(0)	1.000	8/20/2020	0.48	0.96	4.81
PFBS	**375-73-5**	**2.52 J**	**H7723-FS(0)**	**1.000**	**8/20/2020**	**0.13**	**0.48**	**4.81**
PFHxS	355-46-4	21.88	H7723-FS(0)	1.000	8/20/2020	0.11	0.38	4.81
PFOS	**1763-23-1**	**46.10**	**H7723-FS(0)**	**1.000**	**8/20/2020**	**0.42**	**0.96**	**4.81**
HFPO-DA	13252-13-6	0.48 U	H7723-FS(0)	1.000	8/20/2020	0.24	0.48	4.81
Adona	**919005-14-4**	**0.96 U**	**H7723-FS(0)**	**1.000**	**8/20/2020**	**0.26**	**0.96**	**4.81**
11Cl-PF3OUdS	763051-92-9	0.48 U	H7723-FS(0)	1.000	8/20/2020	0.22	0.48	4.81
9Cl-PF3ONS	**756426-58-1**	**0.96 U**	**H7723-FS(0)**	**1.000**	**8/20/2020**	**0.26**	**0.96**	**4.81**

SSL

NW 8/28/20
Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

BATTELLE
It can be done

7

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

Client ID	PX-H2905-WT02P-0720
Battelle ID	H7723-FS
Sample Type	SA
Collection Date	07/27/2020
Extraction Date	08/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	80		H7723-FS(0)	8/20/2020
13C4-PFHpA	**78**		**H7723-FS(0)**	**8/20/2020**
13C8-PFOA	79		H7723-FS(0)	8/20/2020
13C9-PFNA	**76**		**H7723-FS(0)**	**8/20/2020**
13C6-PFDA	74		H7723-FS(0)	8/20/2020
13C7-PFUnA	**63**		**H7723-FS(0)**	**8/20/2020**
13C2-PFDoA	56		H7723-FS(0)	8/20/2020
13C2-PFTeDA	**34**	N	**H7723-FS(0)**	**8/20/2020**
d3-MeFOSAA	44	N	H7723-FS(0)	8/20/2020
d5-EtFOSAA	**47**	N	**H7723-FS(0)**	**8/20/2020**
13C3-PFBS	93		H7723-FS(0)	8/20/2020
13C3-PFHxS	**84**		**H7723-FS(0)**	**8/20/2020**
13C8-PFOS	75		H7723-FS(0)	8/20/2020
13C3-HFPO-DA	**78**		**H7723-FS(0)**	**8/20/2020**

MW 9/28/20
Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

BATTELLE
It can be done

8

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

Client ID		PX-H2905-WT04-0720							
Battelle ID		H7724-FS							
Sample Type		SA							
Collection Date		07/27/2020							
Extraction Date		08/04/2020							
Analytical Instrument		Sciex 5500 LC/MS/MS							
% Moisture		NA							
Matrix		W							
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	1014.80 D		H7724-FS-D(3)	12.500	8/20/2020	6.37	18.03	60.10	
PFHpA	**375-85-9**	**73.89**		**H7724-FS(0)**	**1.000**	**8/20/2020**	**0.25**	**0.96**	**4.81**	
PFOA	335-67-1	71.18	J	H7724-FS(0)	1.000	8/20/2020	0.49	1.44	4.81	SSL
PFNA	**375-95-1**	**4.38**	J	**H7724-FS(0)**	**1.000**	**8/20/2020**	**0.30**	**0.96**	**4.81**	
PFDA	335-76-2	0.21	J	H7724-FS(0)	1.000	8/20/2020	0.13	0.48	4.81	SSL
PFUnA	**2058-94-8**	**0.48**	U	**H7724-FS(0)**	**1.000**	**8/20/2020**	**0.21**	**0.48**	**4.81**	
PFDoA	307-55-1	0.48	U	H7724-FS(0)	1.000	8/20/2020	0.18	0.48	4.81	
PFTrDA	**72629-94-8**	**0.48**	U	**H7724-FS(0)**	**1.000**	**8/20/2020**	**0.14**	**0.48**	**4.81**	
PFTeDA	376-06-7	1.92	U	H7724-FS(0)	1.000	8/20/2020	0.70	1.92	4.81	
NMeFOSAA	**2355-31-9**	**0.96**	UJ	**H7724-FS(0)**	**1.000**	**8/20/2020**	**0.34**	**0.96**	**4.81**	SSL
NEtFOSAA	2991-50-6	0.96	UJ	H7724-FS(0)	1.000	8/20/2020	0.48	0.96	4.81	SSL
PFBS	**375-73-5**	**7.61**		**H7724-FS(0)**	**1.000**	**8/20/2020**	**0.13**	**0.48**	**4.81**	
PFHxS	355-46-4	28.10		H7724-FS(0)	1.000	8/20/2020	0.11	0.38	4.81	
PFOS	**1763-23-1**	**59.10**	J	**H7724-FS(0)**	**1.000**	**8/20/2020**	**0.42**	**0.96**	**4.81**	SSL
HFPO-DA	13252-13-6	0.48	UJ	H7724-FS(0)	1.000	8/20/2020	0.24	0.48	4.81	SSL
Adona	**919005-14-4**	0.96 ~~0.38~~	U	**H7724-FS(0)**	**1.000**	**8/20/2020**	**0.26**	**0.96**	**4.81**	MBL
11Cl-PF3OUdS	763051-92-9	0.48	U	H7724-FS(0)	1.000	8/20/2020	0.22	0.48	4.81	
9Cl-PF3ONS	**756426-58-1**	**0.96**	U	**H7724-FS(0)**	**1.000**	**8/20/2020**	**0.26**	**0.96**	**4.81**	

MW 9/28/20

Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

BATTELLE
It can be done

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

8

Client ID	PX-H2905-WT04-0720
Battelle ID	H7724-FS
Sample Type	SA
Collection Date	07/27/2020
Extraction Date	08/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	92	D	H7724-FS-D(3)	8/20/2020
13C4-PFHpA	**67**		**H7724-FS(0)**	**8/20/2020**
13C8-PFOA	44	N	H7724-FS(0)	8/20/2020
13C9-PFNA	**57**		**H7724-FS(0)**	**8/20/2020**
13C6-PFDA	43	N	H7724-FS(0)	8/20/2020
13C7-PFUnA	**186**	N	**H7724-FS(0)**	**8/20/2020**
13C2-PFDoA	149		H7724-FS(0)	8/20/2020
13C2-PFTeDA	**136**		**H7724-FS(0)**	**8/20/2020**
d3-MeFOSAA	17	N	H7724-FS(0)	8/20/2020
d5-EtFOSAA	**24**	N	**H7724-FS(0)**	**8/20/2020**
13C3-PFBS	63		H7724-FS(0)	8/20/2020
13C3-PFHxS	**52**		**H7724-FS(0)**	**8/20/2020**
13C8-PFOS	45	N	H7724-FS(0)	8/20/2020
13C3-HFPO-DA	**36**	N	**H7724-FS(0)**	**8/20/2020**

NW 9/28/20

Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

BATTELLE
It can be done

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

9

Client ID		PX-H2905-FB01-072720
Battelle ID		H7727-FS
Sample Type		SA
Collection Date		07/27/2020
Extraction Date		08/04/2020
Analytical Instrument		Sciex 5500 LC/MS/MS
% Moisture		NA
Matrix		W
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	H7727-FS(0)	1.000	8/20/2020	0.51	1.44	4.81
PFHpA	**375-85-9**	**0.96 U**	**H7727-FS(0)**	**1.000**	**8/20/2020**	**0.25**	**0.96**	**4.81**
PFOA	335-67-1	1.44 U	H7727-FS(0)	1.000	8/20/2020	0.49	1.44	4.81
PFNA	**375-95-1**	**0.96 U**	**H7727-FS(0)**	**1.000**	**8/20/2020**	**0.30**	**0.96**	**4.81**
PFDA	335-76-2	0.48 U	H7727-FS(0)	1.000	8/20/2020	0.13	0.48	4.81
PFUnA	**2058-94-8**	**0.48 U**	**H7727-FS(0)**	**1.000**	**8/20/2020**	**0.21**	**0.48**	**4.81**
PFDoA	307-55-1	0.48 U	H7727-FS(0)	1.000	8/20/2020	0.18	0.48	4.81
PFTrDA	**72629-94-8**	**0.48 U**	**H7727-FS(0)**	**1.000**	**8/20/2020**	**0.14**	**0.48**	**4.81**
PFTeDA	376-06-7	1.92 U	H7727-FS(0)	1.000	8/20/2020	0.70	1.92	4.81
NMeFOSAA	**2355-31-9**	**0.96 U**	**H7727-FS(0)**	**1.000**	**8/20/2020**	**0.34**	**0.96**	**4.81**
NEtFOSAA	2991-50-6	0.96 U	H7727-FS(0)	1.000	8/20/2020	0.48	0.96	4.81
PFBS	**375-73-5**	**0.48 U**	**H7727-FS(0)**	**1.000**	**8/20/2020**	**0.13**	**0.48**	**4.81**
PFHxS	355-46-4	0.38 U	H7727-FS(0)	1.000	8/20/2020	0.11	0.38	4.81
PFOS	**1763-23-1**	**0.96 U**	**H7727-FS(0)**	**1.000**	**8/20/2020**	**0.42**	**0.96**	**4.81**
HFPO-DA	13252-13-6	0.48 U	H7727-FS(0)	1.000	8/20/2020	0.24	0.48	4.81
Adona	**919005-14-4**	**0.96 U**	**H7727-FS(0)**	**1.000**	**8/20/2020**	**0.26**	**0.96**	**4.81**
11Cl-PF3OUdS	763051-92-9	0.48 U	H7727-FS(0)	1.000	8/20/2020	0.22	0.48	4.81
9Cl-PF3ONS	**756426-58-1**	**0.96 U**	**H7727-FS(0)**	**1.000**	**8/20/2020**	**0.26**	**0.96**	**4.81**

9/28/20
Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

BATTELLE
It can be done

10

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

Client ID		PX-H2905-EB01-072720-GW
Battelle ID		H7728-FS
Sample Type		SA
Collection Date		07/27/2020
Extraction Date		08/04/2020
Analytical Instrument		Sciex 5500 LC/MS/MS
% Moisture		NA
Matrix		W
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	H7728-FS(0)	1.000	8/20/2020	0.51	1.44	4.81
PFHpA	375-85-9	0.96 U	H7728-FS(0)	1.000	8/20/2020	0.25	0.96	4.81
PFOA	335-67-1	1.44 U	H7728-FS(0)	1.000	8/20/2020	0.49	1.44	4.81
PFNA	375-95-1	0.96 U	H7728-FS(0)	1.000	8/20/2020	0.30	0.96	4.81
PFDA	335-76-2	0.48 U	H7728-FS(0)	1.000	8/20/2020	0.13	0.48	4.81
PFUnA	2058-94-8	0.48 U	H7728-FS(0)	1.000	8/20/2020	0.21	0.48	4.81
PFDoA	307-55-1	0.48 U	H7728-FS(0)	1.000	8/20/2020	0.18	0.48	4.81
PFTrDA	72629-94-8	0.48 U	H7728-FS(0)	1.000	8/20/2020	0.14	0.48	4.81
PFTeDA	376-06-7	1.92 U	H7728-FS(0)	1.000	8/20/2020	0.70	1.92	4.81
NMeFOSAA	2355-31-9	0.96 U	H7728-FS(0)	1.000	8/20/2020	0.34	0.96	4.81
NEtFOSAA	2991-50-6	0.96 U	H7728-FS(0)	1.000	8/20/2020	0.48	0.96	4.81
PFBS	375-73-5	0.48 U	H7728-FS(0)	1.000	8/20/2020	0.13	0.48	4.81
PFHxS	355-46-4	0.38 U	H7728-FS(0)	1.000	8/20/2020	0.11	0.38	4.81
PFOS	1763-23-1	0.96 U	H7728-FS(0)	1.000	8/20/2020	0.42	0.96	4.81
HFPO-DA	13252-13-6	0.48 U	H7728-FS(0)	1.000	8/20/2020	0.24	0.48	4.81
Adona	919005-14-4	0.96 U	H7728-FS(0)	1.000	8/20/2020	0.26	0.96	4.81
11Cl-PF3OUdS	763051-92-9	0.48 U	H7728-FS(0)	1.000	8/20/2020	0.22	0.48	4.81
9Cl-PF3ONS	756426-58-1	0.96 U	H7728-FS(0)	1.000	8/20/2020	0.26	0.96	4.81

BATTELLE
It can be done

11

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

Client ID		PX-H2905-WT03-0720							
Battelle ID		H7729-FS							
Sample Type		SA							
Collection Date		07/27/2020							
Extraction Date		08/04/2020							
Analytical Instrument		Sciex 5500 LC/MS/MS							
% Moisture		NA							
Matrix		W							
Sample Size		0.265							
Size Unit-Basis		L							
Analyte	CAS No.	Result (ng/L)		Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	58.46		H7729-FS(0)	1.000	8/20/2020	0.50	1.42	4.72	
PFHpA	**375-85-9**	**23.66**		**H7729-FS(0)**	**1.000**	**8/20/2020**	**0.25**	**0.94**	**4.72**	
PFOA	335-67-1	34.01		H7729-FS(0)	1.000	8/20/2020	0.48	1.42	4.72	
PFNA	**375-95-1**	**2.02**	**J**	**H7729-FS(0)**	**1.000**	**8/20/2020**	**0.29**	**0.94**	**4.72**	
PFDA	335-76-2	0.47	U	H7729-FS(0)	1.000	8/20/2020	0.13	0.47	4.72	
PFUnA	**2058-94-8**	**0.47**	**U**	**H7729-FS(0)**	**1.000**	**8/20/2020**	**0.21**	**0.47**	**4.72**	
PFDoA	307-55-1	0.47	U	H7729-FS(0)	1.000	8/20/2020	0.18	0.47	4.72	
PFTrDA	**72629-94-8**	**0.47**	**U**	**H7729-FS(0)**	**1.000**	**8/20/2020**	**0.14**	**0.47**	**4.72**	
PFTeDA	376-06-7	1.89	U UJ	H7729-FS(0)	1.000	8/20/2020	0.69	1.89	4.72	SSL
NMeFOSAA	**2355-31-9**	**0.94**	**U**	**H7729-FS(0)**	**1.000**	**8/20/2020**	**0.33**	**0.94**	**4.72**	
NEtFOSAA	2991-50-6	0.94	U	H7729-FS(0)	1.000	8/20/2020	0.47	0.94	4.72	
PFBS	**375-73-5**	**12.52**		**H7729-FS(0)**	**1.000**	**8/20/2020**	**0.13**	**0.47**	**4.72**	
PFHxS	355-46-4	86.07		H7729-FS(0)	1.000	8/20/2020	0.10	0.38	4.72	
PFOS	**1763-23-1**	**30.69**		**H7729-FS(0)**	**1.000**	**8/20/2020**	**0.42**	**0.94**	**4.72**	
HFPO-DA	13252-13-6	0.47	U	H7729-FS(0)	1.000	8/20/2020	0.24	0.47	4.72	
Adona	**919005-14-4**	**0.94**	**U**	**H7729-FS(0)**	**1.000**	**8/20/2020**	**0.25**	**0.94**	**4.72**	
11Cl-PF3OUdS	763051-92-9	0.47	U	H7729-FS(0)	1.000	8/20/2020	0.22	0.47	4.72	
9Cl-PF3ONS	**756426-58-1**	**0.94**	**U**	**H7729-FS(0)**	**1.000**	**8/20/2020**	**0.25**	**0.94**	**4.72**	

MW 9/28/20

BATTELLE
It can be done

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

Client ID	PX-H2905-WT03-0720
Battelle ID	H7729-FS
Sample Type	SA
Collection Date	07/27/2020
Extraction Date	08/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	77	H7729-FS(0)	8/20/2020
13C4-PFHpA	**78**	**H7729-FS(0)**	**8/20/2020**
13C8-PFOA	76	H7729-FS(0)	8/20/2020
13C9-PFNA	**75**	**H7729-FS(0)**	**8/20/2020**
13C6-PFDA	71	H7729-FS(0)	8/20/2020
13C7-PFUnA	**70**	**H7729-FS(0)**	**8/20/2020**
13C2-PFDoA	62	H7729-FS(0)	8/20/2020
13C2-PFTeDA	**49**	**H7729-FS(0)**	**8/20/2020**
d3-MeFOSAA	64	H7729-FS(0)	8/20/2020
d5-EtFOSAA	**71**	**H7729-FS(0)**	**8/20/2020**
13C3-PFBS	81	H7729-FS(0)	8/20/2020
13C3-PFHxS	**74**	**H7729-FS(0)**	**8/20/2020**
13C8-PFOS	73	H7729-FS(0)	8/20/2020
13C3-HFPO-DA	**72**	**H7729-FS(0)**	**8/20/2020**

Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

BATTELLE
It can be done

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

12

Client ID	PX-H2905-EB01-072720-SO
Battelle ID	H7744-FS
Sample Type	SA
Collection Date	07/27/2020
Extraction Date	08/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	W
Sample Size	0.255
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.47 U	H7744-FS(0)	1.000	8/20/2020	0.52	1.47	4.90
PFHpA	375-85-9	0.98 U	H7744-FS(0)	1.000	8/20/2020	0.25	0.98	4.90
PFOA	335-67-1	1.47 U	H7744-FS(0)	1.000	8/20/2020	0.50	1.47	4.90
PFNA	375-95-1	0.98 U	H7744-FS(0)	1.000	8/20/2020	0.30	0.98	4.90
PFDA	335-76-2	0.49 U	H7744-FS(0)	1.000	8/20/2020	0.14	0.49	4.90
PFUnA	2058-94-8	0.49 U	H7744-FS(0)	1.000	8/20/2020	0.22	0.49	4.90
PFDoA	307-55-1	0.49 U	H7744-FS(0)	1.000	8/20/2020	0.19	0.49	4.90
PFTrDA	72629-94-8	0.49 U	H7744-FS(0)	1.000	8/20/2020	0.15	0.49	4.90
PFTeDA	376-06-7	1.96 U	H7744-FS(0)	1.000	8/20/2020	0.72	1.96	4.90
NMeFOSAA	2355-31-9	0.98 U	H7744-FS(0)	1.000	8/20/2020	0.34	0.98	4.90
NEtFOSAA	2991-50-6	0.98 U	H7744-FS(0)	1.000	8/20/2020	0.49	0.98	4.90
PFBS	375-73-5	0.49 U	H7744-FS(0)	1.000	8/20/2020	0.14	0.49	4.90
PFHxS	355-46-4	0.39 U	H7744-FS(0)	1.000	8/20/2020	0.11	0.39	4.90
PFOS	1763-23-1	0.98 U	H7744-FS(0)	1.000	8/20/2020	0.43	0.98	4.90
HFPO-DA	13252-13-6	0.49 U	H7744-FS(0)	1.000	8/20/2020	0.25	0.49	4.90
Adona	919005-14-4	0.98 U	H7744-FS(0)	1.000	8/20/2020	0.26	0.98	4.90
11Cl-PF3OUdS	763051-92-9	0.49 U	H7744-FS(0)	1.000	8/20/2020	0.23	0.49	4.90
9Cl-PF3ONS	756426-58-1	0.98 U	H7744-FS(0)	1.000	8/20/2020	0.26	0.98	4.90

NW 9/24/20
Analyzed by: Schultz, Stephanie
Printed: 8/24/2020

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-0863
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, St. Mary's County, CTO-JU14, Maryland
Date: September 28, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-B1669-SS05-000H	H7689-FS	Soil
2	PX-B1669-SS05P-000H	H7690-FS	Soil
3	PX-B1669-SB05-0304	H7691-FS	Soil
4	PX-B1669-SS03-000H	H7692-FS	Soil
4MS	PX-B1669-SS03-000HMS	H7693-FSMS	Soil
4MSD	PX-B1669-SS03-000HMSD	H7694-FSMSD	Soil
5	PX-B1669-SB03-0304	H7695-FS	Soil
6	PX-B1669-SS02-000H	H7696-FS	Soil
7	PX-B1669-SB02-0304	H7697-FS	Soil
8	PX-B1669-SS04-000H	H7699-FS	Soil
9	PX-B1669-SB04-0304	H7700-FS	Soil
10	PX-B1669-SS01-000H	H7701-FS	Soil
11	PX-B1669-SB01-0304	H7702-FS	Soil
12	PX-B1669-SB01P-0304	H7703-FS	Soil

A Stage 2B/4 data validation was performed on the analytical data for twelve soil samples collected on July 28, 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-B1669-EB01-072820-SO	PFOS	0.71	U	2, 4, 8

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate %R values.

Laboratory Fortified Blank (LFB)

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

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

- 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-B1669-SS05-000H ng/g	PX-B1669-SS05P-000H ng/g	RPD	Qualifier
PFHxA	1.04	2.31U	NC	None

Compound	PX-B1669-SB01-0304 ng/g	PX-B1669-SB01P-0304 ng/g	RPD	Qualifier
PFHxA	2.29U	2.47	NC	None

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

Signed: Nancy Weaver Dated: 10/2/20

Nancy Weaver
Senior Chemist

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

BATTELLE
It can be done

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

Client ID	PX-B1669-SS05-000H
Battelle ID	H7689-FS
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	07/31/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	11.42
Matrix	SO
Sample Size	1.70
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.04 J	H7689-FS(3)	10.000	8/16/2020	0.84	2.35	5.88
PFHpA	375-85-9	1.76 U	H7689-FS(3)	10.000	8/16/2020	0.60	1.76	5.88
PFOA	335-67-1	2.35 U	H7689-FS(3)	10.000	8/16/2020	0.72	2.35	5.88
PFNA	375-95-1	1.18 U	H7689-FS(3)	10.000	8/16/2020	0.58	1.18	5.88
PFDA	335-76-2	1.18 U	H7689-FS(3)	10.000	8/16/2020	0.54	1.18	5.88
PFUnA	2058-94-8	1.18 U	H7689-FS(3)	10.000	8/16/2020	0.54	1.18	5.88
PFDoA	307-55-1	2.35 U	H7689-FS(3)	10.000	8/16/2020	0.72	2.35	5.88
PFTrDA	72629-94-8	1.18 U	H7689-FS(3)	10.000	8/16/2020	0.33	1.18	5.88
PFTeDA	376-06-7	2.94 U	H7689-FS(3)	10.000	8/16/2020	1.27	2.94	5.88
NMeFOSAA	2355-31-9	2.94 U	H7689-FS(3)	10.000	8/16/2020	1.20	2.94	5.88
NEtFOSAA	2991-50-6	2.35 U	H7689-FS(3)	10.000	8/16/2020	0.88	2.35	5.88
PFBS	375-73-5	1.18 U	H7689-FS(3)	10.000	8/16/2020	0.41	1.18	5.88
PFHxS	355-46-4	2.35 U	H7689-FS(3)	10.000	8/16/2020	0.95	2.35	5.88
PFOS	1763-23-1	2.35 U	H7689-FS(3)	10.000	8/16/2020	0.81	2.35	5.88
HFPO-DA	13252-13-6	2.35 U	H7689-FS(3)	10.000	8/16/2020	0.75	2.35	5.88
Adona	919005-14-4	2.35 U	H7689-FS(3)	10.000	8/16/2020	0.98	2.35	5.88
11Cl-PF3OUdS	763051-92-9	1.76 U	H7689-FS(3)	10.000	8/16/2020	0.61	1.76	5.88
9Cl-PF3ONS	756426-58-1	1.18 U	H7689-FS(3)	10.000	8/16/2020	0.56	1.18	5.88

NW 9/28/20
Analyzed by: Griffith, Lauren
Printed: 8/24/2020

BATTELLE
It can be done

J

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

Client ID	PX-B1669-SS05P-000H
Battelle ID	H7690-FS
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	07/31/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	11.58
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	H7690-FS(3)	10.000	8/16/2020	0.82	2.31	5.78	
PFHpA	375-85-9	1.73 U	H7690-FS(3)	10.000	8/16/2020	0.59	1.73	5.78	
PFOA	335-67-1	2.31 U	H7690-FS(3)	10.000	8/16/2020	0.71	2.31	5.78	
PFNA	375-95-1	1.16 U	H7690-FS(3)	10.000	8/16/2020	0.57	1.16	5.78	
PFDA	335-76-2	1.16 U	H7690-FS(3)	10.000	8/16/2020	0.53	1.16	5.78	
PFUnA	2058-94-8	1.16 U	H7690-FS(3)	10.000	8/16/2020	0.53	1.16	5.78	
PFDoA	307-55-1	2.31 U	H7690-FS(3)	10.000	8/16/2020	0.71	2.31	5.78	
PFTrDA	72629-94-8	1.16 U	H7690-FS(3)	10.000	8/16/2020	0.32	1.16	5.78	
PFTeDA	376-06-7	2.89 U	H7690-FS(3)	10.000	8/16/2020	1.25	2.89	5.78	
NMeFOSAA	2355-31-9	2.89 U	H7690-FS(3)	10.000	8/16/2020	1.18	2.89	5.78	
NEtFOSAA	2991-50-6	2.31 U	H7690-FS(3)	10.000	8/16/2020	0.87	2.31	5.78	
PFBS	375-73-5	1.16 U	H7690-FS(3)	10.000	8/16/2020	0.40	1.16	5.78	
PFHxS	355-46-4	2.31 U	H7690-FS(3)	10.000	8/16/2020	0.94	2.31	5.78	
PFOS	1763-23-1	2.31 ~~0.82~~ U	H7690-FS(3)	10.000	8/16/2020	0.80	2.31	5.78	EBL
HFPO-DA	13252-13-6	2.31 U	H7690-FS(3)	10.000	8/16/2020	0.74	2.31	5.78	
Adona	919005-14-4	2.31 U	H7690-FS(3)	10.000	8/16/2020	0.96	2.31	5.78	
11Cl-PF3OUdS	763051-92-9	1.73 U	H7690-FS(3)	10.000	8/16/2020	0.60	1.73	5.78	
9Cl-PF3ONS	756426-58-1	1.16 U	H7690-FS(3)	10.000	8/16/2020	0.55	1.16	5.78	

NW 9/28/20

Analyzed by: Griffith, Lauren
Printed: 8/24/2020

BATTELLE
It can be done

3

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

Client ID	PX-B1669-SB05-0304
Battelle ID	H7691-FS
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	07/31/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	12.00
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	H7691-FS(3)	10.000	8/16/2020	0.74	2.08	5.21
PFHpA	375-85-9	1.56 U	H7691-FS(3)	10.000	8/16/2020	0.53	1.56	5.21
PFOA	335-67-1	2.08 U	H7691-FS(3)	10.000	8/16/2020	0.64	2.08	5.21
PFNA	375-95-1	1.04 U	H7691-FS(3)	10.000	8/16/2020	0.51	1.04	5.21
PFDA	335-76-2	1.04 U	H7691-FS(3)	10.000	8/16/2020	0.48	1.04	5.21
PFUnA	2058-94-8	1.04 U	H7691-FS(3)	10.000	8/16/2020	0.48	1.04	5.21
PFDoA	307-55-1	2.08 U	H7691-FS(3)	10.000	8/16/2020	0.64	2.08	5.21
PFTrDA	72629-94-8	1.04 U	H7691-FS(3)	10.000	8/16/2020	0.29	1.04	5.21
PFTeDA	376-06-7	2.60 U	H7691-FS(3)	10.000	8/16/2020	1.13	2.60	5.21
NMeFOSAA	2355-31-9	2.60 U	H7691-FS(3)	10.000	8/16/2020	1.06	2.60	5.21
NEtFOSAA	2991-50-6	2.08 U	H7691-FS(3)	10.000	8/16/2020	0.78	2.08	5.21
PFBS	375-73-5	1.04 U	H7691-FS(3)	10.000	8/16/2020	0.36	1.04	5.21
PFHxS	355-46-4	2.08 U	H7691-FS(3)	10.000	8/16/2020	0.84	2.08	5.21
PFOS	1763-23-1	2.08 U	H7691-FS(3)	10.000	8/16/2020	0.72	2.08	5.21
HFPO-DA	13252-13-6	2.08 U	H7691-FS(3)	10.000	8/16/2020	0.67	2.08	5.21
Adona	919005-14-4	2.08 U	H7691-FS(3)	10.000	8/16/2020	0.86	2.08	5.21
11Cl-PF3OUdS	763051-92-9	1.56 U	H7691-FS(3)	10.000	8/16/2020	0.54	1.56	5.21
9Cl-PF3ONS	756426-58-1	1.04 U	H7691-FS(3)	10.000	8/16/2020	0.50	1.04	5.21

NW 9/28/20
Analyzed by: Griffith, Lauren
Printed: 8/24/2020

BATTELLE
It can be done

4

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

Client ID	PX-B1669-SS03-000H
Battelle ID	H7692-FS
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	07/31/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	5.47
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	H7692-FS(3)	10.000	8/16/2020	0.80	2.25	5.62	
PFHpA	375-85-9	1.69 U	H7692-FS(3)	10.000	8/16/2020	0.57	1.69	5.62	
PFOA	335-67-1	2.25 U	H7692-FS(3)	10.000	8/16/2020	0.69	2.25	5.62	
PFNA	375-95-1	1.12 U	H7692-FS(3)	10.000	8/16/2020	0.55	1.12	5.62	
PFDA	335-76-2	1.12 U	H7692-FS(3)	10.000	8/16/2020	0.52	1.12	5.62	
PFUnA	2058-94-8	1.12 U	H7692-FS(3)	10.000	8/16/2020	0.52	1.12	5.62	
PFDoA	307-55-1	2.25 U	H7692-FS(3)	10.000	8/16/2020	0.69	2.25	5.62	
PFTrDA	72629-94-8	1.12 U	H7692-FS(3)	10.000	8/16/2020	0.31	1.12	5.62	
PFTeDA	376-06-7	2.81 U	H7692-FS(3)	10.000	8/16/2020	1.21	2.81	5.62	
NMeFOSAA	2355-31-9	2.81 U	H7692-FS(3)	10.000	8/16/2020	1.15	2.81	5.62	
NEtFOSAA	2991-50-6	2.25 U	H7692-FS(3)	10.000	8/16/2020	0.84	2.25	5.62	
PFBS	375-73-5	1.12 U	H7692-FS(3)	10.000	8/16/2020	0.39	1.12	5.62	
PFHxS	355-46-4	2.25 U	H7692-FS(3)	10.000	8/16/2020	0.91	2.25	5.62	
PFOS	1763-23-1	2.62 / U	H7692-FS(3)	10.000	8/16/2020	0.78	2.25	5.62	EBL
HFPO-DA	13252-13-6	2.25 U	H7692-FS(3)	10.000	8/16/2020	0.72	2.25	5.62	
Adona	919005-14-4	2.25 U	H7692-FS(3)	10.000	8/16/2020	0.93	2.25	5.62	
11Cl-PF3OUdS	763051-92-9	1.69 U	H7692-FS(3)	10.000	8/16/2020	0.58	1.69	5.62	
9Cl-PF3ONS	756426-58-1	1.12 U	H7692-FS(3)	10.000	8/16/2020	0.54	1.12	5.62	

MS 9/28/20
Analyzed by: Griffith, Lauren
Printed: 8/24/2020

BATTELLE
It can be done

5

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

Client ID	PX-B1669-SB03-0304
Battelle ID	H7695-FS
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	07/31/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	16.72
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	H7695-FS(3)	10.000	8/16/2020	0.85	2.40	5.99
PFHpA	**375-85-9**	**1.80 U**	**H7695-FS(3)**	**10.000**	**8/16/2020**	**0.61**	**1.80**	**5.99**
PFOA	335-67-1	2.40 U	H7695-FS(3)	10.000	8/16/2020	0.73	2.40	5.99
PFNA	**375-95-1**	**1.20 U**	**H7695-FS(3)**	**10.000**	**8/16/2020**	**0.59**	**1.20**	**5.99**
PFDA	335-76-2	1.20 U	H7695-FS(3)	10.000	8/16/2020	0.55	1.20	5.99
PFUnA	**2058-94-8**	**1.20 U**	**H7695-FS(3)**	**10.000**	**8/16/2020**	**0.55**	**1.20**	**5.99**
PFDoA	307-55-1	2.40 U	H7695-FS(3)	10.000	8/16/2020	0.73	2.40	5.99
PFTrDA	**72629-94-8**	**1.20 U**	**H7695-FS(3)**	**10.000**	**8/16/2020**	**0.34**	**1.20**	**5.99**
PFTeDA	376-06-7	2.99 U	H7695-FS(3)	10.000	8/16/2020	1.29	2.99	5.99
NMeFOSAA	**2355-31-9**	**2.99 U**	**H7695-FS(3)**	**10.000**	**8/16/2020**	**1.22**	**2.99**	**5.99**
NEtFOSAA	2991-50-6	2.40 U	H7695-FS(3)	10.000	8/16/2020	0.90	2.40	5.99
PFBS	**375-73-5**	**1.20 U**	**H7695-FS(3)**	**10.000**	**8/16/2020**	**0.42**	**1.20**	**5.99**
PFHxS	355-46-4	2.40 U	H7695-FS(3)	10.000	8/16/2020	0.97	2.40	5.99
PFOS	**1763-23-1**	**2.40 U**	**H7695-FS(3)**	**10.000**	**8/16/2020**	**0.83**	**2.40**	**5.99**
HFPO-DA	13252-13-6	2.40 U	H7695-FS(3)	10.000	8/16/2020	0.77	2.40	5.99
Adona	**919005-14-4**	**2.40 U**	**H7695-FS(3)**	**10.000**	**8/16/2020**	**0.99**	**2.40**	**5.99**
11Cl-PF3OUdS	763051-92-9	1.80 U	H7695-FS(3)	10.000	8/16/2020	0.62	1.80	5.99
9Cl-PF3ONS	**756426-58-1**	**1.20 U**	**H7695-FS(3)**	**10.000**	**8/16/2020**	**0.57**	**1.20**	**5.99**

NW 9/28/20
Analyzed by: Griffith, Lauren
Printed: 8/24/2020

BATTELLE
It can be done

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

6

Client ID		PX-B1669-SS02-000H							
Battelle ID		H7696-FS							
Sample Type		SA							
Collection Date		07/28/2020							
Extraction Date		07/31/2020							
Analytical Instrument		Sciex 5500 LC/MS/MS							
% Moisture		12.45							
Matrix		SO							
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	H7696-FS(3)	10.000	8/16/2020	0.87	2.44	6.10
PFHpA	**375-85-9**	**1.83**	**U**	**H7696-FS(3)**	**10.000**	**8/16/2020**	**0.62**	**1.83**	**6.10**
PFOA	335-67-1	2.44	U	H7696-FS(3)	10.000	8/16/2020	0.74	2.44	6.10
PFNA	**375-95-1**	**0.77**	**J**	**H7696-FS(3)**	**10.000**	**8/16/2020**	**0.60**	**1.22**	**6.10**
PFDA	335-76-2	1.22	U	H7696-FS(3)	10.000	8/16/2020	0.56	1.22	6.10
PFUnA	**2058-94-8**	**1.22**	**U**	**H7696-FS(3)**	**10.000**	**8/16/2020**	**0.56**	**1.22**	**6.10**
PFDoA	307-55-1	2.44	U	H7696-FS(3)	10.000	8/16/2020	0.74	2.44	6.10
PFTrDA	**72629-94-8**	**1.22**	**U**	**H7696-FS(3)**	**10.000**	**8/16/2020**	**0.34**	**1.22**	**6.10**
PFTeDA	376-06-7	3.05	U	H7696-FS(3)	10.000	8/16/2020	1.32	3.05	6.10
NMeFOSAA	**2355-31-9**	**3.05**	**U**	**H7696-FS(3)**	**10.000**	**8/16/2020**	**1.24**	**3.05**	**6.10**
NEtFOSAA	2991-50-6	2.44	U	H7696-FS(3)	10.000	8/16/2020	0.91	2.44	6.10
PFBS	**375-73-5**	**1.22**	**U**	**H7696-FS(3)**	**10.000**	**8/16/2020**	**0.43**	**1.22**	**6.10**
PFHxS	355-46-4	2.44	U	H7696-FS(3)	10.000	8/16/2020	0.99	2.44	6.10
PFOS	**1763-23-1**	**2.44**	**U**	**H7696-FS(3)**	**10.000**	**8/16/2020**	**0.84**	**2.44**	**6.10**
HFPO-DA	13252-13-6	2.44	U	H7696-FS(3)	10.000	8/16/2020	0.78	2.44	6.10
Adona	**919005-14-4**	**2.44**	**U**	**H7696-FS(3)**	**10.000**	**8/16/2020**	**1.01**	**2.44**	**6.10**
11Cl-PF3OUdS	763051-92-9	1.83	U	H7696-FS(3)	10.000	8/16/2020	0.63	1.83	6.10
9Cl-PF3ONS	**756426-58-1**	**1.22**	**U**	**H7696-FS(3)**	**10.000**	**8/16/2020**	**0.59**	**1.22**	**6.10**

NW 9/28/20
Analyzed by: Griffith, Lauren
Printed: 8/24/2020

BATTELLE
It can be done

7

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

Client ID	PX-B1669-SB02-0304
Battelle ID	H7697-FS
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	07/31/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	10.56
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	4.02 J	H7697-FS(3)	10.000	8/16/2020	0.74	2.09	5.24
PFHpA	375-85-9	1.57 U	H7697-FS(3)	10.000	8/16/2020	0.53	1.57	5.24
PFOA	335-67-1	2.09 U	H7697-FS(3)	10.000	8/16/2020	0.64	2.09	5.24
PFNA	375-95-1	1.05 U	H7697-FS(3)	10.000	8/16/2020	0.51	1.05	5.24
PFDA	335-76-2	1.05 U	H7697-FS(3)	10.000	8/16/2020	0.48	1.05	5.24
PFUnA	2058-94-8	1.05 U	H7697-FS(3)	10.000	8/16/2020	0.48	1.05	5.24
PFDoA	307-55-1	2.09 U	H7697-FS(3)	10.000	8/16/2020	0.64	2.09	5.24
PFTrDA	72629-94-8	1.05 U	H7697-FS(3)	10.000	8/16/2020	0.29	1.05	5.24
PFTeDA	376-06-7	2.62 U	H7697-FS(3)	10.000	8/16/2020	1.13	2.62	5.24
NMeFOSAA	2355-31-9	2.62 U	H7697-FS(3)	10.000	8/16/2020	1.07	2.62	5.24
NEtFOSAA	2991-50-6	2.09 U	H7697-FS(3)	10.000	8/16/2020	0.79	2.09	5.24
PFBS	375-73-5	1.05 U	H7697-FS(3)	10.000	8/16/2020	0.37	1.05	5.24
PFHxS	355-46-4	2.09 U	H7697-FS(3)	10.000	8/16/2020	0.85	2.09	5.24
PFOS	1763-23-1	2.09 U	H7697-FS(3)	10.000	8/16/2020	0.72	2.09	5.24
HFPO-DA	13252-13-6	2.09 U	H7697-FS(3)	10.000	8/16/2020	0.67	2.09	5.24
Adona	919005-14-4	2.09 U	H7697-FS(3)	10.000	8/16/2020	0.87	2.09	5.24
11Cl-PF3OUdS	763051-92-9	1.57 U	H7697-FS(3)	10.000	8/16/2020	0.54	1.57	5.24
9Cl-PF3ONS	756426-58-1	1.05 U	H7697-FS(3)	10.000	8/16/2020	0.50	1.05	5.24

NH 9/28/20
Analyzed by: Griffith, Lauren
Printed: 8/24/2020

BATTELLE
It can be done

8

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

Client ID	PX-B1669-SS04-000H
Battelle ID	H7699-FS
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	07/31/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	10.82
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	0.90 J	H7699-FS(3)	10.000	8/16/2020	0.73	2.06	5.15	
PFHpA	375-85-9	1.55 U	H7699-FS(3)	10.000	8/16/2020	0.53	1.55	5.15	
PFOA	335-67-1	2.06 U	H7699-FS(3)	10.000	8/16/2020	0.63	2.06	5.15	
PFNA	375-95-1	0.62 J	H7699-FS(3)	10.000	8/16/2020	0.51	1.03	5.15	
PFDA	335-76-2	1.03 U	H7699-FS(3)	10.000	8/16/2020	0.47	1.03	5.15	
PFUnA	2058-94-8	1.03 U	H7699-FS(3)	10.000	8/16/2020	0.47	1.03	5.15	
PFDoA	307-55-1	2.06 U	H7699-FS(3)	10.000	8/16/2020	0.63	2.06	5.15	
PFTrDA	72629-94-8	1.03 U	H7699-FS(3)	10.000	8/16/2020	0.29	1.03	5.15	
PFTeDA	376-06-7	2.58 U	H7699-FS(3)	10.000	8/16/2020	1.11	2.58	5.15	
NMeFOSAA	2355-31-9	2.58 U	H7699-FS(3)	10.000	8/16/2020	1.05	2.58	5.15	
NEtFOSAA	2991-50-6	2.06 U	H7699-FS(3)	10.000	8/16/2020	0.77	2.06	5.15	
PFBS	375-73-5	1.03 U	H7699-FS(3)	10.000	8/16/2020	0.36	1.03	5.15	
PFHxS	355-46-4	2.06 U	H7699-FS(3)	10.000	8/16/2020	0.84	2.06	5.15	
PFOS	1763-23-1	2.06 ~~1.13~~ / U	H7699-FS(3)	10.000	8/16/2020	0.71	2.06	5.15	EBL
HFPO-DA	13252-13-6	2.06 U	H7699-FS(3)	10.000	8/16/2020	0.66	2.06	5.15	
Adona	919005-14-4	2.06 U	H7699-FS(3)	10.000	8/16/2020	0.86	2.06	5.15	
11Cl-PF3OUdS	763051-92-9	1.55 U	H7699-FS(3)	10.000	8/16/2020	0.54	1.55	5.15	
9Cl-PF3ONS	756426-58-1	1.03 U	H7699-FS(3)	10.000	8/16/2020	0.49	1.03	5.15	

NW 9/28/20

Analyzed by: Griffith, Lauren
Printed: 8/24/2020

BATTELLE
It can be done

9

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

Client ID	PX-B1669-SB04-0304
Battelle ID	H7700-FS
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	07/31/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	9.63
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	0.94 J	H7700-FS(3)	10.000	8/16/2020	0.86	2.41	6.02
PFHpA	375-85-9	0.78 J	H7700-FS(3)	10.000	8/16/2020	0.61	1.81	6.02
PFOA	335-67-1	2.41 U	H7700-FS(3)	10.000	8/16/2020	0.73	2.41	6.02
PFNA	375-95-1	0.71 J	H7700-FS(3)	10.000	8/16/2020	0.59	1.20	6.02
PFDA	335-76-2	0.68 J	H7700-FS(3)	10.000	8/16/2020	0.55	1.20	6.02
PFUnA	2058-94-8	1.20 U	H7700-FS(3)	10.000	8/16/2020	0.55	1.20	6.02
PFDoA	307-55-1	2.41 U	H7700-FS(3)	10.000	8/16/2020	0.73	2.41	6.02
PFTrDA	72629-94-8	1.20 U	H7700-FS(3)	10.000	8/16/2020	0.34	1.20	6.02
PFTeDA	376-06-7	3.01 U	H7700-FS(3)	10.000	8/16/2020	1.30	3.01	6.02
NMeFOSAA	2355-31-9	3.01 U	H7700-FS(3)	10.000	8/16/2020	1.23	3.01	6.02
NEtFOSAA	2991-50-6	2.41 U	H7700-FS(3)	10.000	8/16/2020	0.90	2.41	6.02
PFBS	375-73-5	1.20 U	H7700-FS(3)	10.000	8/16/2020	0.42	1.20	6.02
PFHxS	355-46-4	2.41 U	H7700-FS(3)	10.000	8/16/2020	0.98	2.41	6.02
PFOS	1763-23-1	2.41 U	H7700-FS(3)	10.000	8/16/2020	0.83	2.41	6.02
HFPO-DA	13252-13-6	2.41 U	H7700-FS(3)	10.000	8/16/2020	0.77	2.41	6.02
Adona	919005-14-4	2.41 U	H7700-FS(3)	10.000	8/16/2020	1.00	2.41	6.02
11Cl-PF3OUdS	763051-92-9	1.81 U	H7700-FS(3)	10.000	8/16/2020	0.63	1.81	6.02
9Cl-PF3ONS	756426-58-1	1.20 U	H7700-FS(3)	10.000	8/16/2020	0.58	1.20	6.02

NW 9/28/20
Analyzed by: Griffith, Lauren
Printed: 8/24/2020

BATTELLE
It can be done

10

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

Client ID	PX-B1669-SS01-000H
Battelle ID	H7701-FS
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	07/31/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	4.60
Matrix	SO
Sample Size	1.76
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.27 U	H7701-FS(3)	10.000	8/16/2020	0.81	2.27	5.68
PFHpA	375-85-9	1.70 U	H7701-FS(3)	10.000	8/16/2020	0.58	1.70	5.68
PFOA	335-67-1	2.27 U	H7701-FS(3)	10.000	8/16/2020	0.69	2.27	5.68
PFNA	375-95-1	1.14 U	H7701-FS(3)	10.000	8/16/2020	0.56	1.14	5.68
PFDA	335-76-2	1.14 U	H7701-FS(3)	10.000	8/16/2020	0.52	1.14	5.68
PFUnA	2058-94-8	1.14 U	H7701-FS(3)	10.000	8/16/2020	0.52	1.14	5.68
PFDoA	307-55-1	2.27 U	H7701-FS(3)	10.000	8/16/2020	0.69	2.27	5.68
PFTrDA	72629-94-8	1.14 U	H7701-FS(3)	10.000	8/16/2020	0.32	1.14	5.68
PFTeDA	376-06-7	2.84 U	H7701-FS(3)	10.000	8/16/2020	1.23	2.84	5.68
NMeFOSAA	2355-31-9	2.84 U	H7701-FS(3)	10.000	8/16/2020	1.16	2.84	5.68
NEtFOSAA	2991-50-6	2.27 U	H7701-FS(3)	10.000	8/16/2020	0.85	2.27	5.68
PFBS	375-73-5	1.14 U	H7701-FS(3)	10.000	8/16/2020	0.40	1.14	5.68
PFHxS	355-46-4	2.27 U	H7701-FS(3)	10.000	8/16/2020	0.92	2.27	5.68
PFOS	1763-23-1	2.27 U	H7701-FS(3)	10.000	8/16/2020	0.78	2.27	5.68
HFPO-DA	13252-13-6	2.27 U	H7701-FS(3)	10.000	8/16/2020	0.73	2.27	5.68
Adona	919005-14-4	2.27 U	H7701-FS(3)	10.000	8/16/2020	0.94	2.27	5.68
11Cl-PF3OUdS	763051-92-9	1.70 U	H7701-FS(3)	10.000	8/16/2020	0.59	1.70	5.68
9Cl-PF3ONS	756426-58-1	1.14 U	H7701-FS(3)	10.000	8/16/2020	0.55	1.14	5.68

NW 9/29/20
Analyzed by: Griffith, Lauren
Printed: 8/24/2020

BATTELLE
It can be done

11

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

Client ID	PX-B1669-SB01-0304
Battelle ID	H7702-FS
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	07/31/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	14.99
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	H7702-FS(3)	10.000	8/16/2020	0.81	2.29	5.71
PFHpA	375-85-9	1.71 U	H7702-FS(3)	10.000	8/16/2020	0.58	1.71	5.71
PFOA	335-67-1	2.29 U	H7702-FS(3)	10.000	8/16/2020	0.70	2.29	5.71
PFNA	375-95-1	1.14 U	H7702-FS(3)	10.000	8/16/2020	0.56	1.14	5.71
PFDA	335-76-2	1.14 U	H7702-FS(3)	10.000	8/16/2020	0.53	1.14	5.71
PFUnA	2058-94-8	1.14 U	H7702-FS(3)	10.000	8/16/2020	0.53	1.14	5.71
PFDoA	307-55-1	2.29 U	H7702-FS(3)	10.000	8/16/2020	0.70	2.29	5.71
PFTrDA	72629-94-8	1.14 U	H7702-FS(3)	10.000	8/16/2020	0.32	1.14	5.71
PFTeDA	376-06-7	2.86 U	H7702-FS(3)	10.000	8/16/2020	1.23	2.86	5.71
NMeFOSAA	2355-31-9	2.86 U	H7702-FS(3)	10.000	8/16/2020	1.17	2.86	5.71
NEtFOSAA	2991-50-6	2.29 U	H7702-FS(3)	10.000	8/16/2020	0.86	2.29	5.71
PFBS	375-73-5	1.14 U	H7702-FS(3)	10.000	8/16/2020	0.40	1.14	5.71
PFHxS	355-46-4	2.29 U	H7702-FS(3)	10.000	8/16/2020	0.93	2.29	5.71
PFOS	1763-23-1	2.29 U	H7702-FS(3)	10.000	8/16/2020	0.79	2.29	5.71
HFPO-DA	13252-13-6	2.29 U	H7702-FS(3)	10.000	8/16/2020	0.73	2.29	5.71
Adona	919005-14-4	2.29 U	H7702-FS(3)	10.000	8/16/2020	0.95	2.29	5.71
11Cl-PF3OUdS	763051-92-9	1.71 U	H7702-FS(3)	10.000	8/16/2020	0.59	1.71	5.71
9Cl-PF3ONS	756426-58-1	1.14 U	H7702-FS(3)	10.000	8/16/2020	0.55	1.14	5.71

NW 9/28/20

Analyzed by: Griffith, Lauren
Printed: 8/24/2020

BATTELLE
It can be done

12

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

Client ID	PX-B1669-SB01P-0304
Battelle ID	H7703-FS
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	07/31/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	15.41
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	2.47 J	H7703-FS(3)	10.000	8/16/2020	0.89	2.50	6.25
PFHpA	375-85-9	1.88 U	H7703-FS(3)	10.000	8/16/2020	0.64	1.88	6.25
PFOA	335-67-1	2.50 U	H7703-FS(3)	10.000	8/16/2020	0.76	2.50	6.25
PFNA	375-95-1	1.25 U	H7703-FS(3)	10.000	8/16/2020	0.61	1.25	6.25
PFDA	335-76-2	1.25 U	H7703-FS(3)	10.000	8/16/2020	0.58	1.25	6.25
PFUnA	2058-94-8	1.25 U	H7703-FS(3)	10.000	8/16/2020	0.58	1.25	6.25
PFDoA	307-55-1	2.50 U	H7703-FS(3)	10.000	8/16/2020	0.76	2.50	6.25
PFTrDA	72629-94-8	1.25 U	H7703-FS(3)	10.000	8/16/2020	0.35	1.25	6.25
PFTeDA	376-06-7	3.13 U	H7703-FS(3)	10.000	8/16/2020	1.35	3.13	6.25
NMeFOSAA	2355-31-9	3.13 U	H7703-FS(3)	10.000	8/16/2020	1.28	3.13	6.25
NEtFOSAA	2991-50-6	2.50 U	H7703-FS(3)	10.000	8/16/2020	0.94	2.50	6.25
PFBS	375-73-5	1.25 U	H7703-FS(3)	10.000	8/16/2020	0.44	1.25	6.25
PFHxS	355-46-4	2.50 U	H7703-FS(3)	10.000	8/16/2020	1.01	2.50	6.25
PFOS	1763-23-1	2.50 U	H7703-FS(3)	10.000	8/16/2020	0.86	2.50	6.25
HFPO-DA	13252-13-6	2.50 U	H7703-FS(3)	10.000	8/16/2020	0.80	2.50	6.25
Adona	919005-14-4	2.50 U	H7703-FS(3)	10.000	8/16/2020	1.04	2.50	6.25
11Cl-PF3OUdS	763051-92-9	1.88 U	H7703-FS(3)	10.000	8/16/2020	0.65	1.88	6.25
9Cl-PF3ONS	756426-58-1	1.25 U	H7703-FS(3)	10.000	8/16/2020	0.60	1.25	6.25

NW 9/28/20
Analyzed by: Griffith, Lauren
Printed: 8/24/2020

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-0878
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, St. Mary's County, CTO-JU14, Maryland
Date: September 28, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-B102-SS03-000H	H7964-FS	Soil
1MS	PX-B102-SS03-000HMS	H7965-FSMS	Soil
1MSD	PX-B102-SS03-000HMSD	H7966-FSMSD	Soil
2	PX-B102-SB03-0304	H7967-FS	Soil
3	PX-B102-SS01-000H	H7968-FS	Soil
4	PX-B102-SB01-0304	H7969-FS	Soil
5	PX-B102-SB01P-0304	H7970-FS	Soil
6	PX-B102-SS04-000H	H7971-FS	Soil
7	PX-B102-SS04P-000H	H7972-FS	Soil
8	PX-B102-SB04-0304	H7973-FS	Soil
9	PX-B102-SS02-000H	H7974-FS	Soil
10	PX-B102-SB02-0304	H7975-FS	Soil

A Stage 2B/4 data validation was performed on the analytical data for ten soil samples collected on July 28-29, 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-B102-EB01-072920-SO	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate %R values.

Laboratory Fortified Blank (LFB)

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

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

- 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-B102-SB01-0304 ng/g	PX-B102-SB01P-0304 ng/g	RPD	Qualifier
None	ND	ND	-	-

Compound	PX-B102-SS04-000H ng/g	PX-B102-SS04P-000H ng/g	RPD	Qualifier
PFHxA	2.14U	0.90	NC	None
PFOA	0.72	0.81	12%	
PFHxS	1.54	1.54	0%	
PFOS	25.57	25.87	1%	

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

Signed: Nancy Weaver Dated: 10/2/20

Nancy Weaver
Senior Chemist

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

BATTELLE
It can be done

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

Client ID	PX-B102-SS03-000H
Battelle ID	H7964-FS
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	08/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	6.86
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	H7964-FS(3)	10.000	8/16/2020	0.77	2.16	5.41
PFHpA	**375-85-9**	**1.62 U**	**H7964-FS(3)**	**10.000**	**8/16/2020**	**0.55**	**1.62**	**5.41**
PFOA	335-67-1	2.16 U	H7964-FS(3)	10.000	8/16/2020	0.66	2.16	5.41
PFNA	**375-95-1**	**1.08 U**	**H7964-FS(3)**	**10.000**	**8/16/2020**	**0.53**	**1.08**	**5.41**
PFDA	335-76-2	1.08 U	H7964-FS(3)	10.000	8/16/2020	0.50	1.08	5.41
PFUnA	**2058-94-8**	**1.08 U**	**H7964-FS(3)**	**10.000**	**8/16/2020**	**0.50**	**1.08**	**5.41**
PFDoA	307-55-1	2.16 U	H7964-FS(3)	10.000	8/16/2020	0.66	2.16	5.41
PFTrDA	**72629-94-8**	**1.08 U**	**H7964-FS(3)**	**10.000**	**8/16/2020**	**0.30**	**1.08**	**5.41**
PFTeDA	376-06-7	2.70 U	H7964-FS(3)	10.000	8/16/2020	1.17	2.70	5.41
NMeFOSAA	**2355-31-9**	**2.70 U**	**H7964-FS(3)**	**10.000**	**8/16/2020**	**1.10**	**2.70**	**5.41**
NEtFOSAA	2991-50-6	2.16 U	H7964-FS(3)	10.000	8/16/2020	0.81	2.16	5.41
PFBS	**375-73-5**	**1.08 U**	**H7964-FS(3)**	**10.000**	**8/16/2020**	**0.38**	**1.08**	**5.41**
PFHxS	355-46-4	2.16 U	H7964-FS(3)	10.000	8/16/2020	0.88	2.16	5.41
PFOS	**1763-23-1**	**5.37 J**	**H7964-FS(3)**	**10.000**	**8/16/2020**	**0.75**	**2.16**	**5.41**
HFPO-DA	13252-13-6	2.16 U	H7964-FS(3)	10.000	8/16/2020	0.69	2.16	5.41
Adona	**919005-14-4**	**2.16 U**	**H7964-FS(3)**	**10.000**	**8/16/2020**	**0.90**	**2.16**	**5.41**
11Cl-PF3OUdS	763051-92-9	1.62 U	H7964-FS(3)	10.000	8/16/2020	0.56	1.62	5.41
9Cl-PF3ONS	**756426-58-1**	**1.08 U**	**H7964-FS(3)**	**10.000**	**8/16/2020**	**0.52**	**1.08**	**5.41**

MW 9/28/20

Analyzed by: Griffith, Lauren
Printed: 8/25/2020

BATTELLE
It can be done

2

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

Client ID	PX-B102-SB03-0304
Battelle ID	H7967-FS
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	08/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	6.53
Matrix	SO
Sample Size	1.89
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.12 U	H7967-FS(3)	10.000	8/16/2020	0.75	2.12	5.29
PFHpA	**375-85-9**	**1.59 U**	**H7967-FS(3)**	**10.000**	**8/16/2020**	**0.54**	**1.59**	**5.29**
PFOA	335-67-1	2.12 U	H7967-FS(3)	10.000	8/16/2020	0.65	2.12	5.29
PFNA	**375-95-1**	**1.06 U**	**H7967-FS(3)**	**10.000**	**8/16/2020**	**0.52**	**1.06**	**5.29**
PFDA	335-76-2	1.06 U	H7967-FS(3)	10.000	8/16/2020	0.49	1.06	5.29
PFUnA	**2058-94-8**	**1.06 U**	**H7967-FS(3)**	**10.000**	**8/16/2020**	**0.49**	**1.06**	**5.29**
PFDoA	307-55-1	2.12 U	H7967-FS(3)	10.000	8/16/2020	0.65	2.12	5.29
PFTrDA	**72629-94-8**	**1.06 U**	**H7967-FS(3)**	**10.000**	**8/16/2020**	**0.30**	**1.06**	**5.29**
PFTeDA	376-06-7	2.65 U	H7967-FS(3)	10.000	8/16/2020	1.14	2.65	5.29
NMeFOSAA	**2355-31-9**	**2.65 U**	**H7967-FS(3)**	**10.000**	**8/16/2020**	**1.08**	**2.65**	**5.29**
NEtFOSAA	2991-50-6	2.12 U	H7967-FS(3)	10.000	8/16/2020	0.79	2.12	5.29
PFBS	**375-73-5**	**1.06 U**	**H7967-FS(3)**	**10.000**	**8/16/2020**	**0.37**	**1.06**	**5.29**
PFHxS	355-46-4	2.12 U	H7967-FS(3)	10.000	8/16/2020	0.86	2.12	5.29
PFOS	**1763-23-1**	**2.12 U**	**H7967-FS(3)**	**10.000**	**8/16/2020**	**0.73**	**2.12**	**5.29**
HFPO-DA	13252-13-6	2.12 U	H7967-FS(3)	10.000	8/16/2020	0.68	2.12	5.29
Adona	**919005-14-4**	**2.12 U**	**H7967-FS(3)**	**10.000**	**8/16/2020**	**0.88**	**2.12**	**5.29**
11Cl-PF3OUdS	763051-92-9	1.59 U	H7967-FS(3)	10.000	8/16/2020	0.55	1.59	5.29
9Cl-PF3ONS	**756426-58-1**	**1.06 U**	**H7967-FS(3)**	**10.000**	**8/16/2020**	**0.51**	**1.06**	**5.29**

NW 9/28/20

Analyzed by: Griffith, Lauren
Printed: 8/25/2020

BATTELLE
It can be done

3

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

Client ID	PX-B102-SS01-000H
Battelle ID	H7968-FS
Sample Type	SA
Collection Date	07/29/2020
Extraction Date	08/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	21.72
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	1.02 J	H7968-FS(3)	10.000	8/16/2020	0.85	2.38	5.95
PFHpA	375-85-9	1.79 U	H7968-FS(3)	10.000	8/16/2020	0.61	1.79	5.95
PFOA	335-67-1	1.29 J	H7968-FS(3)	10.000	8/16/2020	0.73	2.38	5.95
PFNA	375-95-1	1.19 U	H7968-FS(3)	10.000	8/16/2020	0.58	1.19	5.95
PFDA	335-76-2	1.19 U	H7968-FS(3)	10.000	8/16/2020	0.55	1.19	5.95
PFUnA	2058-94-8	1.19 U	H7968-FS(3)	10.000	8/16/2020	0.55	1.19	5.95
PFDoA	307-55-1	2.38 U	H7968-FS(3)	10.000	8/16/2020	0.73	2.38	5.95
PFTrDA	72629-94-8	1.19 U	H7968-FS(3)	10.000	8/16/2020	0.33	1.19	5.95
PFTeDA	376-06-7	2.98 U	H7968-FS(3)	10.000	8/16/2020	1.29	2.98	5.95
NMeFOSAA	2355-31-9	2.98 U	H7968-FS(3)	10.000	8/16/2020	1.21	2.98	5.95
NEtFOSAA	2991-50-6	2.38 U	H7968-FS(3)	10.000	8/16/2020	0.89	2.38	5.95
PFBS	375-73-5	1.19 U	H7968-FS(3)	10.000	8/16/2020	0.42	1.19	5.95
PFHxS	355-46-4	2.32 J	H7968-FS(3)	10.000	8/16/2020	0.96	2.38	5.95
PFOS	1763-23-1	8.05	H7968-FS(3)	10.000	8/16/2020	0.82	2.38	5.95
HFPO-DA	13252-13-6	2.38 U	H7968-FS(3)	10.000	8/16/2020	0.76	2.38	5.95
Adona	919005-14-4	2.38 U	H7968-FS(3)	10.000	8/16/2020	0.99	2.38	5.95
11Cl-PF3OUdS	763051-92-9	1.79 U	H7968-FS(3)	10.000	8/16/2020	0.62	1.79	5.95
9Cl-PF3ONS	756426-58-1	1.19 U	H7968-FS(3)	10.000	8/16/2020	0.57	1.19	5.95

NW 9/28/20

Analyzed by: Griffith, Lauren
Printed: 8/25/2020

BATTELLE
It can be done

4

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

Client ID	PX-B102-SB01-0304
Battelle ID	H7969-FS
Sample Type	SA
Collection Date	07/29/2020
Extraction Date	08/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	8.03
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	H7969-FS(3)	10.000	8/16/2020	0.74	2.08	5.21
PFHpA	375-85-9	1.56 U	H7969-FS(3)	10.000	8/16/2020	0.53	1.56	5.21
PFOA	335-67-1	2.08 U	H7969-FS(3)	10.000	8/16/2020	0.64	2.08	5.21
PFNA	375-95-1	1.04 U	H7969-FS(3)	10.000	8/16/2020	0.51	1.04	5.21
PFDA	335-76-2	1.04 U	H7969-FS(3)	10.000	8/16/2020	0.48	1.04	5.21
PFUnA	2058-94-8	1.04 U	H7969-FS(3)	10.000	8/16/2020	0.48	1.04	5.21
PFDoA	307-55-1	2.08 U	H7969-FS(3)	10.000	8/16/2020	0.64	2.08	5.21
PFTrDA	72629-94-8	1.04 U	H7969-FS(3)	10.000	8/16/2020	0.29	1.04	5.21
PFTeDA	376-06-7	2.60 U	H7969-FS(3)	10.000	8/16/2020	1.13	2.60	5.21
NMeFOSAA	2355-31-9	2.60 U	H7969-FS(3)	10.000	8/16/2020	1.06	2.60	5.21
NEtFOSAA	2991-50-6	2.08 U	H7969-FS(3)	10.000	8/16/2020	0.78	2.08	5.21
PFBS	375-73-5	1.04 U	H7969-FS(3)	10.000	8/16/2020	0.36	1.04	5.21
PFHxS	355-46-4	2.08 U	H7969-FS(3)	10.000	8/16/2020	0.84	2.08	5.21
PFOS	1763-23-1	2.08 U	H7969-FS(3)	10.000	8/16/2020	0.72	2.08	5.21
HFPO-DA	13252-13-6	2.08 U	H7969-FS(3)	10.000	8/16/2020	0.67	2.08	5.21
Adona	919005-14-4	2.08 U	H7969-FS(3)	10.000	8/16/2020	0.86	2.08	5.21
11Cl-PF3OUdS	763051-92-9	1.56 U	H7969-FS(3)	10.000	8/16/2020	0.54	1.56	5.21
9Cl-PF3ONS	756426-58-1	1.04 U	H7969-FS(3)	10.000	8/16/2020	0.50	1.04	5.21

MH 9/28/20
Analyzed by: Griffith, Lauren
Printed: 8/25/2020

BATTELLE
It can be done

5

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

Client ID	PX-B102-SB01P-0304
Battelle ID	H7970-FS
Sample Type	SA
Collection Date	07/29/2020
Extraction Date	08/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	8.28
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	H7970-FS(3)	10.000	8/16/2020	0.77	2.16	5.41
PFHpA	375-85-9	1.62 U	H7970-FS(3)	10.000	8/16/2020	0.55	1.62	5.41
PFOA	335-67-1	2.16 U	H7970-FS(3)	10.000	8/16/2020	0.66	2.16	5.41
PFNA	375-95-1	1.08 U	H7970-FS(3)	10.000	8/16/2020	0.53	1.08	5.41
PFDA	335-76-2	1.08 U	H7970-FS(3)	10.000	8/16/2020	0.50	1.08	5.41
PFUnA	2058-94-8	1.08 U	H7970-FS(3)	10.000	8/16/2020	0.50	1.08	5.41
PFDoA	307-55-1	2.16 U	H7970-FS(3)	10.000	8/16/2020	0.66	2.16	5.41
PFTrDA	72629-94-8	1.08 U	H7970-FS(3)	10.000	8/16/2020	0.30	1.08	5.41
PFTeDA	376-06-7	2.70 U	H7970-FS(3)	10.000	8/16/2020	1.17	2.70	5.41
NMeFOSAA	2355-31-9	2.70 U	H7970-FS(3)	10.000	8/16/2020	1.10	2.70	5.41
NEtFOSAA	2991-50-6	2.16 U	H7970-FS(3)	10.000	8/16/2020	0.81	2.16	5.41
PFBS	375-73-5	1.08 U	H7970-FS(3)	10.000	8/16/2020	0.38	1.08	5.41
PFHxS	355-46-4	2.16 U	H7970-FS(3)	10.000	8/16/2020	0.88	2.16	5.41
PFOS	1763-23-1	2.16 U	H7970-FS(3)	10.000	8/16/2020	0.75	2.16	5.41
HFPO-DA	13252-13-6	2.16 U	H7970-FS(3)	10.000	8/16/2020	0.69	2.16	5.41
Adona	919005-14-4	2.16 U	H7970-FS(3)	10.000	8/16/2020	0.90	2.16	5.41
11Cl-PF3OUdS	763051-92-9	1.62 U	H7970-FS(3)	10.000	8/16/2020	0.56	1.62	5.41
9Cl-PF3ONS	756426-58-1	1.08 U	H7970-FS(3)	10.000	8/16/2020	0.52	1.08	5.41

NW 9/28/20

Analyzed by: Griffith, Lauren
Printed: 8/25/2020

BATTELLE
It can be done

6

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

Client ID	PX-B102-SS04-000H
Battelle ID	H7971-FS
Sample Type	SA
Collection Date	07/29/2020
Extraction Date	08/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	8.22
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	H7971-FS(3)	10.000	8/16/2020	0.76	2.14	5.35
PFHpA	375-85-9	1.60 U	H7971-FS(3)	10.000	8/16/2020	0.55	1.60	5.35
PFOA	335-67-1	0.72 J	H7971-FS(3)	10.000	8/16/2020	0.65	2.14	5.35
PFNA	375-95-1	1.07 U	H7971-FS(3)	10.000	8/16/2020	0.52	1.07	5.35
PFDA	335-76-2	1.07 U	H7971-FS(3)	10.000	8/16/2020	0.49	1.07	5.35
PFUnA	2058-94-8	1.07 U	H7971-FS(3)	10.000	8/16/2020	0.49	1.07	5.35
PFDoA	307-55-1	2.14 U	H7971-FS(3)	10.000	8/16/2020	0.65	2.14	5.35
PFTrDA	72629-94-8	1.07 U	H7971-FS(3)	10.000	8/16/2020	0.30	1.07	5.35
PFTeDA	376-06-7	2.67 U	H7971-FS(3)	10.000	8/16/2020	1.16	2.67	5.35
NMeFOSAA	2355-31-9	2.67 U	H7971-FS(3)	10.000	8/16/2020	1.09	2.67	5.35
NEtFOSAA	2991-50-6	2.14 U	H7971-FS(3)	10.000	8/16/2020	0.80	2.14	5.35
PFBS	375-73-5	1.07 U	H7971-FS(3)	10.000	8/16/2020	0.37	1.07	5.35
PFHxS	355-46-4	1.54 J	H7971-FS(3)	10.000	8/16/2020	0.87	2.14	5.35
PFOS	1763-23-1	25.57	H7971-FS(3)	10.000	8/16/2020	0.74	2.14	5.35
HFPO-DA	13252-13-6	2.14 U	H7971-FS(3)	10.000	8/16/2020	0.68	2.14	5.35
Adona	919005-14-4	2.14 U	H7971-FS(3)	10.000	8/16/2020	0.89	2.14	5.35
11Cl-PF3OUdS	763051-92-9	1.60 U	H7971-FS(3)	10.000	8/16/2020	0.56	1.60	5.35
9Cl-PF3ONS	756426-58-1	1.07 U	H7971-FS(3)	10.000	8/16/2020	0.51	1.07	5.35

NW 9/28/20

Analyzed by: Griffith, Lauren
Printed: 8/25/2020

BATTELLE
It can be done

7

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

Client ID	PX-B102-SS04P-000H
Battelle ID	H7972-FS
Sample Type	SA
Collection Date	07/29/2020
Extraction Date	08/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	8.66
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	0.90 J	H7972-FS(3)	10.000	8/16/2020	0.76	2.14	5.35
PFHpA	375-85-9	1.60 U	H7972-FS(3)	10.000	8/16/2020	0.55	1.60	5.35
PFOA	335-67-1	0.81 J	H7972-FS(3)	10.000	8/16/2020	0.65	2.14	5.35
PFNA	375-95-1	1.07 U	H7972-FS(3)	10.000	8/16/2020	0.52	1.07	5.35
PFDA	335-76-2	1.07 U	H7972-FS(3)	10.000	8/16/2020	0.49	1.07	5.35
PFUnA	2058-94-8	1.07 U	H7972-FS(3)	10.000	8/16/2020	0.49	1.07	5.35
PFDoA	307-55-1	2.14 U	H7972-FS(3)	10.000	8/16/2020	0.65	2.14	5.35
PFTrDA	72629-94-8	1.07 U	H7972-FS(3)	10.000	8/16/2020	0.30	1.07	5.35
PFTeDA	376-06-7	2.67 U	H7972-FS(3)	10.000	8/16/2020	1.16	2.67	5.35
NMeFOSAA	2355-31-9	2.67 U	H7972-FS(3)	10.000	8/16/2020	1.09	2.67	5.35
NEtFOSAA	2991-50-6	2.14 U	H7972-FS(3)	10.000	8/16/2020	0.80	2.14	5.35
PFBS	375-73-5	1.07 U	H7972-FS(3)	10.000	8/16/2020	0.37	1.07	5.35
PFHxS	355-46-4	1.54 J	H7972-FS(3)	10.000	8/16/2020	0.87	2.14	5.35
PFOS	1763-23-1	25.87	H7972-FS(3)	10.000	8/16/2020	0.74	2.14	5.35
HFPO-DA	13252-13-6	2.14 U	H7972-FS(3)	10.000	8/16/2020	0.68	2.14	5.35
Adona	919005-14-4	2.14 U	H7972-FS(3)	10.000	8/16/2020	0.89	2.14	5.35
11Cl-PF3OUdS	763051-92-9	1.60 U	H7972-FS(3)	10.000	8/16/2020	0.56	1.60	5.35
9Cl-PF3ONS	756426-58-1	1.07 U	H7972-FS(3)	10.000	8/16/2020	0.51	1.07	5.35

NW 9/28/20
Analyzed by: Griffith, Lauren
Printed: 8/25/2020

BATTELLE
It can be done

8

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

Client ID	PX-B102-SB04-0304
Battelle ID	H7973-FS
Sample Type	SA
Collection Date	07/29/2020
Extraction Date	08/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	6.36
Matrix	SO
Sample Size	2.00
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.00 U	H7973-FS(3)	10.000	8/16/2020	0.71	2.00	5.00
PFHpA	375-85-9	1.50 U	H7973-FS(3)	10.000	8/16/2020	0.51	1.50	5.00
PFOA	335-67-1	2.00 U	H7973-FS(3)	10.000	8/16/2020	0.61	2.00	5.00
PFNA	375-95-1	1.00 U	H7973-FS(3)	10.000	8/16/2020	0.49	1.00	5.00
PFDA	335-76-2	1.00 U	H7973-FS(3)	10.000	8/16/2020	0.46	1.00	5.00
PFUnA	2058-94-8	1.00 U	H7973-FS(3)	10.000	8/16/2020	0.46	1.00	5.00
PFDoA	307-55-1	2.00 U	H7973-FS(3)	10.000	8/16/2020	0.61	2.00	5.00
PFTrDA	72629-94-8	1.00 U	H7973-FS(3)	10.000	8/16/2020	0.28	1.00	5.00
PFTeDA	376-06-7	2.50 U	H7973-FS(3)	10.000	8/16/2020	1.08	2.50	5.00
NMeFOSAA	2355-31-9	2.50 U	H7973-FS(3)	10.000	8/16/2020	1.02	2.50	5.00
NEtFOSAA	2991-50-6	2.00 U	H7973-FS(3)	10.000	8/16/2020	0.75	2.00	5.00
PFBS	375-73-5	1.00 U	H7973-FS(3)	10.000	8/16/2020	0.35	1.00	5.00
PFHxS	355-46-4	2.00 U	H7973-FS(3)	10.000	8/16/2020	0.81	2.00	5.00
PFOS	1763-23-1	3.03 J	H7973-FS(3)	10.000	8/16/2020	0.69	2.00	5.00
HFPO-DA	13252-13-6	2.00 U	H7973-FS(3)	10.000	8/16/2020	0.64	2.00	5.00
Adona	919005-14-4	2.00 U	H7973-FS(3)	10.000	8/16/2020	0.83	2.00	5.00
11Cl-PF3OUdS	763051-92-9	1.50 U	H7973-FS(3)	10.000	8/16/2020	0.52	1.50	5.00
9Cl-PF3ONS	756426-58-1	1.00 U	H7973-FS(3)	10.000	8/16/2020	0.48	1.00	5.00

NW 9/28/20
Analyzed by: Griffith, Lauren
Printed: 8/25/2020

BATTELLE
it can be done

9

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

Client ID	PX-B102-SS02-000H
Battelle ID	H7974-FS
Sample Type	SA
Collection Date	07/29/2020
Extraction Date	08/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	6.13
Matrix	SO
Sample Size	2.00
Size Unit-Basis	g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.00 U	H7974-FS(3)	10.000	8/16/2020	0.71	2.00	5.00
PFHpA	375-85-9	1.50 U	H7974-FS(3)	10.000	8/16/2020	0.51	1.50	5.00
PFOA	335-67-1	2.00 U	H7974-FS(3)	10.000	8/16/2020	0.61	2.00	5.00
PFNA	375-95-1	1.00 U	H7974-FS(3)	10.000	8/16/2020	0.49	1.00	5.00
PFDA	335-76-2	1.00 U	H7974-FS(3)	10.000	8/16/2020	0.46	1.00	5.00
PFUnA	2058-94-8	1.00 U	H7974-FS(3)	10.000	8/16/2020	0.46	1.00	5.00
PFDoA	307-55-1	2.00 U	H7974-FS(3)	10.000	8/16/2020	0.61	2.00	5.00
PFTrDA	72629-94-8	1.00 U	H7974-FS(3)	10.000	8/16/2020	0.28	1.00	5.00
PFTeDA	376-06-7	2.50 U	H7974-FS(3)	10.000	8/16/2020	1.08	2.50	5.00
NMeFOSAA	2355-31-9	2.50 U	H7974-FS(3)	10.000	8/16/2020	1.02	2.50	5.00
NEtFOSAA	2991-50-6	2.00 U	H7974-FS(3)	10.000	8/16/2020	0.75	2.00	5.00
PFBS	375-73-5	1.00 U	H7974-FS(3)	10.000	8/16/2020	0.35	1.00	5.00
PFHxS	355-46-4	2.00 U	H7974-FS(3)	10.000	8/16/2020	0.81	2.00	5.00
PFOS	1763-23-1	2.73 J	H7974-FS(3)	10.000	8/16/2020	0.69	2.00	5.00
HFPO-DA	13252-13-6	2.00 U	H7974-FS(3)	10.000	8/16/2020	0.64	2.00	5.00
Adona	919005-14-4	2.00 U	H7974-FS(3)	10.000	8/16/2020	0.83	2.00	5.00
11Cl-PF3OUdS	763051-92-9	1.50 U	H7974-FS(3)	10.000	8/16/2020	0.52	1.50	5.00
9Cl-PF3ONS	756426-58-1	1.00 U	H7974-FS(3)	10.000	8/16/2020	0.48	1.00	5.00

MW 9/28/20
Analyzed by: Griffith, Lauren
Printed: 8/25/2020

BATTELLE
It can be done

10

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

Client ID	PX-B102-SB02-0304
Battelle ID	H7975-FS
Sample Type	SA
Collection Date	07/29/2020
Extraction Date	08/04/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	13.12
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	H7975-FS(3)	10.000	8/16/2020	0.80	2.26	5.65
PFHpA	375-85-9	1.69 U	H7975-FS(3)	10.000	8/16/2020	0.58	1.69	5.65
PFOA	335-67-1	2.26 U	H7975-FS(3)	10.000	8/16/2020	0.69	2.26	5.65
PFNA	375-95-1	1.13 U	H7975-FS(3)	10.000	8/16/2020	0.55	1.13	5.65
PFDA	335-76-2	1.13 U	H7975-FS(3)	10.000	8/16/2020	0.52	1.13	5.65
PFUnA	2058-94-8	1.13 U	H7975-FS(3)	10.000	8/16/2020	0.52	1.13	5.65
PFDoA	307-55-1	2.26 U	H7975-FS(3)	10.000	8/16/2020	0.69	2.26	5.65
PFTrDA	72629-94-8	1.13 U	H7975-FS(3)	10.000	8/16/2020	0.32	1.13	5.65
PFTeDA	376-06-7	2.82 U	H7975-FS(3)	10.000	8/16/2020	1.22	2.82	5.65
NMeFOSAA	2355-31-9	2.82 U	H7975-FS(3)	10.000	8/16/2020	1.15	2.82	5.65
NEtFOSAA	2991-50-6	2.26 U	H7975-FS(3)	10.000	8/16/2020	0.85	2.26	5.65
PFBS	375-73-5	1.13 U	H7975-FS(3)	10.000	8/16/2020	0.40	1.13	5.65
PFHxS	355-46-4	2.26 U	H7975-FS(3)	10.000	8/16/2020	0.92	2.26	5.65
PFOS	1763-23-1	2.26 U	H7975-FS(3)	10.000	8/16/2020	0.78	2.26	5.65
HFPO-DA	13252-13-6	2.26 U	H7975-FS(3)	10.000	8/16/2020	0.72	2.26	5.65
Adona	919005-14-4	2.26 U	H7975-FS(3)	10.000	8/16/2020	0.94	2.26	5.65
11Cl-PF3OUdS	763051-92-9	1.69 U	H7975-FS(3)	10.000	8/16/2020	0.59	1.69	5.65
9Cl-PF3ONS	756426-58-1	1.13 U	H7975-FS(3)	10.000	8/16/2020	0.54	1.13	5.65

NR 9/28/20
Analyzed by: Griffith, Lauren
Printed: 8/25/2020

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-0879
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, St. Mary's County, CTO-JU14, Maryland
Date: September 28, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-B102-WT03-0720	H7954-FS	Water
2	PX-B102-WT01-0720	H7955-FS	Water
3	PX-B102-WT06-0720	H7956-FS	Water
4	PX-B102-WT05-0720	H7957-FS	Water
5	PX-B102-WT04-0720	H7958-FS	Water
5MS	PX-B102-WT04-0720MS	H7959-FSMS	Water
5MSD	PX-B102-WT04-0720MSD	H7960-FSMSD	Water
6	PX-B102-WT02-0720	H7961-FS	Water
7	PX-B102-WT02P-0720	H7962-FS	Water
8	PX-B102-FB01-072920	H7963-FS	Water
9	PX-B102-EB01-072920-GW	H7976-FS	Water
10	PX-B102-EB01-072920-SO	H7977-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for seven water samples, two aqueous equipment blank samples, and one aqueous field blank sample collected on July 28-29, 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-B102-EB01-072920-SO	None - ND	-	-	-
PX-B102-FB01-072920	None - ND	-	-	-
PX-B102-EB01-072920-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 Surrogate Form 2s at the end of the DVR for specific recoveries and qualifications.

Laboratory Fortified Blank (LFB)

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

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

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

EDS Sample ID	Compound	MS %R/MSD %R/RDP	Qualifier
5	PFBS	68%/OK/OK	J
	PFHxS	225%/176%/OK	None - 4X Rule Applies
	PFOS	179%/63%/96	None - 4X Rule Applies

Internal Standard (IS) Area Performance

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

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

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

Field Duplicate Sample Precision

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

Compound	PX-B102-WT02-0720 ng/L	PX-B102-WT02P-0720 ng/L	RPD	Qualifier
PFHxA	10.42	12.53	18%	None
PFHpA	4.52	4.83	7%	
PFOA	22.33	24.17	8%	
PFNA	2.73	2.80	3%	
PFDA	0.52	0.47	10%	
PFBS	3.22	3.47	7%	
PFHxS	40.25	40.53	1%	
PFOS	145.41	186.09	25%	

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

Signed: Nancy Weaver Dated: 10/2/20

Nancy Weaver
Senior Chemist

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

BATTELLE
It can be done

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

Client ID	PX-B102-WT03-0720
Battelle ID	H7954-FS
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	08/06/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	W
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	62.53	H7954-FS(0)	1.000	8/21/2020	0.49	1.39	4.63
PFHpA	375-85-9	7.71	H7954-FS(0)	1.000	8/21/2020	0.24	0.93	4.63
PFOA	335-67-1	50.68	H7954-FS(0)	1.000	8/21/2020	0.47	1.39	4.63
PFNA	375-95-1	4.98	H7954-FS(0)	1.000	8/21/2020	0.29	0.93	4.63
PFDA	335-76-2	2.21 J	H7954-FS(0)	1.000	8/21/2020	0.13	0.46	4.63
PFUnA	2058-94-8	0.28 J	H7954-FS(0)	1.000	8/21/2020	0.20	0.46	4.63
PFDoA	307-55-1	0.46 U	H7954-FS(0)	1.000	8/21/2020	0.18	0.46	4.63
PFTrDA	72629-94-8	0.46 U	H7954-FS(0)	1.000	8/21/2020	0.14	0.46	4.63
PFTeDA	376-06-7	1.85 J UJ	H7954-FS(0)	1.000	8/21/2020	0.68	1.85	4.63 SSL
NMeFOSAA	2355-31-9	0.93 U	H7954-FS(0)	1.000	8/21/2020	0.32	0.93	4.63
NEtFOSAA	2991-50-6	0.93 U	H7954-FS(0)	1.000	8/21/2020	0.46	0.93	4.63
PFBS	375-73-5	14.76	H7954-FS(0)	1.000	8/21/2020	0.13	0.46	4.63
PFHxS	355-46-4	130.31 D	H7954-FS-D(3)	5.000	8/21/2020	0.51	1.85	23.15
PFOS	1763-23-1	447.92 D	H7954-FS-D(5)	25.000	8/23/2020	10.19	23.15	115.74
HFPO-DA	13252-13-6	0.46 U	H7954-FS(0)	1.000	8/21/2020	0.23	0.46	4.63
Adona	919005-14-4	0.93 U	H7954-FS(0)	1.000	8/21/2020	0.25	0.93	4.63
11Cl-PF3OUdS	763051-92-9	0.46 U	H7954-FS(0)	1.000	8/21/2020	0.21	0.46	4.63
9Cl-PF3ONS	756426-58-1	0.93 U	H7954-FS(0)	1.000	8/21/2020	0.25	0.93	4.63

NW 9/28/20

Analyzed by: Schultz, Stephanie
Printed: 8/26/2020

BATTELLE
It can be done

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

Client ID	PX-B102-WT03-0720
Battelle ID	H7954-FS
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	08/06/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	82		H7954-FS(0)	8/21/2020
13C4-PFHpA	**84**		**H7954-FS(0)**	**8/21/2020**
13C8-PFOA	80		H7954-FS(0)	8/21/2020
13C9-PFNA	**77**		**H7954-FS(0)**	**8/21/2020**
13C6-PFDA	84		H7954-FS(0)	8/21/2020
13C7-PFUnA	**87**		**H7954-FS(0)**	**8/21/2020**
13C2-PFDoA	75		H7954-FS(0)	8/21/2020
13C2-PFTeDA	**45**	M	**H7954-FS(0)**	**8/21/2020**
d3-MeFOSAA	86	D	H7954-FS-D(5)	8/23/2020
d5-EtFOSAA	**102**	D	**H7954-FS-D(5)**	**8/23/2020**
13C3-PFBS	100	D	H7954-FS-D(5)	8/23/2020
13C3-PFHxS	**92**	D	**H7954-FS-D(5)**	**8/23/2020**
13C8-PFOS	87	D	H7954-FS-D(5)	8/23/2020
13C3-HFPO-DA	**74**		**H7954-FS(0)**	**8/21/2020**

NW 9/28/20

Analyzed by: Schultz, Stephanie
Printed: 8/26/2020

BATTELLE
it can be done

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

2.

Client ID		PX-B102-WT01-0720							
Battelle ID		H7955-FS							
Sample Type		SA							
Collection Date		07/29/2020							
Extraction Date		08/06/2020							
Analytical Instrument		Sciex 5500 LC/MS/MS							
% Moisture		NA							
Matrix		W							
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	51.56		H7955-FS(0)	1.000	8/23/2020	0.50	1.42	4.72
PFHpA	375-85-9	7.98		H7955-FS(0)	1.000	8/23/2020	0.25	0.94	4.72
PFOA	335-67-1	118.65	D	H7955-FS-D(3)	5.000	8/21/2020	2.41	7.08	23.58
PFNA	375-95-1	1.81	J	H7955-FS(0)	1.000	8/23/2020	0.29	0.94	4.72
PFDA	335-76-2	1.63	J	H7955-FS(0)	1.000	8/23/2020	0.13	0.47	4.72
PFUnA	2058-94-8	0.47	U	H7955-FS(0)	1.000	8/23/2020	0.21	0.47	4.72
PFDoA	307-55-1	0.47	U	H7955-FS(0)	1.000	8/23/2020	0.18	0.47	4.72
PFTrDA	72629-94-8	0.47	U	H7955-FS(0)	1.000	8/23/2020	0.14	0.47	4.72
PFTeDA	376-06-7	1.89	U	H7955-FS(0)	1.000	8/23/2020	0.69	1.89	4.72
NMeFOSAA	2355-31-9	5.27		H7955-FS(0)	1.000	8/23/2020	0.33	0.94	4.72
NEtFOSAA	2991-50-6	0.68	J	H7955-FS(0)	1.000	8/23/2020	0.47	0.94	4.72
PFBS	375-73-5	16.85		H7955-FS(0)	1.000	8/23/2020	0.13	0.47	4.72
PFHxS	355-46-4	270.80	D	H7955-FS-D(3)	5.000	8/21/2020	0.52	1.89	23.58
PFOS	1763-23-1	150.35	D	H7955-FS-D(3)	5.000	8/21/2020	2.08	4.72	23.58
HFPO-DA	13252-13-6	0.47	U	H7955-FS(0)	1.000	8/23/2020	0.24	0.47	4.72
Adona	919005-14-4	0.94	U	H7955-FS(0)	1.000	8/23/2020	0.25	0.94	4.72
11Cl-PF3OUdS	763051-92-9	0.47	U	H7955-FS(0)	1.000	8/23/2020	0.22	0.47	4.72
9Cl-PF3ONS	756426-58-1	0.94	U	H7955-FS(0)	1.000	8/23/2020	0.25	0.94	4.72

MW 9/28/20

Analyzed by: Schultz, Stephanie
Printed: 8/26/2020

BATTELLE
It can be done

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

3

Client ID		PX-B102-WT06-0720						
Battelle ID		H7956-FS						
Sample Type		SA						
Collection Date		07/29/2020						
Extraction Date		08/06/2020						
Analytical Instrument		Sciex 5500 LC/MS/MS						
% Moisture		NA						
Matrix		W						
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	17.50	H7956-FS(0)	1.000	8/21/2020	0.50	1.42	4.72
PFHpA	375-85-9	4.99	H7956-FS(0)	1.000	8/21/2020	0.25	0.94	4.72
PFOA	335-67-1	35.56	H7956-FS(0)	1.000	8/21/2020	0.48	1.42	4.72
PFNA	375-95-1	3.56 J	H7956-FS(0)	1.000	8/21/2020	0.29	0.94	4.72
PFDA	335-76-2	0.47 J	H7956-FS(0)	1.000	8/21/2020	0.13	0.47	4.72
PFUnA	2058-94-8	0.47 U	H7956-FS(0)	1.000	8/21/2020	0.21	0.47	4.72
PFDoA	307-55-1	0.47 U	H7956-FS(0)	1.000	8/21/2020	0.18	0.47	4.72
PFTrDA	72629-94-8	0.47 U	H7956-FS(0)	1.000	8/21/2020	0.14	0.47	4.72
PFTeDA	376-06-7	1.89 U	H7956-FS(0)	1.000	8/21/2020	0.69	1.89	4.72
NMeFOSAA	2355-31-9	0.94 U	H7956-FS(0)	1.000	8/21/2020	0.33	0.94	4.72
NEtFOSAA	2991-50-6	0.94 U	H7956-FS(0)	1.000	8/21/2020	0.47	0.94	4.72
PFBS	375-73-5	4.40 J	H7956-FS(0)	1.000	8/21/2020	0.13	0.47	4.72
PFHxS	355-46-4	68.69	H7956-FS(0)	1.000	8/21/2020	0.10	0.38	4.72
PFOS	1763-23-1	159.11	H7956-FS-D(3)	5.000	8/24/2020	2.08	4.72	23.58
HFPO-DA	13252-13-6	0.47 U	H7956-FS(0)	1.000	8/21/2020	0.24	0.47	4.72
Adona	919005-14-4	0.94 U	H7956-FS(0)	1.000	8/21/2020	0.25	0.94	4.72
11Cl-PF3OUdS	763051-92-9	0.47 U	H7956-FS(0)	1.000	8/21/2020	0.22	0.47	4.72
9Cl-PF3ONS	756426-58-1	0.94 U	H7956-FS(0)	1.000	8/21/2020	0.25	0.94	4.72

NW 9/28/20

BATTELLE
It can be done

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

4

Client ID		PX-B102-WT05-0720
Battelle ID		H7957-FS
Sample Type		SA
Collection Date		07/29/2020
Extraction Date		08/06/2020
Analytical Instrument		Sciex 5500 LC/MS/MS
% Moisture		NA
Matrix		W
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	4.26 J	H7957-FS(0)	1.000	8/21/2020	0.53	1.50	5.00	
PFHpA	375-85-9	0.54 J	H7957-FS(0)	1.000	8/21/2020	0.26	1.00	5.00	
PFOA	335-67-1	2.54 J	H7957-FS(0)	1.000	8/21/2020	0.51	1.50	5.00	
PFNA	375-95-1	1.00 U	H7957-FS(0)	1.000	8/21/2020	0.31	1.00	5.00	
PFDA	335-76-2	0.50 U	H7957-FS(0)	1.000	8/21/2020	0.14	0.50	5.00	
PFUnA	2058-94-8	0.50 U	H7957-FS(0)	1.000	8/21/2020	0.22	0.50	5.00	
PFDoA	307-55-1	0.50 ~~U~~ UJ	H7957-FS(0)	1.000	8/21/2020	0.19	0.50	5.00	SSL
PFTrDA	72629-94-8	0.50 U	H7957-FS(0)	1.000	8/21/2020	0.15	0.50	5.00	
PFTeDA	376-06-7	2.00 ~~U~~ UJ	H7957-FS(0)	1.000	8/21/2020	0.73	2.00	5.00	SSL
NMeFOSAA	2355-31-9	1.00 U	H7957-FS(0)	1.000	8/21/2020	0.35	1.00	5.00	
NEtFOSAA	2991-50-6	1.00 U	H7957-FS(0)	1.000	8/21/2020	0.50	1.00	5.00	
PFBS	375-73-5	1.95 J	H7957-FS(0)	1.000	8/21/2020	0.14	0.50	5.00	
PFHxS	355-46-4	24.11	H7957-FS(0)	1.000	8/21/2020	0.11	0.40	5.00	
PFOS	1763-23-1	12.47	H7957-FS(0)	1.000	8/21/2020	0.44	1.00	5.00	
HFPO-DA	13252-13-6	0.50 U	H7957-FS(0)	1.000	8/21/2020	0.25	0.50	5.00	
Adona	919005-14-4	1.00 U	H7957-FS(0)	1.000	8/21/2020	0.27	1.00	5.00	
11Cl-PF3OUdS	763051-92-9	0.50 U	H7957-FS(0)	1.000	8/21/2020	0.23	0.50	5.00	
9Cl-PF3ONS	756426-58-1	1.00 U	H7957-FS(0)	1.000	8/21/2020	0.27	1.00	5.00	

MW 9/28/20

Analyzed by: Schultz, Stephanie
Printed: 8/26/2020

BATTELLE
It can be done

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

4

Client ID	PX-B102-WT05-0720
Battelle ID	H7957-FS
Sample Type	SA
Collection Date	07/29/2020
Extraction Date	08/06/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	67	H7957-FS(0)	8/21/2020
13C4-PFHpA	**71**	**H7957-FS(0)**	**8/21/2020**
13C8-PFOA	63	H7957-FS(0)	8/21/2020
13C9-PFNA	**60**	**H7957-FS(0)**	**8/21/2020**
13C6-PFDA	58	H7957-FS(0)	8/21/2020
13C7-PFUnA	**58**	**H7957-FS(0)**	**8/21/2020**
13C2-PFDoA	45 N	H7957-FS(0)	8/21/2020
13C2-PFTeDA	**19 N**	**H7957-FS(0)**	**8/21/2020**
d3-MeFOSAA	58	H7957-FS(0)	8/21/2020
d5-EtFOSAA	**54**	**H7957-FS(0)**	**8/21/2020**
13C3-PFBS	92	H7957-FS(0)	8/21/2020
13C3-PFHxS	**92**	**H7957-FS(0)**	**8/21/2020**
13C8-PFOS	75	H7957-FS(0)	8/21/2020
13C3-HFPO-DA	**59**	**H7957-FS(0)**	**8/21/2020**

MW 9/28/20

Analyzed by: Schultz, Stephanie
Printed: 8/26/2020

BATTELLE
It can be done

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

5

Client ID	PX-B102-WT04-0720
Battelle ID	H7958-FS
Sample Type	SA
Collection Date	07/29/2020
Extraction Date	08/06/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	W
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	165.48 D	H7958-FS-D(3)	5.000	8/21/2020	2.60	7.35	24.51	
PFHpA	**375-85-9**	**19.88**	**H7958-FS(0)**	**1.000**	**8/21/2020**	**0.25**	**0.98**	**4.90**	
PFOA	335-67-1	45.19	H7958-FS(0)	1.000	8/21/2020	0.50	1.47	4.90	
PFNA	**375-95-1**	**1.89 J**	**H7958-FS(0)**	**1.000**	**8/21/2020**	**0.30**	**0.98**	**4.90**	
PFDA	335-76-2	2.25 J	H7958-FS(0)	1.000	8/21/2020	0.14	0.49	4.90	
PFUnA	**2058-94-8**	**1.72 J**	**H7958-FS(0)**	**1.000**	**8/21/2020**	**0.22**	**0.49**	**4.90**	
PFDoA	307-55-1	0.49 U	H7958-FS(0)	1.000	8/21/2020	0.19	0.49	4.90	
PFTrDA	**72629-94-8**	**0.49 U**	**H7958-FS(0)**	**1.000**	**8/21/2020**	**0.15**	**0.49**	**4.90**	
PFTeDA	376-06-7	1.96 J UJ	H7958-FS(0)	1.000	8/21/2020	0.72	1.96	4.90	SSL
NMeFOSAA	**2355-31-9**	**4.32 J**	**H7958-FS(0)**	**1.000**	**8/21/2020**	**0.34**	**0.98**	**4.90**	
NEtFOSAA	2991-50-6	1.95 J	H7958-FS(0)	1.000	8/21/2020	0.49	0.98	4.90	
PFBS	**375-73-5**	**63.45 J**	**H7958-FS(0)**	**1.000**	**8/21/2020**	**0.14**	**0.49**	**4.90**	MSL
PFHxS	355-46-4	807.37 D	H7958-FS-D(5)	12.500	8/21/2020	1.35	4.90	61.27	
PFOS	**1763-23-1**	**227.91 D**	**H7958-FS-D(3)**	**5.000**	**8/21/2020**	**2.16**	**4.90**	**24.51**	
HFPO-DA	13252-13-6	0.49 U	H7958-FS(0)	1.000	8/21/2020	0.25	0.49	4.90	
Adona	**919005-14-4**	**0.98 U**	**H7958-FS(0)**	**1.000**	**8/21/2020**	**0.26**	**0.98**	**4.90**	
11Cl-PF3OUdS	763051-92-9	0.49 U	H7958-FS(0)	1.000	8/21/2020	0.23	0.49	4.90	
9Cl-PF3ONS	**756426-58-1**	**0.98 U**	**H7958-FS(0)**	**1.000**	**8/21/2020**	**0.26**	**0.98**	**4.90**	

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

BATTELLE
It can be done

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

5

Client ID	PX-B102-WT04-0720
Battelle ID	H7958-FS
Sample Type	SA
Collection Date	07/29/2020
Extraction Date	08/06/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	95	D	H7958-FS-D(3)	8/21/2020
13C4-PFHpA	**82**		**H7958-FS(0)**	**8/21/2020**
13C8-PFOA	81		H7958-FS(0)	8/21/2020
13C9-PFNA	**83**		**H7958-FS(0)**	**8/21/2020**
13C6-PFDA	88		H7958-FS(0)	8/21/2020
13C7-PFUnA	**94**		**H7958-FS(0)**	**8/21/2020**
13C2-PFDoA	68		H7958-FS(0)	8/21/2020
13C2-PFTeDA	**24**	N	**H7958-FS(0)**	**8/21/2020**
d3-MeFOSAA	91	D	H7958-FS-D(3)	8/21/2020
d5-EtFOSAA	**104**	D	**H7958-FS-D(3)**	**8/21/2020**
13C3-PFBS	116	D	H7958-FS-D(3)	8/21/2020
13C3-PFHxS	**96**	D	**H7958-FS-D(5)**	**8/21/2020**
13C8-PFOS	95	D	H7958-FS-D(3)	8/21/2020
13C3-HFPO-DA	**77**		**H7958-FS(0)**	**8/21/2020**

NW 9/28/20

Analyzed by: Schultz, Stephanie
Printed: 8/26/2020

BATTELLE
It can be done

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

6

Client ID	PX-B102-WT02-0720
Battelle ID	H7961-FS
Sample Type	SA
Collection Date	07/29/2020
Extraction Date	08/06/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	W
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	10.42	H7961-FS(0)	1.000	8/21/2020	0.52	1.47	4.90	
PFHpA	**375-85-9**	**4.52 J**	**H7961-FS(0)**	**1.000**	**8/21/2020**	**0.25**	**0.98**	**4.90**	
PFOA	335-67-1	22.33	H7961-FS(0)	1.000	8/21/2020	0.50	1.47	4.90	
PFNA	**375-95-1**	**2.73 J**	**H7961-FS(0)**	**1.000**	**8/21/2020**	**0.30**	**0.98**	**4.90**	
PFDA	335-76-2	0.52 J	H7961-FS(0)	1.000	8/21/2020	0.14	0.49	4.90	
PFUnA	**2058-94-8**	**0.49 J UJ**	**H7961-FS(0)**	**1.000**	**8/21/2020**	**0.22**	**0.49**	**4.90**	SSL
PFDoA	307-55-1	0.49 J UJ	H7961-FS(0)	1.000	8/21/2020	0.19	0.49	4.90	SSL
PFTrDA	**72629-94-8**	**0.49 U**	**H7961-FS(0)**	**1.000**	**8/21/2020**	**0.15**	**0.49**	**4.90**	
PFTeDA	376-06-7	1.96 J UJ	H7961-FS(0)	1.000	8/21/2020	0.72	1.96	4.90	SSL
NMeFOSAA	**2355-31-9**	**0.98 U**	**H7961-FS(0)**	**1.000**	**8/21/2020**	**0.34**	**0.98**	**4.90**	
NEtFOSAA	2991-50-6	0.98 U	H7961-FS(0)	1.000	8/21/2020	0.49	0.98	4.90	
PFBS	**375-73-5**	**3.22 J**	**H7961-FS(0)**	**1.000**	**8/21/2020**	**0.14**	**0.49**	**4.90**	
PFHxS	355-46-4	40.25	H7961-FS(0)	1.000	8/21/2020	0.11	0.39	4.90	
PFOS	**1763-23-1**	**145.41 D**	**H7961-FS-D(3)**	**5.000**	**8/21/2020**	**2.16**	**4.90**	**24.51**	
HFPO-DA	13252-13-6	0.49 U	H7961-FS(0)	1.000	8/21/2020	0.25	0.49	4.90	
Adona	**919005-14-4**	**0.98 U**	**H7961-FS(0)**	**1.000**	**8/21/2020**	**0.26**	**0.98**	**4.90**	
11Cl-PF3OUdS	763051-92-9	0.49 U	H7961-FS(0)	1.000	8/21/2020	0.23	0.49	4.90	
9Cl-PF3ONS	**756426-58-1**	**0.98 U**	**H7961-FS(0)**	**1.000**	**8/21/2020**	**0.26**	**0.98**	**4.90**	

NW 9/28/20

Analyzed by: Schultz, Stephanie
Printed: 8/26/2020

BATTELLE
it can be done

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

6

Client ID	PX-B102-WT02-0720
Battelle ID	H7961-FS
Sample Type	SA
Collection Date	07/29/2020
Extraction Date	08/06/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	70		H7961-FS(0)	8/21/2020
13C4-PFHpA	**74**		**H7961-FS(0)**	**8/21/2020**
13C8-PFOA	70		H7961-FS(0)	8/21/2020
13C9-PFNA	**60**		**H7961-FS(0)**	**8/21/2020**
13C6-PFDA	56		H7961-FS(0)	8/21/2020
13C7-PFUnA	**44**	N	**H7961-FS(0)**	**8/21/2020**
13C2-PFDoA	33	N	H7961-FS(0)	8/21/2020
13C2-PFTeDA	**28**	N	**H7961-FS(0)**	**8/21/2020**
d3-MeFOSAA	79	D	H7961-FS-D(3)	8/21/2020
d5-EtFOSAA	**88**	D	**H7961-FS-D(3)**	**8/21/2020**
13C3-PFBS	102	D	H7961-FS-D(3)	8/21/2020
13C3-PFHxS	**97**	D	**H7961-FS-D(3)**	**8/21/2020**
13C8-PFOS	87	D	H7961-FS-D(3)	8/21/2020
13C3-HFPO-DA	**69**		**H7961-FS(0)**	**8/21/2020**

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

BATTELLE
It can be done

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

7

Client ID	PX-B102-WT02P-0720
Battelle ID	H7962-FS
Sample Type	SA
Collection Date	07/29/2020
Extraction Date	08/06/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	W
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	12.53	H7962-FS(0)	1.000	8/21/2020	0.52	1.47	4.90
PFHpA	375-85-9	4.83 J	H7962-FS(0)	1.000	8/21/2020	0.25	0.98	4.90
PFOA	335-67-1	24.17	H7962-FS(0)	1.000	8/21/2020	0.50	1.47	4.90
PFNA	375-95-1	2.80 J	H7962-FS(0)	1.000	8/21/2020	0.30	0.98	4.90
PFDA	335-76-2	0.47 J	H7962-FS(0)	1.000	8/21/2020	0.14	0.49	4.90
PFUnA	2058-94-8	0.49 U	H7962-FS(0)	1.000	8/21/2020	0.22	0.49	4.90
PFDoA	307-55-1	0.49 U	H7962-FS(0)	1.000	8/21/2020	0.19	0.49	4.90
PFTrDA	72629-94-8	0.49 U	H7962-FS(0)	1.000	8/21/2020	0.15	0.49	4.90
PFTeDA	376-06-7	1.96 U	H7962-FS(0)	1.000	8/21/2020	0.72	1.96	4.90
NMeFOSAA	2355-31-9	0.98 U	H7962-FS(0)	1.000	8/21/2020	0.34	0.98	4.90
NEtFOSAA	2991-50-6	0.98 U	H7962-FS(0)	1.000	8/21/2020	0.49	0.98	4.90
PFBS	375-73-5	3.47 J	H7962-FS(0)	1.000	8/21/2020	0.14	0.49	4.90
PFHxS	355-46-4	40.53	H7962-FS(0)	1.000	8/21/2020	0.11	0.39	4.90
PFOS	1763-23-1	186.09 β	H7962-FS-D(3)	5.000	8/23/2020	2.16	4.90	24.51
HFPO-DA	13252-13-6	0.49 U	H7962-FS(0)	1.000	8/21/2020	0.25	0.49	4.90
Adona	919005-14-4	0.98 U	H7962-FS(0)	1.000	8/21/2020	0.26	0.98	4.90
11Cl-PF3OUdS	763051-92-9	0.49 U	H7962-FS(0)	1.000	8/21/2020	0.23	0.49	4.90
9Cl-PF3ONS	756426-58-1	0.98 U	H7962-FS(0)	1.000	8/21/2020	0.26	0.98	4.90

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

BATTELLE
It can be done

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

8

Client ID	PX-B102-FB01-072920
Battelle ID	H7963-FS
Sample Type	SA
Collection Date	07/29/2020
Extraction Date	08/06/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	W
Sample Size	0.255
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.47 U	H7963-FS(0)	1.000	8/21/2020	0.52	1.47	4.90
PFHpA	375-85-9	0.98 U	H7963-FS(0)	1.000	8/21/2020	0.25	0.98	4.90
PFOA	335-67-1	1.47 U	H7963-FS(0)	1.000	8/21/2020	0.50	1.47	4.90
PFNA	375-95-1	0.98 U	H7963-FS(0)	1.000	8/21/2020	0.30	0.98	4.90
PFDA	335-76-2	0.49 U	H7963-FS(0)	1.000	8/21/2020	0.14	0.49	4.90
PFUnA	2058-94-8	0.49 U	H7963-FS(0)	1.000	8/21/2020	0.22	0.49	4.90
PFDoA	307-55-1	0.49 U	H7963-FS(0)	1.000	8/21/2020	0.19	0.49	4.90
PFTrDA	72629-94-8	0.49 U	H7963-FS(0)	1.000	8/21/2020	0.15	0.49	4.90
PFTeDA	376-06-7	1.96 U	H7963-FS(0)	1.000	8/21/2020	0.72	1.96	4.90
NMeFOSAA	2355-31-9	0.98 U	H7963-FS(0)	1.000	8/21/2020	0.34	0.98	4.90
NEtFOSAA	2991-50-6	0.98 U	H7963-FS(0)	1.000	8/21/2020	0.49	0.98	4.90
PFBS	375-73-5	0.49 U	H7963-FS(0)	1.000	8/21/2020	0.14	0.49	4.90
PFHxS	355-46-4	0.39 U	H7963-FS(0)	1.000	8/21/2020	0.11	0.39	4.90
PFOS	1763-23-1	0.98 U	H7963-FS(0)	1.000	8/21/2020	0.43	0.98	4.90
HFPO-DA	13252-13-6	0.49 U	H7963-FS(0)	1.000	8/21/2020	0.25	0.49	4.90
Adona	919005-14-4	0.98 U	H7963-FS(0)	1.000	8/21/2020	0.26	0.98	4.90
11Cl-PF3OUdS	763051-92-9	0.49 U	H7963-FS(0)	1.000	8/21/2020	0.23	0.49	4.90
9Cl-PF3ONS	756426-58-1	0.98 U	H7963-FS(0)	1.000	8/21/2020	0.26	0.98	4.90

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

BATTELLE
It can be done

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

9

Client ID	PX-B102-EB01-072920-GW
Battelle ID	H7976-FS
Sample Type	SA
Collection Date	07/29/2020
Extraction Date	08/06/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	W
Sample Size	0.255
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	1.47 U	H7976-FS(0)	1.000	8/21/2020	0.52	1.47	4.90
PFHpA	375-85-9	0.98 U	H7976-FS(0)	1.000	8/21/2020	0.25	0.98	4.90
PFOA	335-67-1	1.47 U	H7976-FS(0)	1.000	8/21/2020	0.50	1.47	4.90
PFNA	375-95-1	0.98 U	H7976-FS(0)	1.000	8/21/2020	0.30	0.98	4.90
PFDA	335-76-2	0.49 U	H7976-FS(0)	1.000	8/21/2020	0.14	0.49	4.90
PFUnA	2058-94-8	0.49 U	H7976-FS(0)	1.000	8/21/2020	0.22	0.49	4.90
PFDoA	307-55-1	0.49 U	H7976-FS(0)	1.000	8/21/2020	0.19	0.49	4.90
PFTrDA	72629-94-8	0.49 U	H7976-FS(0)	1.000	8/21/2020	0.15	0.49	4.90
PFTeDA	376-06-7	1.96 U	H7976-FS(0)	1.000	8/21/2020	0.72	1.96	4.90
NMeFOSAA	2355-31-9	0.98 U	H7976-FS(0)	1.000	8/21/2020	0.34	0.98	4.90
NEtFOSAA	2991-50-6	0.98 U	H7976-FS(0)	1.000	8/21/2020	0.49	0.98	4.90
PFBS	375-73-5	0.49 U	H7976-FS(0)	1.000	8/21/2020	0.14	0.49	4.90
PFHxS	355-46-4	0.39 U	H7976-FS(0)	1.000	8/21/2020	0.11	0.39	4.90
PFOS	1763-23-1	0.98 U	H7976-FS(0)	1.000	8/21/2020	0.43	0.98	4.90
HFPO-DA	13252-13-6	0.49 U	H7976-FS(0)	1.000	8/21/2020	0.25	0.49	4.90
Adona	919005-14-4	0.98 U	H7976-FS(0)	1.000	8/21/2020	0.26	0.98	4.90
11Cl-PF3OUdS	763051-92-9	0.49 U	H7976-FS(0)	1.000	8/21/2020	0.23	0.49	4.90
9Cl-PF3ONS	756426-58-1	0.98 U	H7976-FS(0)	1.000	8/21/2020	0.26	0.98	4.90

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

BATTELLE
It can be done

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

10

Client ID		PX-B102-EB01-072920-SO						
Battelle ID		H7977-FS						
Sample Type		SA						
Collection Date		07/29/2020						
Extraction Date		08/06/2020						
Analytical Instrument		Sciex 5500 LC/MS/MS						
% Moisture		NA						
Matrix		W						
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	H7977-FS(0)	1.000	8/21/2020	0.51	1.44	4.81
PFHpA	**375-85-9**	**0.96 U**	**H7977-FS(0)**	**1.000**	**8/21/2020**	**0.25**	**0.96**	**4.81**
PFOA	335-67-1	1.44 U	H7977-FS(0)	1.000	8/21/2020	0.49	1.44	4.81
PFNA	**375-95-1**	**0.96 U**	**H7977-FS(0)**	**1.000**	**8/21/2020**	**0.30**	**0.96**	**4.81**
PFDA	335-76-2	0.48 U	H7977-FS(0)	1.000	8/21/2020	0.13	0.48	4.81
PFUnA	**2058-94-8**	**0.48 U**	**H7977-FS(0)**	**1.000**	**8/21/2020**	**0.21**	**0.48**	**4.81**
PFDoA	307-55-1	0.48 U	H7977-FS(0)	1.000	8/21/2020	0.18	0.48	4.81
PFTrDA	**72629-94-8**	**0.48 U**	**H7977-FS(0)**	**1.000**	**8/21/2020**	**0.14**	**0.48**	**4.81**
PFTeDA	376-06-7	1.92 U	H7977-FS(0)	1.000	8/21/2020	0.70	1.92	4.81
NMeFOSAA	**2355-31-9**	**0.96 U**	**H7977-FS(0)**	**1.000**	**8/21/2020**	**0.34**	**0.96**	**4.81**
NEtFOSAA	2991-50-6	0.96 U	H7977-FS(0)	1.000	8/21/2020	0.48	0.96	4.81
PFBS	**375-73-5**	**0.48 U**	**H7977-FS(0)**	**1.000**	**8/21/2020**	**0.13**	**0.48**	**4.81**
PFHxS	355-46-4	0.38 U	H7977-FS(0)	1.000	8/21/2020	0.11	0.38	4.81
PFOS	**1763-23-1**	**0.96 U**	**H7977-FS(0)**	**1.000**	**8/21/2020**	**0.42**	**0.96**	**4.81**
HFPO-DA	13252-13-6	0.48 U	H7977-FS(0)	1.000	8/21/2020	0.24	0.48	4.81
Adona	**919005-14-4**	**0.96 U**	**H7977-FS(0)**	**1.000**	**8/21/2020**	**0.26**	**0.96**	**4.81**
11Cl-PF3OUdS	763051-92-9	0.48 U	H7977-FS(0)	1.000	8/21/2020	0.22	0.48	4.81
9Cl-PF3ONS	**756426-58-1**	**0.96 U**	**H7977-FS(0)**	**1.000**	**8/21/2020**	**0.26**	**0.96**	**4.81**

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

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-0979
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, St. Mary's County, CTO-JU14, Maryland
Date: September 29, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-B1669-WT07-0720	H7705-FS1	Water
2	PX-B1669-WT02P-0720	H7709-FS1	Water
3	PX-H2905-WT06-0720	H7719-FS1	Water
4	PX-H2905-WT07-0720	H7720-FS1	Water

A Stage 2B/4 data validation was performed on the analytical data for four water samples collected on July 27-28, 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 at 27-28 days which is outside of the 14 days for water samples criteria. All results were qualified as estimated (J/UJ) in all samples.

LC/MS Tuning

- All criteria were met.

Initial Calibration

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

Continuing Calibration

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

Method Blank

- The method blanks exhibited the following contamination.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
LC33 IB	PFHxS	0.12	None	All Associated >5X

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-B1669-FB01-072820	None - ND	-	-	-
PX-B1669-EB01-072820-GW	None - ND	-	-	-
PX-H2905-FB01-072720	None - ND	-	-	-
PX-H2905-EB01-072720-GW	None - ND	-	-	-

Surrogate Spike Recoveries

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

Laboratory Fortified Blank (LFB)

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

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

- MS/MSD samples were not analyzed.

Internal Standard (IS) Area Performance

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

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All samples were originally analyzed in SDGs 20-0861 and 20-0862 with low surrogate recoveries. The samples were re-extracted outside of holding times and reanalyzed in this data package. The original analysis results should be used for reporting purposes.

Field Duplicate Sample Precision

- Field duplicate samples were not collected.

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

Signed: Nancy Weaver Dated: 10/2/20

Nancy Weaver
Senior Chemist

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

BATTELLE
It can be done

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

Client ID	PX-B1669-WT07-0720
Battelle ID	H7705-FS1
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	08/24/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	W
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	4.51 JT	H7705-FS1(0)	1.000	8/25/2020	0.50	1.42	4.72
PFHpA	**375-85-9**	**2.48 JT**	**H7705-FS1(0)**	**1.000**	**8/25/2020**	**0.25**	**0.94**	**4.72**
PFOA	335-67-1	6.41 T	H7705-FS1(0)	1.000	8/25/2020	0.48	1.42	4.72
PFNA	**375-95-1**	**1.60 JT**	**H7705-FS1(0)**	**1.000**	**8/25/2020**	**0.29**	**0.94**	**4.72**
PFDA	335-76-2	0.54 JT	H7705-FS1(0)	1.000	8/25/2020	0.13	0.47	4.72
PFUnA	**2058-94-8**	**0.47 UT**	**H7705-FS1(0)**	**1.000**	**8/25/2020**	**0.21**	**0.47**	**4.72**
PFDoA	307-55-1	0.47 UT	H7705-FS1(0)	1.000	8/25/2020	0.18	0.47	4.72
PFTrDA	**72629-94-8**	**0.27 JT**	**H7705-FS1(0)**	**1.000**	**8/25/2020**	**0.14**	**0.47**	**4.72**
PFTeDA	376-06-7	1.89 UT	H7705-FS1(0)	1.000	8/25/2020	0.69	1.89	4.72
NMeFOSAA	**2355-31-9**	**0.94 UT**	**H7705-FS1(0)**	**1.000**	**8/25/2020**	**0.33**	**0.94**	**4.72**
NEtFOSAA	2991-50-6	0.94 UT	H7705-FS1(0)	1.000	8/25/2020	0.47	0.94	4.72
PFBS	**375-73-5**	**1.25 JT**	**H7705-FS1(0)**	**1.000**	**8/25/2020**	**0.13**	**0.47**	**4.72**
PFHxS	355-46-4	8.75 T	H7705-FS1(0)	1.000	8/25/2020	0.10	0.38	4.72
PFOS	**1763-23-1**	**23.17 T**	**H7705-FS1(0)**	**1.000**	**8/25/2020**	**0.42**	**0.94**	**4.72**
HFPO-DA	13252-13-6	0.47 UT	H7705-FS1(0)	1.000	8/25/2020	0.24	0.47	4.72
Adona	**919005-14-4**	**0.94 UT**	**H7705-FS1(0)**	**1.000**	**8/25/2020**	**0.25**	**0.94**	**4.72**
11Cl-PF3OUdS	763051-92-9	0.47 UT	H7705-FS1(0)	1.000	8/25/2020	0.22	0.47	4.72
9Cl-PF3ONS	**756426-58-1**	**0.94 UT**	**H7705-FS1(0)**	**1.000**	**8/25/2020**	**0.25**	**0.94**	**4.72**

NW 9/29/20
Analyzed by: Griffith, Lauren
Printed: 8/26/2020

BATTELLE
It can be done

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

Client ID	PX-B1669-WT07-0720
Battelle ID	H7705-FS1
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	08/24/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	65		H7705-FS1(0)	8/25/2020
13C4-PFHpA	**68**		**H7705-FS1(0)**	**8/25/2020**
13C8-PFOA	66		H7705-FS1(0)	8/25/2020
13C9-PFNA	**61**		**H7705-FS1(0)**	**8/25/2020**
13C6-PFDA	66		H7705-FS1(0)	8/25/2020
13C7-PFUnA	**63**		**H7705-FS1(0)**	**8/25/2020**
13C2-PFDoA	48	N	H7705-FS1(0)	8/25/2020
13C2-PFTeDA	**21**	N	**H7705-FS1(0)**	**8/25/2020**
d3-MeFOSAA	46	N	H7705-FS1(0)	8/25/2020
d5-EtFOSAA	**58**		**H7705-FS1(0)**	**8/25/2020**
13C3-PFBS	75		H7705-FS1(0)	8/25/2020
13C3-PFHxS	**75**		**H7705-FS1(0)**	**8/25/2020**
13C8-PFOS	65		H7705-FS1(0)	8/25/2020
13C3-HFPO-DA	**57**		**H7705-FS1(0)**	**8/25/2020**

1

use original

NW 9/29/20

Analyzed by: Griffith, Lauren
Printed: 8/26/2020

BATTELLE
It can be done

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

Client ID	PX-B1669-WT02P-0720
Battelle ID	H7709-FS1
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	08/24/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	W
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	87.68	T	H7709-FS1(0)	1.000	8/25/2020	0.50	1.42	4.72
PFHpA	**375-85-9**	**131.79**	**TD**	**H7709-FS1-D(3)**	**5.000**	**8/25/2020**	**1.23**	**4.72**	**23.58**
PFOA	335-67-1	95.52	TD	H7709-FS1-D(3)	5.000	8/25/2020	2.41	7.08	23.58
PFNA	**375-95-1**	**64.30**	**T**	**H7709-FS1(0)**	**1.000**	**8/25/2020**	**0.29**	**0.94**	**4.72**
PFDA	335-76-2	3.86	JT	H7709-FS1(0)	1.000	8/25/2020	0.13	0.47	4.72
PFUnA	**2058-94-8**	**0.47**	**UT**	**H7709-FS1(0)**	**1.000**	**8/25/2020**	**0.21**	**0.47**	**4.72**
PFDoA	307-55-1	0.47	UT	H7709-FS1(0)	1.000	8/25/2020	0.18	0.47	4.72
PFTrDA	**72629-94-8**	**0.47**	**UT**	**H7709-FS1(0)**	**1.000**	**8/25/2020**	**0.14**	**0.47**	**4.72**
PFTeDA	376-06-7	1.89	UT	H7709-FS1(0)	1.000	8/25/2020	0.69	1.89	4.72
NMeFOSAA	**2355-31-9**	**0.94**	**UT**	**H7709-FS1(0)**	**1.000**	**8/25/2020**	**0.33**	**0.94**	**4.72**
NEtFOSAA	2991-50-6	0.94	UT	H7709-FS1(0)	1.000	8/25/2020	0.47	0.94	4.72
PFBS	**375-73-5**	**1.37**	**JT**	**H7709-FS1(0)**	**1.000**	**8/25/2020**	**0.13**	**0.47**	**4.72**
PFHxS	355-46-4	7.35	T	H7709-FS1(0)	1.000	8/25/2020	0.10	0.38	4.72
PFOS	**1763-23-1**	**16.70**	**T**	**H7709-FS1(0)**	**1.000**	**8/25/2020**	**0.42**	**0.94**	**4.72**
HFPO-DA	13252-13-6	0.47	UT	H7709-FS1(0)	1.000	8/25/2020	0.24	0.47	4.72
Adona	**919005-14-4**	**0.94**	**UT**	**H7709-FS1(0)**	**1.000**	**8/25/2020**	**0.25**	**0.94**	**4.72**
11Cl-PF3OUdS	763051-92-9	0.47	UT	H7709-FS1(0)	1.000	8/25/2020	0.22	0.47	4.72
9Cl-PF3ONS	**756426-58-1**	**0.94**	**UT**	**H7709-FS1(0)**	**1.000**	**8/25/2020**	**0.25**	**0.94**	**4.72**

NW 9/29/20
Analyzed by: Griffith, Lauren
Printed: 8/26/2020

BATTELLE
It can be done

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

2

Client ID	PX-B1669-WT02P-0720
Battelle ID	H7709-FS1
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	08/24/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Use original

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	88	D	H7709-FS1-D(3)	8/25/2020
13C4-PFHpA	**89**	**D**	**H7709-FS1-D(3)**	**8/25/2020**
13C8-PFOA	92	D	H7709-FS1-D(3)	8/25/2020
13C9-PFNA	**86**	**D**	**H7709-FS1-D(3)**	**8/25/2020**
13C6-PFDA	76		H7709-FS1(0)	8/25/2020
13C7-PFUnA	**81**		**H7709-FS1(0)**	**8/25/2020**
13C2-PFDoA	66		H7709-FS1(0)	8/25/2020
13C2-PFTeDA	**49**	**M**	**H7709-FS1(0)**	**8/25/2020**
d3-MeFOSAA	57		H7709-FS1(0)	8/25/2020
d5-EtFOSAA	**82**		**H7709-FS1(0)**	**8/25/2020**
13C3-PFBS	82		H7709-FS1(0)	8/25/2020
13C3-PFHxS	**88**		**H7709-FS1(0)**	**8/25/2020**
13C8-PFOS	84		H7709-FS1(0)	8/25/2020
13C3-HFPO-DA	**85**	**D**	**H7709-FS1-D(3)**	**8/25/2020**

NW 9/29/20

Analyzed by: Griffith, Lauren
Printed: 8/26/2020

BATTELLE
It can be done

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

3

Client ID	PX-H2905-WT06-0720
Battelle ID	H7719-FS1
Sample Type	SA
Collection Date	07/27/2020
Extraction Date	08/24/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	W
Sample Size	0.260
Size Unit-Basis	L

use original

Analyte	CAS No.	Result (ng/L)		Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	111.74	T J	H7719-FS1(0)	1.000	8/25/2020	0.51	1.44	4.81	HT
PFHpA	**375-85-9**	**50.82**	**T**	**H7719-FS1(0)**	**1.000**	**8/25/2020**	**0.25**	**0.96**	**4.81**	
PFOA	335-67-1	70.48	T	H7719-FS1(0)	1.000	8/25/2020	0.49	1.44	4.81	
PFNA	**375-95-1**	**4.86**	**T**	**H7719-FS1(0)**	**1.000**	**8/25/2020**	**0.30**	**0.96**	**4.81**	
PFDA	335-76-2	0.90	JT	H7719-FS1(0)	1.000	8/25/2020	0.13	0.48	4.81	
PFUnA	**2058-94-8**	**0.48**	**UT UJ**	**H7719-FS1(0)**	**1.000**	**8/25/2020**	**0.21**	**0.48**	**4.81**	
PFDoA	307-55-1	0.48	UT	H7719-FS1(0)	1.000	8/25/2020	0.18	0.48	4.81	
PFTrDA	**72629-94-8**	**0.48**	**UT**	**H7719-FS1(0)**	**1.000**	**8/25/2020**	**0.14**	**0.48**	**4.81**	
PFTeDA	376-06-7	0.89	JT J	H7719-FS1(0)	1.000	8/25/2020	0.70	1.92	4.81	
NMeFOSAA	**2355-31-9**	**0.96**	**UT UJ**	**H7719-FS1(0)**	**1.000**	**8/25/2020**	**0.34**	**0.96**	**4.81**	
NEtFOSAA	2991-50-6	0.96	UT W	H7719-FS1(0)	1.000	8/25/2020	0.48	0.96	4.81	
PFBS	**375-73-5**	**14.16**	**T J**	**H7719-FS1(0)**	**1.000**	**8/25/2020**	**0.13**	**0.48**	**4.81**	
PFHxS	355-46-4	44.98	T	H7719-FS1(0)	1.000	8/25/2020	0.11	0.38	4.81	
PFOS	**1763-23-1**	**34.39**	**T**	**H7719-FS1(0)**	**1.000**	**8/25/2020**	**0.42**	**0.96**	**4.81**	
HFPO-DA	13252-13-6	1.12	JT	H7719-FS1(0)	1.000	8/25/2020	0.24	0.48	4.81	
Adona	**919005-14-4**	**0.96**	**UT UJ**	**H7719-FS1(0)**	**1.000**	**8/25/2020**	**0.26**	**0.96**	**4.81**	
11Cl-PF3OUdS	763051-92-9	0.48	UT	H7719-FS1(0)	1.000	8/25/2020	0.22	0.48	4.81	
9Cl-PF3ONS	**756426-58-1**	**0.96**	**UT**	**H7719-FS1(0)**	**1.000**	**8/25/2020**	**0.26**	**0.96**	**4.81**	

NW 9/29/20

Analyzed by: Griffith, Lauren
Printed: 8/26/2020

BATTELLE
It can be done

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

3

Client ID	PX-H2905-WT06-0720
Battelle ID	H7719-FS1
Sample Type	SA
Collection Date	07/27/2020
Extraction Date	08/24/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

use orig. val

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	54		H7719-FS1(0)	8/25/2020
13C4-PFHpA	70		H7719-FS1(0)	8/25/2020
13C8-PFOA	71		H7719-FS1(0)	8/25/2020
13C9-PFNA	65		H7719-FS1(0)	8/25/2020
13C6-PFDA	64		H7719-FS1(0)	8/25/2020
13C7-PFUnA	51		H7719-FS1(0)	8/25/2020
13C2-PFDoA	32	N	H7719-FS1(0)	8/25/2020
13C2-PFTeDA	6	N	H7719-FS1(0)	8/25/2020
d3-MeFOSAA	38	N	H7719-FS1(0)	8/25/2020
d5-EtFOSAA	36	N	H7719-FS1(0)	8/25/2020
13C3-PFBS	63		H7719-FS1(0)	8/25/2020
13C3-PFHxS	87		H7719-FS1(0)	8/25/2020
13C8-PFOS	72		H7719-FS1(0)	8/25/2020
13C3-HFPO-DA	57		H7719-FS1(0)	8/25/2020

NW 9/29/20

Analyzed by: Griffith, Lauren
Printed: 8/26/2020

BATTELLE
It can be done

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

4

Client ID	PX-H2905-WT07-0720
Battelle ID	H7720-FS1
Sample Type	SA
Collection Date	07/27/2020
Extraction Date	08/24/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	W
Sample Size	0.260
Size Unit-Basis	L

use original

Analyte	CAS No.	Result (ng/L)		Extract ID	DF	Analysis Date	DL	LOD	LOQ	
PFHxA	307-24-4	12.39	T J	H7720-FS1(0)	1.000	8/25/2020	0.51	1.44	4.81	HT
PFHpA	375-85-9	6.21	T	H7720-FS1(0)	1.000	8/25/2020	0.25	0.96	4.81	
PFOA	335-67-1	11.77	T	H7720-FS1(0)	1.000	8/25/2020	0.49	1.44	4.81	
PFNA	375-95-1	1.45	JT	H7720-FS1(0)	1.000	8/25/2020	0.30	0.96	4.81	
PFDA	335-76-2	0.50	JT	H7720-FS1(0)	1.000	8/25/2020	0.13	0.48	4.81	
PFUnA	2058-94-8	0.48	UT UJ	H7720-FS1(0)	1.000	8/25/2020	0.21	0.48	4.81	
PFDoA	307-55-1	0.48	UT	H7720-FS1(0)	1.000	8/25/2020	0.18	0.48	4.81	
PFTrDA	72629-94-8	0.48	UT	H7720-FS1(0)	1.000	8/25/2020	0.14	0.48	4.81	
PFTeDA	376-06-7	1.92	UT	H7720-FS1(0)	1.000	8/25/2020	0.70	1.92	4.81	
NMeFOSAA	2355-31-9	0.96	UT	H7720-FS1(0)	1.000	8/25/2020	0.34	0.96	4.81	
NEtFOSAA	2991-50-6	0.96	UT	H7720-FS1(0)	1.000	8/25/2020	0.48	0.96	4.81	
PFBS	375-73-5	2.80	JT J	H7720-FS1(0)	1.000	8/25/2020	0.13	0.48	4.81	
PFHxS	355-46-4	23.57	T	H7720-FS1(0)	1.000	8/25/2020	0.11	0.38	4.81	
PFOS	1763-23-1	36.75	T	H7720-FS1(0)	1.000	8/25/2020	0.42	0.96	4.81	
HFPO-DA	13252-13-6	0.48	UT UJ	H7720-FS1(0)	1.000	8/25/2020	0.24	0.48	4.81	
Adona	919005-14-4	0.96	UT	H7720-FS1(0)	1.000	8/25/2020	0.26	0.96	4.81	
11Cl-PF3OUdS	763051-92-9	0.48	UT	H7720-FS1(0)	1.000	8/25/2020	0.22	0.48	4.81	
9Cl-PF3ONS	756426-58-1	0.96	UT	H7720-FS1(0)	1.000	8/25/2020	0.26	0.96	4.81	

MW 9/29/20
Analyzed by: Griffith, Lauren
Printed: 8/26/2020

BATTELLE
It can be done

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

4

Client ID	PX-H2905-WT07-0720
Battelle ID	H7720-FS1
Sample Type	SA
Collection Date	07/27/2020
Extraction Date	08/24/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Use original

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	80	H7720-FS1(0)	8/25/2020
13C4-PFHpA	**79**	**H7720-FS1(0)**	**8/25/2020**
13C8-PFOA	78	H7720-FS1(0)	8/25/2020
13C9-PFNA	**73**	**H7720-FS1(0)**	**8/25/2020**
13C6-PFDA	69	H7720-FS1(0)	8/25/2020
13C7-PFUnA	**55**	**H7720-FS1(0)**	**8/25/2020**
13C2-PFDoA	32 N	H7720-FS1(0)	8/25/2020
13C2-PFTeDA	**11 N**	**H7720-FS1(0)**	**8/25/2020**
d3-MeFOSAA	31 N	H7720-FS1(0)	8/25/2020
d5-EtFOSAA	**27 N**	**H7720-FS1(0)**	**8/25/2020**
13C3-PFBS	83	H7720-FS1(0)	8/25/2020
13C3-PFHxS	**84**	**H7720-FS1(0)**	**8/25/2020**
13C8-PFOS	72	H7720-FS1(0)	8/25/2020
13C3-HFPO-DA	**75**	**H7720-FS1(0)**	**8/25/2020**

NW 9/29/20
Analyzed by: Griffith, Lauren
Printed: 8/26/2020

ENVIRONMENTAL
Data Services, Inc.

DATA VALIDATION SUMMARY REPORT
NAS PATUXENT RIVER, MARYLAND

Client: CH2M HILL, Inc., Gainesville, Florida
SDG: 20-0994
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: NAS Patuxent River, St. Mary's County, CTO-JU14, Maryland
Date: September 29, 2020

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	PX-B102-WT03-0720	H7954-FS1	Water
2	PX-B102-WT05-0720	H7957-FS1	Water
3	PX-B102-WT02-0720	H7961-FS1	Water

A Stage 2B/4 data validation was performed on the analytical data for three water samples collected on July 28-29, 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 at 26-27 days which is outside the 14 days for water samples criteria. All results were qualified as estimated (J/UJ) in all samples.

LC/MS Tuning

- All criteria were met.

Initial Calibration

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

Continuing Calibration

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

Method Blank

- The method blanks exhibited the following contamination.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
LC62 IB	PFDA	0.15	U	3
	PFHxS	0.13	None	All Associated >5X

Field QC Blank

- Field QC sample results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
PX-B102-FB01-072920	None - ND	-	-	-
PX-B102-EB01-072920-GW	None - ND	-	-	-

Surrogate Spike Recoveries

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

Laboratory Fortified Blank (LFB)

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

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

- MS/MSD samples were not analyzed.

Internal Standard (IS) Area Performance

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

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- The samples were originally analyzed in SDG 20-0879 with low surrogate recoveries. The samples were re-extracted outside of holding times and reanalyzed in this data package. The original analysis results should be used for reporting purposes.

Field Duplicate Sample Precision

- Field duplicate samples were not collected.

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

Signed: Nancy Weaver Dated: 10/2/20

Nancy Weaver
Senior Chemist

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

BATTELLE
It can be done

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

Client ID	PX-B102-WT03-0720
Battelle ID	H7954-FS1
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	08/24/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	W
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	76.06 T	H7954-FS1(0)	1.000	8/27/2020	0.50	1.42	4.72
PFHpA	**375-85-9**	**13.66 T**	**H7954-FS1(0)**	**1.000**	**8/27/2020**	**0.25**	**0.94**	**4.72**
PFOA	335-67-1	48.64 T	H7954-FS1(0)	1.000	8/27/2020	0.48	1.42	4.72
PFNA	**375-95-1**	**5.11 T**	**H7954-FS1(0)**	**1.000**	**8/27/2020**	**0.29**	**0.94**	**4.72**
PFDA	335-76-2	2.12 JT	H7954-FS1(0)	1.000	8/27/2020	0.13	0.47	4.72
PFUnA	**2058-94-8**	**0.47 UT**	**H7954-FS1(0)**	**1.000**	**8/27/2020**	**0.21**	**0.47**	**4.72**
PFDoA	307-55-1	0.47 UT	H7954-FS1(0)	1.000	8/27/2020	0.18	0.47	4.72
PFTrDA	**72629-94-8**	**0.47 UT**	**H7954-FS1(0)**	**1.000**	**8/27/2020**	**0.14**	**0.47**	**4.72**
PFTeDA	376-06-7	1.89 UT	H7954-FS1(0)	1.000	8/27/2020	0.69	1.89	4.72
NMeFOSAA	**2355-31-9**	**0.94 UT**	**H7954-FS1(0)**	**1.000**	**8/27/2020**	**0.33**	**0.94**	**4.72**
NEtFOSAA	2991-50-6	0.94 UT	H7954-FS1(0)	1.000	8/27/2020	0.47	0.94	4.72
PFBS	**375-73-5**	**12.36 T**	**H7954-FS1(0)**	**1.000**	**8/27/2020**	**0.13**	**0.47**	**4.72**
PFHxS	355-46-4	77.10 TD	H7954-FS1-D(3)	5.000	8/27/2020	0.52	1.89	23.58
PFOS	**1763-23-1**	**265.98 TD**	**H7954-FS1-D(3)**	**5.000**	**8/27/2020**	**2.08**	**4.72**	**23.58**
HFPO-DA	13252-13-6	0.47 UT	H7954-FS1(0)	1.000	8/27/2020	0.24	0.47	4.72
Adona	**919005-14-4**	**0.94 UT**	**H7954-FS1(0)**	**1.000**	**8/27/2020**	**0.25**	**0.94**	**4.72**
11Cl-PF3OUdS	763051-92-9	0.47 UT	H7954-FS1(0)	1.000	8/27/2020	0.22	0.47	4.72
9Cl-PF3ONS	**756426-58-1**	**0.94 UT**	**H7954-FS1(0)**	**1.000**	**8/27/2020**	**0.25**	**0.94**	**4.72**

use original in 20-0879

J
UJ
J
UJ
HT

NW 9/29/20

Analyzed by: Schultz, Stephanie
Printed: 8/27/2020

BATTELLE
It can be done

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

Client ID	PX-B102-WT03-0720
Battelle ID	H7954-FS1
Sample Type	SA
Collection Date	07/28/2020
Extraction Date	08/24/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	37	N	H7954-FS1(0)	8/27/2020
13C4-PFHpA	42	N	H7954-FS1(0)	8/27/2020
13C8-PFOA	41	N	H7954-FS1(0)	8/27/2020
13C9-PFNA	44	N	H7954-FS1(0)	8/27/2020
13C6-PFDA	52		H7954-FS1(0)	8/27/2020
13C7-PFUnA	54		H7954-FS1(0)	8/27/2020
13C2-PFDoA	47	N	H7954-FS1(0)	8/27/2020
13C2-PFTeDA	31	N	H7954-FS1(0)	8/27/2020
d3-MeFOSAA	111	D	H7954-FS1-D(3)	8/27/2020
d5-EtFOSAA	110	D	H7954-FS1-D(3)	8/27/2020
13C3-PFBS	119	D	H7954-FS1-D(3)	8/27/2020
13C3-PFHxS	113	D	H7954-FS1-D(3)	8/27/2020
13C8-PFOS	104	D	H7954-FS1-D(3)	8/27/2020
13C3-HFPO-DA	32	N	H7954-FS1(0)	8/27/2020

use original

NW 9/29/20

Analyzed by: Schultz, Stephanie
Printed: 8/27/2020

BATTELLE
It can be done

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

Client ID	PX-B102-WT05-0720
Battelle ID	H7957-FS1
Sample Type	SA
Collection Date	07/29/2020
Extraction Date	08/24/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	W
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	1.48	JT	H7957-FS1(0)	1.000	8/27/2020	0.52	1.47	4.90
PFHpA	**375-85-9**	**0.80**	**JT**	**H7957-FS1(0)**	**1.000**	**8/27/2020**	**0.25**	**0.98**	**4.90**
PFOA	335-67-1	2.09	JT	H7957-FS1(0)	1.000	8/27/2020	0.50	1.47	4.90
PFNA	**375-95-1**	**0.32**	**JT**	**H7957-FS1(0)**	**1.000**	**8/27/2020**	**0.30**	**0.98**	**4.90**
PFDA	335-76-2	0.49	UT	H7957-FS1(0)	1.000	8/27/2020	0.14	0.49	4.90
PFUnA	**2058-94-8**	**0.49**	**UT**	**H7957-FS1(0)**	**1.000**	**8/27/2020**	**0.22**	**0.49**	**4.90**
PFDoA	307-55-1	0.49	UT	H7957-FS1(0)	1.000	8/27/2020	0.19	0.49	4.90
PFTrDA	**72629-94-8**	**0.49**	**UT**	**H7957-FS1(0)**	**1.000**	**8/27/2020**	**0.15**	**0.49**	**4.90**
PFTeDA	376-06-7	1.96	UT	H7957-FS1(0)	1.000	8/27/2020	0.72	1.96	4.90
NMeFOSAA	**2355-31-9**	**0.98**	**UT**	**H7957-FS1(0)**	**1.000**	**8/27/2020**	**0.34**	**0.98**	**4.90**
NEtFOSAA	2991-50-6	0.98	UT	H7957-FS1(0)	1.000	8/27/2020	0.49	0.98	4.90
PFBS	**375-73-5**	**1.54**	**JT**	**H7957-FS1(0)**	**1.000**	**8/27/2020**	**0.14**	**0.49**	**4.90**
PFHxS	355-46-4	19.33	T	H7957-FS1(0)	1.000	8/27/2020	0.11	0.39	4.90
PFOS	**1763-23-1**	**9.99**	**T**	**H7957-FS1(0)**	**1.000**	**8/27/2020**	**0.43**	**0.98**	**4.90**
HFPO-DA	13252-13-6	0.49	UT	H7957-FS1(0)	1.000	8/27/2020	0.25	0.49	4.90
Adona	**919005-14-4**	**0.98**	**UT**	**H7957-FS1(0)**	**1.000**	**8/27/2020**	**0.26**	**0.98**	**4.90**
11Cl-PF3OUdS	763051-92-9	0.49	UT	H7957-FS1(0)	1.000	8/27/2020	0.23	0.49	4.90
9Cl-PF3ONS	**756426-58-1**	**0.98**	**UT**	**H7957-FS1(0)**	**1.000**	**8/27/2020**	**0.26**	**0.98**	**4.90**

NW 9/29/20

Analyzed by: Schultz, Stephanie
Printed: 8/27/2020

BATTELLE
it can be done

2

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

Client ID	PX-B102-WT05-0720
Battelle ID	H7957-FS1
Sample Type	SA
Collection Date	07/29/2020
Extraction Date	08/24/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

use original

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	63	H7957-FS1(0)	8/27/2020
13C4-PFHpA	69	H7957-FS1(0)	8/27/2020
13C8-PFOA	66	H7957-FS1(0)	8/27/2020
13C9-PFNA	64	H7957-FS1(0)	8/27/2020
13C6-PFDA	68	H7957-FS1(0)	8/27/2020
13C7-PFUnA	55	H7957-FS1(0)	8/27/2020
13C2-PFDoA	43 N	H7957-FS1(0)	8/27/2020
13C2-PFTeDA	24 N	H7957-FS1(0)	8/27/2020
d3-MeFOSAA	59	H7957-FS1(0)	8/27/2020
d5-EtFOSAA	63	H7957-FS1(0)	8/27/2020
13C3-PFBS	82	H7957-FS1(0)	8/27/2020
13C3-PFHxS	87	H7957-FS1(0)	8/27/2020
13C8-PFOS	76	H7957-FS1(0)	8/27/2020
13C3-HFPO-DA	60	H7957-FS1(0)	8/27/2020

NW 9/29/20

Analyzed by: Schultz, Stephanie
Printed: 8/27/2020

BATTELLE
It can be done

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

Client ID	PX-B102-WT02-0720
Battelle ID	H7961-FS1
Sample Type	SA
Collection Date	07/29/2020
Extraction Date	08/24/2020
Analytical Instrument	Sciex 5500 LC/MS/MS
% Moisture	NA
Matrix	W
Sample Size	0.255
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	13.09 T J	H7961-FS1(0)	1.000	8/27/2020	0.52	1.47	4.90
PFHpA	**375-85-9**	**5.25 T**	**H7961-FS1(0)**	**1.000**	**8/27/2020**	**0.25**	**0.98**	**4.90**
PFOA	335-67-1	21.45 T	H7961-FS1(0)	1.000	8/27/2020	0.50	1.47	4.90
PFNA	**375-95-1**	**2.40 JT**	**H7961-FS1(0)**	**1.000**	**8/27/2020**	**0.30**	**0.98**	**4.90**
PFDA	335-76-2	0.51 JT UJ	H7961-FS1(0)	1.000	8/27/2020	0.14	0.49	4.90
PFUnA	**2058-94-8**	**0.49 UT**	**H7961-FS1(0)**	**1.000**	**8/27/2020**	**0.22**	**0.49**	**4.90**
PFDoA	307-55-1	0.49 UT	H7961-FS1(0)	1.000	8/27/2020	0.19	0.49	4.90
PFTrDA	**72629-94-8**	**0.49 UT**	**H7961-FS1(0)**	**1.000**	**8/27/2020**	**0.15**	**0.49**	**4.90**
PFTeDA	376-06-7	1.96 UT	H7961-FS1(0)	1.000	8/27/2020	0.72	1.96	4.90
NMeFOSAA	**2355-31-9**	**0.98 UT**	**H7961-FS1(0)**	**1.000**	**8/27/2020**	**0.34**	**0.98**	**4.90**
NEtFOSAA	2991-50-6	0.98 UT	H7961-FS1(0)	1.000	8/27/2020	0.49	0.98	4.90
PFBS	**375-73-5**	**5.38 T J**	**H7961-FS1(0)**	**1.000**	**8/27/2020**	**0.14**	**0.49**	**4.90**
PFHxS	355-46-4	45.89 T J	H7961-FS1(0)	1.000	8/27/2020	0.11	0.39	4.90
PFOS	**1763-23-1**	**139.63 TD J**	**H7961-FS1-D(3)**	**5.000**	**8/27/2020**	**2.16**	**4.90**	**24.51**
HFPO-DA	13252-13-6	0.49 UT W	H7961-FS1(0)	1.000	8/27/2020	0.25	0.49	4.90
Adona	**919005-14-4**	**0.98 UT**	**H7961-FS1(0)**	**1.000**	**8/27/2020**	**0.26**	**0.98**	**4.90**
11Cl-PF3OUdS	763051-92-9	0.49 UT	H7961-FS1(0)	1.000	8/27/2020	0.23	0.49	4.90
9Cl-PF3ONS	**756426-58-1**	**0.98 UT**	**H7961-FS1(0)**	**1.000**	**8/27/2020**	**0.26**	**0.98**	**4.90**

3
use original IN 20-0879
HT
MBL HT
HT

NW 9/29/20
Analyzed by: Schultz, Stephanie
Printed: 8/27/2020

BATTELLE
It can be done

3

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

Client ID	PX-B102-WT02-0720
Battelle ID	H7961-FS1
Sample Type	SA
Collection Date	07/29/2020
Extraction Date	08/24/2020
Analytical Instrument	Sciex 5500 LC/MS/MS

use original

Surrogate Recoveries (%)	Recovery		Extract ID	Analysis Date
13C5-PFHxA	68		H7961-FS1(0)	8/27/2020
13C4-PFHpA	**77**		**H7961-FS1(0)**	**8/27/2020**
13C8-PFOA	69		H7961-FS1(0)	8/27/2020
13C9-PFNA	**65**		**H7961-FS1(0)**	**8/27/2020**
13C6-PFDA	67		H7961-FS1(0)	8/27/2020
13C7-PFUnA	**63**		**H7961-FS1(0)**	**8/27/2020**
13C2-PFDoA	57		H7961-FS1(0)	8/27/2020
13C2-PFTeDA	**57**		**H7961-FS1(0)**	**8/27/2020**
d3-MeFOSAA	106	D	H7961-FS1-D(3)	8/27/2020
d5-EtFOSAA	**116**	D	**H7961-FS1-D(3)**	**8/27/2020**
13C3-PFBS	117	D	H7961-FS1-D(3)	8/27/2020
13C3-PFHxS	**106**	D	**H7961-FS1-D(3)**	**8/27/2020**
13C8-PFOS	103	D	H7961-FS1-D(3)	8/27/2020
13C3-HFPO-DA	65		**H7961-FS1(0)**	**8/27/2020**

NW 9/29/20

Analyzed by: Schultz, Stephanie
Printed: 8/27/2020

Appendix D
Laboratory Analytical Data

Table D-1. Soil PFAS Analytical Data
Building 2385, Building 102, and Building 1669
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	PAX PFAS SO Values	PX-B102-SO01			PX-B102-SO02		PX-B102-SO03	
Sample ID		PX-B102-SS01-000H	PX-B102-SB01-0304	PX-B102-SB01P-0304	PX-B102-SS02-000H	PX-B102-SB02-0304	PX-B102-SS03-000H	PX-B102-SB03-0304
Sample Date		07/29/20	07/29/20	07/29/20	07/29/20	07/29/20	07/28/20	07/28/20
Chemical Name								
Per- and Polyfluoroalkyl Substances (ng/g)								
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	2.38 U	2.08 U	2.16 U	2 U	2.26 U	2.16 U	2.12 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	1.19 U	1.04 U	1.08 U	1 U	1.13 U	1.08 U	1.06 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	1.79 U	1.56 U	1.62 U	1.5 U	1.69 U	1.62 U	1.59 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	2.38 U	2.08 U	2.16 U	2 U	2.26 U	2.16 U	2.12 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	2.98 U	2.6 U	2.7 U	2.5 U	2.82 U	2.7 U	2.65 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	2.38 U	2.08 U	2.16 U	2 U	2.26 U	2.16 U	2.12 U
Perfluorooctanesulfonic Acid (PFOS)	130	**8.05**	2.08 U	2.16 U	**2.73 J**	2.26 U	**5.37 J**	2.12 U
Perfluoroundecanoic Acid (PFUnA)	--	1.19 U	1.04 U	1.08 U	1 U	1.13 U	1.08 U	1.06 U
Perfluorohexanoic Acid (PFHxA)	--	**1.02 J**	2.08 U	2.16 U	2 U	2.26 U	2.16 U	2.12 U
Perfluorododecanoic Acid (PFDoA)	--	2.38 U	2.08 U	2.16 U	2 U	2.26 U	2.16 U	2.12 U
Perfluorooctanoic Acid (PFOA)	130	**1.29 J**	2.08 U	2.16 U	2 U	2.26 U	2.16 U	2.12 U
Perfluorodecanoic Acid (PFDA)	--	1.19 U	1.04 U	1.08 U	1 U	1.13 U	1.08 U	1.06 U
Perfluorohexanesulfonic Acid (PFHxS)	--	**2.32 J**	2.08 U	2.16 U	2 U	2.26 U	2.16 U	2.12 U
Perfluorobutanesulfonic Acid (PFBS)	1,900	1.19 U	1.04 U	1.08 U	1 U	1.13 U	1.08 U	1.06 U
Perfluoroheptanoic Acid (PFHpA)	--	1.79 U	1.56 U	1.62 U	1.5 U	1.69 U	1.62 U	1.59 U
Perfluorononanoic Acid (PFNA)	--	1.19 U	1.04 U	1.08 U	1 U	1.13 U	1.08 U	1.06 U
Perfluorotetradecanoic Acid (PFTeDA)	--	2.98 U	2.6 U	2.7 U	2.5 U	2.82 U	2.7 U	2.65 U
Perfluorotridecanoic Acid (PFTrDA)	--	1.19 U	1.04 U	1.08 U	1 U	1.13 U	1.08 U	1.06 U

Notes:
Exceeds one or more criteria
Bold indicates detections
NA - Not analyzed
J - Analyte present, value may or may not be accurate or precise
U - The material was analyzed for, but not detected
ng/g - nanograms per gram
µg/kg - micrograms per kilogram
ng/g = µg/kg

Table D-1. Soil PFAS Analytical Data
Building 2385, Building 102, and Building 1669
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	PAX PFAS SO Values	PX-B102-SO04			PX-B1669-SO01			PX-B1669-SO02	
Sample ID		PX-B102-SS04-000H	PX-B102-SS04P-000H	PX-B102-SB04-0304	PX-B1669-SS01-000H	PX-B1669-SB01-0304	PX-B1669-SB01P-0304	PX-B1669-SS02-000H	PX-B1669-SB02-0304
Sample Date		07/29/20	07/29/20	07/29/20	07/28/20	07/28/20	07/28/20	07/28/20	07/28/20
Chemical Name									
Per- and Polyfluoroalkyl Substances (ng/g)									
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	2.14 U	2.14 U	2 U	2.27 U	2.29 U	2.5 U	2.44 U	2.09 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	1.07 U	1.07 U	1 U	1.14 U	1.14 U	1.25 U	1.22 U	1.05 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	1.6 U	1.6 U	1.5 U	1.7 U	1.71 U	1.88 U	1.83 U	1.57 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	2.14 U	2.14 U	2 U	2.27 U	2.29 U	2.5 U	2.44 U	2.09 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	2.67 U	2.67 U	2.5 U	2.84 U	2.86 U	3.13 U	3.05 U	2.62 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	2.14 U	2.14 U	2 U	2.27 U	2.29 U	2.5 U	2.44 U	2.09 U
Perfluorooctanesulfonic Acid (PFOS)	130	**25.6**	**25.9**	**3.03 J**	2.27 U	2.29 U	2.5 U	2.44 U	2.09 U
Perfluoroundecanoic Acid (PFUnA)	--	1.07 U	1.07 U	1 U	1.14 U	1.14 U	1.25 U	1.22 U	1.05 U
Perfluorohexanoic Acid (PFHxA)	--	2.14 U	**0.9 J**	2 U	2.27 U	2.29 U	**2.47 J**	2.44 U	**4.02 J**
Perfluorododecanoic Acid (PFDoA)	--	2.14 U	2.14 U	2 U	2.27 U	2.29 U	2.5 U	2.44 U	2.09 U
Perfluorooctanoic Acid (PFOA)	130	**0.72 J**	**0.81 J**	2 U	2.27 U	2.29 U	2.5 U	2.44 U	2.09 U
Perfluorodecanoic Acid (PFDA)	--	1.07 U	1.07 U	1 U	1.14 U	1.14 U	1.25 U	1.22 U	1.05 U
Perfluorohexanesulfonic Acid (PFHxS)	--	**1.54 J**	**1.54 J**	2 U	2.27 U	2.29 U	2.5 U	2.44 U	2.09 U
Perfluorobutanesulfonic Acid (PFBS)	1,900	1.07 U	1.07 U	1 U	1.14 U	1.14 U	1.25 U	1.22 U	1.05 U
Perfluoroheptanoic Acid (PFHpA)	--	1.6 U	1.6 U	1.5 U	1.7 U	1.71 U	1.88 U	1.83 U	1.57 U
Perfluorononanoic Acid (PFNA)	--	1.07 U	1.07 U	1 U	1.14 U	1.14 U	1.25 U	**0.77 J**	1.05 U
Perfluorotetradecanoic Acid (PFTeDA)	--	2.67 U	2.67 U	2.5 U	2.84 U	2.86 U	3.13 U	3.05 U	2.62 U
Perfluorotridecanoic Acid (PFTrDA)	--	1.07 U	1.07 U	1 U	1.14 U	1.14 U	1.25 U	1.22 U	1.05 U

Notes:
Exceeds one or more criteria
Bold indicates detections
NA - Not analyzed
J - Analyte present, value may or may not be accurate or precise
U - The material was analyzed for, but not detected
ng/g - nanograms per gram
µg/kg - micrograms per kilogram
ng/g = µg/kg

Table D-1. Soil PFAS Analytical Data
Building 2385, Building 102, and Building 1669
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	PAX PFAS SO Values	PX-B1669-SO03		PX-B1669-SO04		PX-B1669-SO05		
Sample ID		PX-B1669-SS03-000H	PX-B1669-SB03-0304	PX-B1669-SS04-000H	PX-B1669-SB04-0304	PX-B1669-SS05-000H	PX-B1669-SS05P-000H	PX-B1669-SB05-0304
Sample Date		07/28/20	07/28/20	07/28/20	07/28/20	07/28/20	07/28/20	07/28/20
Chemical Name								
Per- and Polyfluoroalkyl Substances (ng/g)								
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	2.25 U	2.4 U	2.06 U	2.41 U	2.35 U	2.31 U	2.08 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	1.12 U	1.2 U	1.03 U	1.2 U	1.18 U	1.16 U	1.04 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	1.69 U	1.8 U	1.55 U	1.81 U	1.76 U	1.73 U	1.56 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	2.25 U	2.4 U	2.06 U	2.41 U	2.35 U	2.31 U	2.08 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	2.81 U	2.99 U	2.58 U	3.01 U	2.94 U	2.89 U	2.6 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	2.25 U	2.4 U	2.06 U	2.41 U	2.35 U	2.31 U	2.08 U
Perfluorooctanesulfonic Acid (PFOS)	130	2.62 U	2.4 U	2.06 U	2.41 U	2.35 U	2.31 U	2.08 U
Perfluoroundecanoic Acid (PFUnA)	--	1.12 U	1.2 U	1.03 U	1.2 U	1.18 U	1.16 U	1.04 U
Perfluorohexanoic Acid (PFHxA)	--	2.25 U	2.4 U	**0.9 J**	**0.94 J**	**1.04 J**	2.31 U	2.08 U
Perfluorododecanoic Acid (PFDoA)	--	2.25 U	2.4 U	2.06 U	2.41 U	2.35 U	2.31 U	2.08 U
Perfluorooctanoic Acid (PFOA)	130	2.25 U	2.4 U	2.06 U	2.41 U	2.35 U	2.31 U	2.08 U
Perfluorodecanoic Acid (PFDA)	--	1.12 U	1.2 U	1.03 U	**0.68 J**	1.18 U	1.16 U	1.04 U
Perfluorohexanesulfonic Acid (PFHxS)	--	2.25 U	2.4 U	2.06 U	2.41 U	2.35 U	2.31 U	2.08 U
Perfluorobutanesulfonic Acid (PFBS)	1,900	1.12 U	1.2 U	1.03 U	1.2 U	1.18 U	1.16 U	1.04 U
Perfluoroheptanoic Acid (PFHpA)	--	1.69 U	1.8 U	1.55 U	**0.78 J**	1.76 U	1.73 U	1.56 U
Perfluorononanoic Acid (PFNA)	--	1.12 U	1.2 U	**0.62 J**	**0.71 J**	1.18 U	1.16 U	1.04 U
Perfluorotetradecanoic Acid (PFTeDA)	--	2.81 U	2.99 U	2.58 U	3.01 U	2.94 U	2.89 U	2.6 U
Perfluorotridecanoic Acid (PFTrDA)	--	1.12 U	1.2 U	1.03 U	1.2 U	1.18 U	1.16 U	1.04 U

Notes:
Exceeds one or more criteria
Bold indicates detections
NA - Not analyzed
J - Analyte present, value may or may not be accurate or precise
U - The material was analyzed for, but not detected
ng/g - nanograms per gram
µg/kg - micrograms per kilogram
ng/g = µg/kg

Table D-1. Soil PFAS Analytical Data
Building 2385, Building 102, and Building 1669
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	**PAX PFAS SO Values**	PX-S09-SO19			PX-S09-SO20		PX-S09-SO21	
Sample ID		PX-S09-SS19-000H	PX-S09-SB19-0304	PX-S09-SB19P-0304	PX-S09-SS20-000H	PX-S09-SB20-0203	PX-S09-SS21-000H	PX-S09-SB21-0304
Sample Date		07/07/20	07/07/20	07/07/20	07/07/20	07/07/20	07/07/20	07/07/20
Chemical Name								
Per- and Polyfluoroalkyl Substances (ng/g)								
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	2.19 U	2.38 U	2.3 U	2.16 U	2.26 U	2.34 U	2.52 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	1.09 U	1.19 U	1.15 U	1.08 U	1.13 U	1.17 U	1.26 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	1.64 U	1.79 U	1.72 U	1.62 U	1.69 U	1.75 U	1.89 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	2.19 U	2.38 U	2.3 U	2.16 U	2.26 U	2.34 U	2.52 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	2.73 U	2.98 U	2.87 U	2.7 U	2.82 U	2.92 U	3.14 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	2.19 U	2.38 U	2.3 U	2.16 U	2.26 U	2.34 U	2.52 U
Perfluorooctanesulfonic Acid (PFOS)	130	2.19 U	2.38 U	2.3 U	**355**	**847**	**250**	109 U
Perfluoroundecanoic Acid (PFUnA)	--	1.09 U	1.19 U	1.15 U	1.08 U	1.13 U	1.17 U	1.26 U
Perfluorohexanoic Acid (PFHxA)	--	2.19 U	2.38 U	2.3 U	2.16 U	2.26 U	2.34 U	2.52 U
Perfluorododecanoic Acid (PFDoA)	--	2.19 U	2.38 U	2.3 U	2.16 U	2.26 U	2.34 U	2.52 U
Perfluorooctanoic Acid (PFOA)	130	2.19 U	2.38 U	2.3 U	**0.73 J**	2.26 U	2.34 U	2.52 U
Perfluorodecanoic Acid (PFDA)	--	1.09 U	1.19 U	1.15 U	1.08 U	1.13 U	1.17 U	1.26 U
Perfluorohexanesulfonic Acid (PFHxS)	--	2.19 U	2.38 U	2.3 U	19.6 U	18.0 U	17.5 U	9.55 U
Perfluorobutanesulfonic Acid (PFBS)	1,900	1.09 U	1.19 U	1.15 U	1.08 U	1.13 U	1.17 U	1.26 U
Perfluoroheptanoic Acid (PFHpA)	--	1.64 U	1.79 U	1.72 U	1.62 U	1.69 U	1.75 U	1.89 U
Perfluorononanoic Acid (PFNA)	--	1.09 U	1.19 U	1.15 U	1.08 U	1.13 U	1.17 U	1.26 U
Perfluorotetradecanoic Acid (PFTeDA)	--	2.73 U	2.98 U	2.87 U	2.7 U	2.82 U	2.92 U	3.14 U
Perfluorotridecanoic Acid (PFTrDA)	--	1.09 U	1.19 U	1.15 U	1.08 U	1.13 U	1.17 U	1.26 U

Notes:
Exceeds one or more criteria
Bold indicates detections
NA - Not analyzed
J - Analyte present, value may or may not be accurate or precise
U - The material was analyzed for, but not detected
ng/g - nanograms per gram
µg/kg - micrograms per kilogram
ng/g = µg/kg

Table D-1. Soil PFAS Analytical Data
Building 2385, Building 102, and Building 1669
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	**PAX PFAS SO Values**	PX-S09-SO22		PX-S09-SO23			PX-S09-SO24	
Sample ID		PX-S09-SS22-000H	PX-S09-SB22-0304	PX-S09-SS23-000H	PX-S09-SS23P-000H	PX-S09-SB23-0304	PX-S09-SS24-000H	PX-S09-SB24-0304
Sample Date		07/07/20	07/07/20	07/07/20	07/07/20	07/07/20	07/07/20	07/07/20
Chemical Name								
Per- and Polyfluoroalkyl Substances (ng/g)								
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	2.31 U	2.08 U	2.19 U	2.23 U	2.33 U	2.41 U	2.15 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	1.16 U	1.04 U	1.09 U	1.12 U	1.16 U	1.2 U	1.08 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	1.73 U	1.56 U	1.64 U	1.68 U	1.74 U	1.81 U	1.61 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	2.31 U	2.08 U	2.19 U	2.23 U	2.33 U	2.41 U	2.15 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	2.89 U	2.6 U	2.73 U	2.79 U	2.91 U	3.01 U	2.69 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	2.31 U	2.08 U	2.19 U	2.23 U	2.33 U	2.41 U	2.15 U
Perfluorooctanesulfonic Acid (PFOS)	130	2.31 U	2.08 U	3.34 U	2.23 U	2.33 U	4.49 U	2.15 U
Perfluoroundecanoic Acid (PFUnA)	--	1.16 U	1.04 U	1.09 U	1.12 U	1.16 U	1.2 U	1.08 U
Perfluorohexanoic Acid (PFHxA)	--	2.31 U	2.08 U	2.19 U	2.23 U	2.33 U	2.41 U	2.15 U
Perfluorododecanoic Acid (PFDoA)	--	2.31 U	2.08 U	2.19 U	2.23 U	2.33 U	2.41 U	2.15 U
Perfluorooctanoic Acid (PFOA)	130	2.31 U	2.08 U	2.19 U	2.23 U	2.33 U	2.41 U	2.15 U
Perfluorodecanoic Acid (PFDA)	--	1.16 U	1.04 U	1.09 U	1.12 U	1.16 U	1.2 U	1.08 U
Perfluorohexanesulfonic Acid (PFHxS)	--	2.31 U	2.08 U	2.19 U	2.23 U	2.33 U	2.41 U	2.15 U
Perfluorobutanesulfonic Acid (PFBS)	1,900	1.16 U	1.04 U	1.09 U	1.12 U	1.16 U	1.2 U	1.08 U
Perfluoroheptanoic Acid (PFHpA)	--	1.73 U	1.56 U	1.64 U	1.68 U	1.74 U	1.81 U	1.61 U
Perfluorononanoic Acid (PFNA)	--	1.16 U	1.04 U	1.09 U	1.12 U	1.16 U	1.2 U	1.08 U
Perfluorotetradecanoic Acid (PFTeDA)	--	2.89 U	2.6 U	2.73 U	2.79 U	2.91 U	3.01 U	2.69 U
Perfluorotridecanoic Acid (PFTrDA)	--	1.16 U	1.04 U	1.09 U	1.12 U	1.16 U	1.2 U	1.08 U

Notes:
Exceeds one or more criteria
Bold indicates detections
NA - Not analyzed
J - Analyte present, value may or may not be accurate or precise
U - The material was analyzed for, but not detected
ng/g - nanograms per gram
µg/kg - micrograms per kilogram
ng/g = µg/kg

Table D-2. Groundwater PFAS Analytical Data
Building 2385, Bulding 102, and Building 1669
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	**PAX PFAS GW Values**	PX-B102-WT01	PX-B102-WT02		PX-B102-WT03	PX-B102-WT04	PX-B102-WT05	PX-B102-WT06	PX-B1669-WT01
Sample ID		PX-B102-WT01-0720	PX-B102-WT02-0720	PX-B102-WT02P-0720	PX-B102-WT03-0720	PX-B102-WT04-0720	PX-B102-WT05-0720	PX-B102-WT06-0720	PX-B1669-WT01-0720
Sample Date		07/29/20	07/29/20	07/29/20	07/28/20	07/29/20	07/29/20	07/29/20	07/28/20
Chemical Name									
Per- and Polyfluoroalkyl Substances (ng/L)									
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	0.94 U	0.98 U	0.98 U	0.93 U	0.98 U	1 U	0.94 U	1 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	0.94 U	0.98 U	0.98 U	0.93 U	0.98 U	1 U	0.94 U	1 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	0.47 U	0.49 U	0.49 U	0.46 U	0.49 U	0.5 U	0.47 U	0.5 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	**0.68 J**	0.98 U	0.98 U	0.93 U	**1.95 J**	1 U	0.94 U	1 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	**5.27**	0.98 U	0.98 U	0.93 U	**4.32 J**	1 U	0.94 U	1 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	0.47 U	0.49 U	0.49 U	0.46 U	0.49 U	0.5 U	0.47 U	0.5 U
Perfluorooctanesulfonic Acid (PFOS)	40	**150**	**145**	**186**	**448**	**228**	**12.5**	**159**	**5 J**
Perfluoroundecanoic Acid (PFUnA)	--	0.47 U	0.49 UJ	0.49 U	**0.28 J**	**1.72 J**	0.5 U	0.47 U	0.5 U
Perfluorohexanoic Acid (PFHxA)	--	**51.6**	**10.4**	**12.5**	**62.5**	**165**	**4.26 J**	**17.5**	**19.5**
Perfluorododecanoic Acid (PFDoA)	--	0.47 U	0.49 UJ	0.49 U	0.46 U	0.49 U	0.5 UJ	0.47 U	0.5 U
Perfluorooctanoic Acid (PFOA)	40	**119**	**22.3**	**24.2**	**50.7**	**45.2**	**2.54 J**	**35.6**	**9.73**
Perfluorodecanoic Acid (PFDA)	--	**1.63 J**	**0.52 J**	**0.47 J**	**2.21 J**	**2.25 J**	0.5 U	**0.47 J**	**0.17 J**
Perfluorohexanesulfonic Acid (PFHxS)	--	**271**	**40.3**	**40.5**	**130**	**807**	**24.1**	**68.7**	**5.07**
Perfluorobutanesulfonic Acid (PFBS)	600	**16.9**	**3.22 J**	**3.47 J**	**14.8**	**63.5 J**	**1.95 J**	**4.4 J**	**1.91 J**
Perfluoroheptanoic Acid (PFHpA)	--	**7.98**	**4.52 J**	**4.83 J**	**7.71**	**19.9**	**0.54 J**	**4.99**	**8.88**
Perfluorononanoic Acid (PFNA)	--	**1.81 J**	**2.73 J**	**2.8 J**	**4.98**	**1.89 J**	1 U	**3.56 J**	**2.13 J**
Perfluorotetradecanoic Acid (PFTeDA)	--	1.89 U	1.96 UJ	1.96 U	1.85 UJ	1.96 UJ	2 UJ	1.89 U	2 UJ
Perfluorotridecanoic Acid (PFTrDA)	--	0.47 U	0.49 U	0.49 U	0.46 U	0.49 U	0.5 U	0.47 U	0.5 U

Notes:
Exceeds one or more criteria
Bold indicates detections
NA - Not analyzed
J - Analyte present, value may or may not be accurate or precise
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
NG/L - nanograms per liter

Table D-2. Groundwater PFAS Analytical Data
Building 2385, Bulding 102, and Building 1669
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	PAX PFAS GW Values	PX-B1669-WT02		PX-B1669-WT03	PX-B1669-WT04	PX-B1669-WT05	PX-B1669-WT06	PX-B1669-WT07	PX-S09-MW-05
Sample ID		PX-B1669-WT02-0720	PX-B1669-WT02P-0720	PX-B1669-WT03-0720	PX-B1669-WT04-0720	PX-B1669-WT05-0720	PX-B1669-WT06-0720	PX-B1669-WT07-0720	PX-S09-MW05-0720
Sample Date		07/28/20	07/28/20	07/28/20	07/28/20	07/28/20	07/28/20	07/28/20	07/08/20
Chemical Name									
Per- and Polyfluoroalkyl Substances (ng/L)									
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	0.98 U	0.96 U	0.94 U	0.94 U	1 U	0.94 U	0.94 U	0.98 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	0.98 U	0.96 U	0.94 U	0.94 U	1 U	0.94 U	0.94 U	0.98 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	0.49 U	0.48 U	0.47 U	0.47 U	0.5 U	0.47 U	0.47 U	0.49 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	0.98 U	0.96 U	0.94 U	0.94 U	1 U	0.94 U	0.94 U	0.98 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	0.98 U	0.96 UJ	0.94 U	0.94 U	1 U	0.94 UJ	0.94 U	0.98 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	0.49 U	0.48 U	0.47 U	**0.32 J**	0.5 U	0.47 U	0.47 U	0.49 U
Perfluorooctanesulfonic Acid (PFOS)	40	**24.3 J**	**15.1 J**	**53.2**	**7.26**	**7.32**	**38.5**	**18.7**	**589**
Perfluoroundecanoic Acid (PFUnA)	--	0.49 U	0.48 U	**0.91 J**	**0.74 J**	0.5 U	0.47 U	0.47 U	**1.49 J**
Perfluorohexanoic Acid (PFHxA)	--	**58.3 J**	**86.2 J**	**42.0**	**7.46**	**6.02**	**16.0**	**3.79 J**	**178**
Perfluorododecanoic Acid (PFDoA)	--	0.49 U	0.48 U	0.47 U	0.47 U	0.5 U	0.47 U	0.47 U	**0.61 J**
Perfluorooctanoic Acid (PFOA)	40	**70.6**	**87.7**	**29.7**	**14.4**	**12.6**	**22.0**	**5.56**	**28.6**
Perfluorodecanoic Acid (PFDA)	--	**2.39 J**	**4.31 J**	**2.2 J**	**4.98**	0.5 U	**0.68 J**	**0.4 J**	**1.76 J**
Perfluorohexanesulfonic Acid (PFHxS)	--	**11.2 J**	**6.92 J**	**29.2**	**0.68 J**	**3.61 J**	**19.1**	**7.79**	**515**
Perfluorobutanesulfonic Acid (PFBS)	600	**1.38 J**	**1.17 J**	**3.88 J**	**0.25 J**	**0.71 J**	**1.46 J**	**1.22 J**	**84.2**
Perfluoroheptanoic Acid (PFHpA)	--	**94.5 J**	**125 J**	**23.3**	**13.4**	**6.78**	**16.4**	**2.11 J**	**57.5**
Perfluorononanoic Acid (PFNA)	--	**36.1 J**	**57.5 J**	**9.71**	**15.2**	**1.68 J**	**7.46**	**1.43 J**	**2.22 J**
Perfluorotetradecanoic Acid (PFTeDA)	--	1.96 U	1.92 UJ	1.89 U	1.89 U	2 U	1.89 UJ	1.89 UJ	1.96 U
Perfluorotridecanoic Acid (PFTrDA)	--	0.49 U	0.48 U	0.47 U	0.47 U	0.5 U	0.47 U	0.47 U	0.49 U

Notes:
Exceeds one or more criteria
Bold indicates detections
NA - Not analyzed
J - Analyte present, value may or may not be accurate or precise
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
NG/L - nanograms per liter

Table D-2. Groundwater PFAS Analytical Data
Building 2385, Bulding 102, and Building 1669
Basewide PFAS Site Inspection Report
NAS Patuxent River
St. Mary's County, Maryland

Station ID	**PAX PFAS GW Values**	PX-S09-MW-07		PX-S09-MW-36	PX-S09-MW-37	PX-S09-MW-39	PX-S09-MW-40	PX-S09-MW-42
Sample ID		PX-S09-MW07-0720	PX-S09-MW07P-0720	PX-S09-MW36-0720	PX-S09-MW37-0720	PX-S09-MW39-0720	PX-S09-MW40-0720	PX-S09-MW42-0720
Sample Date		07/08/20	07/08/20	07/07/20	07/08/20	07/08/20	07/08/20	07/08/20
Chemical Name								
Per- and Polyfluoroalkyl Substances (ng/L)								
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	--	0.91 U	0.89 U	0.93 U	0.89 U	0.89 U	0.89 U	0.86 U
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)	--	0.91 U	0.89 U	0.93 U	0.89 U	0.89 U	0.89 U	0.86 U
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	--	0.45 U	0.45 U	0.46 U	0.45 U	0.45 U	0.45 U	0.43 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	--	0.91 U	0.89 U	0.93 U	0.89 U	0.89 U	0.89 U	0.86 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	--	0.91 U	0.89 U	0.93 U	0.89 U	0.89 U	0.89 U	0.86 U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	--	0.45 U	0.45 U	0.46 U	0.45 U	0.45 U	0.45 U	0.43 U
Perfluorooctanesulfonic Acid (PFOS)	40	**11.3**	**11.3**	**1,954**	**347**	**122**	**230**	**10.6**
Perfluoroundecanoic Acid (PFUnA)	--	0.45 U	**0.38 J**	0.46 U	**0.41 J**	0.45 U	0.45 U	0.43 U
Perfluorohexanoic Acid (PFHxA)	--	**1.86 J**	**1.8 J**	**677**	**142**	**119**	**158**	**3.31 J**
Perfluorododecanoic Acid (PFDoA)	--	0.45 U	0.45 U	0.46 U	**0.28 J**	0.45 U	0.45 U	0.43 U
Perfluorooctanoic Acid (PFOA)	40	**2.99 J**	**2.76 J**	**156**	**19.0**	**16.4**	**17.6**	**3.16 J**
Perfluorodecanoic Acid (PFDA)	--	0.45 U	0.45 U	0.46 U	**1.93 J**	0.45 U	0.45 U	0.43 U
Perfluorohexanesulfonic Acid (PFHxS)	--	**4.28 J**	**3.68 J**	**2,966**	**244**	**226**	**324**	**12.6**
Perfluorobutanesulfonic Acid (PFBS)	600	**1.36 J**	**1.46 J**	**536**	**23.9**	**105**	**144**	**2.78 J**
Perfluoroheptanoic Acid (PFHpA)	--	1.26 U	1.43 U	**96.7**	**45.0**	**12.5**	**14.0**	1.87 U
Perfluorononanoic Acid (PFNA)	--	**0.87 J**	**0.88 J**	**1.35 J**	**3.06 J**	**4.34 J**	**3.79 J**	0.86 U
Perfluorotetradecanoic Acid (PFTeDA)	--	1.82 U	1.79 U	1.85 U	1.79 U	1.79 U	1.79 U	1.72 U
Perfluorotridecanoic Acid (PFTrDA)	--	0.45 U	0.45 U	0.46 U	0.45 U	0.45 U	0.45 U	0.43 U

Notes:

Exceeds one or more criteria

Bold indicates detections

NA - Not analyzed

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

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

NG/L - nanograms per liter