IMMEDIATE RESPONSE ACTION PLAN Status Report 13

Cape Cod Gateway Airport
Hyannis, Massachusetts

RTN 4-26347

April 2023

Prepared for:
Cape Cod Gateway Airport
480 Barnstable Road Hyannis,
MA 02840

Prepared by:
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90 Route 6A
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IMMEDIATE RESPONSE ACTION PLAN STATUS REPORT 13
CAPE COD GATEWAY AIRPORT
HYANNIS, MASSACHUSETTS
RTN 4-26347

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APPENDICES

1.0 INTRODUCTION

The Horsley Witten Group, Inc. (HW) has been retained by the Cape Cod Gateway Airport (the "Airport"), formerly known as the Barnstable Municipal Airport, to develop this 13th Immediate Response Action (IRA) Status Report for its property at 480 Barnstable Road, Hyannis, Massachusetts (Figure 1). HW has prepared this report in accordance with the Massachusetts Contingency Plan 310 CMR 40.0000 (MCP) on behalf of:

Ms. Katie Servis, Airport Manager
Cape Cod Gateway Airport
Hyannis, Massachusetts 02601
(508) 775-2020

This report describes IRA related activities conducted at the Airport between October 2022 and April 2023.

2.0 SUMMARY OF IRA PLAN AND IRA MODIFICATION

An IRA was initiated in response to a Notice of Responsibility (NOR) for Release Tracking Number (RTN) 4-26347 dated November 10, 2016, issued to the Airport by the Massachusetts Department of Environmental Protection (MassDEP). The NOR requested that the Airport conduct investigations to evaluate:

- The source(s) of Per- and Poly-Fluoroalkyl Substances (PFAS) including perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) previously detected in groundwater at the Airport and several adjacent properties;
- The source(s) of 1,4-dioxane, previously detected in a monitoring well downgradient of the Airport on the Maher wellfield property; and
- Potential impacts to public water supply wells operated by the Hyannis Water District at the Mary Dunn and Maher wellfields.

A proposed IRA plan was submitted for approval in response to the NOR. Subsequently, a meeting was held by MassDEP at the Airport that included other stakeholders including the Barnstable Department of Public Works, the Hyannis Water District, and Barnstable County representatives (representing the Fire Training Academy). At the meeting, IRA plans were coordinated between the Airport and Fire Training Academy including sampling locations, type of analysis, groundwater modeling, goals, and next steps. The IRA plan served as the guide for the soil and groundwater testing conducted since November 2016 to follow up on the results of the previous analyses.

In June 2019, the MassDEP issued a Request for Modified Immediate Response Action Plan/Interim Deadline dated June 18, 2019 (the "Modified IRA Request") to the Airport. The Modified IRA Request asked that the Airport propose response actions to *"reduce infiltration of precipitation through PFAS-impacted soil, such as temporarily capping the source areas;*

excavating and properly disposing of the PFAS-impacted soil; or some equivalent approach". The Airports response is documented in the report titled *Final Immediate Response Action Plan Modification,* prepared by HW and dated December 2019 (the "IRA Modification"). The IRA Modification included details for the installation of caps in two select areas to reduce precipitation infiltration. The two areas are identified as the Deployment Area and the Airport Rescue and Fire Fighting/Snow Removal Equipment (ARFF/SRE) Building Area (Figure 2). The two capped areas total approximately 94,100-square feet and represent a majority of the known PFAS in soil source areas relating to the historic application of aqueous film forming foam (AFFF) by the Airport. Areas of PFAS in soil remaining above the applicable Method 1 soil standard located outside of the caped area are indicated on Figure 2. Evaluation of these areas will be included in future response actions and/or included as part of a future risk assessment.

2.1 Background

Prior to issuance of the NOR, the Airport had conducted investigations on both 1,4-dioxane and PFAS and provided the results to MassDEP. In July 2015, HW sampled groundwater from seven groundwater monitoring wells for 1,4-dioxane. This contaminant was detected in groundwater monitoring well OW-9DD located in the Maher wellfield at a concentration of 0.926 micrograms per liter (ug/L). This concentration is above the applicable Method 1 standard of 0.30 ug/L. This groundwater monitoring well is screened from 77 to 87 feet below the ground surface.

At that time, it was thought that potential sources of 1,4-dioxane at the Airport could be related to a historic release of 1,1,1-trichloroethane (1,1,1-TCA) from an oil/water separator associated with a floor drain in the former Provincetown Boston Airlines hangar (currently leased to Cape Air) and/or from the application of deicing fluid. Given the screen depth of monitoring well OW-9DD, the 1,4-dioxane may also be from an off-Airport source.

On August 4, 2016, MassDEP issued a Request for Information (RFI) to the Airport requiring investigation of PFAS. On July 1 and 5, 2016, HW collected samples from six groundwater monitoring wells and submitted the samples for laboratory analysis of PFOS and PFOA. These compounds were detected in each of the wells tested. At monitoring wells HW-3 and HW-5, the sum of PFOS and PFOA were 0.0931 and 0.151 ug/L respectively, above the EPA health advisory limit and applicable MassDEP standard. PFOS and PFOA were also detected above the EPA health advisory limit and applicable MassDEP standard in monitoring well HW-1, located at the upgradient, western boundary of the Airport. Additional details about 1,4-dioxane and PFAS are included in the Revised Phase II Comprehensive Site Assessment Report submitted to the MassDEP in January 2022 (the "Revised Phase II Report").

2.2 Actions Under the IRA Plan

A summary of the IRA activities conducted between October 2022 and April 2023 include:

- Groundwater Sampling for PFAS.

- Forensic analysis of groundwater by Battelle Memorial Institute from samples collected from HW-I(s), HW-I(m), HW-(d), ME-1, ME-2, and ME-3.

- Replacement of damaged monitoring wells HW-H and HW-R.

As indicated in the Revised Phase II, the Airport is not the source of 1,4-dioxane and as such, additional delineation of the non-airport related source(s) of 1,4-dioxane will not be completed. Refer to Figure 3 for historic 1,4-dioxane testing locations and results.

3.0 APPLICABLE MCP STANDARDS

Pursuant to 310 CMR 40.0900, the characterization of risk of harm to health, safety, public welfare, and the environment must be evaluated at each disposal site. This characterization includes the determination of site-specific soil and groundwater categories based on site location and use, and the comparison of laboratory results to these standards (310 CMR 40.0930).

In accordance with 310 CMR 40.0933, the applicable soil category is selected based upon the frequency, intensity of use, and accessibility of the Airport by adults and children. Based on these criteria, soil at the Airport is category S-1/GW-1 and S-1/GW-3.

Groundwater located within a Current Drinking Water Source Area is considered category GW-1. The Airport is located within several zones of contribution (Zone II) for Barnstable Village, the Hyannis Water District, and the Town of Yarmouth. Zone Iis are considered current drinking water sources as defined in 310 CMR 40.0006; thus, category GW-1 is applicable.

Groundwater located within 30 feet of an occupied building that has an average annual depth of less than 15 feet is categorized as GW-2. This is primarily a concern because of the possibility of vapor impacts to indoor air. The average annual depth to groundwater at the Airport is greater than 15 feet; therefore GW-2 Standards do not apply. Also, all disposal sites shall be considered a potential source of discharge to surface water, and therefore categorized as GW-3. Based on these criteria, categories GW-1 and GW-3 are applicable to the Airport.

The soil and groundwater standards applicable to the Airport for PFAS as described in the document titled Final PFAS – Related Changes to the MCP – 2019-12-13 prepared by the MassDEP and promulgated December 27, 2019 are as follows:

PFAS Standards				
Analyte	Soil Standard (ug/kg)		Groundwater Standard (ug/l)	
	S-1/GW-1	SW-1/GW-3	GW-1	GW-3
Pefluorodecanoic Acid (PFDA)	0.3	300	N/A	40,000
Perfluoroheptanoic Acid (PFHpA)	0.5	300	N/A	40,000
Perfluorohexanesulfonic Acid (PFHxS)	0.3	300	N/A	500
Perfluorononanoic Acid (PFNA)	0.32	300	N/A	40,000

PFAS Standards				
Analyte	Soil Standard (ug/kg)		Groundwater Standard (ug/l)	
	S-1/GW-1	SW-1/GW-3	GW-1	GW-3
Perfluorooctanesulfonic Acid (PFOS)	2	300	N/A	500
Perfluorooctanoic Acid (PFOA)	0.72	300	N/A	40,000
PFAS Sum of Six*	N/A	N/A	0.02	N/A

* PFAS Sum of Six is the sum of PFDA, PFHpA, PFHxS, PFNA, PFOS, and PFOA

4.0 HISTORIC FIELD INVESTIGATIONS

A general description of historic field investigations conducted at the Airport since the November 2016 NOR and documented in prior IRA status reports are summarized below:

- Three soil samples were collected on December 9, 2016. One sample was taken from each location where it was determined that AFFF had been used at the Airport. The areas included the MCI Drill Area, the Deployment Area, and the 1991 Drill Location.

- One sample of AFFF concentrate was collected on December 9, 2016 and analyzed for PFAS compounds. The analysis was inconclusive (only 225.5 ug/l of total PFAS was detected) and it is assumed that the sample was not homogeneous (i.e., had separated in the foam bucket) and that the addition of water to the concentrate may affect how precursor PFAS analytes transform into various other detectable PFAS compounds.
- The installation of groundwater monitoring wells at six locations in April 2017: in the vicinity of potential sources of PFAS at the ARFF/SRE Area, at the Deployment Area and at upgradient locations outside of the Airport to evaluate potential off-site sources of PFAS and 1,4-dioxane.
- Groundwater from the new wells was initially sampled for PFAS and 1,4-dioxane in April 2017. Additional groundwater samples and one surface water sample were collected for analysis of PFAS on June 20, 2017.

- A second round of soil samples were collected on June 20, 2017 adjacent to the ARFF/SRE Building and within the Deployment Area to begin to determine the extent of PFAS within the surface soils. Based on the results of these analyses, a third round of samples from these two locations were collected on September 26, 2017. The third round of sampling was designed to further delineate the extent of PFAS in soils both horizontally and vertically, with samples taken at the ground surface and at two and four feet below ground surface (BGS).

- Six soil samples were analyzed for PFAS leaching potential using a synthetic precipitation leaching procedure (SPLP) test between September and October 2017. The chosen samples included four samples from the Deployment Area and two samples from runway reconstruction soils stockpiled at the Airport.

- In October 2017, 20 surface samples were collected both on and off Airport property to determine the concentration of PFAS in the area.

- In October 2017, three composite soil samples were taken from piles of soil associated with the redevelopment of Runway 15/33. These piles were located on Airport property at the site of the former Mildred's Restaurant and were analyzed for PFAS compounds to evaluate if soil removed from the Airport as part of this redevelopment contained PFAS.

- On August 14, 2018, 24 PFAS surface soil samples were collected in proximity to the ARFF/SRE Building Area and the Deployment Area. PFAS compounds were previously detected in these areas and additional samples were collected to determine the vertical extent of PFAS impacts in soil and to refine the soil disposal site boundary at the Airport.

- In October 2018, three soil borings (DL11, DL14 and HW-F) were advanced in the Deployment Area. One soil boring (ARFF3) was advanced, and one surface soil sample (HW-3) was collected near the ARFF/SRE Building in order to further delineate the extent of PFAS in soils both horizontally and vertically.

- In October 2018, six monitoring wells were installed at the Airport. A cluster of three wells (HW-G(s), HW-G(m), and HW-G(d)) was installed at an upgradient location to evaluate potential off-site sources of PFAS. Three additional wells (HW-H, HW-I, and HW-J) were installed southeast of the Deployment Area adjacent to the East Ramp.

- In November 2018, six groundwater samples were collected to evaluate PFAS concentrations in the Deployment Area. Four groundwater samples and one surface water sample from Mary Dunn Pond were also collected for analysis of oxygen and hydrogen isotopes to determine the contribution of pond water from Mary Dunn Pond to the four downgradient monitoring wells. The analysis was inconclusive in tracing the contribution of pond water in the downgradient monitoring wells.

- In December 2018, two soil samples were collected from the 1991 Drill Location to determine if PFAS detected in the area are related to background conditions.

- In December 2018, 12 groundwater samples were collected for analysis of PFAS, and 13 groundwater samples were collected for analysis of oxygen and hydrogen isotopes to determine the contribution of pond water from Mary Dunn Pond to the 13 downgradient wells. Groundwater samples were also collected from four monitoring wells in the Maher Wellfield for analysis of 1,4-dioxane.

- In February 2019, three additional surface soil samples were collected to further delineate the soil Disposal Site boundary around the ARFF/SRE building.

- In May and June 2019, HW installed nine groundwater monitoring wells to delineate the vertical and horizontal extent of PFAS and 1,4-dioxane at the Airport and on adjacent hydraulically upgradient properties.

- In June 2019, eight groundwater samples were collected from newly installed groundwater monitoring wells HW-L, HW-K, HW-I (m), HW-I (d), HW-M, HW-D(d), HW-D (dd), and HW-N for PFAS.

- In July 2019, one groundwater sample was collected from the newly installed groundwater monitoring wells HW-O for PFAS. One groundwater sample was collected from HW-L for 1,4-dioxane.

- In July 2019, two surface water samples were collected from Upper Gate and Lewis Ponds for PFAS analysis.

- In August 2019, four groundwater samples were collected from monitoring wells HW-N, HW-A(d), HW-O, and HW-1 to evaluate potential sources of 1,4-dioxane entering the Airport from unknown upgradient sources(s). One groundwater sample was also collected from groundwater monitoring well HW-E for PFAS.

- In August 2019, soil sample DL 11 (0-1) was collected from the Deployment Area.

- In August 2019, six spray water samples were collected from discharge locations on a fire truck at the Airport. The samples were collected to verify that the valve mechanism that controls the mixing of AFFF with water was working appropriately. PFAS should not be detected in the spray water. Although the spray water is not considered drinking water, PFAS was detected in each of the six samples collected above the GW-1 standard.

- On September 27, 2019, HW collected groundwater samples from six monitoring wells located on the Airport for 1,4-dioxane analysis.

- In November 2019, the Airport replaced the valve mechanism in the fire truck to ensure that AFFF was no longer mixing with the water despite the mechanism not being engaged. In December 2019, HW resampled the six discharge locations from the fire truck at the Airport. PFAS was detected at various concentrations at each location, but all were below the GW-1 standard.

- Between May 5th and May 21st, 2020, HW collected 16 groundwater samples PFAS analysis. Refer to Table 2 for groundwater results.

- Between May 5th and May 13th, 2020, HW collected groundwater samples from four monitoring wells for 1,4-dioxane analysis.

- Between September 14th and September 24th, 2020, HW and Desmond Well Drilling installed 13 monitoring wells.

- On September 17, 2020, HW collected groundwater samples from the three Maher Wells (ME-1 through ME-3) for PFAS analysis.
- Between September 14th and September 30th, 2020, HW collected 23 soil samples for PFAS analysis.
- Between October 1 and October 7, 2020, HW collected groundwater samples from 16 monitoring wells for PFAS.
- On October 2 and 7, 2020 HW collected groundwater samples from four monitoring wells for 1,4-dioxane analysis.
- Between November 5 and 6, 2020, HW collected five groundwater samples for PFAS analysis.
- On November 17, 2020, HW collected two roof samples (rubber membrane and asphalt shingle) from the ARFF/SRE building for SPLP PFAS. The testing was completed to determine if roofing materials were a potential source of PFAS in groundwater through stormwater infiltration. PFAS was detected in each of the samples collected. Although the leachate is not considered drinking water, the concentration of the MassDEP Sum of 6 were below the Method 1 GW-1 and GW-3 standards.
- On February 18 and 19th, 2021 HW conducted hydraulic conductivity testing at three monitoring well locations. Refer to the Revised Phase II Report for additional details.
- Between March 17th and March 19, 2021, HW collected 21 groundwater samples for PFAS analysis as part of the first round of post-cap semiannual monitoring.
- Between April 5th and April 7th, 2021, HW and Desmond Well Drilling installed monitoring wells HW-U(s), HW-U(m), HW-W(m), HW-W(d), and HW-W (dd).
- Between April 6th and 19th, 2021, HW collected 17 soil samples for total organic carbon (TOC) analysis. The TOC samples were collected from various depths between the ground surface and 65 feet below grade. The TOC data was used to determine plume migration.
- On April 19, 2021, HW sampled the recently installed monitoring wells HW-U(s), HW-U(m) HW-W(m), HW-W(d), and HW-W (dd) for further analysis of PFAS compounds in groundwater.
- On September 7, 2021, HW and New England Geotech installed monitoring wells HW-X(s) and HW-X(m). The monitoring wells were installed adjacent to the former ARFF/SRE Building.
- On September 7, 2021, HW collected a soil sample from HW-X (m) and submitted it for PFAS analysis. None of the MassDEP six regulated PFAS compounds were detected above the laboratory method detection limit.

- On September 10, 2021, HW collected groundwater samples from HW-X (s) and HW-X(m) and submitted them for PFAS and 1,4-dioxane analysis.

- Between September 1 and September 11, 2021, HW collected 26 groundwater samples as part of the second round of post cap semiannual monitoring.

- On September 10, 2021, HW collected two groundwater samples from monitoring wells HW-E and HW-J located in the Deployment Area for 1,4-dioxane. 1,4-dioxane was not detected above the laboratory reporting limit.

- On March 2nd and 4th, 2022, HW collected six surficial composite soil samples from Runway 6-24 and submitted them to Alpha Analytical for PFAS analysis. Runway 6-24 will be redeveloped in beginning April 2023 and is expected to be completed by October 2023. The soil testing was conducted to evaluate how soils removed from the areas around the runway would need to be managed if they were taken off site. None of the MassDEP six regulated PFAS compounds were detected above the applicable Method 1 Standard.
- Between March 15th and March 31st, 2022, HW collected 29 groundwater samples for PFAS analysis.
- On May 18th, 2022, HW collected three groundwater samples for PFAS analysis.

- Between July 29 and August 8th, 2022, HW collected eight groundwater samples for PFAS analysis.

Soil, surface water and groundwater sampling locations are indicated on Figures 2 through 7. Tabulated analytical data are included on Tables 1 through 11. Laboratory data packages and soil boring logs associated with the historic field investigations detailed above have previously been submitted to MassDEP and are available in other IRA Status Reports and phased reports (i.e., Phase II).

5.0 FIELD INVESTIGATIONS CONDUCTED DURING THE CURRENT REPORTING PERIOD

Details concerning field investigations conducted between October 2022 and April 2023 are summarized below.

- Between October 31 and November 2, 2022, HW collected groundwater samples from the three Maher Wells (ME-1, ME-2 and ME-3) and monitoring wells HW-W(m), HW-I(s), HM-I(m), HW-I(d), HW-3, HW-P(s), and HW-P(m) for PFAS analysis.

- On February 2, 2023, HW collected groundwater samples from the three Maher Wells (ME-1, ME-2 and ME-3) and monitoring wells HW-I(s) and HW-P(s) for PFAS analysis.

- On March 16 and 17, 2023 HW and Desmond Well Drilling reinstalled monitoring wells HW-H and HW-R (Figure 3) that were destroyed by the Lawrence Lynch Corporation

(road work construction company) during the Mary Dun Way road paving/sewer line installation project. It is estimated that the wells were destroyed during the week of July 12, 2022. It should be noted that these wells are used to track the groundwater plume from the Deployment Area and soil in the vicinity of the wells and Mary Dun Way have not been impacted by the Airports historic use of AFFF. Refer to Figure 2, soil samples A7, A8, A9, A11, A12, D10, D11, DL19, DL20, and DL21. Monitoring well construction logs will be included in the next MassDEP submittal.

- The Airport submitted groundwater samples from HW-I(s), HW-I(m), HW-I(d) and ME-1 through ME-3 for forensic PFAS analysis at Battelle (see attached report in Appendix B titled *PFAS Signature® Analysis Report,* dated December 8, 2022). As indicated in previous reports, HW-I(s) is representative of the Airports PFAS Plume, and HW-I(m) and HW-I(d) are representative of upgradient non-airport related sources (i.e., the Barnstable Fire Training Academy and others). The forensic report prepared by Battelle concluded that sample ***"HW-I(d) seems most like the ME samples"***.

Analytical results are included on Table 2, and laboratory reports are included in Appendix A. PFAS in groundwater trend graphs for select wells in the vicinity of the caps are included in Appendix C.

HW anticipates conducting the final quarterly sampling event of the Maher Wells in May 2023. HW will continue to sample select wells in the vicinity of the Deployment Area, ARFF/SRE Building and other select locations bi-annually as part of the on-going evaluation of the cap and PFAS plume monitoring.

6.0 BI-ANNUAL CAP INSPECTION AND CAP PERFORMANCE MONITORING

HW inspected the asphalt cap on March 31, 2023 in the vicinity of the ARFF/SRE Building. The asphalt cap was free of significant cracks or depressions as indicated in the photographs below.

HW inspected the geomembrane cap on March 31, 2023, in the vicinity of the Deployment Area. The sand and loam protective layer over the geomembrane cap were intact with no signs of significant erosion as indicated in the photos below.

HW will continue to inspect the two cap areas every six months and collect groundwater samples from select existing monitoring wells to document the effectiveness of the caps.

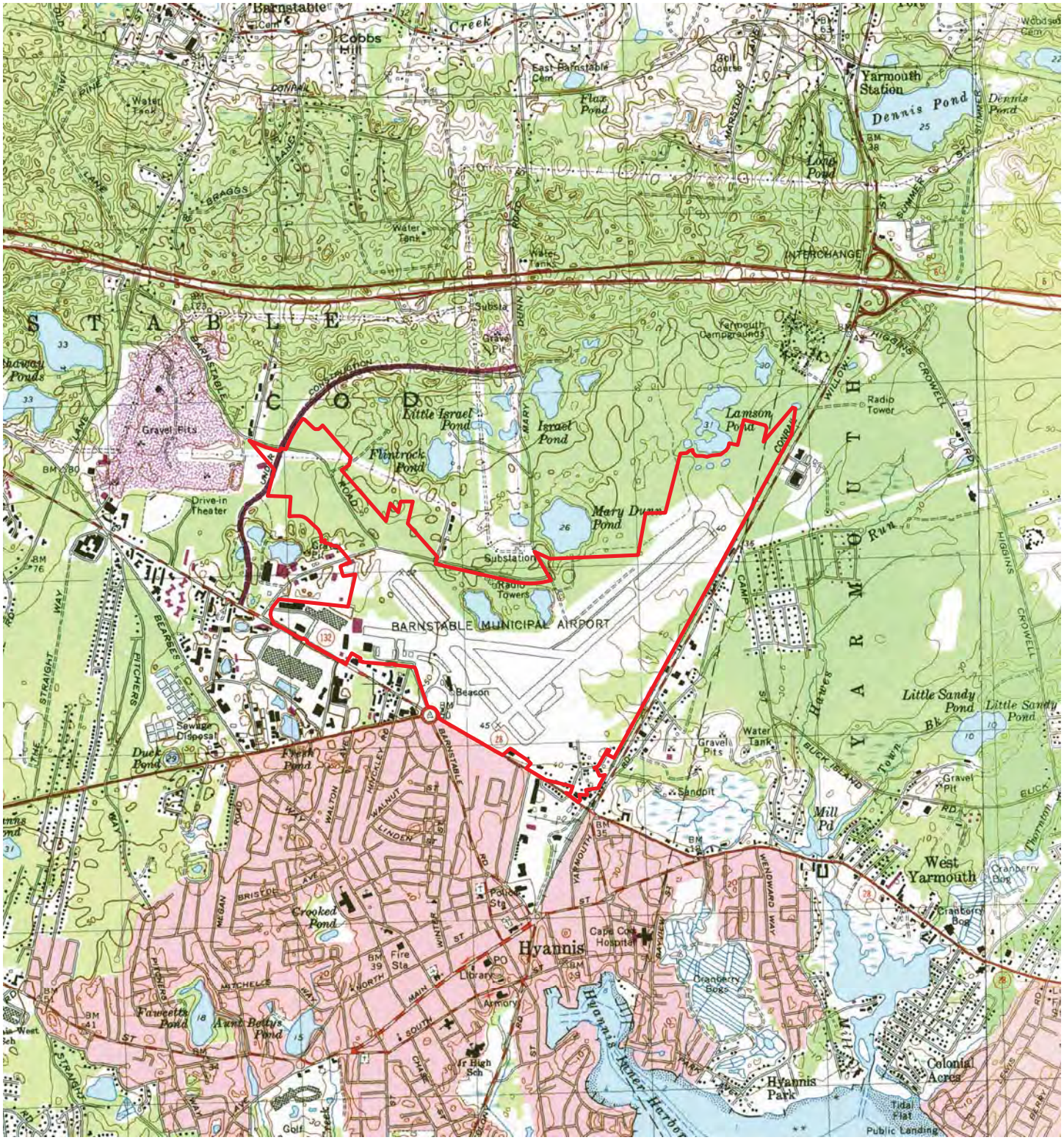
7.0 GROUNDWATER MODELING AND CONTAMINANT TRANSPORT ANALYSIS

A full evaluation of the groundwater plumes associated with the releases at the Deployment Area and the ARFF/SRE Building Area are included in the Revised Phase II Report submitted to MassDEP in January 2022. Additional groundwater testing and forensic techniques will be utilized to further refine the groundwater contaminant fate and transport characteristics.

8.0 PLANS FOR NEXT REPORTING PERIOD

HW will continue to conduct inspections of the two cap areas and monitor groundwater. Future analytical results and laboratory reports will be included in future status reports.

FIGURES



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Legend

Airport Property Line

*Hyannis Topographic Quadrangle

N

Miles

0.5

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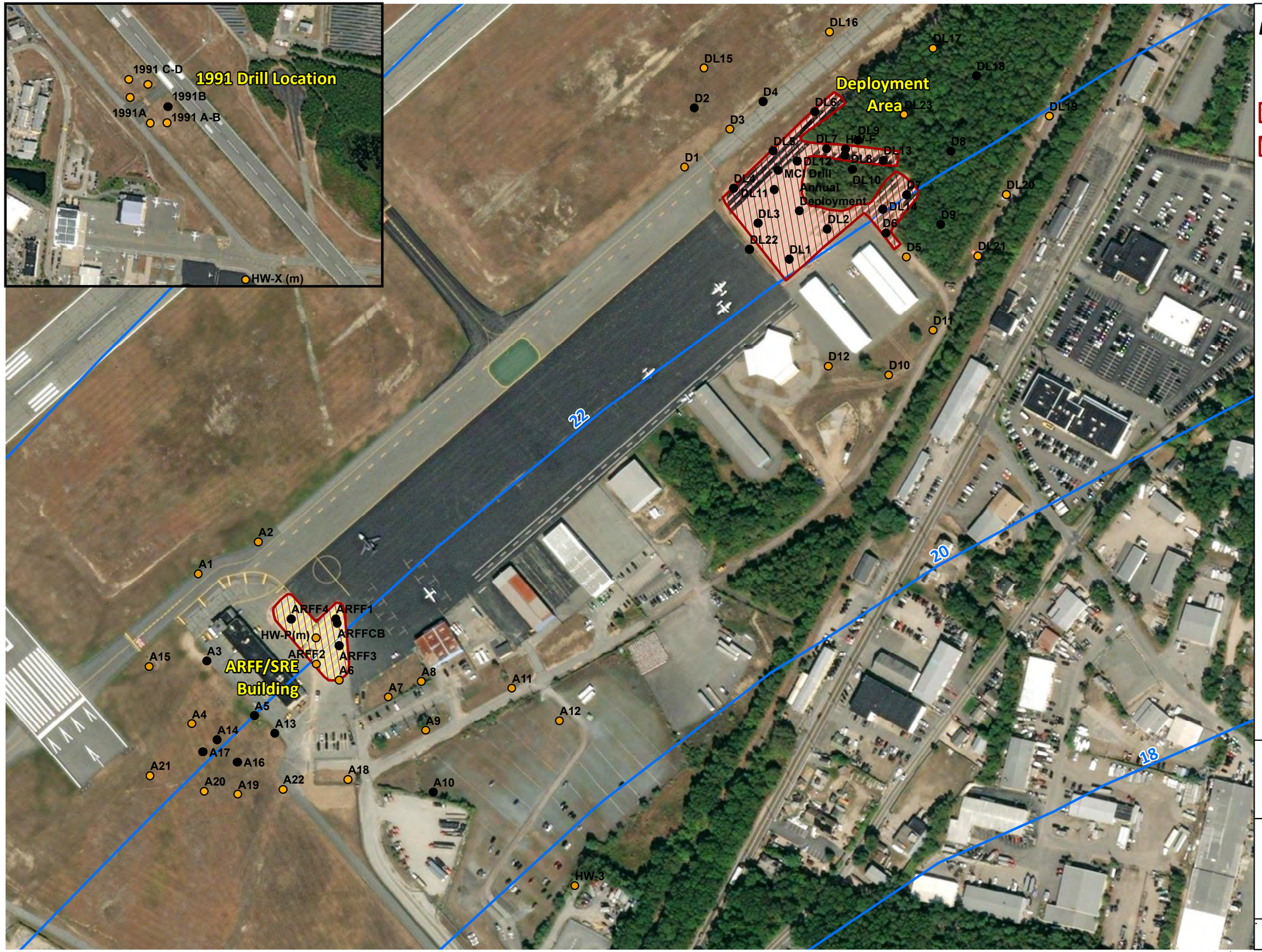
USGS Locus
Cape Cod Gateway Airport
Hyannis, MA

Date: 4/17/2018

Figure 1



Legend

- Groundwater Contours*
- Deployment Area Liner Cap
- ARFF Asphalt Cap
- Soil Sample Location below Method 1 S-1/GW-1 Standard for all Six PFAS Compounds
- Soil Sample Exceeding Method 1 S-1/GW-1 for at least one of the six regulated PFAS compounds

Method
PFHpA = 0.5 ug/kg
PFHxS = 0.3 ug/kg
PFOA = 0.72 ug/kg
PFNA = 0.32 ug/kg
PFOS = 2 ug/kg
PFDA = 0.3 ug/kg

Soil Sample Location for TOC

N

0 225

1 in = 225 feet

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Soil Sample Locations
Barnstable Municipal Airport
Hyannis, MA

Date: 10/4/2021 Figure 2

* Cape Cod Commission (CCC) Groundwater Contours

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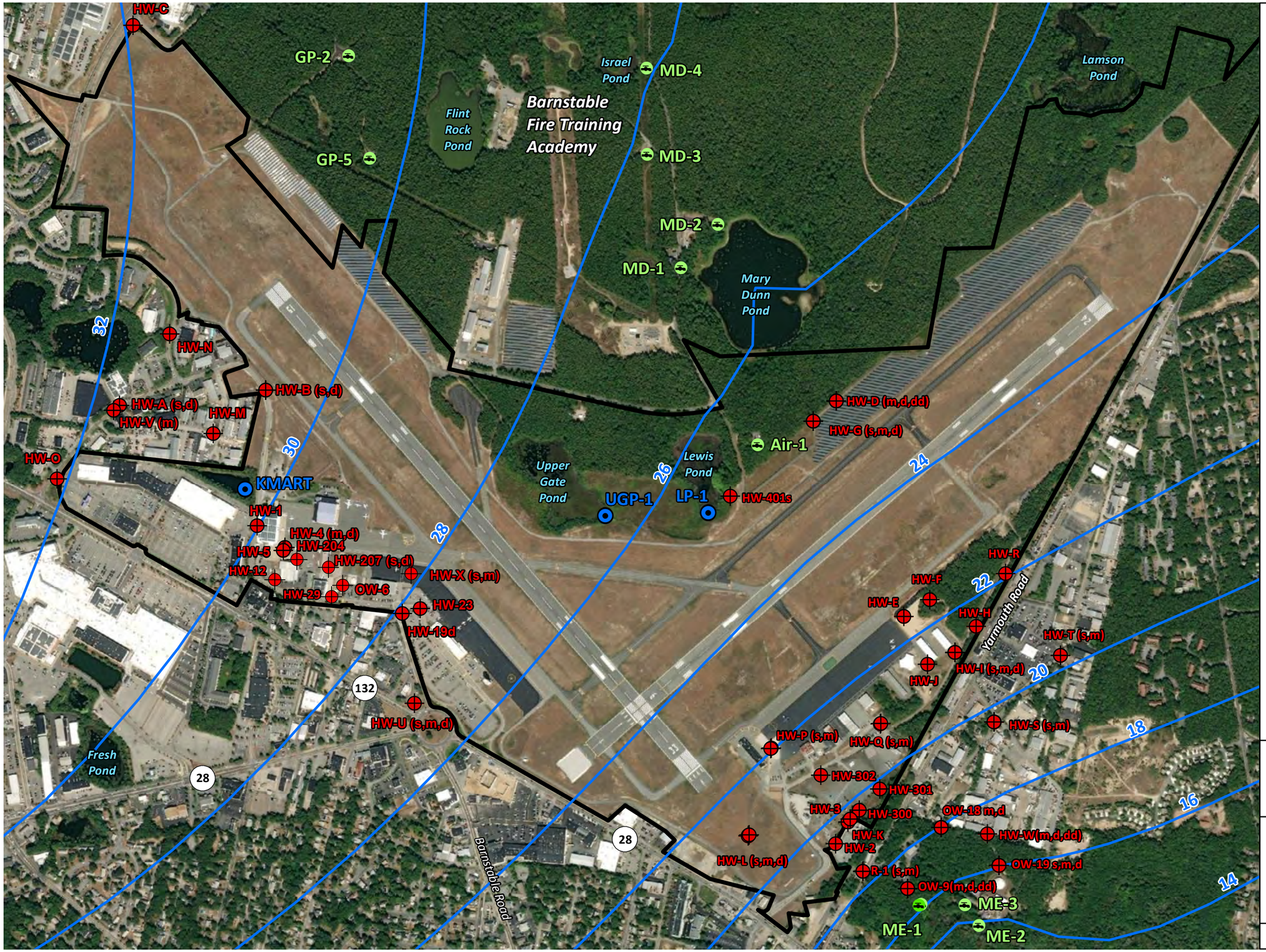

Legend

- PFAS Monitoring Wells
- Surface Water Samples Completed by Airport
- Drinking Water Wells
- Barnstable Municipal Airport Property Boundary
- Groundwater Contours*

N

0 750

1 inch = 750 feet

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Surface Water and Monitoring Well Locations
Barnstable Municipal Airport
Hyannis, MA

Date: 10/4/2021

Figure 3

* Cape Cod Commission (CCC) Groundwater Contours

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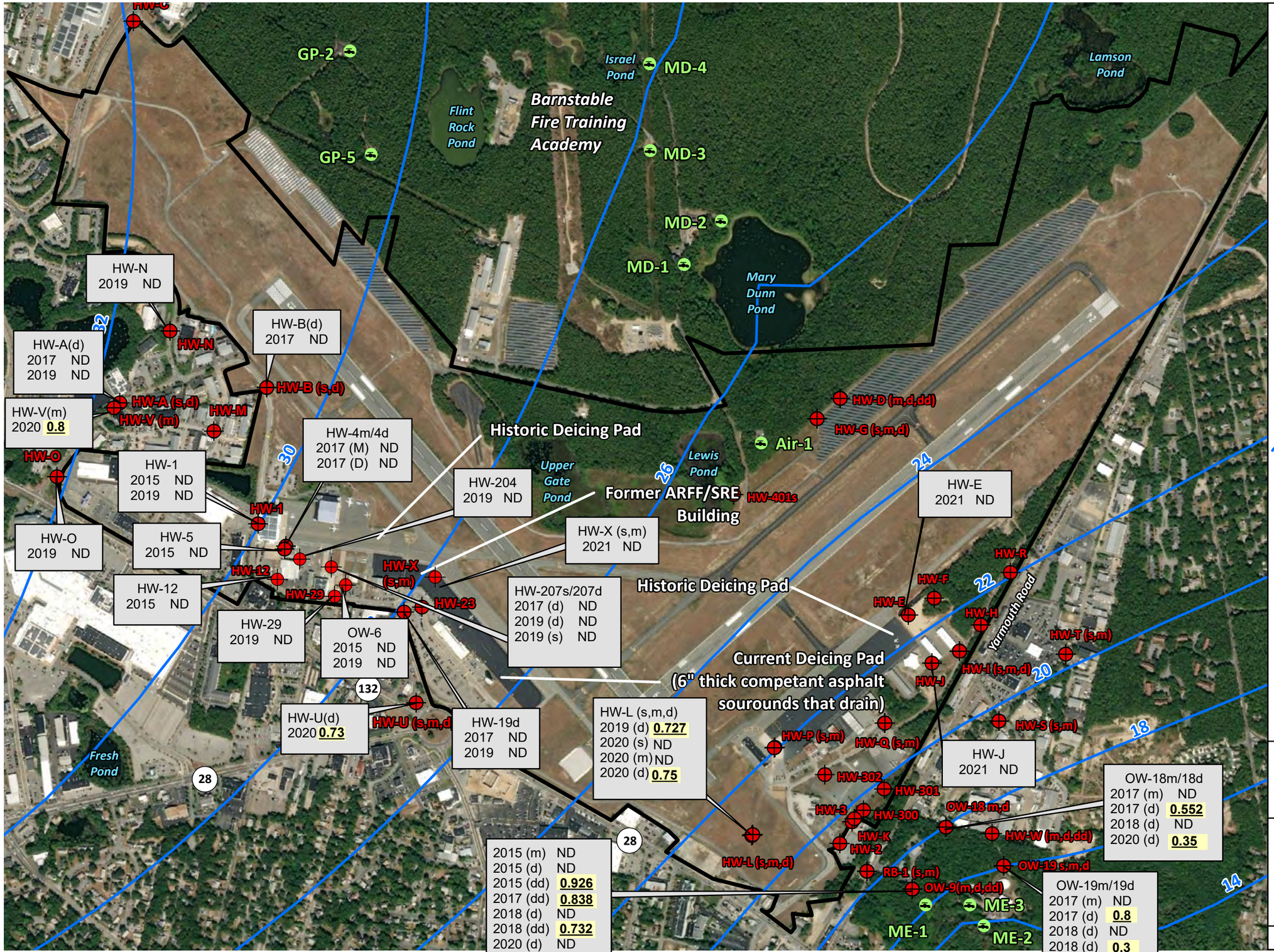

Legend

- Monitoring Wells
- ND — Not detected by the laboratory above the reporting limit
- 0.2 — 1,4 Dioxane Below MassDEP Limit (0.3 ug/L)
- **0.8** — 1,4 Dioxane Above Method 1 GW-1 Standard (0.3 ug/L)
- Drinking Water Wells
- Barnstable Municipal Airport Property Boundary
- Groundwater Contours

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1,4 Dioxane Results In Groundwater Cape Cod Gateway Airport Hyannis, MA

Date: 10/1/2021 Figure 4

Path: H:\Projects\HYA\17027 BMA PFOS 1-4 IRA\GIS\Maps\210409_DioxaneMap.mxd

Legend

- Background PFAS sample locations
- Barnstable Municipal Airport Property Boundary

N

0 1,750

Feet

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Background
PFAS Sample Locations
Cape Cod Gateway Airport
Hyannis, MA

Date: 11/25/2020 Figure 5

Path: H:\Projects\HYA\17027 BMA PFOS 1-4 IRA\GIS\Maps\180110_PFOS_BackgroundSampleLocations.mxd

Legend

- Groundwater Contours
- Approximate Location of TOC Sample
- Deployment Area Liner Cap
- ARFF Asphalt Cap

N

0 400

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TOC Sample Locations
Cape Cod Gateway Airport
Hyannis, MA

Date: 8/9/2021 Figure 6

** Cape Cod Commission (CCC) Groundwater Contours*

Path: K:\Projects\HYA\17027 BMA PFOS 1-4 IRA\GIS\Maps\TOC Sample Locations.mxd

Legend

- Soil Sample Location 6-24 A Composite (0-1')
- Soil Sample Location 6-24 A Composite (1-2')
- Soil Sample 6-24 B (0-1') Composite Locations
- Soil Sample 6-24 B (1-2') Composite Locations
- Soil Sample 6-24 C (0-1') Composite Locations
- Soil Sample 6-24 C (1-2') Composite Locations
- Barnstable Municipal Airport Property Boundary

N

0 375

1 inch = 375 feet

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Surficial Soil Sampling
Runway 6/24 Locations
Cape Cod Gateway Airport
Hyannis, MA

Date: 3/17/2022 Figure 7

* Cape Cod Commission (CCC) Groundwater Contours

Path: H:\Projects\HYA\17027 BMA PFOS 1-4 IRA\GIS\Maps\220302_Surficial Soil Sampling.mxd

TABLES

Table 1. Soil Results for PFAS Compounds ug/kg

Sample Location				ARFF Building																																		
Sample ID	Method 1 Standard		UCL	ARFF1 (0-1')	ARFF1 (2')	ARFF1 (4')	ARFF2 (0-1')	ARFF3 (0-1')	ARFF3 (10-12)	ARFF4 (0-1')	ARFFCB (0-1)	A1 (0-1')	A2 (0-1')	A3 (0-1')	A4 (0-1')	A5 (0-1')	A5 (2-4')	A6 (0-1')	A7 (0-1')	A8 (0-1')	A9 (0-1')	A10 (0-1')	A11 (0-1')	A12 (0-1')	A13 (0-1')	A13 (0-1')	A14 (0-1')	A14 (0-1')	A15 (0-1')	A15 (0-1')	A16 (0-1')	A17 (0-1')	A18 (0-1)	A19 (0-1)	A20 (0-1)	A20 (2-4)	A21 (0-1)	A22 (0-1)	HW-P(M) [8-10]	HW-P(M) [18-20]	DL1(0-1')
Sample Date	S-1/GW-1	S-1/GW-3		6/20/2017	9/26/2017	9/26/2017	6/20/2017	9/26/2017	10/9/2018	9/26/2017	9/26/2017	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	9/24/2020	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	2/27/2019	9/29/2020	2/27/2019	5/13/2020	2/27/2019	5/13/2020	9/17/2020	9/17/2020	9/29/2020	9/24/2020	9/24/2020	9/24/2020	9/24/2020	9/29/2020	9/18/2020	9/18/2020	6/20/2017
Perfluoroheptanoic acid (PFHpA)	0.5	300	4,000	**0.82 J**	**1.8**	**0.66 J**	0.17 U	**0.60 J**	0.32 J	**0.75 J**	**0.60 J**	0.19 U	0.19 U	0.38 J	0.19 U	**1.1**	0.089 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	**<2.0**	0.396 J	**<1.9**	**0.51 J**	**<2.0**	0.21 U	0.067 J	**1.07**	0.076 J	0.101 J	0.09 U	0.09 U	0.045 U	0.096 J	0.044 U	0.043 U	0.30 J
Perfluorohexanesulfonic acid (PFHxS)	0.3	300	4,000	0.23 U	0.23 U	0.23 U	0.23 U	**0.64 J**	0.24 U	0.23 U	0.23 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.12 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	**<2.0**	0.058 U	**<1.9**	0.24 U	**<2.0**	0.21 U	0.085 J	0.058 U	0.054 U	0.059 U	0.121 U	0.121 U	0.06 U	0.055 U	0.059 U	0.058 U	0.23 U
Perfluorooctanoic acid (PFOA)	0.72	300	4,000	**0.75 J**	**2.6**	**0.75 J**	0.26 U	**0.78 J**	**1.9**	**0.97 J**	**0.90 J**	0.25 U	0.25 U	0.37 J	0.30 J	**1.9**	0.228 U	0.25 U	0.25 U	0.34 J	0.25 U	0.25 U	0.25 U	**<2.0**	0.67 J	**<1.9**	0.68 J	**<2.0**	0.14 U	0.088 J	**0.989**	0.111 J	0.129 J	0.196 J	0.147 J	0.042 U	0.069 J	0.089 J	0.046 J	0.26 U
Perfluorononanoic acid (PFNA)	0.32	300	4,000	**2.5**	**5.7**	**1.4**	0.20 J	**0.91 J**	**3.1**	**2.9**	0.17 U	0.22 U	0.22 U	**0.51 J**	0.22 U	**0.87 J**	0.148 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	**<2.0**	**1.2**	**<1.9**	**0.54 J**	**<2.0**	0.15 U	0.119 J	**0.774 J**	0.281 J	0.246 J	0.15 U	0.15 U	0.075 U	0.11 J	0.073 U	0.072 U	0.17 U
Perfluorooctane sulfonate (PFOS)	2	300	4,000	**4.5**	**2.7**	1.1	0.29 J	**4.4**	1.1	1.0	1.1	0.26 U	0.26 U	0.29 J	0.26 U	0.26 U	0.257 U	0.26 U	0.38 J	0.26 U	0.85 J	0.26 U	0.26 U	0.26 U	<2.0	1.3	<1.9	0.32 J	<2.0	0.29 J	**2.02**	0.573 J	1.15	0.611 J	0.259 U	0.26 U	0.276 J	0.559 J	0.0127 U	0.0124 U	0.40 J
Perfluorodecanoic Acid (PFDA)	0.3	300	4,000	**4.4**	**1.2**	**0.62 J**	0.13 U	**1.6**	0.28 U	**0.85 J**	0.13 U	0.28 U	0.28 U	**0.42 J**	0.28 U	**1.4**	0.133 U	0.28 U	0.28 U	0.28 U	0.28 U	**0.33 J**	0.28 U	**<2.0**	**0.34 J**	**<1.9**	**0.95 J**	**<2.0**	0.15 U	0.074 J	0.147 J	0.146 J	0.066 U	0.134 U	0.134 U	0.067 U	0.119 J	0.065 U	0.064 U	**0.63 J**
6:2 Fluorotelomer sulfonate (6:2 FTS)	NA	NA	NA	0.93 J	0.74 J	1	0.23 U	0.61 J	4.2	0.65 J	2.2	0.26 U	0.26 U	0.26 U	0.26 U	18	0.355 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	<2.0	0.173 U	<1.9	0.25 U	<2.0	0.22 U	0.17 U	0.172 U	0.161 U	0.175 U	0.358 U	0.359 U	0.179 U	0.164 U	0.221 J	0.172 U	0.39 J
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six																																							
Total PFAS	NA	NA	NA	120.06	41.75	46.85	1.16	23.72	11.03	11.9	95.43	0	0	6.2	1.14	161.07	0.613	1.5	1.35	0.48	1.92	1.1	0.43	0	0.0	5.2	0	13.15	0.0	0.45	3.131	11.267	2.652	1.409	0.316	0.147	0.571	1.412	0.411	0.09	11.14
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	NA	NA	NA	12.97	14	4.53	0.49	8.93	6.42	6.47	2.6	0	0	1.97	0.3	5.27	0.228	0	0.38	0	1.19	0.33	0	0	0	3.916	0	3	0	0.29	2.453	3.553	1.764	1.087	0.196	0.147	0.276	0.953	0.089	0.046	1.33

Sample Location				Deployment Area																																				
Sample ID	Method 1 Standard		UCL	DL2 (0-1')	DL2 2'	DL2 4'	DL3 (0-1')	DL3 2'	DL3 4'	DL4 (0-1')	DL4 2'	DL4 4'	DL5 (0-1')	DL5 2'	DL5 4'	DL6 (0-1')	DL7 (0-1')	DL8 (2')	DL8 (4')	DL9 (0-1')	DL10 (0-1')	DL11 (0-1')	DL11 (4-6')	DL11 (10-12')	DL11 (14-16')	DL12 (0-1')	DL13 (0-1')	DL14 (0-1')	DL14 (4-6')	DL14 (10-12')	DL14 (14-16')	DL15 (0-1)	DL16 (0-1)	DL17 (0-1)	DL18 (0-1)	DL19 (0-1)	DL20 (0-1)	DL21 (0-1)	DL22 (2-4)	DL22 (6-8)
Sample Date	S-1/GW-1	S-1/GW-3		6/20/2017	9/26/2017	9/26/2017	6/20/2017	9/26/2017	9/26/2017	6/20/2017	9/26/2017	9/26/2017	6/20/2017	9/26/2017	9/26/2017	6/20/2017	6/20/2017	6/20/2017	9/26/2017	6/20/2017	6/20/2017	9/26/2017	8/20/2019	10/4/2018	10/4/2018	10/4/2018	9/26/2017	9/26/2017	9/26/2017	10/4/2018	10/4/2018	10/4/2018	9/30/2020	9/30/2020	9/25/2020	9/25/2020	9/25/2020	9/25/2020	9/25/2020	9/25/2020	9/25/2020
Perfluoroheptanoic acid (PFHpA)	0.5	300	4,000	**1.9**	**1.2**	0.48 J	**0.84 J**	0.17 U	0.17 U	0.31 J	0.17 U	0.17 U	**2.5**	0.40 J	0.50 J	**5.0**	**2.5 J**	**2.9 J**	**4.7 J**	**0.66 J**	**1.3**	**2.1**	**1.8**	**1.3**	0.31 J	0.23 J	**1.2**	**1.6**	**4.9**	0.36 J	0.19 U	**1.4**	0.175 U	0.138 J	0.167 U	0.319 J	0.145 U	0.157 U	0.158 U	0.109 J	0.481 J
Perfluorohexanesulfonic acid (PFHxS)	0.3	300	4,000	**1.8**	**1.3**	**0.59 J**	**0.34 J**	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	**0.49 J**	**0.49 J**	0.23 U	0.23 U	**2.3 U**	**2.3 U**	**2.3 U**	**0.35 J**	**0.94 J**	**0.82 J**	**<0.9**	0.24 U	0.24 U	0.24 U	0.23 U	0.23 U	**0.71 J**	0.24 U	0.24 U	**0.74 J**	0.235 U	0.057 U	0.224 U	0.159 J	0.194 U	0.21 U	0.212 U	0.057 U	0.07 J
Perfluorooctanoic acid (PFOA)	0.72	300	4,000	**1.6**	**4.1**	**0.74 J**	**0.80 J**	0.26 U	0.26 U	**0.83 J**	0.26 U	0.26 U	**3.7**	**1.6**	0.26 U	0.26 U	**4.2 J**	**25**	**22**	0.68 J	**1.7**	**4.7**	**5.2**	**2.9**	**1.9**	0.50 J	**4.6**	**2.4**	**23**	0.58 J	0.32 J	**2.9**	0.334 J	0.223 J	0.166 J	**0.979 J**	0.135 U	0.146 U	0.159 J	0.447 J	**1.32**
Perfluorononanoic acid (PFNA)	0.32	300	4,000	**0.81 J**	**2.5**	0.17 U	**0.55 J**	0.17 U	0.17 U	**2.7**	0.17 U	**3.7**	0.19 J	0.17 U	0.17 U	0.19 J	**9.6 J**	**46**	**1.7 U**	0.22 J	0.17 U	**16**	**2.4**	**2.5**	0.22 U	0.22 U	**7.3**	**1.5**	**10**	0.22 U	0.22 U	**10**	0.292 U	0.285 J	0.277 U	0.296 J	0.241 U	0.261 U	0.263 U	**5.46**	**2.66**
Perfluorooctane sulfonate (PFOS)	2	300	4,000	**12**	1.5	0.21 U	0.51 J	0.21 U	0.21 U	2.0	0.21 U	0.50 J	0.21 U	0.21 U	0.21 U	0.21 U	**3.9 J**	**14**	**2.1 U**	0.38 J	0.26 J	**29**	1.5	0.26 U	0.26 U	0.26 U	**23**	0.66 J	**7.4**	**9.6**	0.28 U	0.28 U	0.28 U	0.26 U	0.181 J	0.248 U	0.167 J	0.215 U	0.233 U	0.235 U	**0.834 J**	**0.383 J**
6:2 Fluorotelomer sulfonate (6:2 FTS)	NA	NA	NA	0.23 U	0.23 U	0.57 J	3.1	1.5	1	0.24 J	0.23 U	1.7	0.23 U	0.23 U	0.23 U	2	290	1600	900	0.23 U	0.23 U	**1.8**	**8.7**	0.28 U	0.28 U	0.28 U	0.28 U	**0.66 J**	**7.4**	**9.6**	0.28 U	0.28 U	0.28 U	0.26 U	0.181 J	0.248 U	0.167 J	0.215 U	0.233 U	0.235 U	**0.834 J**	**0.383 J**
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six																																							
Total PFAS	NA	NA		24.41	12.17	2.38	84.86	9.56	13.81	9.6	0.88	5.9	11.03	2.49	0.5	18.59	404.4	1727.2	949.6	6.38	9.1	85.22	91.5	11.07	6.82	7.63	108.56	521.26	598.24	50.11	21.22	116.64	4.523	2.269	0.628	4.84	0	0	0.68	66.813	41.988
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	NA	NA	NA	18.11	10.6	1.81	4.44	0	0	7.14	0	4.2	6.88	2.49	0.5	5.19	20.2	87.9	26.7	2.29	4.2	54.42	19.6	6.7	2.21	0.73	36.76	13.56	55.81	0.94	0.32	17.34	0.334	1.402	0.166	2.97	0	0	0.159	27.15	13.764

Sample Location				Deployment Area																
Sample ID	Method 1 Standard		UCL	DL22 (18-20)	DL23 (0-1)	D1 (0-1')	D2 (0-1')	D3 (0-1')	D4 (0-1')	D5 (0-1')	D6 (0-1')	D7 (0-1')	D8 (0-1')	D9 (0-1')	D10 (0-1')	D11 (0-1')	D12 (0-1')	HW-F (10-12')	HW-F (14-16')	HW-3 (0-1')	MCI Drill (0-1)	Annual Deployment (0-1)
Sample Date	S-1/GW-1	S-1/GW-3		9/25/2020	9/29/2020	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	10/4/2018	10/4/2018	10/9/2018	12/9/2016	12/9/2016
Perfluoroheptanoic acid (PFHpA)	0.5	300	4,000	0.073 J	0.24 J	0.19 U	0.21 J	0.19 U	**0.95 J**	0.22 J	0.25 J	**7.8**	**1.0**	**2.7**	0.19 U	0.19 U	0.19 U	0.32 J	**1.3**	0.19 U	**8.4**	**20**
Perfluorohexanesulfonic acid (PFHxS)	0.3	300	4,000	0.059 U	0.134 J	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	**0.31 J**	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	**0.5 J**	**4 U**
Perfluorooctanoic acid (PFOA)	0.72	300	4,000	0.176 J	0.471 J	0.25 U	0.33 J	0.25 U	**1.1**	0.25 U	0.28 J	**14**	**2.2**	**3**	0.25 U	0.25 U	0.25 U	0.25 U	**1.4**	0.25 U	**23**	**100**
Perfluorononanoic acid (PFNA)	0.32	300	4,000	**0.476 J**	0.176 J	0.22 U	**0.67 J**	0.22 U	**0.98 J**	0.22 U	0.22 U	**10**	**0.59 J**	**0.83 J**	0.22 U	0.22 U	0.22 U	0.32 J	0.22 U	0.22 U	**14**	**31**
Perfluorooctane sulfonate (PFOS)	2	300	4,000	1.18	0.725 J	0.26 U	0.66 J	0.38 J	**2.9**	0.26 U	0.26 U	**3.4**	**2.1**	0.67 J	0.54 J	0.91 J	0.44 J	0.26 U	0.26 U	0.26 U	**24**	1.9 J
Perfluorodecanoic Acid (PFDA)	0.3	300	4,000	0.065 U	0.266 J	0.28 U	0.28 U	0.28 U	**0.40 J**	0.28 U	**0.66 J**	**8.6**	**1.3**	**1.6**	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	**20**	**69**
6:2 Fluorotelomer sulfonate (6:2 FTS)	NA	NA	NA	2.67	0.181 U	0.26 U	0.26 U	0.26 U	0.26 U	0.78 J	1.2	12	0.26 U	6.6	0.26 U	0.26 U	0.26 U	24	140	0.26 U	270	4300
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six																						
Total PFAS	NA	NA	NA	11.352	4.053	0.74	1.87	0.94	11.42	3.01	9.06	151.24	24.61	43.41	0.83	1.62	1.47	25.27	146.5	0	1,524	5,972.9
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	NA	NA	NA	1.905	2.012	0	1.87	0.38	6.33	0.22	1.19	43.8	7.5	8.8	0.54	0.91	0.76	0.32	2.7	0	89.9	221.9

Sample Location				**1991 Drill Location**						**Old ARFF/SRE Building**
Sample ID	Method 1 Standard		UCL	1991A (0-1')	1991B (0-1')	1991C (0-1')	1991D (0-1')	1991A-B (3-4')	1991C-D (2-3')	HW-X(m) [7-9]
Sample Date	S-1/GW-1	S-1/GW-3		8/14/2018	8/14/2018	8/14/2018	8/14/2018	12/14/2018	12/14/2018	9/7/2021
Perfluoroheptanoic acid (PFHpA)	0.5	300	4,000	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.043 U
Perfluorohexanesulfonic acid (PFHxS)	0.3	300	4,000	0.24 U	**0.66 J**	0.24 U	0.24 U	0.24 U	0.24 U	0.058 U
Perfluorooctanoic acid (PFOA)	0.72	300	4,000	0.25 U	0.26 J	0.25 U	0.25 U	0.25 U	0.25 U	0.04 U
Perfluorononanoic acid (PFNA)	0.32	300	4,000	0.22 U	0.22 U	0.22 U	0.30 J	0.22 U	0.22 U	0.072 U
Perfluorooctane sulfonate (PFOS)	2	300	4,000	0.49 J	1.1	0.55 J	0.36 J	0.30 J	0.42 J	0.124 U
Perfluorodecanoic Acid (PFDA)	0.3	300	4,000	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.064 U
6:2 Fluorotelomer sulfonate (6:2 FTS)	NA	NA	NA	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.171 U
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six										
Total PFAS	NA	NA	NA	0.49	3.18	0.55	0.66	0.3	0.42	0.139
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	NA	NA	NA	0.49	2.02	0.55	0.66	0.3	0.42	0.124 U

Notes:
< = Not detected by the laboratory above the reporting limit. Reporting limit shown.
J = Estimated concentration between the method detection limit and reporting limit.
Results in ug/kg, micrograms per kilogram.
U= Not detected by the Laboratory above the method detection limit. Method detection limit shown.
Bold results above the Method 1 S-1/GW-1 standard.
Total PFAS is the sum of all laboratory detected PFAS analytes including estimated values and does not include non-detects (U or <).
Sum of six includes estimated values and does not include non-detects (U or <).
UCL = Upper Concentration Limit

Table 2. Groundwater Results for PFAS Compounds ug/L

Sample Location		North Ramp Area													Lewis Pond Area	Airport Road/Iyannough Road Area									
Sample ID	UCL	HW-1	HW-1	HW-1	HW-4M	HW-4M	HW-5	HW-5	HW-5	HW-5	HW-23	HW-23	HW-19D	HW-19D	HW-X(s)	HW-X(m)	HW-401S	HW-A(S)	HW-B(S)	HW-B(S)	HW-B(D)	HW-C	HW-M	HW-N	HW-O
Sample Date		7/1/2016	6/20/2017	11/1/2018	4/5/2017	3/25/2022	7/1/2016	4/7/2017	11/1/2018	3/25/2022	6/20/2017	11/1/2018	6/20/2017	11/7/2018	9/10/2021	9/10/2021	4/7/2017	4/7/2017	4/7/2017	10/26/2018	10/26/2018	4/7/2017	6/24/2019	6/24/2019	7/2/2019
TOC Elevation		51.51	51.51	51.51	54.02	54.02	54.98	54.98	54.98	54.98	50.65	50.65	49.10	49.10	NA	NA	41.58	55.34	51.84	51.84	51.95	69.25	53.69	49.49	43.46
Depth to Groundwater		21.63	25.00	21.83	26.20	25.00	24.94	26.75	25.27	25.31	22.70	24.01	21.29	22.19	24.74	25.21	17.95	24.62	22.26	21.59	21.66	38.50	20.32	15.48	3.62
Groundwater Elevation		29.88	26.51	29.68	27.82	29.02	30.04	28.23	29.71	29.67	27.95	26.64	27.81	26.91	NA	NA	23.63	30.72	29.58	30.25	30.29	30.75	33.37	34.01	39.84
Total Well Depth		30.84	30.84	30.84	32.32	32.32	27.80	27.80	27.80	27.80	28.11	28.11	41.30	41.30	29.24	36.82	23.60	32.00	30.23	30.23	57.20	42.15	26.92	22.33	14.10
Perfluoroheptanoic acid (PFHpA)	100,000	0.01	0.0042 J	0.013 J	0.007 J	0.003	0.0041	0.0084 J	0.0074 U	0.0048	0.0045J	0.0098 J	0.0052 J	0.0080 J	0.0061	0.0034	0.0043 J	0.0048 J	0.049	0.012 J	0.0074 U	0.0033 U	0.007	0.0034	<0.002
Perfluorohexanesulfonic acid (PFHxS)	5,000	0.018	0.065	0.018 J	0.02	0.011	0.011	0.018 J	0.0056 U	0.013	0.021	0.023	0.046	0.045	0.047	0.0021	0.011 J	0.0079 J	0.044	0.047	0.0056 U	0.0034 U	0.016	0.033	0.0043
Perfluorononanoic acid (PFNA)	100,000	<0.002	0.0057 J	0.0087 U	0.0046 U	0.0018 U	<0.002	0.0046 U	0.0088 J	0.0018 U	0.0038 U	0.0087 U	0.0065 J	0.0087 U	0.00049 J	0.002	0.0046 U	0.0046 U	0.0046 U	0.0087 U	0.0087 U	0.0046 U	<0.002	<0.002	<0.002
Perfluorooctanoic acid (PFOA)	100,000	0.033	0.022	0.031	0.011 J	0.013	0.031	0.020 J	0.011 J	0.023	0.0046 U	0.011 J	0.017 J	0.014 J	0.013	0.0062	0.0046 U	0.0026 U	0.0094 J	0.020 J	0.012 J	0.0026 U	0.027	0.0088	0.0039
Perfluorooctane sulfonate (PFOS)	5,000	0.017	0.24	0.028	0.043	0.025	0.12	0.052	0.12	0.048	0.0079 J	0.015 J	0.061	0.069	0.068	0.034	0.012 J	0.0026 U	0.026	0.019 J	0.010 J	0.0026 U	0.0074	0.004	0.017
Perfluorodecanoic Acid (PFDA)	100,000	NA	0.0040 U	0.0061 U	0.0040 U	0.0018 U	NA	0.0040 U	0.0061 U	0.0018 U	0.0040 U	0.0061 U	0.0040 U	0.0061 U	0.00050 U	0.0042	0.0040 U	0.0040 U	0.0040 U	0.0061 U	0.0061 U	0.0040 U	<0.002	<0.002	0.0021
6:2 Fluorotelomer sulfonate (6:2 FTS)	NA	NA	0.0032 U	0.0066 U	0.0038 J	0.0018 U	NA	0.0037 J	0.0066 U	0.0018 U	0.0032 U	0.0066 U	0.0032 U	0.0066 U	0.002 J	0.00035 U	0.004 J	0.0032 U	0.0032 U	0.0066 U	0.0066 U	0.0034 J	<0.002	<0.002	0.002 U
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six																									
Total PFAS	NA	0.078	0.4247	0.15	0.1162	0.0679	0.1661	3.0021	0.1507	0.1045	0.0745	0.0858	0.1758	0.16	0.18221	0.10025	0.0313	0.0779	0.4561	0.186	0.0465	0.0034	0.0927	0.0727	0.0585
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	NA	**0.078**	**0.3369**	**0.09**	**0.081**	**0.052**	**0.1661**	**0.0984**	**0.1398**	**0.0888**	**0.0334**	**0.0588**	**0.1357**	**0.136**	**0.13459**	**0.0519**	**0.0273**	0.0127	**0.1284**	**0.098**	**0.022**	<0.0046	**0.0574**	**0.0492**	**0.0273**

Sample Location		Deployment Area																							
Sample ID	UCL	HW-I (s)	HW-I (s)	HW-I (s)	HW-I (s)	HW-I (s)	HW-I (s)	HW-I (s)	HW-I (s)	HW-I (m)	HW-I (m)	HW-I (m)	HW-I (m)	HW-I (m)	HW-I (m)	HW-I (m)	HW-I (d)	HW-I (d)	HW-I (d)	HW-I (d)	HW-I (d)	HW-I (d)	HW-I (d)	HW-J	HW-J	HW-J	HW-J
Sample Date		11/7/2018	5/8/2020	3/17/2021	9/8/2021	3/18/2022	8/2/2022	10/31/2022	2/2/2023	6/24/2019	5/8/2020	3/17/2021	9/8/2021	3/18/2022	8/2/2022	10/31/2022	6/24/2019	5/8/2020	3/17/2021	9/11/2021	3/18/2022	8/2/2022	10/31/2022	11/7/2018	3/17/2021	9/10/2021	3/16/2022
TOC Elevation		36.08	36.08	36.08	36.08	36.08	36.08	36.08	36.08	36.27	36.27	36.27	36.27	36.27	36.27	36.27	36.02	36.02	36.02	36.02	36.02	36.02	36.02	37.10	37.10	37.10	37.10
Depth to Groundwater		18.35	15.39	18.42	19.94	17.72	19.81	20.44	17.55	16.33	15.61	18.66	20.17	18.07	20.03	20.70	16.20	15.49	18.52	20.04	17.95	19.90	20.55	19.18	19.34	20.60	18.75
Groundwater Elevation		17.73	20.69	17.66	16.14	18.36	16.27	15.64	18.53	19.94	20.66	17.61	16.10	18.20	16.24	15.57	19.82	20.53	17.50	15.98	18.07	16.12	15.47	17.92	17.76	16.50	18.35
Total Well Depth		25.10	25.10	25.10	25.10	25.15	25.18	25.14	25.15	34.80	34.80	34.80	34.80	34.80	34.80	34.80	41.67	41.67	41.67	41.67	41.67	41.70	41.70	24.30	24.30	24.30	24.28
Perfluoroheptanoic acid (PFHpA)	100,000	0.2	0.54	0.032	0.097	0.098	0.2	0.065	0.021	0.0032	0.0012	0.00086 J	0.0014 J	0.0024	0.0017 U	0.00067 J	0.0053	0.0046	0.0065	0.0083	0.0079	0.012	0.0093	0.025	0.044	0.02	0.13
Perfluorohexanesulfonic acid (PFHxS)	5,000	0.18	0.22	0.021	0.036	0.06	0.11	0.026	0.011	0.019	0.0091	0.0052	0.0078	0.0052	0.0032	0.0042	0.057	0.018	0.031	0.05	0.039	0.063	0.045	0.0056 U	0.088	0.01	0.15
Perfluorononanoic acid (PFNA)	100,000	0.16	0.082	0.065	0.033	0.21	0.12	0.04	0.028	<0.002	0.00078	0.00048 U	0.00046 J	0.00061 J	0.0017 U	0.00061 U	<0.002	0.00063 U	0.00075 J	0.00084 J	0.00077 J	0.0018 U	0.0011 J	0.028	0.035 J	0.015	0.062
Perfluorooctanoic acid (PFOA)	100,000	0.26	0.29	0.05	0.063	0.11	0.17	0.067	0.016	0.0061	0.0018	0.0014 J	0.0016 J	0.0016 J	0.0017 U	0.00076 J	0.0047	0.0028	0.0043	0.0053	0.0074	0.013 U	0.0096	0.026	0.061	0.0091	0.13
Perfluorooctane sulfonate (PFOS)	5,000	0.066	0.04	0.028	0.02	0.52	0.43	0.036	0.024	0.014	0.014	0.013	0.016	0.011	0.005	0.0043	0.012	0.02	0.038	0.039	0.047	0.083	0.063	0.13	0.25	0.08	0.15
Perfluorodecanoic Acid (PFDA)	100,000	0.012 U	0.00062 U	0.0038 U	0.00047 U	0.00043 U	0.0018 U	0.00065 U	0.0018 U	<0.002	0.00062 U	0.00038 U	0.00050 U	0.00043 U	0.0017 U	0.00065 U	<0.002	0.00062 U	0.00038 U	0.00048 U	0.00043 U	0.0018 U	0.00065 U	0.0061 U	0.0076 U	0.00050 U	0.00044 U
6:2 Fluorotelomer sulfonate (6:2 FTS)	NA	11	13	1.7	2.1	1.3	4.6	0.0013 U	0.48	<0.002	0.00039 U	0.0011 U	0.00037 U	0.00032 U	0.0017 U	0.0013 U	<0.002	0.0016	0.0011 U	0.00054	0.00086	0.0018 U	0.0013 U	0.68	0.44	0.13	1.6
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six																											
Total PFAS	NA	13.346	15.5383	2.082	2.73304	2.66512	6.1201	0.5101	0.69229	0.0718	0.03308	0.02516	0.03254	0.02985	0.0082	0.00993	0.1367	0.08985	0.15585	0.16687	0.15181	0.23	0.1844	1.074	1.217	0.511	2.826
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	NA	**0.866**	**1.172**	**0.196**	**0.249**	**0.998**	**5.63**	**0.234**	**0.58**	**0.0423**	**0.02688**	**0.02046**	**0.02726**	**0.02081**	**0.0082**	**0.00993**	**0.079**	**0.0454**	**0.08055**	**0.10344**	**0.10207**	**0.158**	**0.128**	**0.209**	**0.478**	**0.1341**	**0.622**

Sample Location		Yarmouth Road Area													Solar Field Area							Steamship Parking Lot Area			
Sample ID	UCL	HW-T (s)	HW-T (s)	HW-T (m)	HW-T (m)	RB-1 (s)	RB-1 (s)	RB-1 (s)	RB-1 (s)	RB-1 (m)	RB-1 (m)	RB-1 (m)	RB-1 (m)	HW-D (m)	HW-D (m)	HW-D (d)	HW-D (d)	HW-D (d)	HW-D (dd)	HW-G(S)	HW-G(M)	HW-G(D)	HW-2	HW-2	HW-2	HW-2
Sample Date		10/1/2020	5/18/2022	10/1/2020	5/18/2022	11/5/2020	3/18/2021	9/5/2021	3/31/2022	11/5/2020	3/18/2021	9/5/2021	3/31/2022	4/7/2017	5/13/2020	6/24/2019	5/13/2020	6/24/2019	5/13/2020	12/3/2018	12/3/2018	12/3/2018	7/1/2016	5/5/2020	9/1/2021	3/25/2022
TOC Elevation		28.97	28.97	29.11	29.11	NA	NA	NA	NA	NA	NA	NA	NA	45.20	45.20	45.08	45.08	45.05	45.05	44.99	45.11	44.93	40.41	40.41	40.41	40.41
Depth to Groundwater		13.41	12.07	13.58	12.24	17.87	16.91	18.64	16.65	17.79	16.85	18.57	16.59	18.83	18.34	18.99	18.23	20.60	19.97	20.69	20.75	20.71	27.48	25.33	30.20	27.72
Groundwater Elevation		15.56	16.90	15.53	16.87	NA	NA	NA	NA	NA	NA	NA	NA	26.37	26.86	26.09	26.85	24.45	25.08	24.30	24.36	24.22	12.93	15.08	10.21	12.69
Total Well Depth		18.54	18.60	28.96	28.96	27.80	27.80	27.80	27.81	49.85	49.85	48.85	48.82	30.32	30.32	44.94	44.94	65.05	65.05	28.45	38.25	48.28	32.80	32.80	32.80	32.35
Perfluoroheptanoic acid (PFHpA)	100,000	0.0039	0.0073	0.022	0.02	0.0042	0.0054	0.0077	0.0051	0.011	0.013 J	0.0073	0.0073	0.0033 U	0.00053 U	0.021	0.017	<0.002	0.00053 U	0.0074 U	0.0074 U	0.0074 U	0.0071	0.035	0.046	0.011
Perfluorohexanesulfonic acid (PFHxS)	5,000	0.17	0.029	0.019	0.046	0.0084	0.03	0.0051	0.022	0.01	0.017 J	0.0099	0.016	0.0089 J	0.00077 U	0.062	0.039	0.0092	0.008	0.0056 U	0.012 J	0.0056 U	0.0035	0.0066	0.0056 J	0.009
Perfluorononanoic acid (PFNA)	100,000	0.00074	0.0013	0.0032	0.00031 U	0.0047	0.0025	0.0026	0.0029	0.0068	0.0072 J	0.0044	0.0062	0.0046 U	0.00063 U	0.015	0.019	0.0041	0.0029	0.0087 U	0.011 J	0.0087 U	<0.002	0.016	0.004 J	0.0052
Perfluorooctanoic acid (PFOA)	100,000	0.0067	0.01	0.011	0.0035	0.007	0.0087	0.0093	0.0092	0.013	0.013 J	0.012	0.01	0.0046 U	0.00071 U	0.0088	0.0076	<0.002	0.00071 U	0.0033 U	0.0033 U	0.0033 U	0.0063	0.039	0.012	0.01
Perfluorooctane sulfonate (PFOS)	5,000	0.21	0.035	0.025	0.0059	0.038	0.04	0.01	0.0045	0.049	0.075	0.055	0.054	0.022	0.0011	0.095	0.12	0.013	0.013	0.0060 U	0.036	0.0060 U	0.012	0.053	0.026	0.024
Perfluorodecanoic Acid (PFDA)	100,000	0.00062 U	0.00047	0.0014	0.00054	0.00062 U	0.00038 U	0.00045 U	0.0019 U	0.00075	0.0038 U	0.0033	0.0028	0.0040 U	0.00062 U	<0.002	0.00062 U	<0.002	0.00062 U	0.0061 U	0.0061 U	0.0061 U	NA	0.00062 U	0.0025 U	0.0018 U
6:2 Fluorotelomer sulfonate (6:2 FTS)	NA	0.00039 U	0.00032 U	0.00039 U	0.00033 U	0.00039 U	0.0011 U	0.00034 U	0.0019 U	0.038	0.055	0.013	0.02	0.0032 U	0.00039 U	0.0022	0.00039 U	0.002 U	0.00039 U	0.0066 U	0.0066 U	0.0066 U	NA	0.15	0.071	0.052
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six																										
Total PFAS	NA	0.44114	0.1295	0.3254	0.33614	0.08008	0.1175	0.06755	0.0713	0.2015	0.2642	0.1561	0.1733	0.0309	0.0011	0.2768	0.24993	0.0263	0.02444	0.0087 U	0.059	0.0087 U	0.0289	0.42678	0.4136	0.1563
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	NA	**0.39134**	**0.08307**	**0.0816**	**0.07594**	**0.0623**	**0.0866**	**0.0347**	**0.0437**	**0.09055**	**0.1252**	**0.0919**	**0.0963**	**0.0309**	0.0011	**0.2018**	**0.2026**	**0.0263**	**0.0239**	0.0087 U	**0.059**	0.0087 U	**0.0289**	**0.1496**	**0.0936**	**0.0592**

Sample Location		Maher Well Area																							
Sample ID	UCL	ME-1*	MW-1*	ME-1*	ME-1*	ME-2**	ME-2**	ME-2**	ME-2**	ME-3***	ME-3***	ME-3***	ME-3***	OW-18S	OW-18S	OW-18S	OW-18M	OW-18M	OW-18M	OW-18D	OW-18D Duplicate	OW-18D	OW-18D	OW-18D	
Sample Date		9/17/2020	7/29/2022	11/2/2022	2/2/2023	9/17/2020	7/29/2022	11/2/2022	2/2/2023	9/17/2020	7/29/2022	11/2/2022	2/2/2023	7/5/2016	12/7/2018	5/8/2020	7/5/2016	12/7/2018	5/8/2020	7/5/2016	7/5/2016	4/11/2017	12/7/2018	5/13/2020	
TOC Elevation		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	39.03	39.03	39.03	39.30	39.30	39.30	38.84	38.84	38.84	38.84	38.84	
Depth to Groundwater		3.60	NA	NA	NA	6.50	NA	NA	NA	6.00	NA	NA	NA	24.40	24.29	23.45	25.82	24.72	23.93	25.95	25.95	25.55	24.28	23.47	
Groundwater Elevation		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	14.63	14.74	15.58	13.48	14.58	15.37	12.89	12.89	13.29	14.56	15.37	
Total Well Depth		81.20	NA	NA	NA	54.20	NA	NA	NA	50.30	NA	NA	NA	31.23	31.23	31.23	74.44	74.44	74.44	123.36	123.36	123.36	123.36	123.36	
Perfluoroheptanoic acid (PFHpA)	100,000	0.011	0.025	0.017	0.015	0.0055	0.016	0.036	0.027	0.0036	0.0065	0.0082	0.0087	0.0071	0.0074 U	0.0039	0.0029	0.0074 U	0.0074	0.0071	0.0063	0.015J	0.014 J	0.012	
Perfluorohexanesulfonic acid (PFHxS)	5,000	0.03	0.058	0.04	0.027	0.04	0.035	0.071	0.065	0.018	0.029	0.032	0.032	0.0068	0.0056 U	0.0085	0.016	0.073	0.07	0.01	0.011	0.13	0.13	0.03	
Perfluorononanoic acid (PFNA)	100,000	0.017	0.021	0.015	0.0098	0.003	0.0089	0.023	0.014	0.004	0.0054	0.007	0.0063	<0.002	0.0087 U	0.0032	0.0076	0.0087 U	0.0027	0.0065	0.0058	0.0046 U	0.0087 U	0.0028	
Perfluorooctanoic acid (PFOA)	100,000	0.016	0.029	0.021	0.015	0.0077	0.017	0.032	0.02	0.012	0.012	0.014	0.011	0.018	0.012 J	0.01	0.0058	0.0060 J	0.0096	0.0059	0.0059	0.025	0.019 J	0.0095	
Perfluorooctane sulfonate (PFOS)	5,000	0.11	0.12	0.087	0.069	0.095	0.051	0.093	0.077	0.072	0.07	0.086	0.072	0.0083	0.028	0.016	0.044	0.24	0.18	0.018	0.019	0.22	0.32	0.041	
Perfluorodecanoic Acid (PFDA)	100,000	0.00062 U	0.0017 U	0.001	0.0018 U	0.00062 U	0.0017 U	0.0014 J	0.00086 J	0.00062 U	0.0017 U	0.00064	0.0018 U	NA	0.0061 U	0.00062 U	NA	0.0061 U	0.00062 U	NA	NA	0.0040 U	0.0061 U	0.00062 U		
6:2 Fluorotelomer sulfonate (6:2 FTS)	NA	0.034	0.046	0.026	0.026	0.00039 U	0.043	0.25	0.31	0.0071	0.0054	0.0035	0.004	NA	0.0066 U	0.00039 U	NA	0.0066 U	0.00039 U	NA	NA	0.0032 U	0.0066 U	0.00039 U	
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six																									
Total PFAS	NA	0.2873	0.4769	0.3426	0.2712	0.2009	0.2702	0.73928	0.70216	0.14005	0.1796	0.221	0.2012	0.0402	0.0573	0.05953	0.0763	0.3891	0.4357	0.0475	NA	0.506	0.5504	0.1832	
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	NA	**0.184**	**0.299**	**0.181**	**0.1618**	**0.1512**	**0.1709**	**0.2564**	**0.51386**	**0.1096**	**0.1283**	**0.1472**	**0.134**	**0.0402**	**0.04**	**0.0416**	**0.0763**	**0.319**	**0.2697**	**0.0475**	**0.048**	**0.39**	**0.483**	**0.0953**	

Notes:

UCL = Upper Concentration Limit
< = Not detected by the laboratory above the reporting limit. Reporting limit shown.
J = Estimated concentration between the method detection limit and reporting limit.
Results in ug/L, micrograms per liter.
U= Not detected by the Laboratory above the method detection limit. Method detection limit shown.
Bold results above Method 1 GW-1 standard (0.02 ug/L).
Sum of six includes estimated values and does not include non-detects (U or <).
Total PFAS is the sum of all laboratory detected PFAS analytes including estimated values and does not include non-detects (U or <).
NA = Not Applicable.
* = ME-1 is screened from 37 to 47 and 70 to 80 feet below grade.
** = ME-2 is screened from 44 to 54 feet below grade.
*** = ME-3 is screened from 40 to 50 feet below grade.
The Method 1 GW-3 Standard for the individual analytes in the Sum of Six ranges from 500 to 40,000 ug/l.
1. Well elevation increased due to soil cap.

Table 2. Groundwater Results for PFAS Compounds ug/L

Sample Location		Airport Road/Iyannough Road Area												ARFF Building Area						
Sample ID	UCL	HW-U(s)	HW-U(s)	HW-U(s)	HW-U(m)	HW-U(m)	HW-U(m)	HW-U(d)	HW-U(d)	HW-U(d)	HW-V(m)	HW-L (s)	HW-L (m)	HW-L (d)	HW-L (d)	HW-P (s)	HW-P (s)	HW-P (s)	HW-P (s)	HW-P (s)
Sample Date		4/19/2021	9/5/2021	3/15/2022	4/19/2021	9/5/2021	3/15/2022	10/2/2020	9/5/2021	3/15/2022	10/2/2020	10/7/2020	10/7/2020	6/19/2019	10/7/2020	10/1/2020	3/18/2021	9/8/2021	3/18/2022	11/2/2022	2/2/2023
TOC Elevation		NA	NA	NA	NA	NA	NA	48.80	48.80	48.80	53.83	39.07	38.98	39.15	39.15	40.51	40.51	40.51	40.51	40.51	40.51
Depth to Groundwater		23.59	24.53	22.89	23.50	24.49	22.80	24.66	25.24	23.52	22.90	21.96	21.88	19.40	22.22	22.69	22.09	23.54	21.61	23.96	21.42
Groundwater Elevation		NA	NA	NA	NA	NA	NA	24.14	23.56	25.28	30.93	17.11	17.10	19.75	16.93	17.82	18.42	16.97	18.90	16.55	19.09
Total Well Depth		28.83	28.83	29.15	38.93	38.93	39.65	62.30	62.30	63.65	36.15	27.33	37.33	70.55	70.55	27.60	27.60	27.60	27.61	27.61	27.62
Perfluoroheptanoic acid (PFHpA)	100,000	0.002 J	0.004	0.0027	0.0018 J	0.0049	0.004	0.01	0.01	0.01	0.0033	0.00053 U	0.0064	0.0078	0.0065	0.026	0.0067	0.004	0.01	0.0044	0.012
Perfluorohexanesulfonic acid (PFHxS)	5,000	0.01	0.0034	0.0039	0.0043	0.011	0.0098	0.018	0.022	0.017	0.0032	0.0013	0.023	0.033	0.015	0.0018	0.00074 J	0.00056 J	0.0012 J	0.00054 U	0.0022
Perfluorononanoic acid (PFNA)	100,000	0.0013 J	0.0017 J	0.0013 J	0.00083 J	0.0011 J	0.0021	0.0016	0.005	0.0025	0.0017	0.00063 U	0.0025	0.0033	0.0022	0.0061	0.002	0.0013 J	0.0039	0.0016 J	0.015
Perfluorooctanoic acid (PFOA)	100,000	0.0075	0.0047	0.0052	0.0055	0.0094	0.018	0.01	0.013	0.013	0.0063	0.00071 U	0.01	0.025	0.018	0.0084	0.0042	0.0017 J	0.012	0.0037	0.014
Perfluorooctane sulfonate (PFOS)	5,000	0.06	0.029	0.012	0.0093	0.027	0.029	0.023	0.051	0.043	0.0059	0.0014	0.07	0.049	0.039	0.00097	0.00049 J	0.00054 U	0.00098 J	0.00048 J	0.0037
Perfluorodecanoic Acid (PFDA)	100,000	0.00064 J	0.0011 J	0.0006 J	0.00038 U	0.001 U	0.00055 J	0.00062 U	0.0025 U	0.00047 J	0.00062 U	0.00062 U	0.00062 U	<0.002	0.0019	0.00085	0.0004 J	0.00048 U	0.00043 U	0.00066 U	0.0018 U
6:2 Fluorotelomer sulfonate (6:2 FTS)	NA	0.0011 U	0.00034 U	0.00032 U	0.0011 U	0.00075	0.00033 U	0.0012	0.04	0.00032 U	0.00039 U	0.00039 U	0.022	0.0021	0.00078	0.011	0.0034	0.0014	0.0083	0.0016 J	0.019
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six																					
Total PFAS	NA	0.09704	0.06596	0.04424	0.03622	0.0839	0.10395	0.0889	0.1775	0.12378	0.0543	0.0027	0.18375	0.1823	0.12348	0.2478	0.06294	0.05055	0.08508	0.03898	0.1232
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	NA	**0.08144**	**0.0439**	**0.0257**	**0.02173**	**0.0534**	**0.06345**	**0.0588**	**0.0987**	**0.08167**	**0.0204**	0.0027	**0.1119**	**0.1181**	**0.0826**	**0.04412**	0.01453	0.00756	**0.02808**	**0.01018**	**0.0659**

Sample Location		Deployment Area																		
Sample ID	UCL	HW-E	HW-E	HW-E	HW-E	HW-E[1]	HW-E[1]	HW-E[1]	HW-F	HW-F	HW-F	HW-F	HW-F	HW-F	HW-H	HW-H	HW-H	HW-R(s)	HW-R(s)	HW-R(s)	HW-R(s)
Sample Date		4/5/2017	11/7/2018	8/19/2019	5/5/2020	3/17/2021	9/8/2021	3/16/2022	4/5/2017	11/7/2018	5/5/2020	3/17/2021	9/8/2021	3/16/2022	11/7/2018	5/8/2020	5/18/2022	10/1/2020	3/17/2021	9/8/2021	3/16/2022
TOC Elevation		38.45	38.45	38.45	38.45	42.40	42.40	42.40	36.32	36.32	36.32	36.32	36.32	36.32	38.47	38.47	38.47	35.72	35.72	35.72	35.72
Depth to Groundwater		19.05	19.38	17.82	16.16	23.35	25.02	22.67	19.60	20.08	16.82	20.01	21.72	19.34	20.39	17.37	20.07	18.33	17.37	19.00	16.69
Groundwater Elevation		19.40	19.07	20.63	22.29	19.05	17.38	19.73	16.72	16.24	19.50	16.31	14.60	16.98	18.08	21.10	18.40	17.39	18.35	16.72	19.03
Total Well Depth		26.22	26.22	26.22	26.22	30.26	30.26	30.26	26.89	26.89	26.89	26.89	26.89	26.83	27.09	27.09	27.07	23.56	23.67	23.67	23.66
Perfluoroheptanoic acid (PFHpA)	100,000	0.15	0.0074 U	0.0053	0.044	0.014	0.0018 J	0.023	0.34	0.0074 U	0.23	0.39	0.0051	0.36	0.077	0.28	0.015	0.021	0.005	0.021	0.03
Perfluorohexanesulfonic acid (PFHxS)	5,000	0.042	0.0056 U	0.0021	0.011	0.0015 J	0.00088 J	0.0028	0.019J	0.0056 U	0.005	0.012 U	0.00037 U	0.0097	0.0056 U	0.0031	0.0021	0.02	0.01	0.0046	0.0019
Perfluorononanoic acid (PFNA)	100,000	0.0087 J	0.0087 U	<0.002	0.0052	0.00048 U	0.00037 U	0.0023	0.0046 U	0.0087 U	0.00081	0.0097 U	0.00037 U	0.0025	0.0087 U	0.00063 U	0.0003 U	0.0031	0.001 J	0.00034 U	0.00031 U
Perfluorooctanoic acid (PFOA)	100,000	0.053	0.0033 U	0.0047	0.027	0.00095 J	0.00094 J	0.029 J	0.075	0.0033 U	0.02	0.052	0.00074 U	0.052	0.0050 J	0.002	0.0006 U	0.014	0.004	0.004	0.0014 J
Perfluorooctane sulfonate (PFOS)	5,000	0.047	0.0060 U	<0.002	0.0037	0.00082 J	0.00064 U	0.0013 J	0.0026 U	0.0060 U	0.00086	0.0076 U	0.00065 U	0.0037	0.0060 U	0.00068 U	0.00053 U	0.016	0.0023	0.0053	0.001 J
Perfluorodecanoic Acid (PFDA)	100,000	0.0040 U	0.0061 U	<0.002	0.00062 U	0.00038 U	0.00052 U	0.00043 U	0.0040 U	0.0061 U	0.00062 U	0.0076 U	0.00053 U	0.00043 U	0.0061 U	0.00062 U	0.00043 U	0.00062 U	0.00038 U	0.00049 U	0.00044 U
6:2 Fluorotelomer sulfonate (6:2 FTS)	NA	2	0.0066 U	0.069	0.86	0.0035	0.00039 U	0.83	5.7	0.0066 U	1.5	4.8	0.0049	8.2	1.5	0.13	0.00032 U	0.037	0.0048	0.003	0.0053
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six																					
Total PFAS	NA	3.2257	0.0074 U	0.14	1.04526	0.04812	0.01342	0.9169	12.96	0.084	2.65637	8.422	0.159	12.18373	4.452	1.26666	0.165	0.2171	0.04878	0.2549	0.30126
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	NA	**0.3007**	0.0074 U	0.0121	**0.0909**	0.01727	0.00362	**0.0584**	**0.434**	0.0087 U	**0.25667**	**0.442**	0.0051	**0.4279**	**0.082**	**0.2851**	0.0171	**0.0741**	**0.0751**	**0.0213**	**0.0343**

Sample Location		Steamship Parking Lot Area																
Sample ID	UCL	HW-3	HW-3	HW-3	HW-3	HW-3	HW-3	HW-3	HW-3	HW-300	HW-300	HW-300	HW-300	HW-301	HW-302	HW-302	HW-302	HW-302	HW-302
Sample Date		7/1/2016	4/5/2017	10/26/2018	5/5/2020	3/17/2021	9/1/2021	3/25/2022	10/31/2022	7/1/2016	3/17/2021	9/2/2021	3/31/2022	7/1/2016	7/1/2016	12/3/2018	3/17/2021	9/1/2021	3/25/2022
TOC Elevation		38.74	38.74	38.74	38.74	38.74	38.74	38.74	38.74	36.09	36.09	36.09	36.09	39.46	41.17	41.17	41.17	41.17	41.17
Depth to Groundwater		25.81	25.70	26.06	23.64	26.19	28.35	26.03	27.63	22.52	22.86	23.02	22.53	25.05	23.52	22.65	24.04	26.15	23.70
Groundwater Elevation		12.93	13.04	12.68	15.10	12.55	10.39	12.71	11.11	13.57	13.23	13.07	13.56	14.41	17.65	18.52	17.13	15.02	17.47
Total Well Depth		33.08	33.08	33.08	33.08	33.12	33.11	33.70	33.00	30.33	30.30	30.34	30.40	30.42	30.45	30.45	30.44	30.40	30.42
Perfluoroheptanoic acid (PFHpA)	100,000	0.016	0.1	0.10	0.1	0.084	0.035	0.02	0.054	0.0096	0.0028	0.0029	0.0019 U	0.002	0.019	0.015 J	0.0066	0.0062	0.0092
Perfluorohexanesulfonic acid (PFHxS)	5,000	0.0043	0.020 J	0.012 J	0.0087	0.0064 J	0.0057 J	0.013	0.024	0.012	0.0099	0.00066 J	0.006	0.038	0.0063	0.016 J	0.0022	0.004	0.013
Perfluorononanoic acid (PFNA)	100,000	0.0063	0.027	0.023	0.021	0.019 J	0.014 J	0.0039	0.0097	<0.002	0.00099 J	0.0028	0.0019 U	<0.002	0.054	0.0097 J	0.0066	0.005	0.02
Perfluorooctanoic acid (PFOA)	100,000	0.0091	0.065	0.057	0.054	0.064	0.016 J	0.0069	0.022	0.0052	0.0044	0.0044	0.0033	0.0037	0.033	0.03	0.005	0.0065	0.017
Perfluorooctane sulfonate (PFOS)	5,000	0.084	0.15	0.053	0.1	0.056	0.044	0.024	0.028	0.017	0.015	0.017	0.012	0.011	0.014	0.031	0.0041	0.015	0.0095
Perfluorodecanoic Acid (PFDA)	100,000	NA	0.0040 U	0.0061 U	0.0014	0.0038 U	0.0052 U	0.0019 U	0.00069 U	NA	0.00038 U	0.0006 J	0.0019 U	NA	NA	0.0061 U	0.00086 J	0.001 J	0.0019 U
6:2 Fluorotelomer sulfonate (6:2 FTS)	NA	NA	0.47	0.12	0.13	0.47	0.2	0.14	0.0014 U	NA	0.0011 U	0.00034 U	0.0019 U	NA	NA	0.13	0.012	0.0062	0.072
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six																			
Total PFAS	NA	0.1197	1.603	0.952	0.96981	1.1394	0.6867	0.4359	0.73178	0.0438	0.05509	0.03812	0.0369	0.0547	0.1263	0.3427	0.08304	0.09793	0.2149
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	NA	**0.1197**	**0.362**	**0.245**	**0.2851**	**0.2294**	**0.1147**	**0.0678**	**0.1377**	**0.0438**	**0.03309**	**0.02832**	**0.0213**	**0.0547**	**0.1263**	**0.1017**	**0.02536**	**0.0377**	**0.0687**

Sample Location		Maher Well Area																		
Sample ID	UCL	OW-19(S)	OW-19(S)	OW-19(S)	OW-19(S)	OW-19(M)	OW-19(M)	OW-19(M)	OW-19(M)	OW-19D	OW-19D	OW-19D	OW-19D	OW-19D	HW-W(m)	HW-W(m)	HW-W(m)	HW-W(m)	HW-W(d)	HW-W(d)	HW-W(d)
Sample Date		11/6/2020	3/18/2021	9/2/2021	3/16/2022	11/6/2020	3/19/2021	9/3/2021	3/18/2022	4/11/2017	5/13/2020	3/19/2021	9/11/2021	3/18/2022	4/19/2021	9/5/2021	3/16/2022	10/31/2022	4/19/2021	9/5/2021	3/16/2022
TOC Elevation		NA	NA	NA	NA	NA	NA	NA	NA	39.06	39.06	39.06	39.06	39.06	NA	NA	NA	NA	NA	NA	NA
Depth to Groundwater		27.38	26.27	28.47	27.42	27.57	27.15	28.65	27.59	26.73	25.64	27.52	28.90	27.95	28.96	30.17	29.12	29.59	28.73	29.93	28.92
Groundwater Elevation		NA	NA	NA	NA	NA	NA	NA	NA	12.33	13.42	11.54	10.16	11.11	NA	NA	NA	NA	NA	NA	NA
Total Well Depth		34.56	34.65	34.67	35.20	76.28	76.24	76.25	78.05	110.42	110.42	110.33	110.34	112.70	52.04	58.02	53.10	52.09	61.78	61.78	63.02
Perfluoroheptanoic acid (PFHpA)	100,000	0.0042	0.0044	0.0056	0.0062	0.03	0.044	0.014	0.0038	0.0051 J	0.011	0.018	0.022	0.018	0.01	0.0034	0.0041	0.013	0.0021	0.01	0.01
Perfluorohexanesulfonic acid (PFHxS)	5,000	0.0031	0.0064	0.0027	0.0044	0.027	0.014 J	0.015	0.013	0.029	0.12	0.026	0.028	0.029	0.012	0.015	0.014	0.025	0.0088	0.0064	0.022
Perfluorononanoic acid (PFNA)	100,000	0.0024	0.0012 J	0.0025	0.0012 J	0.002	0.0048 U	0.0021	0.0022	0.006 J	0.0017	0.0029	0.00088 J	0.00042 J	0.00077 J	0.001 J	0.00055 J	0.002	0.0013 J	0.0025	0.0023
Perfluorooctanoic acid (PFOA)	100,000	0.011	0.007	0.0066	0.0085	0.011	0.0094 J	0.0037	0.0045	0.0046 U	0.023	0.0097	0.007	0.0078	0.0041	0.0024	0.0032	0.0071	0.0029	0.0094	0.0097
Perfluorooctane sulfonate (PFOS)	5,000	0.025	0.015	0.031	0.0071	0.047	0.027	0.029	0.012	0.029	0.31	0.047	0.053	0.041	0.075	0.042	0.068	0.13	0.012	0.017	0.034
Perfluorodecanoic Acid (PFDA)	100,000	0.0027	0.001 J	0.00048 U	0.00046 U	0.00062 U	0.0038 U	0.00046 U	0.00043 U	0.0040 U	0.00062 U	0.00038 U	0.00048 U	0.00046 U	0.00038 U	0.00046 U	0.00044 U	0.00063 U	0.00038 U	0.00046 U	0.00043 U
6:2 Fluorotelomer sulfonate (6:2 FTS)	NA	0.00039 U	0.0011 U	0.00036 U	0.00034 U	0.00095	0.011 U	0.00035 U	0.00032 U	0.0032 U	0.00039 U	0.0011 U	0.00036 U	0.00034 U	0.0011 U	0.0029	0.0034	0.0072	0.0011 U	0.00042	0.00059
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six																					
Total PFAS	NA	0.0707	0.0634	0.07307	0.05705	0.37335	0.3974	0.16133	0.0571	0.0936	0.5463	0.3127	0.31489	0.28111	0.17849	0.17264	0.20725	0.3989	0.04339	0.08666	0.13162
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	NA	**0.0484**	**0.035**	**0.0484**	**0.0274**	**0.117**	**0.0944**	**0.0638**	**0.0355**	**0.0691**	**0.4657**	**0.1036**	**0.11088**	**0.09622**	**0.09707**	**0.06380**	**0.08985**	**0.1771**	**0.0271**	**0.0453**	**0.078**

Notes:

UCL = Upper Concentration Limit

< = Not detected by the laboratory above the reporting limit. Reporting limit shown.

J = Estimated concentration between the method detection limit and reporting limit.

Results in ug/L, micrograms per liter.

U= Not detected by the Laboratory above the method detection limit. Method detection limit shown.

Bold results above Method 1 GW-1 standard (0.02 ug/L).

Sum of six includes estimated values and does not include non-detects (U or <).

Total PFAS is the sum of all laboratory detected PFAS analytes including estimated values and does not include non-detects (U or <).

NA = Not Applicable.

The Method 1 GW-3 Standard for the individual analytes in the Sum of Six ranges from 500 to 40,000 ug/l.

1. Well elevation increased due to soil cap.

Table 2. Groundwater Results for PFAS Compounds ug/L

Sample Location		ARFF Building Area							
Sample ID	UCL	HW-P (m)	HW-P (m)	HW-P (m)	HW-P (m)	HW-P (m)	HW-Q (s)	HW-Q (s)	HW-Q (m)
Sample Date		10/1/2020	3/18/2021	9/8/2021	3/18/2022	11/2/2022	10/1/2020	11/6/2020	10/1/2020
TOC Elevation		40.64	40.64	40.64	40.64	40.64	37.89	37.89	37.90
Depth to Groundwater		22.80	22.20	23.67	21.73	24.08	21.45	22.04	21.41
Groundwater Elevation		17.84	18.44	16.97	18.91	16.56	16.44	15.85	16.49
Total Well Depth		38.30	38.30	38.30	38.28	38.30	26.60	26.60	36.79
Perfluoroheptanoic acid (PFHpA)	100,000	0.003	0.017	0.016	0.009	0.0083	0.0018 J	0.0021	0.00053 U
Perfluorohexanesulfonic acid (PFHxS)	5,000	0.00085	0.0015 J	0.0013 J	0.002	0.0011 J	0.013	0.0087	0.0019
Perfluorononanoic acid (PFNA)	100,000	0.0011	0.006	0.0099	0.009	0.0095	0.00063 U	0.00063 U	0.00075
Perfluorooctanoic acid (PFOA)	100,000	0.0018	0.0096	0.01	0.0081	0.008	0.0049	0.0062	0.00095
Perfluorooctane sulfonate (PFOS)	5,000	0.0011	0.0035	0.003	0.0026	0.0022	0.0041	0.0075	0.0049
Perfluorodecanoic Acid (PFDA)	100,000	0.00062 U	0.00038 U	0.00048 U	0.00043 U	0.00065 U	0.00062 U	0.00062 U	0.00062 U
6:2 Fluorotelomer sulfonate (6:2 FTS)	NA	0.00092	0.0011 U	0.00036 U	0.00033 U	0.0013 U	0.00039 U	0.00039 U	0.00039 U
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six									
Total PFAS	NA	0.02967	0.17311	0.15362	0.08697	0.0705	0.0307	0.0346	0.00944
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	NA	0.00785	**0.0376**	**0.0402**	**0.0307**	**0.0291**	**0.0238**	**0.0245**	0.0085

Sample Location		Yarmouth Road Area									
Sample ID	UCL	HW-S (s)	HW-S (s)	HW-S (s)	HW-S (s)	HW-S(s)	HW-S (m)	HW-S (m)	HW-S (m)	HW-S (m)	HW-S(m)
Sample Date		10/1/2020	3/18/2021	9/3/2021	3/31/2022	8/8/2022	10/1/2020	3/18/2021	9/3/2021	3/25/2022	8/8/2022
TOC Elevation		31.60	31.60	31.60	31.60	31.60	31.59	31.59	31.59	31.59	31.59
Depth to Groundwater		16.88	16.29	17.30	15.70	16.43	17.01	16.35	17.37	15.48	17.94
Groundwater Elevation		14.72	15.31	14.30	15.90	15.17	14.58	15.24	14.22	16.11	13.65
Total Well Depth		22.10	22.10	22.10	22.20	22.15	32.04	32.04	32.04	32.05	32.11
Perfluoroheptanoic acid (PFHpA)	100,000	0.11	0.14	0.11	0.061	0.16	0.00096	0.0011 J	0.0012 J	0.0018 U	0.0065
Perfluorohexanesulfonic acid (PFHxS)	5,000	0.055	0.083	0.064	0.041	0.12	0.0064	0.0073	0.0053	0.0026	0.0074
Perfluorononanoic acid (PFNA)	100,000	0.1	0.024	0.1	0.043	0.16	0.00063 U	0.00057 J	0.00055 J	0.0018 U	0.0017 U
Perfluorooctanoic acid (PFOA)	100,000	0.062	0.078	0.13	0.05	0.23	0.0013	0.0018 J	0.0014 J	0.0019	0.0049
Perfluorooctane sulfonate (PFOS)	5,000	0.1	0.03	0.048	0.048	0.16	0.0058	0.006	0.0094	0.0052	0.0096
Perfluorodecanoic Acid (PFDA)	100,000	0.00062 U	0.0038 U	0.012 U	0.0019 U	0.0017 U	0.00062 U	0.00038 U	0.00047 U	0.0018 U	0.0017 U
6:2 Fluorotelomer sulfonate (6:2 FTS)	NA	3.7	3.1	5.2	0.0019 U	0.0017 U	0.0065	0.0067	0.0036	0.023	0.0017 U
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six											
Total PFAS	NA	4.8958	4.3105	6.1418	0.5956	1.5581	0.02471	0.03263	0.02873	0.043	0.0564
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	NA	**0.427**	**0.427**	**0.452**	**0.243**	**0.83**	0.01446	0.01677	0.01785	0.0097	**0.0284**

Sample Location		Steamship Parking Lot Area				
Sample ID	UCL	HW-K	HW-K	HW-K	HW-K	HW-K
Sample Date		6/19/2019	5/21/2020	3/18/2021	9/2/2021	3/25/2022
TOC Elevation		37.70	37.70	37.70	37.70	37.70
Depth to Groundwater		20.88	20.56	22.87	24.24	22.93
Groundwater Elevation		16.82	17.14	14.83	13.46	14.77
Total Well Depth		44.18	44.18	44.17	44.18	44.17
Perfluoroheptanoic acid (PFHpA)	100,000	0.0051	0.0028	0.0044	0.0086	0.017
Perfluorohexanesulfonic acid (PFHxS)	5,000	<0.002	0.001	0.00066 J	0.0015 J	0.0019
Perfluorononanoic acid (PFNA)	100,000	<0.002	0.0012	0.0037	0.003	0.0087
Perfluorooctanoic acid (PFOA)	100,000	0.0041	0.0019	0.0036	0.0038	0.012
Perfluorooctane sulfonate (PFOS)	5,000	<0.002	0.0016	0.0015 J	0.0019	0.0037
Perfluorodecanoic Acid (PFDA)	100,000	<0.002	0.00062 U	0.00038 U	0.00046 U	0.0019 U
6:2 Fluorotelomer sulfonate (6:2 FTS)	NA	<0.002	0.00039 U	0.0011 U	0.00034 U	0.0019 U
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six						
Total PFAS	NA	0.0348	0.0275	0.04486	0.09217	0.1864
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	NA	0.0092	0.0085	0.01386	0.0188	**0.0414**

Sample Location		Maher Well Area												
Sample ID	UCL	HW-W(dd)	HW-W(dd)	HW-W(dd)	OW-9S	OW-9S	OW-9S	OW-9M	OW-9M	OW-9D	OW-9D	OW-9D	OW-9DD	OW-9DD	OW-9DD
Sample Date		4/19/2021	9/5/2021	3/16/2022	7/5/2016	12/3/2018	5/8/2020	12/3/2018	5/8/2020	7/5/2016	12/3/2018	5/5/2020	4/11/2017	12/3/2018	10/2/2020
TOC Elevation		NA	NA	NA	23.25	23.25	23.25	23.53	23.53	23.22	23.22	23.22	23.81	23.81	23.81
Depth to Groundwater		28.67	29.89	28.85	12.23	10.80	10.14	11.11	10.45	12.48	10.82	10.15	12.10	11.30	13.04
Groundwater Elevation		NA	NA	NA	11.02	12.45	13.11	12.42	13.08	10.74	12.40	13.07	11.71	12.51	10.77
Total Well Depth		72.10	72.09	73.61	21.35	21.35	21.35	56.20	56.20	68.63	68.63	68.63	86.75	86.75	86.75
Perfluoroheptanoic acid (PFHpA)	100,000	0.0091	0.0073	0.0077	0.014	0.048	0.0064	0.11	0.0061	0.0028	0.033	0.044	0.034	0.015 J	0.0085
Perfluorohexanesulfonic acid (PFHxS)	5,000	0.0086	0.0048	0.02	<0.003	0.023	0.011	0.0056 U	0.0033	0.012	0.12	0.18	0.12	0.042	0.019
Perfluorononanoic acid (PFNA)	100,000	0.0014 J	0.002	0.0015 J	0.0077	0.0087 U	0.0033	0.044	0.0037	0.0036	0.1	0.15	0.059	0.038	0.018
Perfluorooctanoic acid (PFOA)	100,000	0.0046	0.0069	0.0059	0.007	0.032	0.0043	0.052	0.0035	0.0052	0.057	0.088	0.055	0.020 J	0.01
Perfluorooctane sulfonate (PFOS)	5,000	0.015	0.0081	0.035	0.0074	0.024	0.0058	0.0081 J	0.01	0.041	0.52	0.72	0.5	0.14	0.049
Perfluorodecanoic Acid (PFDA)	100,000	0.00038 U	0.00049 U	0.00045 U	NA	0.0061 U	0.00062 U	0.0061 U	0.00062 U	NA	0.0061 U	0.00062 U	0.0040 U	0.0061 U	0.00062 U
6:2 Fluorotelomer sulfonate (6:2 FTS)	NA	0.0011 U	0.00036 U	0.0033 U	NA	0.0066 U	0.00039 U	0.64	0.0049	NA	0.19	0.23	0.13	0.062	0.02
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six															
Total PFAS	NA	0.10469	0.0563	0.11378	0.0361	0.618	0.06678	1.7141	0.0816	0.0646	1.217	1.5845	1.02	0.39	0.169
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	NA	**0.0387**	**0.0291**	**0.0701**	**0.0361**	**0.127**	**0.0308**	**0.2141**	**0.0266**	**0.0646**	**0.83**	**1.182**	**0.768**	**0.255**	**0.1045**

Notes:

UCL = Upper Concentration Limit
< = Not detected by the laboratory above the reporting limit. Reporting limit shown.
J = Estimated concentration between the method detection limit and reporting limit.
Results in ug/L, micrograms per liter.
U= Not detected by the Laboratory above the method detection limit. Method detection limit shown.
Bold results above Method 1 GW-1 standard (0.02 ug/L).
Sum of six includes estimated values and does not include non-detects (U or <).
Total PFAS is the sum of all laboratory detected PFAS analytes including estimated values and does not include non-detects (U or <).
NA = Not Applicable.

Table 3 - 1,4 Dioxane Groundwater Results ug/L

Sample Location	North Ramp																	Airport Road/Iyannough Road Area							ARFF Building			
Sample ID	HW-1	HW-1	HW-5	HW-12	OW-6	OW-6	HW-4M	HW-4D	HW-204	HW-29	HW-207S	HW-207D	HW-207D	HW-19D	HW-19D	HW-X(s)	HW-X(m)	HW-A(D)	HW-A(D)	HW-B(D)	HW-N	HW-O	HW-U(d)	HW-V(m)	HW-L(s)	HW-L(m)	HW-L(d)	HW-L(d)
Sample Date	5/7/2015	8/5/2019	5/7/2015	5/7/2015	5/7/2015	9/27/2019	4/5/2017	4/5/2017	9/27/2019	9/27/2019	9/27/2019	4/5/2017	9/27/2019	4/5/2017	9/27/2019	9/10/2021	9/10/2021	4/5/2017	8/5/2019	4/5/2017	8/5/2019	8/5/2019	10/2/2020	10/2/2020	10/7/2020	10/7/2020	7/2/2019	5/13/2020
1,4-Dioxane	<0.152	<0.25	<0.150	<0.150	<0.150	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.19	<0.22	<0.25	<0.25	<0.25	<0.25	<0.25	**0.73**	**0.8**	<0.2	<0.2	**0.727**	**0.75**

Sample Location	Maher Well Field															Deployment Area	
Sample ID	OW-9M	OW-9D	OW-9D	OW-9D	OW-9DD	OW-9DD	OW-9DD	OW-18M	OW-18D	OW-18D	OW-18D	OW-19M	OW-19D	OW-19D	OW-19D	HW-E	HW-J
Sample Date	5/28/2015	5/28/2015	12/3/2018	5/5/2020	5/28/2015	4/11/2017	12/3/2018	4/11/2017	4/11/2017	12/7/2018	5/13/2020	4/11/2017	4/11/2017	12/7/2018	5/13/2020	9/10/2021	9/10/2021
1,4-Dioxane	<0.141	<0.141	<0.25	<0.19	**0.926**	**0.838**	**0.732**	<0.25	**0.552**	<0.25	**0.35**	<0.25	**0.800**	<0.25	**0.3**	<0.20	<0.20

Notes:
Results in ug/L, micrograms per liter.
< = Not detected by the laboratory above the reporting limit. Reporting limit shown.
Bold results above Method 1 GW-1 standard (0.3 ug/L).
The Method 1 GW-2 standard for 1,4-dioxane is 6,000 ug/l.
The Method 1 GW-3 standard for 1,4-dioxane is 50,000 ug/l.

Table 4. ARFF Concentrate Analytical Results ug/L

Sample ID	Foam Mix
Sample Date	12/9/2016
Perfluoroheptanoic acid (PFHpA)	3.4 J
Perfluorohexanesulfonic acid (PFHxS)	2.1 J
Perfluorononanoic acid (PFNA)	93
Perfluorooctanoic acid (PFOA)	19
Perfluorooctane sulfonate (PFOS)	5 U
Perfluorodecanoic Acid (PFDA)	2.8 J
6:2 FTS	33
Total PFAS	222.5
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	120.3

Notes:

1. U = Not detected by the laboratory above the Method Detection Limit. Method Detection Limit shown.
2. Results in ug/L, micrograms per liter.
3. Total PFAS is the sum of all laboratory detected PFAS analytes including estimated values and does not include non-detects (U).
4. Sample is AFFF concentrate.
5. J = Estimated concentration between the Method Detection Limit and the Laboratory Reporting Limit.

Table 5. SPLP Results ug/L

Sample ID	DL4 4'	DL5 2'	DL8 (4')	DL14(0-1')	Stockpile West	Stockpile East	ARFF Rubber Roof	ARFF Asphalt Roof
Sample Date	9/26/2017	9/26/2017	9/26/2017	9/26/2017	10/10/2017	10/10/2017	11/17/2020	11/17/2020
Perfluoroheptanoic acid (PFHpA)	0.011 U	0.011 U	0.065 J	0.17	0.011 U	0.011 U	0.00279	0.0002 U
Perfluorohexanesulfonic acid (PFHxS)	0.0072 U	0.0072 U	0.036 U	0.01 J	0.0072 U	0.0072 U	0.00034 U	0.00036 U
Perfluorononanoic acid (PFNA)	0.16	0.0032 U	0.052 J	0.37	0.0032 U	0.0032 U	0.00068 J	0.00028 U
Perfluorooctanoic acid (PFOA)	0.012 J	0.042	0.6	0.87	0.0037 U	0.0037 U	0.0073	0.00021 U
Perfluorooctane sulfonate (PFOS)	0.013 J	0.0072 U	0.036 U	0.19	0.0072 U	0.0072 U	0.00045 U	0.00202
Perfluorodecanoic Acid (PFDA)	0.0052 U	0.0052 U	0.026 U	0.34	0.0052 U	0.0052 U	0.000364 J	0.000271 U
6:2 FTS	0.067	0.0072 U	25	7.13	0.034 J	0.024 J	0.0154 J	0.0017 J
Total PFAS	0.195	0.042	26.25	20.195	0.034	0.024	0.072723	0.07957
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	0.185	0.042	0.717	1.95	0.011 U	0.011 U	0.011133	0.00202

Notes:

1. U = Not detected by the laboratory above the Method Detection Limit. Method Detection Limit shown.
2. Results in ug/L, micrograms per liter.
3. Total PFAS is the sum of all laboratory detected PFAS analytes including estimated values and does not include non-detects (U).

Table 6: Background PFAS Levels in Soil and Soilstock Pile Samples

Background Sample Locations																									
Sample ID	Method 1 Standard		Stockpile West	Stockpile East	Loam Pile	BG-1 0-1'	BG-2 0-1'	BG-3 0-1'	BG-4 0-1'	BG-5 0-1'	BG-6 0-1'	BG-7 0-1'	BG-8 0-1'	BG-9 0-1'	BG-10 0-1'	BG-11 0-1'	BG-12 0-1'	BG-13 0-1'	BG-14 0-1'	BG-15 0-1'	BG-16 0-1'	BG-17 0-1'	BG-18 0-1'	BG-19 0-1'	BG-20 0-1'
Sample Date	S-1/GW-1	S-1/GW-3	10/10/2017	10/10/2017	10/10/2017	10/26/2017	10/26/2017	10/26/2017	10/26/2017	10/26/2017	10/26/2017	10/26/2017	10/26/2017	10/26/2017	10/26/2017	12/14/2017	12/14/2017	12/14/2017	12/14/2017	12/14/2017	12/14/2017	12/14/2017	12/14/2017	12/14/2017	12/14/2017
Sample Location			On-Airport	On-Airport	On-Airport	Off-Airport	On-Airport	On-Airport	On-Airport	On-Airport	On-Airport	On-Airport	On-Airport	Off-Airport	Off-Airport	Off-Airport	Off-Airport	Off-Airport	Off-Airport	Off-Airport	Off-Airport	Off-Airport	Off-Airport	Off-Airport	Off-Airport
Perfluoroheptanoic acid (PFHpA)	0.5	300	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.18 J	0.17 U	0.18 J	0.17 U	0.17 U	0.23 J	0.17 U	0.17 U	0.19 U	0.19 U	0.19 U	0.19 U	0.44 J	0.19 U	0.19 U	0.35 J	0.19 U	0.46 J
Perfluorohexanesulfonic acid (PFHxS)	0.3	300	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.24 U	**0.39 J**	0.24 U	0.24 U	**0.57 J**	**0.47 J**	0.24 U	**0.49 J**	0.24 U	0.24 U
Perfluorooctanoic acid (PFOA)	0.72	300	0.26 U	0.26 U	0.26 U	0.58 J	0.26 U	0.26 U	0.16 U	0.47 J	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	**0.75 J**	0.67 J	0.33 J	0.25 U	0.46 J	0.37 J	0.36 J	0.5 J	0.25 U	**0.86 J**
Perfluorononanoic acid (PFNA)	0.32	300	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.22 U	0.29 J	0.22 U	0.22 U	**0.53 J**	0.22	**0.67 J**	**0.41 J**	0.22 U	0.22 U
Perfluorooctane sulfonate (PFOS)	2	300	0.38 J	0.39 J	0.81 J	0.21 U	0.7 J	0.38 J	**2.3**	0.41 J	0.32 J	0.33 J	0.31 J	1.3	0.62 J	0.41 J	0.76 J	0.99	0.26 U	**3.1**	2	0.36 J	**2.3**	0.41 J	0.44 J
Perfluorodecanoic Acid (PFDA)	0.3	300	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.28 U	0.28 U	**0.36 J**	0.28 U	**0.31 J**	**0.41 J**	0.28 U	**0.41 J**	0.28 U	0.28 U
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six																									
Total PFAS	NA	NA	1.78	0.91	0.81	1.47	0.7	0.56	3.21	1.31	0.32	0.3	0.84	1.3	0.62	1.16	2.73	1.68	0	6.79	3.77	5.09	5.45	0.41	2.43
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	NA	NA	0.38	0.39	0.81	0.58	0.7	0.56	2.3	1.06	0.32	0.33	0.54	1.3	0.62	1.16	2.11	1.68	0	5.41	3.47	1.39	4.46	0.41	1.76

Notes:
J = Estimated concentration between the method detection limit and reporting limit.
Results in ug/kg, micrograms per kilogram.
U= Not detected by the Laboratory above the method detection limit. Method detection limit shown.
Bold results above the proposed Method 1 S-1/GW-1 standard.
Total PFAS is the sum of all laboratory detected PFAS analytes including estimated values and does not include non-detects (U or <).
Sum of six includes estimated values and does not include non-detects (U or <).

Table 7. Surface Water Results for PFAS ug/L

	Surface Water		
Sample ID	Kmart	LP-1	UGP-1
Sample Date	6/20/2017	7/11/19	7/11/19
Perfluoroheptanoic acid (PFHpA)	0.0033 U	<0.01	<0.02
Perfluorohexanesulfonic acid (PFHxS)	0.0034 U	<0.01	<0.02
Perfluorononanoic acid (PFNA)	0.0043 J	<0.01	<0.02
Perfluorooctanoic acid (PFOA)	0.0026 U	<0.01	<0.02
Perfluorooctane sulfonate (PFOS)	0.0046 U	<0.01	<0.02
Perfluorodecanoic Acid (PFDA)	0.0040 U	<0.01	<0.02
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six			
Total PFAS	0.0174	0.018	0.047
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	0.0043	<0.01	<0.02

Notes:

< = Not detected by the laboratory above the reporting limit. Reporting limit shown.

J = Estimated concentration between the method detection limit and reporting limit.

Results in ug/L, micrograms per liter.

U= Not detected by the laboratory above the method detection limit. Method detection limit shown.

Sum of six includes estimated values and does not include non-detects (U or <).

Total PFAS is the sum of all laboratory detected PFAS analytes including estimated values and does not include non-detects (U or <).

Currently MassDEP has not issued a surface water standard for PFAS.

The Method 1 GW-1 Standard for the Sum of Six is 0.02 ug/l.

The Method 1 GW-3 Standard for the individual analytes in the Sum of Six range from 500 to 40,000 ug/l.

Table 8: Ratio of Stable Isotopes Oxygen-18 and Hydrogen-2 Laboratory Results

Sample Date	Lab Sample ID	HW Sample ID	Stable Isotope Oxygen-18			Stable Isotope Hydrogen-2		
			δ18O (V-SMOW)	Atm %	Expected Values	δ18O (V-SMOW)	Atm %	Expected Values
11/7/2018	1811299-2	HW-I	-6.92	0.20	-	-40.41	0.01494	-
			-6.77	0.20	-	-40.17	0.01495	-
	1811299-4	HW-E	-6.79	0.20	-	-38.56	0.01497	-
			-6.85	0.20	-	-38.87	0.01497	-
	1811299-5	HW-F	-6.9	0.20	-	-38.28	0.01498	-
			-6.88	0.20	-	-38.15	0.01498	-
	1811299-7	SW-2	-2.67	0.20	-	-18.65	0.01528	-
			-2.61	0.20	-	-20.42	0.01526	-
						-23.04	0.01521	-
12/3/2018	1812198-1	HW-G(S)	-6.74	0.20	-	-38.19	0.01498	-
			-6.93	0.20	-	-37.87	0.01498	-
	1812198-2	HW-G(M)	-7.53	0.20	-	-44.34	0.01498	-
			-7.57	0.20	-	-44.39	0.01498	-
	1812198-3	HW-G(D)	-7.18	0.20	-	-44.15	0.01489	-
			-7.45	0.20	-	-44.56	0.01488	-
	1812198-4	OW-9S	-7.29	0.20	-	-41.86	0.01492	-
			-7.41	0.20	-	-42.94	0.0149	-
	1812198-5	OW-9D	-7.76	0.20	-	-47.91	0.01483	-
			-7.71	0.20	-	-46.82	0.01484	-
					-	-47.20	0.01484	-
	1812198-6	OW-9DD	-7.52	0.20	-	-45.58	0.01486	-
			-7.57	0.20	-	-45.48	0.01487	-
	1812198-7	OW-9M	-7.13	0.20	-	-41.44	0.01493	-
			-7.24	0.20	-	-43.40	0.0149	-
12/7/2018	1812232-1	OW-18S	-7.58	0.20	-	-49.29	0.01481	-
			-7.54	0.20	-	-49.66	0.0148	-
	1812232-2	OW-18M	-6.95	0.20	-	-42.64	0.01491	-
			-6.89	0.20	-	-42.57	0.01491	-
	1812232-3	OW-18D	-7.28	0.20	-	-44.76	0.01488	*
			-7.36	0.20	-	-41.61	0.01493	*
QA/QC	IAEA OH-14	-	-5.64	0.20	-5.6	-37.45	0.01499	-37.70
	IAEA OH-15	-	-9.59	0.20	-9.41	-77.89	0.01436	-78
	IAEA OH-16	-	-15.72	0.20	-15.41	-	-	-113.8
	Antarc IC	-	-29.83	0.19	-30	-	-	-239.69

Table 9. Fire Truck Spray Water PFAS Results ug/L

	Fire Truck Spray Water Spray											
Sample ID	Hose		Roof		Bumper		Officer Side Handline		Driver side-Rear		Officer side-Rear	
Sample Date	8/22/2019	11/12/2019	8/22/2019	11/12/2019	8/22/2019	11/12/2019	8/22/2019	11/12/2019	8/22/2019	11/12/2019	8/22/2019	11/12/2019
Perfluoroheptanoic acid (PFHpA)	0.073	<0.002	0.0045	<0.002	0.0039	<0.002	0.027	<0.002	0.0055	<0.002	0.081	0.0021
Perfluorohexanesulfonic acid (PFHxS)	0.0059	<0.002	0.0033	<0.002	0.0039	<0.002	0.004	<0.002	0.0048	<0.002	0.0043	<0.002
Perfluorononanoic acid (PFNA)	0.011	<0.002	0.0026	<0.002	0.0031	<0.002	0.013	<0.002	0.003	<0.002	0.016	<0.002
Perfluorooctanoic acid (PFOA)	0.088	0.0062	0.0087	<0.002	0.01	<0.002	0.039	<0.002	0.011	<0.002	0.076	0.0041
Perfluorooctane sulfonate (PFOS)	0.009	0.0021	0.0068	<0.002	0.006	<0.002	0.0087	<0.002	0.0093	<0.002	0.0086	<0.002
Perfluorodecanoic Acid (PFDA)	0.014	<0.002	0.004	<0.002	0.0045	<0.002	0.032	<0.002	0.0049	<0.002	0.032	<0.002
Total PFAS	5.7017	0.3391	0.9195	0.0205	0.7817	0.0167	4.1098	0.0481	0.8302	0.0087	5.4701	0.086
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	**0.2009**	0.0083	**0.0299**	<0.002	**0.0314**	<0.002	**0.1237**	<0.002	**0.0385**	<0.002	**0.2179**	0.0041

Notes:

< = Not detected by the laboratory above the reporting limit. Reporting limit shown.

Results in ug/L, micrograms per liter.

Bold results above proposed MassDEP GW-1 standard (0.02 ug/L)

Total PFAS is the sum of all laboratory detected PFAS analytes including estimated values and does not include non-detects (U or <).

Table 10: Total Organic Carbon Levels (mg/kg)

Total Organic Carbon Concentration																	
Sample ID	HW-W dd 3-5 ft	HW-W dd 8-10 ft	HW-W dd 18-20 ft	HW-W dd 23-25 ft	HW-W dd 28-30 ft	HW-W dd 33-35 ft	HW-W dd 38-40 ft	HW-W dd 43-45 ft	HW-W dd 48-50 ft	HW-W dd 58-60 ft	HW-W dd 63-65 ft	S1 0-2ft	S1 2-4ft	S1 4-6ft	S2 0-2ft	S2 2-4ft	S2 4-6ft
Sample Date	04/06/2021	04/06/2021	04/06/2021	04/06/2021	04/06/2021	04/06/2021	04/06/2021	04/06/2021	04/06/2021	04/06/2021	04/06/2021	4/19/2021	4/19/2021	4/19/2021	4/19/2021	4/19/2021	4/19/2021
Sample Depth (ft below grade)	3-5	8-10	18-20	23-25	28-30	33-35	38-40	43-45	48-50	58-60	63-65	0-2	2-4	4-6	0-2	2-4	4-6
Sample Location	Water Department Property	Water Department Property	Water Department Property	Water Department Property	Water Department Property	Water Department Property	Water Department Property	Water Department Property	Water Department Property	Water Department Property	Water Department Property	Deployment Area	Deployment Area	Deployment Area	Deployment Area	Deployment Area	Deployment Area
Total Organic Carbon	94.8 U	94.3 U	96.5 U	93.9 U	95.7 U	93.5 U	96.9 U	95.7 U	95.7 U	95.7 U	95.7 U	28,900	1,150	180	1,550	95.1 U	3,500

Notes:
Results in mg/kg, milligrams per kilogram.
U= Not detected by the Laboratory above the method detection limit. Method detection limit shown.

Table 11.Runway 6/24 Surface Soil Results ug/kg

Sample Location	Surface Soils								
Sample ID	Method 1 Standard		UCL	6-24 A (0-1)	6-24 A (1-2)	6-24 B (0-1)	6-24 B (1-2)	6-24 C (0-1)	6-24 C (1-2)
Sample Date	S-1/GW-1	S-1/GW-3		3/2/2022	3/2/2022	3/2/2022	3/2/2022	3/4/2022	3/4/2022
Perfluoroheptanoic acid (PFHpA)	0.5	300	4,000	<0.051	<0.046	0.068 J	<0.049	<0.055	0.079 J
Perfluorohexanesulfonic acid (PFHxS)	0.3	300	4,000	<0.068	<0.062	<0.064	<0.066	<0.074	<0.069
Perfluorooctanoic acid (PFOA)	0.72	300	4,000	<0.047	0.115 J	0.136 J	0.106 J	0.058 J	0.156 J
Perfluorononanoic acid (PFNA)	0.32	300	4,000	<0.085	<0.077	0.115 J	<0.082	<0.091	<0.085
Perfluorooctane sulfonate (PFOS)	2	300	4,000	0.318	0.361	0.471	0.196 J	0.654	0.297
Perfluorodecanoic Acid (PFDA)	0.3	300	4,000	<0.076	<0.069	<0.071	<0.073	<0.082	<0.076
6:2 Fluorotelomer sulfonate (6:2 FTS)	NA	NA	NA	<0.203	<0.184	<0.19	<0.197	<0.219	<0.203
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six									
Total PFAS	NA	NA	NA	0.457	0.731	1.312	0.55	1.123	0.85
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	NA	NA	NA	0.318	0.476	0.79	0.302	0.712	0.532

Notes:
< = Not detected by the laboratory above the reporting limit. Reporting limit shown.
J = Estimated concentration between the method detection limit and reporting limit.
Results in ug/kg, micrograms per kilogram.
U= Not detected by the Laboratory above the method detection limit. Method detection limit shown.
Bold results above the Method 1 S-1/GW-1 standard.
Total PFAS is the sum of all laboratory detected PFAS analytes including estimated values and does not include non-detects (U or <).
Sum of six includes estimated values and does not include non-detects (U or <).
UCL = Upper Concentration Limit
Sample depth in feet below grade in parenthesis

APPENDIX A

Laboratory Analysis Reports (Not Previously Submitted to MassDEP)

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

October 25, 2022

Bryan Massa
Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563

Project Location: Mahes Wellfield
Client Job Number:
Project Number: 22071
Laboratory Work Order Number: 22H0298

Enclosed are results of analyses for samples as received by the laboratory on August 4, 2022. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Kaitlyn A. Feliciano
Project Manager

Table of Contents

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563
ATTN: Bryan Massa

REPORT DATE: 10/25/2022

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 22071

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 22H0298

The results of analyses performed on the following samples submitted to CON-TEST, a Pace Analytical Laboratory, are found in this report.

PROJECT LOCATION: Mahes Wellfield

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
ME-1	22H0298-01	Ground Water		-	
				SOP-454 PFAS	
ME-3	22H0298-02	Ground Water		SOP-454 PFAS	
ME-2	22H0298-03	Ground Water		SOP-454 PFAS	
HW-I (s)	22H0298-04	Ground Water		SOP-454 PFAS	
HW-I (m)	22H0298-05	Ground Water		SOP-454 PFAS	
HW-I (d)	22H0298-06	Ground Water		SOP-454 PFAS	

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

REVISED REPORT 10/25/22- PFAS reported down to MDL

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Qualifications:

L-04

Laboratory fortified blank/laboratory control sample recovery and duplicate recovery are outside of control limits. Reported value for this compound is likely to be biased on the low side.

Analyte & Samples(s) Qualified:

Hexafluoropropylene oxide dimer a
22H0298-01[ME-1], 22H0298-02[ME-3], 22H0298-03[ME-2], 22H0298-04[HW-I (s)], 22H0298-05[HW-I (m)], B315452-BS1, B315452-BSD1

N-EtFOSAA
22H0298-01[ME-1], 22H0298-02[ME-3], 22H0298-03[ME-2], 22H0298-04[HW-I (s)], 22H0298-05[HW-I (m)], B315452-BS1, B315452-BSD1

L-07

Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD between the two LFB/LCS results is within method specified criteria.

Analyte & Samples(s) Qualified:

6:2 Fluorotelomersulfonic acid (6:2
22H0298-01[ME-1], 22H0298-02[ME-3], 22H0298-03[ME-2], B315452-BSD1

PF-17

Extracted Internal Standard recovery is outside of control limits. Data is not significantly affected since associated analyte is not detected and bias is on the high side.

Analyte & Samples(s) Qualified:

d5-NEtFOSAA
22H0298-01[ME-1], 22H0298-02[ME-3], 22H0298-03[ME-2], 22H0298-04[HW-I (s)], 22H0298-05[HW-I (m)], B315452-BLK1

M2-8:2FTS
B315452-BLK1, S075995-IBL1

M3HFPO-DA
22H0298-01[ME-1], 22H0298-02[ME-3], 22H0298-03[ME-2], 22H0298-04[HW-I (s)], 22H0298-05[HW-I (m)], B315452-BLK1

S-29

Extracted Internal Standard is outside of control limits.

Analyte & Samples(s) Qualified:

d3-NMeFOSAA
22H0298-01[ME-1]

d5-NEtFOSAA
B315452-BS1, B315452-BSD1

M2-4:2FTS
22H0298-01[ME-1], 22H0298-01RE1[ME-1], S076727-CCV3, S076727-CCV6

M2-6:2FTS
22H0298-01[ME-1], 22H0298-04[HW-I (s)], S076727-CCV3

M2-8:2FTS
22H0298-01[ME-1], B315452-BS1

M2PFTA
22H0298-01[ME-1]

M3HFPO-DA
B315452-BS1, B315452-BSD1, S076727-CCV3, S076727-CCV4

M3PFHxS
22H0298-01[ME-1]

M4PFHpA
22H0298-01[ME-1]

M5PFHxA
22H0298-01[ME-1]

M5PFPeA
22H0298-01[ME-1]

M6PFDA
22H0298-01[ME-1]

M7PFUnA
22H0298-01[ME-1]

M8FOSA
22H0298-01[ME-1], 22H0298-06[HW-I (d)]

M8PFOA
22H0298-01[ME-1]

M8PFOS
22H0298-01[ME-1]

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

S-29

Extracted Internal Standard is outside of control limits.

Analyte & Samples(s) Qualified:

M9PFNA
22H0298-01[ME-1]

MPFBA
22H0298-01[ME-1]

MPFDoA
22H0298-01[ME-1]

V-05

Continuing calibration verification (CCV) did not meet method specifications and was biased on the low side for this compound.

Analyte & Samples(s) Qualified:

Perfluoro-4-oxapentanoic acid (PF
S076727-CCV6

Z-01

Original extract within hold. Re-extract to confirm extracted internal standard recoveries performed outside of hold. Re-extract resulted in conforming data for many analytes. Both results reported.

Analyte & Samples(s) Qualified:

22H0298-01RE1[ME-1]

Z-01a

Sample analyzed at a refortified dilution.

Analyte & Samples(s) Qualified:

22H0298-04RE1[HW-I (s)]

Z-01b

Signal to noise on quantification ion <10. Detection suspect.

Analyte & Samples(s) Qualified:

Perfluoroheptanesulfonic acid (PFI
22H0298-01[ME-1]

The results of analyses reported only relate to samples submitted to Con-Test, a Pace Analytical Laboratory, for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Lisa A. Worthington
Technical Representative

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Mahes Wellfield | Sample Description: | Work Order: 22H0298

Date Received: 8/4/2022

Field Sample #: ME-1 | Sampled: 7/29/2022 10:10

Sample ID: 22H0298-01

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	25	1.7	0.64	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
Perfluorobutanoic acid (PFBA)	15	1.7	0.65	ng/L	1		SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
Perfluorobutanesulfonic acid (PFBS)	3.3	1.7	0.24	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
Perfluorobutanesulfonic acid (PFBS)	2.3	1.7	0.25	ng/L	1		SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
Perfluoropentanoic acid (PFPeA)	89	1.7	0.34	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
Perfluoropentanoic acid (PFPeA)	55	1.7	0.34	ng/L	1		SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
Perfluorohexanoic acid (PFHxA)	54	1.7	0.33	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
Perfluorohexanoic acid (PFHxA)	32	1.7	0.34	ng/L	1		SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
11Cl-PF3OUdS (F53B Major)	ND	1.7	0.56	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
11Cl-PF3OUdS (F53B Major)	ND	1.7	0.56	ng/L	1		SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
9Cl-PF3ONS (F53B Minor)	ND	1.7	0.34	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
9Cl-PF3ONS (F53B Minor)	ND	1.7	0.34	ng/L	1		SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.7	0.30	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.7	0.30	ng/L	1		SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.7	0.21	ng/L	1	L-04	SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.7	0.21	ng/L	1		SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
8:2 Fluorotelomersulfonic acid (8:2FTS A)	0.98	1.7	0.53	ng/L	1	J	SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
8:2 Fluorotelomersulfonic acid (8:2FTS A)	0.69	1.7	0.53	ng/L	1	J	SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
Perfluorodecanoic acid (PFDA)	1.3	1.7	0.42	ng/L	1	J	SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
Perfluorodecanoic acid (PFDA)	0.79	1.7	0.43	ng/L	1	J	SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
Perfluorododecanoic acid (PFDoA)	ND	1.7	0.38	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
Perfluorododecanoic acid (PFDoA)	ND	1.7	0.38	ng/L	1		SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.7	0.20	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.7	0.20	ng/L	1		SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
Perfluoroheptanesulfonic acid (PFHpS)	2.9	1.7	0.81	ng/L	1	Z-01b	SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
Perfluoroheptanesulfonic acid (PFHpS)	2.0	1.7	0.82	ng/L	1		SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
N-EtFOSAA	ND	1.7	0.55	ng/L	1	L-04	SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
N-EtFOSAA	ND	1.7	0.55	ng/L	1		SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
N-MeFOSAA	ND	1.7	0.66	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
N-MeFOSAA	ND	1.7	0.66	ng/L	1		SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
Perfluorotetradecanoic acid (PFTA)	ND	1.7	0.32	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
Perfluorotetradecanoic acid (PFTA)	ND	1.7	0.32	ng/L	1		SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
Perfluorotridecanoic acid (PFTrDA)	ND	1.7	0.24	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
Perfluorotridecanoic acid (PFTrDA)	ND	1.7	0.24	ng/L	1		SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.7	0.24	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.7	0.25	ng/L	1		SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
Perfluorodecanesulfonic acid (PFDS)	ND	1.7	0.28	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
Perfluorodecanesulfonic acid (PFDS)	ND	1.7	0.28	ng/L	1		SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
Perfluorooctanesulfonamide (FOSA)	ND	1.7	0.36	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
Perfluorooctanesulfonamide (FOSA)	ND	1.7	0.37	ng/L	1		SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
Perfluorononanesulfonic acid (PFNS)	ND	1.7	0.15	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Mahes Wellfield | Sample Description: | Work Order: 22H0298

Date Received: 8/4/2022

Field Sample #: ME-1 | Sampled: 7/29/2022 10:10

Sample ID: 22H0298-01

Sample Matrix: Ground Water

Sample Flags: Z-01

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorononanesulfonic acid (PFNS)	ND	1.7	0.15	ng/L	1		SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
Perfluoro-1-hexanesulfonamide (FHxSA)	0.71	1.7	0.27	ng/L	1	J	SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
Perfluoro-1-hexanesulfonamide (FHxSA)	1.0	1.7	0.27	ng/L	1	J	SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
Perfluoro-1-butanesulfonamide (FBSA)	1.6	1.7	0.17	ng/L	1	J	SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
Perfluoro-1-butanesulfonamide (FBSA)	1.2	1.7	0.17	ng/L	1	J	SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
Perfluorohexanesulfonic acid (PFHxS)	58	1.7	0.29	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
Perfluorohexanesulfonic acid (PFHxS)	31	1.7	0.29	ng/L	1		SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.7	0.36	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.7	0.36	ng/L	1		SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.7	0.30	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.7	0.30	ng/L	1		SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
6:2 Fluorotelomersulfonic acid (6:2FTS A)	46	1.7	0.32	ng/L	1	L-07	SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
6:2 Fluorotelomersulfonic acid (6:2FTS A)	27	1.7	0.32	ng/L	1		SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
Perfluoropetanesulfonic acid (PFPeS)	3.7	1.7	0.22	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
Perfluoropetanesulfonic acid (PFPeS)	2.1	1.7	0.22	ng/L	1		SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
Perfluoroundecanoic acid (PFUnA)	0.71	1.7	0.32	ng/L	1	J	SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
Perfluoroundecanoic acid (PFUnA)	0.50	1.7	0.32	ng/L	1	J	SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.7	0.24	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.7	0.24	ng/L	1		SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
Perfluoroheptanoic acid (PFHpA)	25	1.7	0.30	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
Perfluoroheptanoic acid (PFHpA)	15	1.7	0.30	ng/L	1		SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
Perfluorooctanoic acid (PFOA)	29	1.7	0.59	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
Perfluorooctanoic acid (PFOA)	16	1.7	0.59	ng/L	1		SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
Perfluorooctanesulfonic acid (PFOS)	120	1.7	0.52	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
Perfluorooctanesulfonic acid (PFOS)	81	1.7	0.52	ng/L	1		SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH
Perfluorononanoic acid (PFNA)	21	1.7	0.30	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:51	DRL
Perfluorononanoic acid (PFNA)	12	1.7	0.30	ng/L	1		SOP-454 PFAS	9/1/22	9/19/22 3:30	BLH

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Project Location: Mahes Wellfield | Sample Description: | Work Order: 22H0298

Date Received: 8/4/2022

Field Sample #: ME-3 | Sampled: 7/29/2022 10:20

Sample ID: 22H0298-02

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	6.1	1.7	0.64	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
Perfluorobutanesulfonic acid (PFBS)	2.1	1.7	0.24	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
Perfluoropentanoic acid (PFPeA)	20	1.7	0.34	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
Perfluorohexanoic acid (PFHxA)	15	1.7	0.33	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
11Cl-PF3OUdS (F53B Major)	ND	1.7	0.55	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
9Cl-PF3ONS (F53B Minor)	ND	1.7	0.34	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.7	0.30	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.7	0.21	ng/L	1	L-04	SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	1.7	0.52	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
Perfluorodecanoic acid (PFDA)	ND	1.7	0.42	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
Perfluorododecanoic acid (PFDoA)	ND	1.7	0.38	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.7	0.20	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
Perfluoroheptanesulfonic acid (PFHpS)	1.7	1.7	0.81	ng/L	1	J	SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
N-EtFOSAA	ND	1.7	0.54	ng/L	1	L-04	SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
N-MeFOSAA	ND	1.7	0.65	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
Perfluorotetradecanoic acid (PFTA)	ND	1.7	0.32	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
Perfluorotridecanoic acid (PFTrDA)	ND	1.7	0.24	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.7	0.24	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
Perfluorodecanesulfonic acid (PFDS)	ND	1.7	0.28	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
Perfluorooctanesulfonamide (FOSA)	4.3	1.7	0.36	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
Perfluorononanesulfonic acid (PFNS)	ND	1.7	0.14	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
Perfluoro-1-hexanesulfonamide (FHxSA)	1.8	1.7	0.27	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
Perfluoro-1-butanesulfonamide (FBSA)	0.93	1.7	0.16	ng/L	1	J	SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
Perfluorohexanesulfonic acid (PFHxS)	29	1.7	0.29	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.7	0.36	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.7	0.29	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
6:2 Fluorotelomersulfonic acid (6:2FTS A)	5.4	1.7	0.31	ng/L	1	L-07	SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
Perfluoropetanesulfonic acid (PFPeS)	2.0	1.7	0.22	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
Perfluoroundecanoic acid (PFUnA)	ND	1.7	0.32	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.7	0.24	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
Perfluoroheptanoic acid (PFHpA)	6.5	1.7	0.30	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
Perfluorooctanoic acid (PFOA)	12	1.7	0.59	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
Perfluorooctanesulfonic acid (PFOS)	70	1.7	0.52	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL
Perfluorononanoic acid (PFNA)	5.4	1.7	0.30	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 3:58	DRL

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Project Location: Mahes Wellfield | Sample Description: | Work Order: 22H0298

Date Received: 8/4/2022

Field Sample #: ME-2 | Sampled: 7/29/2022 10:30

Sample ID: 22H0298-03

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	12	1.7	0.65	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
Perfluorobutanesulfonic acid (PFBS)	3.5	1.7	0.24	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
Perfluoropentanoic acid (PFPeA)	47	1.7	0.34	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
Perfluorohexanoic acid (PFHxA)	34	1.7	0.33	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
11Cl-PF3OUdS (F53B Major)	ND	1.7	0.56	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
9Cl-PF3ONS (F53B Minor)	ND	1.7	0.34	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.7	0.30	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.7	0.21	ng/L	1	L-04	SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
8:2 Fluorotelomersulfonic acid (8:2FTS A)	0.78	1.7	0.53	ng/L	1	J	SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
Perfluorodecanoic acid (PFDA)	0.59	1.7	0.43	ng/L	1	J	SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
Perfluorododecanoic acid (PFDoA)	ND	1.7	0.38	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.7	0.20	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
Perfluoroheptanesulfonic acid (PFHpS)	1.5	1.7	0.82	ng/L	1	J	SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
N-EtFOSAA	ND	1.7	0.55	ng/L	1	L-04	SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
N-MeFOSAA	ND	1.7	0.66	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
Perfluorotetradecanoic acid (PFTA)	ND	1.7	0.32	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
Perfluorotridecanoic acid (PFTrDA)	ND	1.7	0.24	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.7	0.24	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
Perfluorodecanesulfonic acid (PFDS)	ND	1.7	0.28	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
Perfluorooctanesulfonamide (FOSA)	ND	1.7	0.37	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
Perfluorononanesulfonic acid (PFNS)	ND	1.7	0.15	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
Perfluoro-1-hexanesulfonamide (FHxSA)	0.53	1.7	0.27	ng/L	1	J	SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
Perfluoro-1-butanesulfonamide (FBSA)	1.3	1.7	0.17	ng/L	1	J	SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
Perfluorohexanesulfonic acid (PFHxS)	35	1.7	0.29	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.7	0.36	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.7	0.30	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
6:2 Fluorotelomersulfonic acid (6:2FTS A)	43	1.7	0.32	ng/L	1	L-07	SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
Perfluoropetanesulfonic acid (PFPeS)	2.8	1.7	0.22	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
Perfluoroundecanoic acid (PFUnA)	ND	1.7	0.32	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.7	0.24	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
Perfluoroheptanoic acid (PFHpA)	16	1.7	0.30	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
Perfluorooctanoic acid (PFOA)	17	1.7	0.59	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
Perfluorooctanesulfonic acid (PFOS)	51	1.7	0.52	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL
Perfluorononanoic acid (PFNA)	8.9	1.7	0.30	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:13	DRL

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Project Location: Mahes Wellfield | Sample Description: | Work Order: 22H0298

Date Received: 8/4/2022

Field Sample #: HW-I (s) | Sampled: 8/2/2022 13:45

Sample ID: 22H0298-04

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	53	1.8	0.67	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL
Perfluorobutanesulfonic acid (PFBS)	2.8	1.8	0.25	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL
Perfluoropentanoic acid (PFPeA)	210	180	35	ng/L	100		SOP-454 PFAS	8/24/22	9/9/22 17:30	DRL
Perfluorohexanoic acid (PFHxA)	150	1.8	0.35	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL
11Cl-PF3OUdS (F53B Major)	ND	1.8	0.58	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL
9Cl-PF3ONS (F53B Minor)	ND	1.8	0.35	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.8	0.31	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.8	0.22	ng/L	1	L-04	SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL
8:2 Fluorotelomersulfonic acid (8:2FTS A)	3.1	1.8	0.55	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL
Perfluorodecanoic acid (PFDA)	ND	1.8	0.44	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL
Perfluorododecanoic acid (PFDoA)	ND	1.8	0.40	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.8	0.21	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL
Perfluoroheptanesulfonic acid (PFHpS)	18	1.8	0.84	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL
N-EtFOSAA	ND	1.8	0.57	ng/L	1	L-04	SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL
N-MeFOSAA	ND	1.8	0.68	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL
Perfluorotetradecanoic acid (PFTA)	ND	1.8	0.33	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL
Perfluorotridecanoic acid (PFTrDA)	ND	1.8	0.25	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL
4:2 Fluorotelomersulfonic acid (4:2FTS A)	0.67	1.8	0.25	ng/L	1	J	SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL
Perfluorodecanesulfonic acid (PFDS)	ND	1.8	0.29	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL
Perfluorooctanesulfonamide (FOSA)	ND	1.8	0.38	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL
Perfluorononanesulfonic acid (PFNS)	1.3	1.8	0.15	ng/L	1	J	SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL
Perfluoro-1-hexanesulfonamide (FHxSA)	39	1.8	0.28	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL
Perfluoro-1-butanesulfonamide (FBSA)	6.8	1.8	0.17	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL
Perfluorohexanesulfonic acid (PFHxS)	110	1.8	0.30	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.8	0.37	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.8	0.31	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL
6:2 Fluorotelomersulfonic acid (6:2FTS A)	4600	180	33	ng/L	100		SOP-454 PFAS	8/24/22	9/9/22 17:30	DRL
Perfluoropetanesulfonic acid (PFPeS)	7.4	1.8	0.23	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL
Perfluoroundecanoic acid (PFUnA)	ND	1.8	0.33	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.8	0.25	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL
Perfluoroheptanoic acid (PFHpA)	200	180	31	ng/L	100		SOP-454 PFAS	8/24/22	9/9/22 17:30	DRL
Perfluorooctanoic acid (PFOA)	170	1.8	0.61	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL
Perfluorooctanesulfonic acid (PFOS)	430	180	54	ng/L	100		SOP-454 PFAS	8/24/22	9/9/22 17:30	DRL
Perfluorononanoic acid (PFNA)	120	1.8	0.31	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:20	DRL

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Project Location: Mahes Wellfield | Sample Description: | Work Order: 22H0298

Date Received: 8/4/2022

Field Sample #: HW-I (m) | Sampled: 8/2/2022 14:10

Sample ID: 22H0298-05

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	ND	1.7	0.64	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
Perfluorobutanesulfonic acid (PFBS)	ND	1.7	0.24	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
Perfluoropentanoic acid (PFPeA)	ND	1.7	0.34	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
Perfluorohexanoic acid (PFHxA)	0.69	1.7	0.33	ng/L	1	J	SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
11Cl-PF3OUdS (F53B Major)	ND	1.7	0.55	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
9Cl-PF3ONS (F53B Minor)	ND	1.7	0.33	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.7	0.30	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.7	0.21	ng/L	1	L-04	SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	1.7	0.52	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
Perfluorodecanoic acid (PFDA)	ND	1.7	0.42	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
Perfluorododecanoic acid (PFDoA)	ND	1.7	0.38	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.7	0.20	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
Perfluoroheptanesulfonic acid (PFHpS)	ND	1.7	0.81	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
N-EtFOSAA	ND	1.7	0.54	ng/L	1	L-04	SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
N-MeFOSAA	ND	1.7	0.65	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
Perfluorotetradecanoic acid (PFTA)	ND	1.7	0.31	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
Perfluorotridecanoic acid (PFTrDA)	ND	1.7	0.24	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.7	0.24	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
Perfluorodecanesulfonic acid (PFDS)	ND	1.7	0.28	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
Perfluorooctanesulfonamide (FOSA)	ND	1.7	0.36	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
Perfluorononanesulfonic acid (PFNS)	ND	1.7	0.14	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	1.7	0.27	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
Perfluoro-1-butanesulfonamide (FBSA)	ND	1.7	0.16	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
Perfluorohexanesulfonic acid (PFHxS)	3.2	1.7	0.29	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.7	0.36	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.7	0.29	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
6:2 Fluorotelomersulfonic acid (6:2FTS A)	0.75	1.7	0.31	ng/L	1	J	SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
Perfluoropetanesulfonic acid (PFPeS)	ND	1.7	0.22	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
Perfluoroundecanoic acid (PFUnA)	ND	1.7	0.32	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.7	0.24	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
Perfluoroheptanoic acid (PFHpA)	0.68	1.7	0.30	ng/L	1	J	SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
Perfluorooctanoic acid (PFOA)	0.65	1.7	0.58	ng/L	1	J	SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
Perfluorooctanesulfonic acid (PFOS)	5.0	1.7	0.52	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL
Perfluorononanoic acid (PFNA)	ND	1.7	0.30	ng/L	1		SOP-454 PFAS	8/24/22	8/30/22 4:27	DRL

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Project Location: Mahes Wellfield | Sample Description: | Work Order: 22H0298

Date Received: 8/4/2022

Field Sample #: HW-I (d) | Sampled: 8/2/2022 14:50

Sample ID: 22H0298-06

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	10	1.8	0.67	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
Perfluorobutanesulfonic acid (PFBS)	2.2	1.8	0.25	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
Perfluoropentanoic acid (PFPeA)	30	1.8	0.35	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
Perfluorohexanoic acid (PFHxA)	24	1.8	0.35	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
11Cl-PF3OUdS (F53B Major)	ND	1.8	0.58	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
9Cl-PF3ONS (F53B Minor)	ND	1.8	0.35	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.8	0.31	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.8	0.22	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	1.8	0.55	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
Perfluorodecanoic acid (PFDA)	ND	1.8	0.44	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
Perfluorododecanoic acid (PFDoA)	ND	1.8	0.40	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.8	0.21	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
Perfluoroheptanesulfonic acid (PFHpS)	3.5	1.8	0.85	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
N-EtFOSAA	ND	1.8	0.57	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
N-MeFOSAA	ND	1.8	0.68	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
Perfluorotetradecanoic acid (PFTA)	ND	1.8	0.33	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
Perfluorotridecanoic acid (PFTrDA)	ND	1.8	0.25	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.8	0.25	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
Perfluorodecanesulfonic acid (PFDS)	ND	1.8	0.29	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
Perfluorooctanesulfonamide (FOSA)	ND	1.8	0.38	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
Perfluorononanesulfonic acid (PFNS)	ND	1.8	0.15	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	1.8	0.28	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
Perfluoro-1-butanesulfonamide (FBSA)	0.29	1.8	0.17	ng/L	1	J	SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
Perfluorohexanesulfonic acid (PFHxS)	63	1.8	0.31	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.8	0.37	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.8	0.31	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
6:2 Fluorotelomersulfonic acid (6:2FTS A)	1.4	1.8	0.33	ng/L	1	J	SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
Perfluoropetanesulfonic acid (PFPeS)	2.3	1.8	0.23	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
Perfluoroundecanoic acid (PFUnA)	ND	1.8	0.33	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.8	0.25	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
Perfluoroheptanoic acid (PFHpA)	12	1.8	0.31	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
Perfluorooctanoic acid (PFOA)	13	1.8	0.61	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
Perfluorooctanesulfonic acid (PFOS)	83	1.8	0.54	ng/L	1		SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH
Perfluorononanoic acid (PFNA)	1.2	1.8	0.31	ng/L	1	J	SOP-454 PFAS	8/24/22	8/31/22 3:46	BLH

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Sample Extraction Data

Prep Method: SOP 454-PFAAS **Analytical Method: SOP-454 PFAS**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
22H0298-01 [ME-1]	B315452	289	1.00	08/24/22
22H0298-02 [ME-3]	B315452	291	1.00	08/24/22
22H0298-03 [ME-2]	B315452	288	1.00	08/24/22
22H0298-04 [HW-I (s)]	B315452	278	1.00	08/24/22
22H0298-04RE1 [HW-I (s)]	B315452	278	1.00	08/24/22
22H0298-05 [HW-I (m)]	B315452	292	1.00	08/24/22

Prep Method: SOP 454-PFAAS **Analytical Method: SOP-454 PFAS**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
22H0298-06 [HW-I (d)]	B315519	278	1.00	08/24/22

Prep Method: SOP 454-PFAAS **Analytical Method: SOP-454 PFAS**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
22H0298-01RE1 [ME-1]	B316366	288	1.00	09/01/22

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QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B315452 - SOP 454-PFAAS											
Blank (B315452-BLK1)				Prepared: 08/24/22 Analyzed: 08/30/22							
Perfluorobutanoic acid (PFBA)	ND	1.8	ng/L								
Perfluorobutanesulfonic acid (PFBS)	ND	1.8	ng/L								
Perfluoropentanoic acid (PFPeA)	ND	1.8	ng/L								
Perfluorohexanoic acid (PFHxA)	ND	1.8	ng/L								
11Cl-PF3OUdS (F53B Major)	ND	1.8	ng/L								
9Cl-PF3ONS (F53B Minor)	ND	1.8	ng/L								
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.8	ng/L								
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.8	ng/L								
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	1.8	ng/L								
Perfluorodecanoic acid (PFDA)	ND	1.8	ng/L								
Perfluorododecanoic acid (PFDoA)	ND	1.8	ng/L								
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.8	ng/L								
Perfluoroheptanesulfonic acid (PFHpS)	ND	1.8	ng/L								
N-EtFOSAA	ND	1.8	ng/L								
N-MeFOSAA	ND	1.8	ng/L								
Perfluorotetradecanoic acid (PFTA)	ND	1.8	ng/L								
Perfluorotridecanoic acid (PFTrDA)	ND	1.8	ng/L								
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.8	ng/L								
Perfluorodecanesulfonic acid (PFDS)	ND	1.8	ng/L								
Perfluorooctanesulfonamide (FOSA)	ND	1.8	ng/L								
Perfluorononanesulfonic acid (PFNS)	ND	1.8	ng/L								
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	1.8	ng/L								
Perfluoro-1-butanesulfonamide (FBSA)	ND	1.8	ng/L								
Perfluorohexanesulfonic acid (PFHxS)	ND	1.8	ng/L								
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.8	ng/L								
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.8	ng/L								
6:2 Fluorotelomersulfonic acid (6:2FTS A)	0.46	1.8	ng/L								J
Perfluoropetanesulfonic acid (PFPeS)	ND	1.8	ng/L								
Perfluoroundecanoic acid (PFUnA)	ND	1.8	ng/L								
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.8	ng/L								
Perfluoroheptanoic acid (PFHpA)	ND	1.8	ng/L								
Perfluorooctanoic acid (PFOA)	ND	1.8	ng/L								
Perfluorooctanesulfonic acid (PFOS)	ND	1.8	ng/L								
Perfluorononanoic acid (PFNA)	ND	1.8	ng/L								
LCS (B315452-BS1)				Prepared: 08/24/22 Analyzed: 08/30/22							
Perfluorobutanoic acid (PFBA)	9.90	1.8	ng/L	9.06		109		73-129			
Perfluorobutanesulfonic acid (PFBS)	8.51	1.8	ng/L	8.02		106		72-130			
Perfluoropentanoic acid (PFPeA)	9.66	1.8	ng/L	9.06		107		72-129			
Perfluorohexanoic acid (PFHxA)	9.99	1.8	ng/L	9.06		110		72-129			
11Cl-PF3OUdS (F53B Major)	6.56	1.8	ng/L	8.54		76.9		50-150			
9Cl-PF3ONS (F53B Minor)	8.10	1.8	ng/L	8.44		95.9		50-150			
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	8.83	1.8	ng/L	8.54		103		50-150			
Hexafluoropropylene oxide dimer acid (HFPO-DA)	3.13	1.8	ng/L	9.06		**34.5**	*	50-150			L-04
8:2 Fluorotelomersulfonic acid (8:2FTS A)	8.82	1.8	ng/L	8.70		101		67-138			
Perfluorodecanoic acid (PFDA)	9.57	1.8	ng/L	9.06		106		71-129			
Perfluorododecanoic acid (PFDoA)	9.13	1.8	ng/L	9.06		101		72-134			
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	7.29	1.8	ng/L	8.06		90.4		50-150			

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QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B315452 - SOP 454-PFAAS											
LCS (B315452-BS1)				Prepared: 08/24/22 Analyzed: 08/30/22							
Perfluoroheptanesulfonic acid (PFHpS)	8.01	1.8	ng/L	8.65		92.6		69-134			
N-EtFOSAA	1.98	1.8	ng/L	9.06		**21.8**	*	61-135			L-04
N-MeFOSAA	11.1	1.8	ng/L	9.06		123		65-136			
Perfluorotetradecanoic acid (PFTA)	8.90	1.8	ng/L	9.06		98.3		71-132			
Perfluorotridecanoic acid (PFTrDA)	9.44	1.8	ng/L	9.06		104		65-144			
4:2 Fluorotelomersulfonic acid (4:2FTS A)	9.35	1.8	ng/L	8.47		110		63-143			
Perfluorodecanesulfonic acid (PFDS)	7.73	1.8	ng/L	8.74		88.4		53-142			
Perfluorooctanesulfonamide (FOSA)	8.51	1.8	ng/L	9.06		93.9		67-137			
Perfluorononanesulfonic acid (PFNS)	9.28	1.8	ng/L	8.70		107		69-127			
Perfluoro-1-hexanesulfonamide (FHxSA)	9.93	1.8	ng/L	9.06		110		50-150			
Perfluoro-1-butanesulfonamide (FBSA)	9.14	1.8	ng/L	9.06		101		50-150			
Perfluorohexanesulfonic acid (PFHxS)	8.45	1.8	ng/L	8.29		102		68-131			
Perfluoro-4-oxapentanoic acid (PFMPA)	9.48	1.8	ng/L	9.06		105		50-150			
Perfluoro-5-oxahexanoic acid (PFMBA)	9.52	1.8	ng/L	9.06		105		50-150			
6:2 Fluorotelomersulfonic acid (6:2FTS A)	11.0	1.8	ng/L	8.61		127		64-140			
Perfluoropetanesulfonic acid (PFPeS)	10.4	1.8	ng/L	8.52		122		71-127			
Perfluoroundecanoic acid (PFUnA)	9.07	1.8	ng/L	9.06		100		69-133			
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	8.83	1.8	ng/L	9.06		97.5		50-150			
Perfluoroheptanoic acid (PFHpA)	9.85	1.8	ng/L	9.06		109		72-130			
Perfluorooctanoic acid (PFOA)	10.8	1.8	ng/L	9.06		119		71-133			
Perfluorooctanesulfonic acid (PFOS)	8.98	1.8	ng/L	8.38		107		65-140			
Perfluorononanoic acid (PFNA)	9.89	1.8	ng/L	9.06		109		69-130			
LCS Dup (B315452-BSD1)				Prepared: 08/24/22 Analyzed: 08/30/22							
Perfluorobutanoic acid (PFBA)	9.80	1.8	ng/L	9.02		109		73-129	0.963	30	
Perfluorobutanesulfonic acid (PFBS)	8.43	1.8	ng/L	7.98		106		72-130	0.967	30	
Perfluoropentanoic acid (PFPeA)	9.42	1.8	ng/L	9.02		104		72-129	2.43	30	
Perfluorohexanoic acid (PFHxA)	9.74	1.8	ng/L	9.02		108		72-129	2.45	30	
11Cl-PF3OUdS (F53B Major)	7.38	1.8	ng/L	8.50		86.9		50-150	11.7	30	
9Cl-PF3ONS (F53B Minor)	8.31	1.8	ng/L	8.41		98.8		50-150	2.59	30	
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	8.61	1.8	ng/L	8.50		101		50-150	2.52	30	
Hexafluoropropylene oxide dimer acid (HFPO-DA)	3.15	1.8	ng/L	9.02		**34.9**	*	50-150	0.797	30	L-04
8:2 Fluorotelomersulfonic acid (8:2FTS A)	8.49	1.8	ng/L	8.66		98.1		67-138	3.76	30	
Perfluorodecanoic acid (PFDA)	9.16	1.8	ng/L	9.02		102		71-129	4.28	30	
Perfluorododecanoic acid (PFDoA)	8.86	1.8	ng/L	9.02		98.2		72-134	3.08	30	
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	7.07	1.8	ng/L	8.03		88.1		50-150	3.05	30	
Perfluoroheptanesulfonic acid (PFHpS)	9.12	1.8	ng/L	8.62		106		69-134	12.9	30	
N-EtFOSAA	1.82	1.8	ng/L	9.02		**20.2**	*	61-135	8.12	30	L-04
N-MeFOSAA	10.3	1.8	ng/L	9.02		114		65-136	8.02	30	
Perfluorotetradecanoic acid (PFTA)	9.34	1.8	ng/L	9.02		104		71-132	4.76	30	
Perfluorotridecanoic acid (PFTrDA)	9.90	1.8	ng/L	9.02		110		65-144	4.81	30	
4:2 Fluorotelomersulfonic acid (4:2FTS A)	9.17	1.8	ng/L	8.44		109		63-143	1.90	30	
Perfluorodecanesulfonic acid (PFDS)	7.16	1.8	ng/L	8.71		82.2		53-142	7.71	30	
Perfluorooctanesulfonamide (FOSA)	8.05	1.8	ng/L	9.02		89.3		67-137	5.54	30	
Perfluorononanesulfonic acid (PFNS)	9.26	1.8	ng/L	8.66		107		69-127	0.181	30	
Perfluoro-1-hexanesulfonamide (FHxSA)	10.0	1.8	ng/L	9.02		111		50-150	0.807	30	
Perfluoro-1-butanesulfonamide (FBSA)	8.76	1.8	ng/L	9.02		97.2		50-150	4.20	30	
Perfluorohexanesulfonic acid (PFHxS)	8.38	1.8	ng/L	8.25		102		68-131	0.840	30	
Perfluoro-4-oxapentanoic acid (PFMPA)	9.28	1.8	ng/L	9.02		103		50-150	2.16	30	
Perfluoro-5-oxahexanoic acid (PFMBA)	9.29	1.8	ng/L	9.02		103		50-150	2.40	30	

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QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B315452 - SOP 454-PFAAS											
LCS Dup (B315452-BSD1)				Prepared: 08/24/22 Analyzed: 08/30/22							
6:2 Fluorotelomersulfonic acid (6:2FTS A)	12.5	1.8	ng/L	8.57		**146**	*	64-140	13.3	30	L-07
Perfluoropetanesulfonic acid (PFPeS)	9.68	1.8	ng/L	8.48		114		71-127	7.07	30	
Perfluoroundecanoic acid (PFUnA)	9.86	1.8	ng/L	9.02		109		69-133	8.41	30	
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	8.80	1.8	ng/L	9.02		97.6		50-150	0.341	30	
Perfluoroheptanoic acid (PFHpA)	9.55	1.8	ng/L	9.02		106		72-130	3.08	30	
Perfluorooctanoic acid (PFOA)	11.1	1.8	ng/L	9.02		123		71-133	2.76	30	
Perfluorooctanesulfonic acid (PFOS)	9.62	1.8	ng/L	8.35		115		65-140	6.96	30	
Perfluorononanoic acid (PFNA)	10.4	1.8	ng/L	9.02		115		69-130	4.97	30	
Batch B315519 - SOP 454-PFAAS											
Blank (B315519-BLK1)				Prepared: 08/23/22 Analyzed: 08/31/22							
Perfluorobutanoic acid (PFBA)	ND	1.8	ng/L								
Perfluorobutanesulfonic acid (PFBS)	ND	1.8	ng/L								
Perfluoropentanoic acid (PFPeA)	ND	1.8	ng/L								
Perfluorohexanoic acid (PFHxA)	ND	1.8	ng/L								
11Cl-PF3OUdS (F53B Major)	ND	1.8	ng/L								
9Cl-PF3ONS (F53B Minor)	ND	1.8	ng/L								
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.8	ng/L								
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.8	ng/L								
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	1.8	ng/L								
Perfluorodecanoic acid (PFDA)	ND	1.8	ng/L								
Perfluorododecanoic acid (PFDoA)	ND	1.8	ng/L								
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.8	ng/L								
Perfluoroheptanesulfonic acid (PFHpS)	ND	1.8	ng/L								
N-EtFOSAA	ND	1.8	ng/L								
N-MeFOSAA	ND	1.8	ng/L								
Perfluorotetradecanoic acid (PFTA)	ND	1.8	ng/L								
Perfluorotridecanoic acid (PFTrDA)	ND	1.8	ng/L								
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.8	ng/L								
Perfluorodecanesulfonic acid (PFDS)	ND	1.8	ng/L								
Perfluorooctanesulfonamide (FOSA)	ND	1.8	ng/L								
Perfluorononanesulfonic acid (PFNS)	ND	1.8	ng/L								
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	1.8	ng/L								
Perfluoro-1-butanesulfonamide (FBSA)	ND	1.8	ng/L								
Perfluorohexanesulfonic acid (PFHxS)	ND	1.8	ng/L								
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.8	ng/L								
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.8	ng/L								
6:2 Fluorotelomersulfonic acid (6:2FTS A)	0.62	1.8	ng/L								J
Perfluoropetanesulfonic acid (PFPeS)	ND	1.8	ng/L								
Perfluoroundecanoic acid (PFUnA)	ND	1.8	ng/L								
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.8	ng/L								
Perfluoroheptanoic acid (PFHpA)	ND	1.8	ng/L								
Perfluorooctanoic acid (PFOA)	ND	1.8	ng/L								
Perfluorooctanesulfonic acid (PFOS)	ND	1.8	ng/L								
Perfluorononanoic acid (PFNA)	ND	1.8	ng/L								

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QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B315519 - SOP 454-PFAAS										
LCS (B315519-BS1)				Prepared: 08/23/22 Analyzed: 08/31/22						
Perfluorobutanoic acid (PFBA)	8.41	1.8	ng/L	9.24		91.0	73-129			
Perfluorobutanesulfonic acid (PFBS)	7.15	1.8	ng/L	8.17		87.5	72-130			
Perfluoropentanoic acid (PFPeA)	8.30	1.8	ng/L	9.24		89.9	72-129			
Perfluorohexanoic acid (PFHxA)	8.44	1.8	ng/L	9.24		91.3	72-129			
11Cl-PF3OUdS (F53B Major)	6.01	1.8	ng/L	8.70		69.0	50-150			
9Cl-PF3ONS (F53B Minor)	6.74	1.8	ng/L	8.61		78.3	50-150			
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	7.56	1.8	ng/L	8.70		86.9	50-150			
Hexafluoropropylene oxide dimer acid (HFPO-DA)	5.06	1.8	ng/L	9.24		54.8	50-150			
8:2 Fluorotelomersulfonic acid (8:2FTS A)	7.54	1.8	ng/L	8.87		85.0	67-138			
Perfluorodecanoic acid (PFDA)	8.24	1.8	ng/L	9.24		89.2	71-129			
Perfluorododecanoic acid (PFDoA)	8.61	1.8	ng/L	9.24		93.3	72-134			
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	6.13	1.8	ng/L	8.22		74.5	50-150			
Perfluoroheptanesulfonic acid (PFHpS)	8.83	1.8	ng/L	8.82		100	69-134			
N-EtFOSAA	8.52	1.8	ng/L	9.24		92.2	61-135			
N-MeFOSAA	10.1	1.8	ng/L	9.24		109	65-136			
Perfluorotetradecanoic acid (PFTA)	8.64	1.8	ng/L	9.24		93.5	71-132			
Perfluorotridecanoic acid (PFTrDA)	8.51	1.8	ng/L	9.24		92.2	65-144			
4:2 Fluorotelomersulfonic acid (4:2FTS A)	7.89	1.8	ng/L	8.64		91.4	63-143			
Perfluorodecanesulfonic acid (PFDS)	7.30	1.8	ng/L	8.91		81.9	53-142			
Perfluorooctanesulfonamide (FOSA)	8.86	1.8	ng/L	9.24		95.9	67-137			
Perfluorononanesulfonic acid (PFNS)	6.85	1.8	ng/L	8.87		77.3	69-127			
Perfluoro-1-hexanesulfonamide (FHxSA)	8.44	1.8	ng/L	9.24		91.4	50-150			
Perfluoro-1-butanesulfonamide (FBSA)	7.50	1.8	ng/L	9.24		81.2	50-150			
Perfluorohexanesulfonic acid (PFHxS)	6.71	1.8	ng/L	8.45		79.4	68-131			
Perfluoro-4-oxapentanoic acid (PFMPA)	7.71	1.8	ng/L	9.24		83.5	50-150			
Perfluoro-5-oxahexanoic acid (PFMBA)	7.83	1.8	ng/L	9.24		84.8	50-150			
6:2 Fluorotelomersulfonic acid (6:2FTS A)	9.59	1.8	ng/L	8.77		109	64-140			
Perfluoropetanesulfonic acid (PFPeS)	6.72	1.8	ng/L	8.68		77.4	71-127			
Perfluoroundecanoic acid (PFUnA)	8.52	1.8	ng/L	9.24		92.2	69-133			
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	8.36	1.8	ng/L	9.24		90.5	50-150			
Perfluoroheptanoic acid (PFHpA)	8.24	1.8	ng/L	9.24		89.2	72-130			
Perfluorooctanoic acid (PFOA)	9.98	1.8	ng/L	9.24		108	71-133			
Perfluorooctanesulfonic acid (PFOS)	7.65	1.8	ng/L	8.54		89.6	65-140			
Perfluorononanoic acid (PFNA)	8.36	1.8	ng/L	9.24		90.5	69-130			
LCS Dup (B315519-BSD1)				Prepared: 08/23/22 Analyzed: 08/31/22						
Perfluorobutanoic acid (PFBA)	8.81	1.8	ng/L	8.88		99.2	73-129	4.65	30	
Perfluorobutanesulfonic acid (PFBS)	7.50	1.8	ng/L	7.85		95.5	72-130	4.68	30	
Perfluoropentanoic acid (PFPeA)	8.75	1.8	ng/L	8.88		98.6	72-129	5.22	30	
Perfluorohexanoic acid (PFHxA)	8.77	1.8	ng/L	8.88		98.8	72-129	3.83	30	
11Cl-PF3OUdS (F53B Major)	5.88	1.8	ng/L	8.36		70.3	50-150	2.16	30	
9Cl-PF3ONS (F53B Minor)	6.69	1.8	ng/L	8.27		80.9	50-150	0.735	30	
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	8.04	1.8	ng/L	8.36		96.2	50-150	6.16	30	
Hexafluoropropylene oxide dimer acid (HFPO-DA)	4.85	1.8	ng/L	8.88		54.7	50-150	4.15	30	
8:2 Fluorotelomersulfonic acid (8:2FTS A)	8.47	1.8	ng/L	8.52		99.4	67-138	11.7	30	
Perfluorodecanoic acid (PFDA)	8.67	1.8	ng/L	8.88		97.7	71-129	5.15	30	
Perfluorododecanoic acid (PFDoA)	8.91	1.8	ng/L	8.88		100	72-134	3.37	30	
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	6.32	1.8	ng/L	7.90		80.1	50-150	3.14	30	

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QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B315519 - SOP 454-PFAAS										
LCS Dup (B315519-BSD1)				Prepared: 08/23/22 Analyzed: 08/31/22						
Perfluoroheptanesulfonic acid (PFHpS)	8.62	1.8	ng/L	8.48		102	69-134	2.48	30	
N-EtFOSAA	8.44	1.8	ng/L	8.88		95.1	61-135	0.927	30	
N-MeFOSAA	9.26	1.8	ng/L	8.88		104	65-136	8.75	30	
Perfluorotetradecanoic acid (PFTA)	8.75	1.8	ng/L	8.88		98.5	71-132	1.26	30	
Perfluorotridecanoic acid (PFTrDA)	8.48	1.8	ng/L	8.88		95.5	65-144	0.444	30	
4:2 Fluorotelomersulfonic acid (4:2FTS A)	7.95	1.8	ng/L	8.30		95.8	63-143	0.675	30	
Perfluorodecanesulfonic acid (PFDS)	7.50	1.8	ng/L	8.56		87.6	53-142	2.71	30	
Perfluorooctanesulfonamide (FOSA)	8.69	1.8	ng/L	8.88		97.9	67-137	1.88	30	
Perfluorononanesulfonic acid (PFNS)	6.92	1.8	ng/L	8.52		81.2	69-127	0.947	30	
Perfluoro-1-hexanesulfonamide (FHxSA)	8.59	1.8	ng/L	8.88		96.8	50-150	1.70	30	
Perfluoro-1-butanesulfonamide (FBSA)	8.04	1.8	ng/L	8.88		90.6	50-150	7.03	30	
Perfluorohexanesulfonic acid (PFHxS)	7.40	1.8	ng/L	8.12		91.1	68-131	9.71	30	
Perfluoro-4-oxapentanoic acid (PFMPA)	8.08	1.8	ng/L	8.88		91.0	50-150	4.59	30	
Perfluoro-5-oxahexanoic acid (PFMBA)	8.07	1.8	ng/L	8.88		90.9	50-150	2.97	30	
6:2 Fluorotelomersulfonic acid (6:2FTS A)	9.22	1.8	ng/L	8.43		109	64-140	3.93	30	
Perfluoropetanesulfonic acid (PFPeS)	7.40	1.8	ng/L	8.34		88.7	71-127	9.66	30	
Perfluoroundecanoic acid (PFUnA)	9.20	1.8	ng/L	8.88		104	69-133	7.73	30	
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	8.50	1.8	ng/L	8.88		95.8	50-150	1.64	30	
Perfluoroheptanoic acid (PFHpA)	8.90	1.8	ng/L	8.88		100	72-130	7.62	30	
Perfluorooctanoic acid (PFOA)	8.99	1.8	ng/L	8.88		101	71-133	10.5	30	
Perfluorooctanesulfonic acid (PFOS)	7.38	1.8	ng/L	8.21		89.9	65-140	3.55	30	
Perfluorononanoic acid (PFNA)	9.35	1.8	ng/L	8.88		105	69-130	11.2	30	
Batch B316366 - SOP 454-PFAAS										
Blank (B316366-BLK1)				Prepared: 09/01/22 Analyzed: 09/19/22						
Perfluorobutanoic acid (PFBA)	ND	1.8	ng/L							
Perfluorobutanesulfonic acid (PFBS)	ND	1.8	ng/L							
Perfluoropentanoic acid (PFPeA)	ND	1.8	ng/L							
Perfluorohexanoic acid (PFHxA)	ND	1.8	ng/L							
11Cl-PF3OUdS (F53B Major)	ND	1.8	ng/L							
9Cl-PF3ONS (F53B Minor)	ND	1.8	ng/L							
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.8	ng/L							
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.8	ng/L							
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	1.8	ng/L							
Perfluorodecanoic acid (PFDA)	ND	1.8	ng/L							
Perfluorododecanoic acid (PFDoA)	ND	1.8	ng/L							
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.8	ng/L							
Perfluoroheptanesulfonic acid (PFHpS)	ND	1.8	ng/L							
N-EtFOSAA	ND	1.8	ng/L							
N-MeFOSAA	ND	1.8	ng/L							
Perfluorotetradecanoic acid (PFTA)	ND	1.8	ng/L							
Perfluorotridecanoic acid (PFTrDA)	ND	1.8	ng/L							
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.8	ng/L							
Perfluorodecanesulfonic acid (PFDS)	ND	1.8	ng/L							
Perfluorooctanesulfonamide (FOSA)	ND	1.8	ng/L							
Perfluorononanesulfonic acid (PFNS)	ND	1.8	ng/L							
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	1.8	ng/L							
Perfluoro-1-butanesulfonamide (FBSA)	ND	1.8	ng/L							
Perfluorohexanesulfonic acid (PFHxS)	ND	1.8	ng/L							

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QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B316366 - SOP 454-PFAAS										
Blank (B316366-BLK1)				Prepared: 09/01/22 Analyzed: 09/19/22						
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.8	ng/L							
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.8	ng/L							
6:2 Fluorotelomersulfonic acid (6:2FTS A)	0.85	1.8	ng/L							J
Perfluoropetanesulfonic acid (PFPeS)	ND	1.8	ng/L							
Perfluoroundecanoic acid (PFUnA)	ND	1.8	ng/L							
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.8	ng/L							
Perfluoroheptanoic acid (PFHpA)	ND	1.8	ng/L							
Perfluorooctanoic acid (PFOA)	ND	1.8	ng/L							
Perfluorooctanesulfonic acid (PFOS)	ND	1.8	ng/L							
Perfluorononanoic acid (PFNA)	ND	1.8	ng/L							
LCS (B316366-BS1)				Prepared: 09/01/22 Analyzed: 09/19/22						
Perfluorobutanoic acid (PFBA)	9.35	1.8	ng/L	9.24		101	73-129			
Perfluorobutanesulfonic acid (PFBS)	8.41	1.8	ng/L	8.17		103	72-130			
Perfluoropentanoic acid (PFPeA)	9.59	1.8	ng/L	9.24		104	72-129			
Perfluorohexanoic acid (PFHxA)	9.50	1.8	ng/L	9.24		103	72-129			
11Cl-PF3OUdS (F53B Major)	5.85	1.8	ng/L	8.70		67.2	50-150			
9Cl-PF3ONS (F53B Minor)	8.19	1.8	ng/L	8.61		95.1	50-150			
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	8.55	1.8	ng/L	8.70		98.2	50-150			
Hexafluoropropylene oxide dimer acid (HFPO-DA)	8.89	1.8	ng/L	9.24		96.3	50-150			
8:2 Fluorotelomersulfonic acid (8:2FTS A)	8.11	1.8	ng/L	8.87		91.4	67-138			
Perfluorodecanoic acid (PFDA)	9.43	1.8	ng/L	9.24		102	71-129			
Perfluorododecanoic acid (PFDoA)	8.27	1.8	ng/L	9.24		89.5	72-134			
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	5.94	1.8	ng/L	8.22		72.3	50-150			
Perfluoroheptanesulfonic acid (PFHpS)	9.52	1.8	ng/L	8.82		108	69-134			
N-EtFOSAA	10.3	1.8	ng/L	9.24		111	61-135			
N-MeFOSAA	10.1	1.8	ng/L	9.24		109	65-136			
Perfluorotetradecanoic acid (PFTA)	10.2	1.8	ng/L	9.24		111	71-132			
Perfluorotridecanoic acid (PFTrDA)	9.06	1.8	ng/L	9.24		98.1	65-144			
4:2 Fluorotelomersulfonic acid (4:2FTS A)	9.45	1.8	ng/L	8.64		109	63-143			
Perfluorodecanesulfonic acid (PFDS)	7.05	1.8	ng/L	8.91		79.1	53-142			
Perfluorooctanesulfonamide (FOSA)	9.81	1.8	ng/L	9.24		106	67-137			
Perfluorononanesulfonic acid (PFNS)	8.83	1.8	ng/L	8.87		99.6	69-127			
Perfluoro-1-hexanesulfonamide (FHxSA)	7.82	1.8	ng/L	9.24		84.7	50-150			
Perfluoro-1-butanesulfonamide (FBSA)	8.79	1.8	ng/L	9.24		95.1	50-150			
Perfluorohexanesulfonic acid (PFHxS)	8.28	1.8	ng/L	8.45		98.0	68-131			
Perfluoro-4-oxapentanoic acid (PFMPA)	8.21	1.8	ng/L	9.24		88.8	50-150			
Perfluoro-5-oxahexanoic acid (PFMBA)	8.16	1.8	ng/L	9.24		88.3	50-150			
6:2 Fluorotelomersulfonic acid (6:2FTS A)	8.68	1.8	ng/L	8.77		98.9	64-140			
Perfluoropetanesulfonic acid (PFPeS)	8.78	1.8	ng/L	8.68		101	71-127			
Perfluoroundecanoic acid (PFUnA)	9.64	1.8	ng/L	9.24		104	69-133			
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	9.42	1.8	ng/L	9.24		102	50-150			
Perfluoroheptanoic acid (PFHpA)	9.69	1.8	ng/L	9.24		105	72-130			
Perfluorooctanoic acid (PFOA)	10.0	1.8	ng/L	9.24		109	71-133			
Perfluorooctanesulfonic acid (PFOS)	8.85	1.8	ng/L	8.54		104	65-140			
Perfluorononanoic acid (PFNA)	9.88	1.8	ng/L	9.24		107	69-130			

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit is at the level of quantitation (LOQ)
DL	Detection Limit is the lower limit of detection determined by the MDL study
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
J	Detected but below the Reporting Limit (lowest calibration standard); therefore, result is an estimated concentration (CLP J-Flag).
L-04	Laboratory fortified blank/laboratory control sample recovery and duplicate recovery are outside of control limits. Reported value for this compound is likely to be biased on the low side.
L-07	Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD between the two LFB/LCS results is within method specified criteria.
PF-17	Extracted Internal Standard recovery is outside of control limits. Data is not significantly affected since associated analyte is not detected and bias is on the high side.
S-29	Extracted Internal Standard is outside of control limits.
V-05	Continuing calibration verification (CCV) did not meet method specifications and was biased on the low side for this compound.
Z-01	Original extract within hold. Re-extract to confirm extracted internal standard recoveries performed outside of hold. Re-extract resulted in conforming data for many analytes. Both results reported.
Z-01a	Sample analyzed at a refortified dilution.
Z-01b	Signal to noise on quantification ion <10. Detection suspect.

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
ME-1 (22H0298-01)			Lab File ID: 22H0298-01.d			Analyzed: 08/30/22 03:51			
M8FOSA	113040.8	3.980583	253,489.00	3.980567	45	50 - 150	0.0000	+/-0.50	*
M2-4:2FTS	45081.32	2.4146	181,274.00	2.4146	25	50 - 150	0.0000	+/-0.50	*
M2PFTA	273052.3	4.30535	788,408.00	4.30535	35	50 - 150	0.0000	+/-0.50	*
M2-8:2FTS	61502.75	3.7789	134,920.00	3.778883	46	50 - 150	0.0000	+/-0.50	*
MPFBA	202481.4	1.058467	435,289.00	1.050167	47	50 - 150	0.0083	+/-0.50	*
M3HFPO-DA	248135.9	2.76565	109,736.00	2.76565	226	50 - 150	0.0000	+/-0.50	*
M6PFDA	230126	3.787383	576,444.00	3.779417	40	50 - 150	0.0080	+/-0.50	*
M3PFBS	64422.88	1.83695	125,952.00	1.828667	51	50 - 150	0.0083	+/-0.50	
M7PFUnA	339093.4	3.93005	898,020.00	3.93005	38	50 - 150	0.0000	+/-0.50	*
M2-6:2FTS	28424.72	3.4205	86,775.00	3.4205	33	50 - 150	0.0000	+/-0.50	*
M5PFPeA	195998.6	1.6652	415,405.00	1.6652	47	50 - 150	0.0000	+/-0.50	*
M5PFHxA	360311.6	2.498417	771,580.00	2.498433	47	50 - 150	0.0000	+/-0.50	*
M3PFHxS	38835.15	3.177667	94,993.00	3.177667	41	50 - 150	0.0000	+/-0.50	*
M4PFHpA	333994.9	3.138483	774,416.00	3.138483	43	50 - 150	0.0000	+/-0.50	*
M8PFOA	218486.7	3.43785	564,919.00	3.437833	39	50 - 150	0.0000	+/-0.50	*
M8PFOS	45008.88	3.628217	94,009.00	3.6282	48	50 - 150	0.0000	+/-0.50	*
M9PFNA	182441.8	3.62925	438,303.00	3.629233	42	50 - 150	0.0000	+/-0.50	*
MPFDoA	328482.9	4.064667	925,952.00	4.064667	35	50 - 150	0.0000	+/-0.50	*
d5-NEtFOSAA	586783.5	3.929533	199,379.00	3.937517	294	50 - 150	-0.0080	+/-0.50	*
d3-NMeFOSAA	81641.39	3.857667	260,310.00	3.85765	31	50 - 150	0.0000	+/-0.50	*

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
ME-1 (22H0298-01RE1)			Lab File ID: 22H0298-01RE1.d			Analyzed: 09/19/22 03:30			
M8FOSA	176264.7	3.99655	292,494.00	3.99655	60	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	97852.95	2.439333	244,134.00	2.439333	40	50 - 150	0.0000	+/-0.50	*
M2PFTA	713115.9	4.313416	1,239,252.00	4.313416	58	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	66625.04	3.78685	119,127.00	3.78685	56	50 - 150	0.0000	+/-0.50	
MPFBA	438391.3	1.058467	436,533.00	1.058467	100	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	117732	2.782017	89,402.00	2.782017	132	50 - 150	0.0000	+/-0.50	
M6PFDA	521967	3.787367	629,060.00	3.787367	83	50 - 150	0.0000	+/-0.50	
M3PFBS	129023.3	1.861817	118,592.00	1.861817	109	50 - 150	0.0000	+/-0.50	
M7PFUnA	504676	3.930033	737,522.00	3.930033	68	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	81078.46	3.4293	141,111.00	3.4205	57	50 - 150	0.0088	+/-0.50	
M5PFPeA	410882.7	1.690017	391,952.00	1.690017	105	50 - 150	0.0000	+/-0.50	
M5PFHxA	839074.1	2.523067	820,754.00	2.523067	102	50 - 150	0.0000	+/-0.50	
M3PFHxS	120722.3	3.193817	114,140.00	3.185733	106	50 - 150	0.0081	+/-0.50	
M4PFHpA	988753.9	3.154633	966,420.00	3.14655	102	50 - 150	0.0081	+/-0.50	
M8PFOA	901638.4	3.437833	882,375.00	3.437833	102	50 - 150	0.0000	+/-0.50	
M8PFOS	85951.77	3.636183	101,504.00	3.6282	85	50 - 150	0.0080	+/-0.50	
M9PFNA	614519.3	3.629233	734,996.00	3.629233	84	50 - 150	0.0000	+/-0.50	
MPFDoA	457791	4.07265	753,263.00	4.07265	61	50 - 150	0.0000	+/-0.50	
d5-NEtFOSAA	148582.1	3.937517	264,483.00	3.9375	56	50 - 150	0.0000	+/-0.50	
d3-NMeFOSAA	192806.9	3.8656	308,492.00	3.8656	62	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
ME-3 (22H0298-02)			Lab File ID: 22H0298-02.d			Analyzed: 08/30/22 03:58			
M8FOSA	322919.9	3.980567	253,489.00	3.980567	127	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	110356.1	2.4146	181,274.00	2.4146	61	50 - 150	0.0000	+/-0.50	
M2PFTA	885878.5	4.305333	788,408.00	4.30535	112	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	189132.7	3.778883	134,920.00	3.778883	140	50 - 150	0.0000	+/-0.50	
MPFBA	473597.7	1.050167	435,289.00	1.050167	109	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	266785.9	2.76565	109,736.00	2.76565	243	50 - 150	0.0000	+/-0.50	*
M6PFDA	707726.8	3.787367	576,444.00	3.779417	123	50 - 150	0.0080	+/-0.50	
M3PFBS	154485	1.828667	125,952.00	1.828667	123	50 - 150	0.0000	+/-0.50	
M7PFUnA	1018033	3.930033	898,020.00	3.93005	113	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	54554.79	3.4205	86,775.00	3.4205	63	50 - 150	0.0000	+/-0.50	
M5PFPeA	480465.6	1.6652	415,405.00	1.6652	116	50 - 150	0.0000	+/-0.50	
M5PFHxA	884240.9	2.498417	771,580.00	2.498433	115	50 - 150	0.0000	+/-0.50	
M3PFHxS	102801.4	3.17765	94,993.00	3.177667	108	50 - 150	0.0000	+/-0.50	
M4PFHpA	894954.7	3.138467	774,416.00	3.138483	116	50 - 150	0.0000	+/-0.50	
M8PFOA	616688.5	3.42985	564,919.00	3.437833	109	50 - 150	-0.0080	+/-0.50	
M8PFOS	117575.2	3.6282	94,009.00	3.6282	125	50 - 150	0.0000	+/-0.50	
M9PFNA	488724.6	3.629233	438,303.00	3.629233	112	50 - 150	0.0000	+/-0.50	
MPFDoA	919479.6	4.06465	925,952.00	4.064667	99	50 - 150	0.0000	+/-0.50	
d5-NEtFOSAA	932673.6	3.929517	199,379.00	3.937517	468	50 - 150	-0.0080	+/-0.50	*
d3-NMeFOSAA	255955.4	3.85765	260,310.00	3.85765	98	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
ME-2 (22H0298-03)			Lab File ID: 22H0298-03.d			Analyzed: 08/30/22 04:13			
M8FOSA	350311.6	3.980583	253,489.00	3.980567	138	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	108107.5	2.4146	181,274.00	2.414617	60	50 - 150	0.0000	+/-0.50	
M2PFTA	927392.5	4.305367	788,408.00	4.30535	118	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	170501.8	3.7789	134,920.00	3.778883	126	50 - 150	0.0000	+/-0.50	
MPFBA	519917.2	1.050167	435,289.00	1.050167	119	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	267450.4	2.76565	109,736.00	2.765667	244	50 - 150	0.0000	+/-0.50	*
M6PFDA	755278.4	3.787383	576,444.00	3.787383	131	50 - 150	0.0000	+/-0.50	
M3PFBS	156642.4	1.828667	125,952.00	1.828667	124	50 - 150	0.0000	+/-0.50	
M7PFUnA	995026.2	3.93005	898,020.00	3.93005	111	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	68410.1	3.4205	86,775.00	3.4205	79	50 - 150	0.0000	+/-0.50	
M5PFPeA	500506	1.6652	415,405.00	1.6652	120	50 - 150	0.0000	+/-0.50	
M5PFHxA	907770.9	2.498417	771,580.00	2.498433	118	50 - 150	0.0000	+/-0.50	
M3PFHxS	112809.5	3.185733	94,993.00	3.177667	119	50 - 150	0.0081	+/-0.50	
M4PFHpA	903580.1	3.14655	774,416.00	3.14655	117	50 - 150	0.0000	+/-0.50	
M8PFOA	637873.1	3.437833	564,919.00	3.42985	113	50 - 150	0.0080	+/-0.50	
M8PFOS	134660.8	3.6282	94,009.00	3.6282	143	50 - 150	0.0000	+/-0.50	
M9PFNA	547228.8	3.629233	438,303.00	3.629233	125	50 - 150	0.0000	+/-0.50	
MPFDoA	1011224	4.064667	925,952.00	4.064667	109	50 - 150	0.0000	+/-0.50	
d5-NEtFOSAA	1004131	3.929517	199,379.00	3.937517	504	50 - 150	-0.0080	+/-0.50	*
d3-NMeFOSAA	276881.3	3.857667	260,310.00	3.85765	106	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
HW-I (s) (22H0298-04)			Lab File ID: 22H0298-04.d			Analyzed: 08/30/22 04:20			
M8FOSA	300515.6	3.980583	253,489.00	3.980567	119	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	122916.5	2.414617	181,274.00	2.414617	68	50 - 150	0.0000	+/-0.50	
M2PFTA	895639.8	4.30535	788,408.00	4.30535	114	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	176371.4	3.7789	134,920.00	3.778883	131	50 - 150	0.0000	+/-0.50	
MPFBA	426981.8	1.050167	435,289.00	1.050167	98	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	273571	2.76565	109,736.00	2.765667	249	50 - 150	0.0000	+/-0.50	*
M6PFDA	696609.5	3.7874	576,444.00	3.787383	121	50 - 150	0.0000	+/-0.50	
M3PFBS	140531.2	1.836967	125,952.00	1.828667	112	50 - 150	0.0083	+/-0.50	
M7PFUnA	1000905	3.930067	898,020.00	3.93005	111	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	682463.8	3.420517	86,775.00	3.4205	786	50 - 150	0.0000	+/-0.50	*
M5PFPeA	444029.3	1.6652	415,405.00	1.6652	107	50 - 150	0.0000	+/-0.50	
M5PFHxA	828030.4	2.498433	771,580.00	2.498433	107	50 - 150	0.0000	+/-0.50	
M3PFHxS	103010.7	3.18575	94,993.00	3.177667	108	50 - 150	0.0081	+/-0.50	
M4PFHpA	823495.6	3.146567	774,416.00	3.14655	106	50 - 150	0.0000	+/-0.50	
M8PFOA	520494.8	3.429867	564,919.00	3.42985	92	50 - 150	0.0000	+/-0.50	
M8PFOS	103227	3.628217	94,009.00	3.6282	110	50 - 150	0.0000	+/-0.50	
M9PFNA	463302.8	3.62925	438,303.00	3.629233	106	50 - 150	0.0000	+/-0.50	
MPFDoA	960215.6	4.064683	925,952.00	4.064667	104	50 - 150	0.0000	+/-0.50	
d5-NEtFOSAA	1031909	3.937533	199,379.00	3.937517	518	50 - 150	0.0000	+/-0.50	*
d3-NMeFOSAA	253160.7	3.857667	260,310.00	3.85765	97	50 - 150	0.0000	+/-0.50	
HW-I (s) (22H0298-04RE1)			Lab File ID: 22H0298-04RE1.d			Analyzed: 09/09/22 17:30			
M2-6:2FTS	38333.86	3.485367	56,034.00	3.485383	68	50 - 150	0.0000	+/-0.50	
M5PFPeA	176843.2	1.7743	291,406.00	1.7743	61	50 - 150	0.0000	+/-0.50	
M4PFHpA	173873.5	3.227617	341,842.00	3.227633	51	50 - 150	0.0000	+/-0.50	
M8PFOS	42189.76	3.6841	73,698.00	3.684117	57	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
HW-I (m) (22H0298-05)			Lab File ID: 22H0298-05.d			Analyzed: 08/30/22 04:27			
M8FOSA	366857	3.980567	253,489.00	3.980567	145	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	126036.8	2.4146	181,274.00	2.414617	70	50 - 150	0.0000	+/-0.50	
M2PFTA	1008766	4.30535	788,408.00	4.30535	128	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	189433.4	3.778883	134,920.00	3.778883	140	50 - 150	0.0000	+/-0.50	
MPFBA	495869.8	1.050167	435,289.00	1.050167	114	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	281244.1	2.76565	109,736.00	2.765667	256	50 - 150	0.0000	+/-0.50	*
M6PFDA	788066.1	3.787383	576,444.00	3.787383	137	50 - 150	0.0000	+/-0.50	
M3PFBS	161686.8	1.828667	125,952.00	1.828667	128	50 - 150	0.0000	+/-0.50	
M7PFUnA	1134175	3.93005	898,020.00	3.93005	126	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	66463.64	3.4205	86,775.00	3.4205	77	50 - 150	0.0000	+/-0.50	
M5PFPeA	517533.3	1.6652	415,405.00	1.6652	125	50 - 150	0.0000	+/-0.50	
M5PFHxA	939442.4	2.498417	771,580.00	2.498433	122	50 - 150	0.0000	+/-0.50	
M3PFHxS	116674.1	3.17765	94,993.00	3.177667	123	50 - 150	0.0000	+/-0.50	
M4PFHpA	956055.7	3.14655	774,416.00	3.14655	123	50 - 150	0.0000	+/-0.50	
M8PFOA	704916.6	3.437833	564,919.00	3.42985	125	50 - 150	0.0080	+/-0.50	
M8PFOS	136408.5	3.6282	94,009.00	3.6282	145	50 - 150	0.0000	+/-0.50	
M9PFNA	568454.3	3.629233	438,303.00	3.629233	130	50 - 150	0.0000	+/-0.50	
MPFDoA	1081139	4.064667	925,952.00	4.064667	117	50 - 150	0.0000	+/-0.50	
d5-NEtFOSAA	1019535	3.937517	199,379.00	3.937517	511	50 - 150	0.0000	+/-0.50	*
d3-NMeFOSAA	282085.4	3.85765	260,310.00	3.85765	108	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
HW-I (d) (22H0298-06)			Lab File ID: 22H0298-06.d			Analyzed: 08/31/22 03:46			
M8FOSA	59545.23	3.9806	293,084.00	3.980567	20	50 - 150	0.0000	+/-0.50	*
M2-4:2FTS	89546.84	2.422817	171,911.00	2.4146	52	50 - 150	0.0082	+/-0.50	
M2PFTA	508484.7	4.305367	810,248.00	4.305333	63	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	162557.8	3.7789	160,893.00	3.778883	101	50 - 150	0.0000	+/-0.50	
MPFBA	341697.8	1.058467	450,804.00	1.050167	76	50 - 150	0.0083	+/-0.50	
M3HFPO-DA	145892.2	2.76565	129,648.00	2.76565	113	50 - 150	0.0000	+/-0.50	
M6PFDA	509152.4	3.779433	642,324.00	3.7794	79	50 - 150	0.0000	+/-0.50	
M3PFBS	111621.9	1.83695	128,766.00	1.828667	87	50 - 150	0.0083	+/-0.50	
M7PFUnA	630761	3.922067	876,840.00	3.92205	72	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	55928.65	3.4205	87,191.00	3.4205	64	50 - 150	0.0000	+/-0.50	
M5PFPeA	365340.6	1.673467	437,818.00	1.6652	83	50 - 150	0.0083	+/-0.50	
M5PFHxA	661594.3	2.506633	785,551.00	2.498417	84	50 - 150	0.0082	+/-0.50	
M3PFHxS	89490.92	3.177667	99,698.00	3.17765	90	50 - 150	0.0000	+/-0.50	
M4PFHpA	687931.2	3.146567	809,634.00	3.138467	85	50 - 150	0.0081	+/-0.50	
M8PFOA	496728.5	3.429867	579,240.00	3.42985	86	50 - 150	0.0000	+/-0.50	
M8PFOS	87553.51	3.6282	106,944.00	3.6282	82	50 - 150	0.0000	+/-0.50	
M9PFNA	407523.6	3.62925	478,068.00	3.629233	85	50 - 150	0.0000	+/-0.50	
MPFDoA	568596	4.064683	942,196.00	4.064667	60	50 - 150	0.0000	+/-0.50	
d5-NEtFOSAA	132748.2	3.929533	218,021.00	3.929517	61	50 - 150	0.0000	+/-0.50	
d3-NMeFOSAA	168254.3	3.857683	248,391.00	3.85765	68	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Blank (B315452-BLK1)			Lab File ID: B315452-BLK1.d			Analyzed: 08/30/22 02:46			
M8FOSA	294407.4	3.9806	253,489.00	3.980567	116	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	158618.8	2.422817	181,274.00	2.4146	88	50 - 150	0.0082	+/-0.50	
M2PFTA	730093.6	4.305367	788,408.00	4.30535	93	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	246724.5	3.778917	134,920.00	3.778883	183	50 - 150	0.0000	+/-0.50	*
MPFBA	442933.4	1.058467	435,289.00	1.050167	102	50 - 150	0.0083	+/-0.50	
M3HFPO-DA	358327	2.765667	109,736.00	2.76565	327	50 - 150	0.0000	+/-0.50	*
M6PFDA	648594.6	3.7874	576,444.00	3.779417	113	50 - 150	0.0080	+/-0.50	
M3PFBS	141592.5	1.836967	125,952.00	1.828667	112	50 - 150	0.0083	+/-0.50	
M7PFUnA	916817.6	3.930067	898,020.00	3.93005	102	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	69704.11	3.420517	86,775.00	3.4205	80	50 - 150	0.0000	+/-0.50	
M5PFPeA	453166.2	1.673467	415,405.00	1.6652	109	50 - 150	0.0083	+/-0.50	
M5PFHxA	831287.6	2.498433	771,580.00	2.498433	108	50 - 150	0.0000	+/-0.50	
M3PFHxS	95214.95	3.18575	94,993.00	3.177667	100	50 - 150	0.0081	+/-0.50	
M4PFHpA	796295.9	3.146567	774,416.00	3.138483	103	50 - 150	0.0081	+/-0.50	
M8PFOA	528314.4	3.437867	564,919.00	3.437833	94	50 - 150	0.0000	+/-0.50	
M8PFOS	105902.6	3.628217	94,009.00	3.6282	113	50 - 150	0.0000	+/-0.50	
M9PFNA	444566	3.629267	438,303.00	3.629233	101	50 - 150	0.0000	+/-0.50	
MPFDoA	856345.9	4.064683	925,952.00	4.064667	92	50 - 150	0.0000	+/-0.50	
d5-NEtFOSAA	938126.1	3.937533	199,379.00	3.937517	471	50 - 150	0.0000	+/-0.50	*
d3-NMeFOSAA	259282.6	3.857683	260,310.00	3.85765	100	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
LCS (B315452-BS1)			Lab File ID: B315452-BS1.d			Analyzed: 08/30/22 02:32			
M8FOSA	272282.5	3.980567	253,489.00	3.980567	107	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	134701.2	2.4228	181,274.00	2.4146	74	50 - 150	0.0082	+/-0.50	
M2PFTA	698668.5	4.30535	788,408.00	4.30535	89	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	205859.4	3.778883	134,920.00	3.778883	153	50 - 150	0.0000	+/-0.50	*
MPFBA	403902.1	1.058467	435,289.00	1.050167	93	50 - 150	0.0083	+/-0.50	
M3HFPO-DA	305550.6	2.76565	109,736.00	2.76565	278	50 - 150	0.0000	+/-0.50	*
M6PFDA	623567.4	3.779417	576,444.00	3.779417	108	50 - 150	0.0000	+/-0.50	
M3PFBS	129645.2	1.83695	125,952.00	1.828667	103	50 - 150	0.0083	+/-0.50	
M7PFUnA	865399.8	3.93005	898,020.00	3.93005	96	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	57091.99	3.4205	86,775.00	3.4205	66	50 - 150	0.0000	+/-0.50	
M5PFPeA	416846.1	1.673467	415,405.00	1.6652	100	50 - 150	0.0083	+/-0.50	
M5PFHxA	760449.9	2.506633	771,580.00	2.498433	99	50 - 150	0.0082	+/-0.50	
M3PFHxS	80752.11	3.185733	94,993.00	3.177667	85	50 - 150	0.0081	+/-0.50	
M4PFHpA	708261.3	3.14655	774,416.00	3.138483	91	50 - 150	0.0081	+/-0.50	
M8PFOA	509353.6	3.437833	564,919.00	3.437833	90	50 - 150	0.0000	+/-0.50	
M8PFOS	98178.8	3.6282	94,009.00	3.6282	104	50 - 150	0.0000	+/-0.50	
M9PFNA	409364.7	3.629233	438,303.00	3.629233	93	50 - 150	0.0000	+/-0.50	
MPFDoA	831393.1	4.064667	925,952.00	4.064667	90	50 - 150	0.0000	+/-0.50	
d5-NEtFOSAA	827195.6	3.929517	199,379.00	3.937517	415	50 - 150	-0.0080	+/-0.50	*
d3-NMeFOSAA	216582.1	3.85765	260,310.00	3.85765	83	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
LCS Dup (B315452-BSD1)			Lab File ID: B315452-BSD1.d			Analyzed: 08/30/22 02:39			
M8FOSA	239113.2	3.980583	253,489.00	3.980567	94	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	130908.3	2.4228	181,274.00	2.4146	72	50 - 150	0.0082	+/-0.50	
M2PFTA	623516.1	4.30535	788,408.00	4.30535	79	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	201235.6	3.7789	134,920.00	3.778883	149	50 - 150	0.0000	+/-0.50	
MPFBA	368639.5	1.058467	435,289.00	1.050167	85	50 - 150	0.0083	+/-0.50	
M3HFPO-DA	284525.7	2.76565	109,736.00	2.76565	259	50 - 150	0.0000	+/-0.50	*
M6PFDA	583912.9	3.779417	576,444.00	3.779417	101	50 - 150	0.0000	+/-0.50	
M3PFBS	118456.3	1.83695	125,952.00	1.828667	94	50 - 150	0.0083	+/-0.50	
M7PFUnA	741424.5	3.930067	898,020.00	3.93005	83	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	54286.85	3.4205	86,775.00	3.4205	63	50 - 150	0.0000	+/-0.50	
M5PFPeA	381838.8	1.673467	415,405.00	1.6652	92	50 - 150	0.0083	+/-0.50	
M5PFHxA	694416.6	2.498417	771,580.00	2.498433	90	50 - 150	0.0000	+/-0.50	
M3PFHxS	74646.42	3.185733	94,993.00	3.177667	79	50 - 150	0.0081	+/-0.50	
M4PFHpA	645436.3	3.14655	774,416.00	3.138483	83	50 - 150	0.0081	+/-0.50	
M8PFOA	456913.4	3.437833	564,919.00	3.437833	81	50 - 150	0.0000	+/-0.50	
M8PFOS	84932.37	3.6282	94,009.00	3.6282	90	50 - 150	0.0000	+/-0.50	
M9PFNA	369743.9	3.629233	438,303.00	3.629233	84	50 - 150	0.0000	+/-0.50	
MPFDoA	741711.6	4.064683	925,952.00	4.064667	80	50 - 150	0.0000	+/-0.50	
d5-NEtFOSAA	766062.1	3.929533	199,379.00	3.937517	384	50 - 150	-0.0080	+/-0.50	*
d3-NMeFOSAA	204652.1	3.857667	260,310.00	3.85765	79	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Blank (B315519-BLK1)			Lab File ID: B315519-BLK1.d			Analyzed: 08/31/22 03:39			
M8FOSA	194491	3.980583	293,084.00	3.980567	66	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	121786.2	2.4228	171,911.00	2.4146	71	50 - 150	0.0082	+/-0.50	
M2PFTA	586825.6	4.30535	810,248.00	4.305333	72	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	187112.6	3.7789	160,893.00	3.778883	116	50 - 150	0.0000	+/-0.50	
MPFBA	384914.5	1.050167	450,804.00	1.050167	85	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	133073.1	2.76565	129,648.00	2.76565	103	50 - 150	0.0000	+/-0.50	
M6PFDA	530808.2	3.779417	642,324.00	3.7794	83	50 - 150	0.0000	+/-0.50	
M3PFBS	109045.7	1.83695	128,766.00	1.828667	85	50 - 150	0.0083	+/-0.50	
M7PFUnA	654944.7	3.93005	876,840.00	3.92205	75	50 - 150	0.0080	+/-0.50	
M2-6:2FTS	66416.34	3.4205	87,191.00	3.4205	76	50 - 150	0.0000	+/-0.50	
M5PFPeA	359940.3	1.6652	437,818.00	1.6652	82	50 - 150	0.0000	+/-0.50	
M5PFHxA	646868.8	2.498417	785,551.00	2.498417	82	50 - 150	0.0000	+/-0.50	
M3PFHxS	85741.09	3.177667	99,698.00	3.17765	86	50 - 150	0.0000	+/-0.50	
M4PFHpA	675313.4	3.14655	809,634.00	3.138467	83	50 - 150	0.0081	+/-0.50	
M8PFOA	522083.9	3.42985	579,240.00	3.42985	90	50 - 150	0.0000	+/-0.50	
M8PFOS	90527.88	3.6282	106,944.00	3.6282	85	50 - 150	0.0000	+/-0.50	
M9PFNA	401714.5	3.629233	478,068.00	3.629233	84	50 - 150	0.0000	+/-0.50	
MPFDoA	605293.8	4.064667	942,196.00	4.064667	64	50 - 150	0.0000	+/-0.50	
d5-NEtFOSAA	134170.3	3.929533	218,021.00	3.929517	62	50 - 150	0.0000	+/-0.50	
d3-NMeFOSAA	177637	3.857667	248,391.00	3.85765	72	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
LCS (B315519-BS1)			Lab File ID: B315519-BS1.d			Analyzed: 08/31/22 03:24			
M8FOSA	204022.3	3.980567	293,084.00	3.980567	70	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	129296.3	2.4228	171,911.00	2.4146	75	50 - 150	0.0082	+/-0.50	
M2PFTA	633997.4	4.305333	810,248.00	4.305333	78	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	186857.4	3.778883	160,893.00	3.778883	116	50 - 150	0.0000	+/-0.50	
MPFBA	416491.8	1.058467	450,804.00	1.050167	92	50 - 150	0.0083	+/-0.50	
M3HFPO-DA	146187.1	2.773833	129,648.00	2.76565	113	50 - 150	0.0082	+/-0.50	
M6PFDA	565915.1	3.7794	642,324.00	3.7794	88	50 - 150	0.0000	+/-0.50	
M3PFBS	115133	1.83695	128,766.00	1.828667	89	50 - 150	0.0083	+/-0.50	
M7PFUnA	656365.5	3.930033	876,840.00	3.92205	75	50 - 150	0.0080	+/-0.50	
M2-6:2FTS	71794.28	3.4205	87,191.00	3.4205	82	50 - 150	0.0000	+/-0.50	
M5PFPeA	388123.1	1.673467	437,818.00	1.6652	89	50 - 150	0.0083	+/-0.50	
M5PFHxA	691367	2.506633	785,551.00	2.498417	88	50 - 150	0.0082	+/-0.50	
M3PFHxS	93756.85	3.185733	99,698.00	3.17765	94	50 - 150	0.0081	+/-0.50	
M4PFHpA	720935.5	3.14655	809,634.00	3.138467	89	50 - 150	0.0081	+/-0.50	
M8PFOA	531983.4	3.437833	579,240.00	3.42985	92	50 - 150	0.0080	+/-0.50	
M8PFOS	91860.38	3.6282	106,944.00	3.6282	86	50 - 150	0.0000	+/-0.50	
M9PFNA	437894.7	3.629233	478,068.00	3.629233	92	50 - 150	0.0000	+/-0.50	
MPFDoA	663333.5	4.06465	942,196.00	4.064667	70	50 - 150	0.0000	+/-0.50	
d5-NEtFOSAA	137564.3	3.929517	218,021.00	3.929517	63	50 - 150	0.0000	+/-0.50	
d3-NMeFOSAA	179972	3.85765	248,391.00	3.85765	72	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
LCS Dup (B315519-BSD1)			Lab File ID: B315519-BSD1.d			Analyzed: 08/31/22 03:31			
M8FOSA	232135.6	3.980583	293,084.00	3.980567	79	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	137371.3	2.4228	171,911.00	2.4146	80	50 - 150	0.0082	+/-0.50	
M2PFTA	710081.5	4.30535	810,248.00	4.305333	88	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	172330.7	3.7789	160,893.00	3.778883	107	50 - 150	0.0000	+/-0.50	
MPFBA	421237.6	1.050167	450,804.00	1.050167	93	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	141652.3	2.76565	129,648.00	2.76565	109	50 - 150	0.0000	+/-0.50	
M6PFDA	582773.1	3.779417	642,324.00	3.7794	91	50 - 150	0.0000	+/-0.50	
M3PFBS	119041.2	1.83695	128,766.00	1.828667	92	50 - 150	0.0083	+/-0.50	
M7PFUnA	710720.8	3.92205	876,840.00	3.92205	81	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	73444.91	3.4205	87,191.00	3.4205	84	50 - 150	0.0000	+/-0.50	
M5PFPeA	395607.2	1.6652	437,818.00	1.6652	90	50 - 150	0.0000	+/-0.50	
M5PFHxA	702282.7	2.498417	785,551.00	2.498417	89	50 - 150	0.0000	+/-0.50	
M3PFHxS	92138.43	3.17765	99,698.00	3.17765	92	50 - 150	0.0000	+/-0.50	
M4PFHpA	714648.3	3.14655	809,634.00	3.138467	88	50 - 150	0.0081	+/-0.50	
M8PFOA	555480.9	3.42985	579,240.00	3.42985	96	50 - 150	0.0000	+/-0.50	
M8PFOS	103390.7	3.6282	106,944.00	3.6282	97	50 - 150	0.0000	+/-0.50	
M9PFNA	451647.9	3.629233	478,068.00	3.629233	94	50 - 150	0.0000	+/-0.50	
MPFDoA	731815.9	4.064667	942,196.00	4.064667	78	50 - 150	0.0000	+/-0.50	
d5-NEtFOSAA	153174.8	3.929533	218,021.00	3.929517	70	50 - 150	0.0000	+/-0.50	
d3-NMeFOSAA	202119.6	3.857667	248,391.00	3.85765	81	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Blank (B316366-BLK1)			Lab File ID: B316366-BLK1.d			Analyzed: 09/19/22 02:40			
M8FOSA	217208.9	3.99655	292,494.00	3.99655	74	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	134283.7	2.439333	244,134.00	2.439333	55	50 - 150	0.0000	+/-0.50	
M2PFTA	938673.3	4.313416	1,239,252.00	4.313416	76	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	97024.48	3.78685	119,127.00	3.78685	81	50 - 150	0.0000	+/-0.50	
MPFBA	507067.1	1.050167	436,533.00	1.058467	116	50 - 150	-0.0083	+/-0.50	
M3HFPO-DA	116066.4	2.773833	89,402.00	2.782017	130	50 - 150	-0.0082	+/-0.50	
M6PFDA	626794.1	3.787367	629,060.00	3.787367	100	50 - 150	0.0000	+/-0.50	
M3PFBS	134044.1	1.861817	118,592.00	1.861817	113	50 - 150	0.0000	+/-0.50	
M7PFUnA	641612.9	3.930033	737,522.00	3.930033	87	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	87602.66	3.4293	141,111.00	3.4205	62	50 - 150	0.0088	+/-0.50	
M5PFPeA	438932.7	1.681733	391,952.00	1.690017	112	50 - 150	-0.0083	+/-0.50	
M5PFHxA	893500.4	2.523067	820,754.00	2.523067	109	50 - 150	0.0000	+/-0.50	
M3PFHxS	126112.4	3.1938	114,140.00	3.185733	110	50 - 150	0.0081	+/-0.50	
M4PFHpA	1064378	3.154633	966,420.00	3.14655	110	50 - 150	0.0081	+/-0.50	
M8PFOA	984937.8	3.437833	882,375.00	3.437833	112	50 - 150	0.0000	+/-0.50	
M8PFOS	100650.2	3.636183	101,504.00	3.6282	99	50 - 150	0.0080	+/-0.50	
M9PFNA	716694.6	3.629233	734,996.00	3.629233	98	50 - 150	0.0000	+/-0.50	
MPFDoA	631718.5	4.07265	753,263.00	4.07265	84	50 - 150	0.0000	+/-0.50	
d5-NEtFOSAA	203339.5	3.9375	264,483.00	3.9375	77	50 - 150	0.0000	+/-0.50	
d3-NMeFOSAA	247914.5	3.8656	308,492.00	3.8656	80	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
LCS (B316366-BS1)			Lab File ID: B316366-BS1.d			Analyzed: 09/19/22 02:33			
M8FOSA	231204.9	3.99655	292,494.00	3.99655	79	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	122585.6	2.439333	244,134.00	2.439333	50	50 - 150	0.0000	+/-0.50	
M2PFTA	926942.3	4.313416	1,239,252.00	4.313416	75	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	92017.65	3.78685	119,127.00	3.78685	77	50 - 150	0.0000	+/-0.50	
MPFBA	542887.4	1.050167	436,533.00	1.058467	124	50 - 150	-0.0083	+/-0.50	
M3HFPO-DA	117544.5	2.782017	89,402.00	2.782017	131	50 - 150	0.0000	+/-0.50	
M6PFDA	691644.5	3.787367	629,060.00	3.787367	110	50 - 150	0.0000	+/-0.50	
M3PFBS	144703.1	1.861817	118,592.00	1.861817	122	50 - 150	0.0000	+/-0.50	
M7PFUnA	656739	3.930033	737,522.00	3.930033	89	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	84980.66	3.4293	141,111.00	3.4205	60	50 - 150	0.0088	+/-0.50	
M5PFPeA	471351	1.681733	391,952.00	1.690017	120	50 - 150	-0.0083	+/-0.50	
M5PFHxA	940557.8	2.523067	820,754.00	2.523067	115	50 - 150	0.0000	+/-0.50	
M3PFHxS	133427.7	3.1938	114,140.00	3.185733	117	50 - 150	0.0081	+/-0.50	
M4PFHpA	1101564	3.154633	966,420.00	3.14655	114	50 - 150	0.0081	+/-0.50	
M8PFOA	1042088	3.437833	882,375.00	3.437833	118	50 - 150	0.0000	+/-0.50	
M8PFOS	107898.9	3.636183	101,504.00	3.6282	106	50 - 150	0.0080	+/-0.50	
M9PFNA	727099.6	3.629233	734,996.00	3.629233	99	50 - 150	0.0000	+/-0.50	
MPFDoA	617913.8	4.07265	753,263.00	4.07265	82	50 - 150	0.0000	+/-0.50	
d5-NEtFOSAA	196478.8	3.9375	264,483.00	3.9375	74	50 - 150	0.0000	+/-0.50	
d3-NMeFOSAA	252284.7	3.8656	308,492.00	3.8656	82	50 - 150	0.0000	+/-0.50	

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SOP-454 PFAS in Water	
Perfluorobutanoic acid (PFBA)	NH-P
Perfluorobutanesulfonic acid (PFBS)	NH-P
Perfluoropentanoic acid (PFPeA)	NH-P
Perfluorohexanoic acid (PFHxA)	NH-P
11Cl-PF3OUdS (F53B Major)	NH-P
9Cl-PF3ONS (F53B Minor)	NH-P
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	NH-P
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NH-P
8:2 Fluorotelomersulfonic acid (8:2FTS A)	NH-P
Perfluorodecanoic acid (PFDA)	NH-P
Perfluorododecanoic acid (PFDoA)	NH-P
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	NH-P
Perfluoroheptanesulfonic acid (PFHpS)	NH-P
N-EtFOSAA	NH-P
N-MeFOSAA	NH-P
Perfluorotetradecanoic acid (PFTA)	NH-P
Perfluorotridecanoic acid (PFTrDA)	NH-P
4:2 Fluorotelomersulfonic acid (4:2FTS A)	NH-P
Perfluorodecanesulfonic acid (PFDS)	NH-P
Perfluorooctanesulfonamide (FOSA)	NH-P
Perfluorononanesulfonic acid (PFNS)	NH-P
Perfluoro-1-hexanesulfonamide (FHxSA)	NH-P
Perfluoro-1-butanesulfonamide (FBSA)	NH-P
Perfluorohexanesulfonic acid (PFHxS)	NH-P
Perfluoro-4-oxapentanoic acid (PFMPA)	NH-P
Perfluoro-5-oxahexanoic acid (PFMBA)	NH-P
6:2 Fluorotelomersulfonic acid (6:2FTS A)	NH-P
Perfluoropetanesulfonic acid (PFPeS)	NH-P
Perfluoroundecanoic acid (PFUnA)	NH-P
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	NH-P
Perfluoroheptanoic acid (PFHpA)	NH-P
Perfluorooctanoic acid (PFOA)	NH-P
Perfluorooctanesulfonic acid (PFOS)	NH-P
Perfluorononanoic acid (PFNA)	NH-P
SOP-466 PFAS in Soil	
Perfluorobutanoic acid (PFBA)	NH-P
Perfluorobutanesulfonic acid (PFBS)	NH-P
Perfluoropentanoic acid (PFPeA)	NH-P
Perfluorohexanoic acid (PFHxA)	NH-P
11Cl-PF3OUdS (F53B Major)	NH-P
9Cl-PF3ONS (F53B Minor)	NH-P
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	NH-P
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NH-P
8:2 Fluorotelomersulfonic acid (8:2FTS A)	NH-P
Perfluorodecanoic acid (PFDA)	NH-P
Perfluorododecanoic acid (PFDoA)	NH-P

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SOP-466 PFAS in Soil	
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	NH-P
Perfluoroheptanesulfonic acid (PFHpS)	NH-P
N-EtFOSAA	NH-P
N-MeFOSAA	NH-P
Perfluorotetradecanoic acid (PFTA)	NH-P
Perfluorotridecanoic acid (PFTrDA)	NH-P
4:2 Fluorotelomersulfonic acid (4:2FTS A)	NH-P
Perfluorodecanesulfonic acid (PFDS)	NH-P
Perfluorooctanesulfonamide (FOSA)	NH-P
Perfluorononanesulfonic acid (PFNS)	NH-P
Perfluoro-1-hexanesulfonamide (FHxSA)	NH-P
Perfluoro-1-butanesulfonamide (FBSA)	NH-P
Perfluorohexanesulfonic acid (PFHxS)	NH-P
Perfluoro-4-oxapentanoic acid (PFMPA)	NH-P
Perfluoro-5-oxahexanoic acid (PFMBA)	NH-P
6:2 Fluorotelomersulfonic acid (6:2FTS A)	NH-P
Perfluoropetanesulfonic acid (PFPeS)	NH-P
Perfluoroundecanoic acid (PFUnA)	NH-P
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	NH-P
Perfluoroheptanoic acid (PFHpA)	NH-P
Perfluorooctanoic acid (PFOA)	NH-P
Perfluorooctanesulfonic acid (PFOS)	NH-P
Perfluorononanoic acid (PFNA)	NH-P

Con-Test, a Pace Environmental Laboratory, operates under the following certifications and accreditations:

Code	Description	Number	Expires
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2023

22H0298

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Access COC's and Support Requests

http://www.pacelabs.com

CHAIN OF CUSTODY RECORD

39 Spruce Street
East Longmeadow, MA 01028

Doc # 381 Rev 5_07/13/2021

Company Name:	Horsley Witten Group
Address:	90 Rt 6A
Phone:	508-833-6600
Project Name:	HYA PFAS Monitoring
Project Location:	Maher Wellfield
Project Number:	22071
Project Manager:	Bryan Massa
Pace Quote Name/Number:	
Invoice Recipient:	
Sampled By:	HW

Requested Turnaround Time: 7-Day ☐ 10-Day ☐ PFAS 10-Day (std) ☒ Due Date:

Rush-Approval Required: 1-Day ☐ 3-Day ☐ 2-Day ☐ 4-Day ☐

Data Delivery: Format: PDF ☑ EXCEL ☑ Other: CLP Like Data Pkg Required: ☐ Email To: Fax To #:

Dissolved Metals Samples: ○ Field Filtered ○ Lab to Filter

Orthophosphate Samples: ○ Field Filtered ○ Lab to Filter

PCB ONLY: SOXHLET ☐ NON SOXHLET ☐

ANALYSIS REQUESTED: PFAS - All - Isotope Dilution

Pace Work Order#	Client Sample ID / Description	Beginning Date/Time	Ending Date/Time	COMP/GRAB	Matrix Code	Conc Code	VIALS	GLASS	PLASTIC	BACTERIA	ENCORE	PFAS - All - Isotope Dilution
1	ME-1	~~1010~~ 7/29/22	1010	Grab	GW	L			2			x
2	ME-3	7/29/22	1020	Grab	GW	L			2			x
3	ME-2	7/29/22	1030	Grab	GW	L			2			x
4	HW-I(s)	8/2/22	1345	Grab	GW	L			2			x
5	HW-I(m)	8/2/22	1410	Grab	GW	L			2			x
6	HW-I(d)	8/2/22	1450	Grab	GW	L			1			x

ME-1, ME-3:

	Date/Time
Relinquished by: (signature) [signature]	7/29/22 1200
Received by: (signature) HW fridge	7/29/22 1200

HW-I wells:

	Date/Time
Relinquished by: (signature) Sarah Ballato	8/2/22 1641
Received by: (signature) HW fridge	8/2/22 1641
Relinquished by: (signature) [signature]	8/4/22
Received by: (signature) Paul Chastenay	8-4-22 1229
Relinquished by: (signature) Paul Chastenay	8-4-22 1645
Received by: (signature) [signature]	8-4-22 1645

Client Comments: No preservative - Samples Iced

Detection Limit Requirements: MA GW-1; CT; Other

Special Requirements: ☑ MA MCP Required; MCP Certification Form Required; ☐ CT RCP Required; RCP Certification Form Required; ☐ MA State DW Required; PWSID #

Please use the following codes to indicate possible sample concentration within the Conc Code column above: H - High; M - Medium; L - Low; C - Clean; U - Unknown

NELAC and AIHA-LAP, LLC Accredited

Project Entity: Government ☐ Federal ☐ City ☐ Municipality ☐ 21 J ☐ Brownfield ☐ MWRA ☐ School ☐ MBTA ☐ WRTA ☐

Other: ☐ Chromatogram ☐ AIHA-LAP,LLC

Lab Comments: [signature] 8-4-22 1805
[initials] 4.1 8/4 1805
~~Missing one ME 2~~ [initials] 8/4/22

Disclaimer: Pace Analytical is not responsible for any omitted information on the Chain of Custody. The Chain of Custody is a legal document that must be complete and accurate and is used to determine what analyses the laboratory will perform. Any missing information is not the laboratory's responsibility. Pace Analytical values your partnership on each project and will try to assist with missing information, but will not be held accountable.

[2] Preservation Code

Courier Use Only

Total Number Of:
VIALS
GLASS
PLASTIC 11
BACTERIA
ENCORE

Glassware in the fridge? (Y) N
Glassware in freezer? Y / N
Prepackaged Cooler? Y / N

*Pace Analytical is not responsible for missing samples from prepacked coolers

[1] Matrix Codes:
GW = Ground Water
WW = Waste Water
DW = Drinking Water
A = Air
S = Soil
SL = Sludge
SOL = Solid
O = Other (please define)

[2] Preservation Codes:
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium Bisulfate
X = Sodium Hydroxide
T = Sodium Thiosulfate
O = Other (please define)

39 Spruce St.
East Longmeadow, MA. 01028
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Pace PEOPLE ADVANCING SCIENCE

Doc# 277 Rev 6 July 2022

Login Sample Receipt Checklist - (Rejection Criteria Listing - Using Acceptance Policy) Any False Statement will be brought to the attention of the Client - State True or False

Client Received By Horsley DMW Date 08/04/22 Time 1605

How were the samples received? In Cooler T No Cooler _____ On Ice T No Ice _____
Direct From Sample _____ Ambient _____ Melted Ice _____

Were samples within Tempurature? Within 2-6°C T By Gun # 5 Actual Temp - 4.1
By Blank # _____ Actual Temp - _____

Was Custody Seal In tact? N/A Were Samples Tampered with? N/A

Was COC Relinquished ? F Does Chain Agree With Samples? T

Are there broken/leaking/loose caps on any samples? F

Is COC in ink/ Legible? T Were samples received within holding time? T

Did COC include all pertinent Information? Client? T Analysis? T Sampler Name? T
Project? T ID's? T Collection Dates/Times? T

Are Sample labels filled out and legible? T

Are there Lab to Filters? F Who was notified? _____

Are there Rushes? F Who was notified? _____

Are there Short Holds? F Who was notified? _____

Samples are received within holding time? T Is there enough Volume? T

Is there Headspace where applicable? T N/A MS/MSD? F

Proper Media/Containers Used? T splitting samples require F

Were trip blanks receive F On COC? F

Do All Samples Have the proper pH? Acid N/A Base N/A

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic	1	16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic	9	4oz Amb/Clear	
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear	
DI-		Other Plastic		Other Glass		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Unused Media

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic		4oz Amb/Clear	
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear	
DI-		Other Plastic		Other Glass		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Comments:

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October 26, 2022

Bryan Massa
Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563

Project Location: Hyannis, MA
Client Job Number:
Project Number: 22071
Laboratory Work Order Number: 22H0420

Enclosed are results of analyses for samples as received by the laboratory on August 9, 2022. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Kaitlyn A. Feliciano
Project Manager

Table of Contents

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563
ATTN: Bryan Massa

REPORT DATE: 10/26/2022

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 22071

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 22H0420

The results of analyses performed on the following samples submitted to CON-TEST, a Pace Analytical Laboratory, are found in this report.

PROJECT LOCATION: Hyannis, MA

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
HW-S (s)	22H0420-01	Ground Water		-	
				SOP-454 PFAS	
HW-S (m)	22H0420-02	Ground Water		SOP-454 PFAS	

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CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

REVISED REPORT 10/25/22- PFAS reported down to MDL

SOP-454 PFAS

Qualifications:

PF-19

Sample re-analyzed at a dilution that was re-fortified with internal standard.

Analyte & Samples(s) Qualified:

22H0420-01RE1[HW-S (s)]

R-05

Laboratory fortified blank duplicate RPD is outside of control limits. Reduced precision is anticipated for any reported value for this compound.

Analyte & Samples(s) Qualified:

Hexafluoropropylene oxide dimer a
B315759-BSD1

S-29

Extracted Internal Standard is outside of control limits.

Analyte & Samples(s) Qualified:

d3-NMeFOSAA
22H0420-01[HW-S (s)]

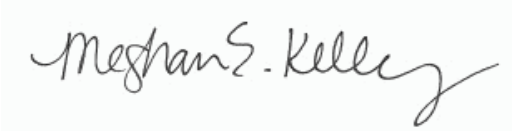
d5-NEtFOSAA
22H0420-01[HW-S (s)]

M2-4:2FTS
22H0420-02[HW-S (m)], S076742-CCV5

M2-6:2FTS
22H0420-01[HW-S (s)], S076742-CCV5

M3HFPO-DA
S076742-CCV5

The results of analyses reported only relate to samples submitted to Con-Test, a Pace Analytical Laboratory, for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.



Meghan E. Kelley
Reporting Specialist

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Hyannis, MA | Sample Description: | Work Order: 22H0420

Date Received: 8/9/2022

Field Sample #: HW-S (s) | Sampled: 8/8/2022 10:30

Sample ID: 22H0420-01

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	100	1.7	0.64	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH
Perfluorobutanesulfonic acid (PFBS)	5.2	1.7	0.24	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH
Perfluoropentanoic acid (PFPeA)	360	86	17	ng/L	50		SOP-454 PFAS	8/29/22	9/20/22 20:22	BLH
Perfluorohexanoic acid (PFHxA)	220	86	17	ng/L	50		SOP-454 PFAS	8/29/22	9/20/22 20:22	BLH
11Cl-PF3OUdS (F53B Major)	ND	1.7	0.55	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH
9Cl-PF3ONS (F53B Minor)	ND	1.7	0.34	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.7	0.30	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.7	0.21	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH
8:2 Fluorotelomersulfonic acid (8:2FTS A)	0.91	1.7	0.53	ng/L	1	J	SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH
Perfluorodecanoic acid (PFDA)	ND	1.7	0.42	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH
Perfluorododecanoic acid (PFDoA)	ND	1.7	0.38	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.7	0.20	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH
Perfluoroheptanesulfonic acid (PFHpS)	27	1.7	0.81	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH
N-EtFOSAA	ND	1.7	0.55	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH
N-MeFOSAA	ND	1.7	0.66	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH
Perfluorotetradecanoic acid (PFTA)	ND	1.7	0.32	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH
Perfluorotridecanoic acid (PFTrDA)	ND	1.7	0.24	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH
4:2 Fluorotelomersulfonic acid (4:2FTS A)	0.32	1.7	0.24	ng/L	1	J	SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH
Perfluorodecanesulfonic acid (PFDS)	ND	1.7	0.28	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH
Perfluorooctanesulfonamide (FOSA)	ND	1.7	0.36	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH
Perfluorononanesulfonic acid (PFNS)	0.21	1.7	0.15	ng/L	1	J	SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH
Perfluoro-1-hexanesulfonamide (FHxSA)	4.0	1.7	0.27	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH
Perfluoro-1-butanesulfonamide (FBSA)	3.2	1.7	0.17	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH
Perfluorohexanesulfonic acid (PFHxS)	120	1.7	0.29	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.7	0.36	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.7	0.30	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	1.7	0.32	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH
Perfluoropetanesulfonic acid (PFPeS)	8.7	1.7	0.22	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH
Perfluoroundecanoic acid (PFUnA)	ND	1.7	0.32	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.7	0.24	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH
Perfluoroheptanoic acid (PFHpA)	160	1.7	0.30	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH
Perfluorooctanoic acid (PFOA)	230	86	29	ng/L	50		SOP-454 PFAS	8/29/22	9/20/22 20:22	BLH
Perfluorooctanesulfonic acid (PFOS)	160	86	26	ng/L	50		SOP-454 PFAS	8/29/22	9/20/22 20:22	BLH
Perfluorononanoic acid (PFNA)	160	1.7	0.30	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:01	BLH

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Project Location: Hyannis, MA | Sample Description: | Work Order: 22H0420

Date Received: 8/9/2022

Field Sample #: HW-S (m) | Sampled: 8/8/2022 11:15

Sample ID: 22H0420-02

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	4.1	1.7	0.64	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
Perfluorobutanesulfonic acid (PFBS)	ND	1.7	0.24	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
Perfluoropentanoic acid (PFPeA)	14	1.7	0.34	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
Perfluorohexanoic acid (PFHxA)	9.9	1.7	0.33	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
11Cl-PF3OUdS (F53B Major)	ND	1.7	0.55	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
9Cl-PF3ONS (F53B Minor)	ND	1.7	0.33	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.7	0.30	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.7	0.21	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	1.7	0.52	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
Perfluorodecanoic acid (PFDA)	ND	1.7	0.42	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
Perfluorododecanoic acid (PFDoA)	ND	1.7	0.38	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.7	0.20	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
Perfluoroheptanesulfonic acid (PFHpS)	ND	1.7	0.81	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
N-EtFOSAA	ND	1.7	0.54	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
N-MeFOSAA	ND	1.7	0.65	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
Perfluorotetradecanoic acid (PFTA)	ND	1.7	0.31	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
Perfluorotridecanoic acid (PFTrDA)	ND	1.7	0.24	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.7	0.24	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
Perfluorodecanesulfonic acid (PFDS)	ND	1.7	0.28	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
Perfluorooctanesulfonamide (FOSA)	ND	1.7	0.36	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
Perfluorononanesulfonic acid (PFNS)	ND	1.7	0.14	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	1.7	0.27	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
Perfluoro-1-butanesulfonamide (FBSA)	0.20	1.7	0.16	ng/L	1	J	SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
Perfluorohexanesulfonic acid (PFHxS)	7.4	1.7	0.29	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.7	0.36	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.7	0.29	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	1.7	0.31	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
Perfluoropetanesulfonic acid (PFPeS)	0.45	1.7	0.22	ng/L	1	J	SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
Perfluoroundecanoic acid (PFUnA)	ND	1.7	0.32	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.7	0.24	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
Perfluoroheptanoic acid (PFHpA)	6.5	1.7	0.30	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
Perfluorooctanoic acid (PFOA)	4.9	1.7	0.58	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
Perfluorooctanesulfonic acid (PFOS)	9.6	1.7	0.52	ng/L	1		SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH
Perfluorononanoic acid (PFNA)	1.3	1.7	0.30	ng/L	1	J	SOP-454 PFAS	8/29/22	9/19/22 0:08	BLH

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Sample Extraction Data

Prep Method: SOP 454-PFAAS **Analytical Method: SOP-454 PFAS**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
22H0420-01 [HW-S (s)]	B315759	289	1.00	08/29/22
22H0420-01RE1 [HW-S (s)]	B315759	289	1.00	08/29/22
22H0420-02 [HW-S (m)]	B315759	292	1.00	08/29/22

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QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B315759 - SOP 454-PFAAS										
Blank (B315759-BLK1)				Prepared: 08/29/22 Analyzed: 09/18/22						
Perfluorobutanoic acid (PFBA)	ND	1.7	ng/L							
Perfluorobutanesulfonic acid (PFBS)	ND	1.7	ng/L							
Perfluoropentanoic acid (PFPeA)	ND	1.7	ng/L							
Perfluorohexanoic acid (PFHxA)	ND	1.7	ng/L							
11Cl-PF3OUdS (F53B Major)	ND	1.7	ng/L							
9Cl-PF3ONS (F53B Minor)	ND	1.7	ng/L							
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.7	ng/L							
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.7	ng/L							
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	1.7	ng/L							
Perfluorodecanoic acid (PFDA)	ND	1.7	ng/L							
Perfluorododecanoic acid (PFDoA)	ND	1.7	ng/L							
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.7	ng/L							
Perfluoroheptanesulfonic acid (PFHpS)	ND	1.7	ng/L							
N-EtFOSAA	ND	1.7	ng/L							
N-MeFOSAA	ND	1.7	ng/L							
Perfluorotetradecanoic acid (PFTA)	ND	1.7	ng/L							
Perfluorotridecanoic acid (PFTrDA)	ND	1.7	ng/L							
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.7	ng/L							
Perfluorodecanesulfonic acid (PFDS)	ND	1.7	ng/L							
Perfluorooctanesulfonamide (FOSA)	ND	1.7	ng/L							
Perfluorononanesulfonic acid (PFNS)	ND	1.7	ng/L							
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	1.7	ng/L							
Perfluoro-1-butanesulfonamide (FBSA)	ND	1.7	ng/L							
Perfluorohexanesulfonic acid (PFHxS)	ND	1.7	ng/L							
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.7	ng/L							
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.7	ng/L							
6:2 Fluorotelomersulfonic acid (6:2FTS A)	0.55	1.7	ng/L							J
Perfluoropetanesulfonic acid (PFPeS)	ND	1.7	ng/L							
Perfluoroundecanoic acid (PFUnA)	ND	1.7	ng/L							
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.7	ng/L							
Perfluoroheptanoic acid (PFHpA)	ND	1.7	ng/L							
Perfluorooctanoic acid (PFOA)	ND	1.7	ng/L							
Perfluorooctanesulfonic acid (PFOS)	ND	1.7	ng/L							
Perfluorononanoic acid (PFNA)	ND	1.7	ng/L							
LCS (B315759-BS1)				Prepared: 08/29/22 Analyzed: 09/18/22						
Perfluorobutanoic acid (PFBA)	9.91	1.8	ng/L	8.90		111	73-129			
Perfluorobutanesulfonic acid (PFBS)	9.17	1.8	ng/L	7.88		116	72-130			
Perfluoropentanoic acid (PFPeA)	10.1	1.8	ng/L	8.90		114	72-129			
Perfluorohexanoic acid (PFHxA)	10.2	1.8	ng/L	8.90		114	72-129			
11Cl-PF3OUdS (F53B Major)	6.82	1.8	ng/L	8.39		81.4	55.1-141			
9Cl-PF3ONS (F53B Minor)	7.88	1.8	ng/L	8.30		95.0	59.6-146			
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	9.19	1.8	ng/L	8.39		110	60.3-131			
Hexafluoropropylene oxide dimer acid (HFPO-DA)	10.5	1.8	ng/L	8.90		118	37.6-167			
8:2 Fluorotelomersulfonic acid (8:2FTS A)	8.64	1.8	ng/L	8.55		101	67-138			
Perfluorodecanoic acid (PFDA)	10.4	1.8	ng/L	8.90		117	71-129			
Perfluorododecanoic acid (PFDoA)	8.86	1.8	ng/L	8.90		99.5	72-134			
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	6.07	1.8	ng/L	7.92		76.6	49.4-154			

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QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD		RPD Limit	Notes
Batch B315759 - SOP 454-PFAAS											
LCS (B315759-BS1)				Prepared: 08/29/22 Analyzed: 09/18/22							
Perfluoroheptanesulfonic acid (PFHpS)	9.76	1.8	ng/L	8.50		115	69-134				
N-EtFOSAA	11.1	1.8	ng/L	8.90		124	61-135				
N-MeFOSAA	10.9	1.8	ng/L	8.90		122	65-136				
Perfluorotetradecanoic acid (PFTA)	11.2	1.8	ng/L	8.90		126	71-132				
Perfluorotridecanoic acid (PFTrDA)	10.5	1.8	ng/L	8.90		118	65-144				
4:2 Fluorotelomersulfonic acid (4:2FTS A)	9.87	1.8	ng/L	8.32		119	63-143				
Perfluorodecanesulfonic acid (PFDS)	8.19	1.8	ng/L	8.59		95.4	53-142				
Perfluorooctanesulfonamide (FOSA)	10.7	1.8	ng/L	8.90		120	67-137				
Perfluorononanesulfonic acid (PFNS)	8.13	1.8	ng/L	8.55		95.1	69-127				
Perfluoro-1-hexanesulfonamide (FHxSA)	8.65	1.8	ng/L	8.90		97.2	61.7-156				
Perfluoro-1-butanesulfonamide (FBSA)	9.43	1.8	ng/L	8.90		106	61.3-145				
Perfluorohexanesulfonic acid (PFHxS)	9.21	1.8	ng/L	8.15		113	68-131				
Perfluoro-4-oxapentanoic acid (PFMPA)	8.51	1.8	ng/L	8.90		95.6	59.8-147				
Perfluoro-5-oxahexanoic acid (PFMBA)	9.29	1.8	ng/L	8.90		104	59.5-146				
6:2 Fluorotelomersulfonic acid (6:2FTS A)	10.2	1.8	ng/L	8.46		121	64-140				
Perfluoropetanesulfonic acid (PFPeS)	8.86	1.8	ng/L	8.37		106	71-127				
Perfluoroundecanoic acid (PFUnA)	9.97	1.8	ng/L	8.90		112	69-133				
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	10.0	1.8	ng/L	8.90		112	58.5-143				
Perfluoroheptanoic acid (PFHpA)	10.3	1.8	ng/L	8.90		116	72-130				
Perfluorooctanoic acid (PFOA)	10.7	1.8	ng/L	8.90		120	71-133				
Perfluorooctanesulfonic acid (PFOS)	9.28	1.8	ng/L	8.24		113	65-140				
Perfluorononanoic acid (PFNA)	10.6	1.8	ng/L	8.90		119	69-130				
LCS Dup (B315759-BSD1)				Prepared: 08/29/22 Analyzed: 09/18/22							
Perfluorobutanoic acid (PFBA)	8.82	1.8	ng/L	8.76		101	73-129	11.6		30	
Perfluorobutanesulfonic acid (PFBS)	7.91	1.8	ng/L	7.76		102	72-130	14.7		30	
Perfluoropentanoic acid (PFPeA)	9.03	1.8	ng/L	8.76		103	72-129	11.4		30	
Perfluorohexanoic acid (PFHxA)	9.29	1.8	ng/L	8.76		106	72-129	9.14		30	
11Cl-PF3OUdS (F53B Major)	6.63	1.8	ng/L	8.25		80.3	55.1-141	2.90		30	
9Cl-PF3ONS (F53B Minor)	7.60	1.8	ng/L	8.17		93.0	59.6-146	3.70		30	
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	8.27	1.8	ng/L	8.25		100	60.3-131	10.5		30	
Hexafluoropropylene oxide dimer acid (HFPO-DA)	5.67	1.8	ng/L	8.76		64.7	37.6-167	**60.0**	*	30	R-05
8:2 Fluorotelomersulfonic acid (8:2FTS A)	7.14	1.8	ng/L	8.41		84.9	67-138	19.0		30	
Perfluorodecanoic acid (PFDA)	9.24	1.8	ng/L	8.76		105	71-129	11.9		30	
Perfluorododecanoic acid (PFDoA)	7.68	1.8	ng/L	8.76		87.7	72-134	14.2		30	
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	5.43	1.8	ng/L	7.80		69.6	49.4-154	11.1		30	
Perfluoroheptanesulfonic acid (PFHpS)	9.41	1.8	ng/L	8.37		112	69-134	3.64		30	
N-EtFOSAA	10.2	1.8	ng/L	8.76		117	61-135	7.73		30	
N-MeFOSAA	10.1	1.8	ng/L	8.76		115	65-136	7.49		30	
Perfluorotetradecanoic acid (PFTA)	9.98	1.8	ng/L	8.76		114	71-132	11.7		30	
Perfluorotridecanoic acid (PFTrDA)	9.60	1.8	ng/L	8.76		110	65-144	9.05		30	
4:2 Fluorotelomersulfonic acid (4:2FTS A)	9.08	1.8	ng/L	8.19		111	63-143	8.41		30	
Perfluorodecanesulfonic acid (PFDS)	7.31	1.8	ng/L	8.46		86.5	53-142	11.4		30	
Perfluorooctanesulfonamide (FOSA)	9.78	1.8	ng/L	8.76		112	67-137	9.20		30	
Perfluorononanesulfonic acid (PFNS)	8.61	1.8	ng/L	8.41		102	69-127	5.69		30	
Perfluoro-1-hexanesulfonamide (FHxSA)	7.94	1.8	ng/L	8.76		90.6	61.7-156	8.54		30	
Perfluoro-1-butanesulfonamide (FBSA)	8.50	1.8	ng/L	8.76		97.0	61.3-145	10.4		30	
Perfluorohexanesulfonic acid (PFHxS)	8.01	1.8	ng/L	8.02		99.9	68-131	14.0		30	
Perfluoro-4-oxapentanoic acid (PFMPA)	7.77	1.8	ng/L	8.76		88.7	59.8-147	9.11		30	
Perfluoro-5-oxahexanoic acid (PFMBA)	8.36	1.8	ng/L	8.76		95.4	59.5-146	10.5		30	

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QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B315759 - SOP 454-PFAAS										
LCS Dup (B315759-BSD1)				Prepared: 08/29/22 Analyzed: 09/18/22						
6:2 Fluorotelomersulfonic acid (6:2FTS A)	8.93	1.8	ng/L	8.32		107	64-140	13.6	30	
Perfluoropetanesulfonic acid (PFPeS)	8.19	1.8	ng/L	8.24		99.4	71-127	7.82	30	
Perfluoroundecanoic acid (PFUnA)	8.69	1.8	ng/L	8.76		99.2	69-133	13.7	30	
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	9.01	1.8	ng/L	8.76		103	58.5-143	10.5	30	
Perfluoroheptanoic acid (PFHpA)	9.45	1.8	ng/L	8.76		108	72-130	8.74	30	
Perfluorooctanoic acid (PFOA)	10.0	1.8	ng/L	8.76		114	71-133	6.57	30	
Perfluorooctanesulfonic acid (PFOS)	8.53	1.8	ng/L	8.11		105	65-140	8.44	30	
Perfluorononanoic acid (PFNA)	9.36	1.8	ng/L	8.76		107	69-130	12.2	30	

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit is at the level of quantitation (LOQ)
DL	Detection Limit is the lower limit of detection determined by the MDL study
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
J	Detected but below the Reporting Limit (lowest calibration standard); therefore, result is an estimated concentration (CLP J-Flag).
PF-19	Sample re-analyzed at a dilution that was re-fortified with internal standard.
R-05	Laboratory fortified blank duplicate RPD is outside of control limits. Reduced precision is anticipated for any reported value for this compound.
S-29	Extracted Internal Standard is outside of control limits.

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
HW-S (s) (22H0420-01)			Lab File ID: 22H0420-01.d			Analyzed: 09/19/22 00:01			
M8FOSA	172635.6	3.99655	292,494.00	3.99655	59	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	129551.3	2.513233	244,134.00	2.513233	53	50 - 150	0.0000	+/-0.50	
M2PFTA	741534.6	4.345917	1,239,252.00	4.345917	60	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	61850.55	3.818733	119,127.00	3.818733	52	50 - 150	0.0000	+/-0.50	
MPFBA	379445.9	1.075083	436,533.00	1.0834	87	50 - 150	-0.0083	+/-0.50	
M3HFPO-DA	77779.23	2.847483	89,402.00	2.8393	87	50 - 150	0.0082	+/-0.50	
M6PFDA	430278.8	3.81925	629,060.00	3.81925	68	50 - 150	0.0000	+/-0.50	
M3PFBS	118048.6	1.911533	118,592.00	1.911533	100	50 - 150	0.0000	+/-0.50	
M7PFUnA	386232.5	3.962017	737,522.00	3.962017	52	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	582495.9	3.4614	141,111.00	3.4614	413	50 - 150	0.0000	+/-0.50	*
M5PFPeA	334921.8	1.731383	391,952.00	1.731383	85	50 - 150	0.0000	+/-0.50	
M5PFHxA	753039.6	2.596967	820,754.00	2.596967	92	50 - 150	0.0000	+/-0.50	
M3PFHxS	114493	3.226417	114,140.00	3.226417	100	50 - 150	0.0000	+/-0.50	
M4PFHpA	924118.5	3.195017	966,420.00	3.186933	96	50 - 150	0.0081	+/-0.50	
M8PFOA	719439.8	3.469917	882,375.00	3.469917	82	50 - 150	0.0000	+/-0.50	
M8PFOS	75094.32	3.660133	101,504.00	3.660133	74	50 - 150	0.0000	+/-0.50	
M9PFNA	585274.3	3.661167	734,996.00	3.661167	80	50 - 150	0.0000	+/-0.50	
MPFDoA	377588.9	4.104633	753,263.00	4.104633	50	50 - 150	0.0000	+/-0.50	
d5-NEtFOSAA	115125.6	3.969483	264,483.00	3.969483	44	50 - 150	0.0000	+/-0.50	*
d3-NMeFOSAA	134211.2	3.897717	308,492.00	3.889733	44	50 - 150	0.0080	+/-0.50	*
HW-S (s) (22H0420-01RE1)			Lab File ID: 22H0420-01RE1.d			Analyzed: 09/20/22 20:22			
M5PFPeA	384967.5	1.757717	451,752.00	1.757717	85	50 - 150	0.0000	+/-0.50	
M5PFHxA	768121.3	2.629817	913,633.00	2.629817	84	50 - 150	0.0000	+/-0.50	
M8PFOA	912187.8	3.485883	1,084,912.00	3.485883	84	50 - 150	0.0000	+/-0.50	
M8PFOS	93544.19	3.6761	117,592.00	3.6761	80	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
HW-S (m) (22H0420-02)			Lab File ID: 22H0420-02.d			Analyzed: 09/19/22 00:08			
M8FOSA	192545.6	3.99655	292,494.00	3.99655	66	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	109129.2	2.513233	244,134.00	2.513233	45	50 - 150	0.0000	+/-0.50	*
M2PFTA	811344.4	4.345917	1,239,252.00	4.345917	65	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	69191.6	3.818717	119,127.00	3.818733	58	50 - 150	0.0000	+/-0.50	
MPFBA	349353.6	1.075083	436,533.00	1.0834	80	50 - 150	-0.0083	+/-0.50	
M3HFPO-DA	66176.36	2.847483	89,402.00	2.8393	74	50 - 150	0.0082	+/-0.50	
M6PFDA	525264.5	3.81925	629,060.00	3.81925	83	50 - 150	0.0000	+/-0.50	
M3PFBS	104342	1.911533	118,592.00	1.911533	88	50 - 150	0.0000	+/-0.50	
M7PFUnA	573446.5	3.962017	737,522.00	3.962017	78	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	110837.9	3.4614	141,111.00	3.4614	79	50 - 150	0.0000	+/-0.50	
M5PFPeA	306579.6	1.731383	391,952.00	1.731383	78	50 - 150	0.0000	+/-0.50	
M5PFHxA	666997.4	2.596967	820,754.00	2.596967	81	50 - 150	0.0000	+/-0.50	
M3PFHxS	102457.1	3.2345	114,140.00	3.226417	90	50 - 150	0.0081	+/-0.50	
M4PFHpA	816008.5	3.195017	966,420.00	3.186933	84	50 - 150	0.0081	+/-0.50	
M8PFOA	816402.4	3.469917	882,375.00	3.469917	93	50 - 150	0.0000	+/-0.50	
M8PFOS	92799.28	3.660133	101,504.00	3.660133	91	50 - 150	0.0000	+/-0.50	
M9PFNA	604222.2	3.661167	734,996.00	3.661167	82	50 - 150	0.0000	+/-0.50	
MPFDoA	540864.1	4.104633	753,263.00	4.104633	72	50 - 150	0.0000	+/-0.50	
d5-NEtFOSAA	179057.9	3.969483	264,483.00	3.969483	68	50 - 150	0.0000	+/-0.50	
d3-NMeFOSAA	202718.7	3.897717	308,492.00	3.889733	66	50 - 150	0.0080	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Blank (B315759-BLK1)			Lab File ID: B315759-BLK1.d			Analyzed: 09/18/22 23:47			
M8FOSA	235350.4	3.99655	292,494.00	3.99655	80	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	209874.7	2.513233	244,134.00	2.513233	86	50 - 150	0.0000	+/-0.50	
M2PFTA	895246.3	4.345917	1,239,252.00	4.345917	72	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	105192.3	3.818717	119,127.00	3.818733	88	50 - 150	0.0000	+/-0.50	
MPFBA	416811.4	1.075083	436,533.00	1.0834	95	50 - 150	-0.0083	+/-0.50	
M3HFPO-DA	87619.05	2.8393	89,402.00	2.8393	98	50 - 150	0.0000	+/-0.50	
M6PFDA	591235.4	3.81925	629,060.00	3.81925	94	50 - 150	0.0000	+/-0.50	
M3PFBS	116076	1.911533	118,592.00	1.911533	98	50 - 150	0.0000	+/-0.50	
M7PFUnA	616114.8	3.962017	737,522.00	3.962017	84	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	131790.2	3.4614	141,111.00	3.4614	93	50 - 150	0.0000	+/-0.50	
M5PFPeA	368012.3	1.731383	391,952.00	1.731383	94	50 - 150	0.0000	+/-0.50	
M5PFHxA	773353.6	2.596967	820,754.00	2.596967	94	50 - 150	0.0000	+/-0.50	
M3PFHxS	112651.2	3.226417	114,140.00	3.226417	99	50 - 150	0.0000	+/-0.50	
M4PFHpA	928084.7	3.195	966,420.00	3.186933	96	50 - 150	0.0081	+/-0.50	
M8PFOA	895770	3.469917	882,375.00	3.469917	102	50 - 150	0.0000	+/-0.50	
M8PFOS	100688.9	3.660133	101,504.00	3.660133	99	50 - 150	0.0000	+/-0.50	
M9PFNA	668823.2	3.661167	734,996.00	3.661167	91	50 - 150	0.0000	+/-0.50	
MPFDoA	593757.1	4.104633	753,263.00	4.104633	79	50 - 150	0.0000	+/-0.50	
d5-NEtFOSAA	202559.8	3.969483	264,483.00	3.969483	77	50 - 150	0.0000	+/-0.50	
d3-NMeFOSAA	254953.3	3.897717	308,492.00	3.889733	83	50 - 150	0.0080	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
LCS (B315759-BS1)			Lab File ID: B315759-BS1.d			Analyzed: 09/18/22 23:32			
M8FOSA	249182.4	3.99655	292,494.00	3.99655	85	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	233312.9	2.505033	244,134.00	2.513233	96	50 - 150	-0.0082	+/-0.50	
M2PFTA	999368.5	4.345917	1,239,252.00	4.345917	81	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	122682.2	3.818717	119,127.00	3.818733	103	50 - 150	0.0000	+/-0.50	
MPFBA	437797.8	1.075083	436,533.00	1.0834	100	50 - 150	-0.0083	+/-0.50	
M3HFPO-DA	75869.39	2.8393	89,402.00	2.8393	85	50 - 150	0.0000	+/-0.50	
M6PFDA	630033.4	3.81925	629,060.00	3.81925	100	50 - 150	0.0000	+/-0.50	
M3PFBS	123096.6	1.911533	118,592.00	1.911533	104	50 - 150	0.0000	+/-0.50	
M7PFUnA	653542.1	3.962017	737,522.00	3.962017	89	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	143789.4	3.4614	141,111.00	3.4614	102	50 - 150	0.0000	+/-0.50	
M5PFPeA	382479.2	1.731383	391,952.00	1.731383	98	50 - 150	0.0000	+/-0.50	
M5PFHxA	820250.4	2.596967	820,754.00	2.596967	100	50 - 150	0.0000	+/-0.50	
M3PFHxS	120948.4	3.226417	114,140.00	3.226417	106	50 - 150	0.0000	+/-0.50	
M4PFHpA	992325.3	3.195017	966,420.00	3.186933	103	50 - 150	0.0081	+/-0.50	
M8PFOA	934632.3	3.469917	882,375.00	3.469917	106	50 - 150	0.0000	+/-0.50	
M8PFOS	106830.7	3.660133	101,504.00	3.660133	105	50 - 150	0.0000	+/-0.50	
M9PFNA	715393.4	3.661167	734,996.00	3.661167	97	50 - 150	0.0000	+/-0.50	
MPFDoA	648874.4	4.104633	753,263.00	4.104633	86	50 - 150	0.0000	+/-0.50	
d5-NEtFOSAA	222046.9	3.969483	264,483.00	3.969483	84	50 - 150	0.0000	+/-0.50	
d3-NMeFOSAA	273662.9	3.889733	308,492.00	3.889733	89	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
LCS Dup (B315759-BSD1)			Lab File ID: B315759-BSD1.d			Analyzed: 09/18/22 23:39			
M8FOSA	248617.6	3.99655	292,494.00	3.99655	85	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	220691	2.513233	244,134.00	2.513233	90	50 - 150	0.0000	+/-0.50	
M2PFTA	958538.8	4.345917	1,239,252.00	4.345917	77	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	117820.9	3.818717	119,127.00	3.818733	99	50 - 150	0.0000	+/-0.50	
MPFBA	434884	1.075083	436,533.00	1.0834	100	50 - 150	-0.0083	+/-0.50	
M3HFPO-DA	100725.5	2.847483	89,402.00	2.8393	113	50 - 150	0.0082	+/-0.50	
M6PFDA	597416.1	3.81925	629,060.00	3.81925	95	50 - 150	0.0000	+/-0.50	
M3PFBS	120396.7	1.911533	118,592.00	1.911533	102	50 - 150	0.0000	+/-0.50	
M7PFUnA	655512.6	3.962017	737,522.00	3.962017	89	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	140577.4	3.4614	141,111.00	3.4614	100	50 - 150	0.0000	+/-0.50	
M5PFPeA	380229.4	1.731383	391,952.00	1.731383	97	50 - 150	0.0000	+/-0.50	
M5PFHxA	806588.6	2.596967	820,754.00	2.596967	98	50 - 150	0.0000	+/-0.50	
M3PFHxS	115905.8	3.226417	114,140.00	3.226417	102	50 - 150	0.0000	+/-0.50	
M4PFHpA	963593.4	3.195017	966,420.00	3.186933	100	50 - 150	0.0081	+/-0.50	
M8PFOA	919495.3	3.469917	882,375.00	3.469917	104	50 - 150	0.0000	+/-0.50	
M8PFOS	99059.66	3.660133	101,504.00	3.660133	98	50 - 150	0.0000	+/-0.50	
M9PFNA	693265	3.661167	734,996.00	3.661167	94	50 - 150	0.0000	+/-0.50	
MPFDoA	649476.9	4.104633	753,263.00	4.104633	86	50 - 150	0.0000	+/-0.50	
d5-NEtFOSAA	226189.8	3.969483	264,483.00	3.969483	86	50 - 150	0.0000	+/-0.50	
d3-NMeFOSAA	265771.7	3.889733	308,492.00	3.889733	86	50 - 150	0.0000	+/-0.50	

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SOP-454 PFAS in Water	
Perfluorobutanoic acid (PFBA)	NH-P
Perfluorobutanesulfonic acid (PFBS)	NH-P
Perfluoropentanoic acid (PFPeA)	NH-P
Perfluorohexanoic acid (PFHxA)	NH-P
11Cl-PF3OUdS (F53B Major)	NH-P
9Cl-PF3ONS (F53B Minor)	NH-P
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	NH-P
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NH-P
8:2 Fluorotelomersulfonic acid (8:2FTS A)	NH-P
Perfluorodecanoic acid (PFDA)	NH-P
Perfluorododecanoic acid (PFDoA)	NH-P
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	NH-P
Perfluoroheptanesulfonic acid (PFHpS)	NH-P
N-EtFOSAA	NH-P
N-MeFOSAA	NH-P
Perfluorotetradecanoic acid (PFTA)	NH-P
Perfluorotridecanoic acid (PFTrDA)	NH-P
4:2 Fluorotelomersulfonic acid (4:2FTS A)	NH-P
Perfluorodecanesulfonic acid (PFDS)	NH-P
Perfluorooctanesulfonamide (FOSA)	NH-P
Perfluorononanesulfonic acid (PFNS)	NH-P
Perfluoro-1-hexanesulfonamide (FHxSA)	NH-P
Perfluoro-1-butanesulfonamide (FBSA)	NH-P
Perfluorohexanesulfonic acid (PFHxS)	NH-P
Perfluoro-4-oxapentanoic acid (PFMPA)	NH-P
Perfluoro-5-oxahexanoic acid (PFMBA)	NH-P
6:2 Fluorotelomersulfonic acid (6:2FTS A)	NH-P
Perfluoropetanesulfonic acid (PFPeS)	NH-P
Perfluoroundecanoic acid (PFUnA)	NH-P
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	NH-P
Perfluoroheptanoic acid (PFHpA)	NH-P
Perfluorooctanoic acid (PFOA)	NH-P
Perfluorooctanesulfonic acid (PFOS)	NH-P
Perfluorononanoic acid (PFNA)	NH-P

Con-Test, a Pace Environmental Laboratory, operates under the following certifications and accreditations:

Code	Description	Number	Expires
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2023

22H0420

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http://www.pacelabs.com

CHAIN OF CUSTODY RECORD

39 Spruce Street
East Longmeadow, MA 01028

Doc # 381 Rev 5_07/13/2021

Company Name: Horsley Witten Group
Address: 90 Route 6A Sandwich MA
Phone: 508-833-6600
Project Name:
Project Location: Hyannis MA
Project Number: 22071
Project Manager: Bryan Massa
Pace Quote Name/Number:
Invoice Recipient:
Sampled By: SB

Requested Turnaround Time
7-Day ☐ 10-Day ☐
PFAS 10-Day (std) ☑ Due Date:

Rush-Approval Required
1-Day ☐ 3-Day ☐
2-Day ☐ 4-Day ☐

Data Delivery
Format: PDF ☑ EXCEL ☑
Other:
CLP Like Data Pkg Required: ☐
Email To: bmassa@horsley witten.com
Fax To #:

Dissolved Metals Samples
○ Field Filtered
○ Lab to Filter

Orthophosphate Samples
○ Field Filtered
○ Lab to Filter

PCB ONLY
SOXHLET ☐
NON SOXHLET ☐

ANALYSIS REQUESTED: PFAS -all isotope dilution

Pace Work Order#	Client Sample ID / Description	Beginning Date/Time	Ending Date/Time	COMP/GRAB	[1]Matrix Code	Conc Code	VIALS	GLASS	PLASTIC	BACTERIA	ENCORE	PFAS -all isotope dilution
	HW-S(s)	8/8/22	10:30	Grab	GW				2			X
	HW-S(m)	8/8/22	11:15	Grab	GW				2			X

[2] Preservation Code

Courier Use Only
Total Number Of:
VIALS
GLASS
PLASTIC 4
BACTERIA
ENCORE

Glassware in the fridge? Y / N
Glassware in freezer? Y / N
Prepackaged Cooler? Y / N

*Pace Analytical is not responsible for missing samples from prepacked coolers

[1] Matrix Codes:
GW = Ground Water
WW = Waste Water
DW = Drinking Water
A = Air
S = Soil
SL = Sludge
SOL = Solid
O = Other (please define)

[2] Preservation Codes:
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium Bisulfate
X = Sodium Hydroxide
T = Sodium Thiosulfate
O = Other (please define)

Signature	Date/Time
Relinquished by: (signature) [signature]	8/8/22 12:00
Received by: (signature) HW Fridge	8/8/22 12:00
Relinquished by: (signature) HW Fridge	8/9/22 1000
Received by: (signature) [signature] 10:00	8-9-22
Relinquished by: (signature) [signature] 15:15	8-9-22
Received by: (signature) [signature] 3.4 1515	8/9
Relinquished by: (signature)	
Received by: (signature)	

Client Comments:

Detection Limit Requirements
MA: GW-1
CT:
Other:

Special Requirements
☑ MA MCP Required
MCP Certification Form Required
☐ CT RCP Required
RCP Certification Form Required
☐ MA State DW Required
PWSID #

Please use the following codes to indicate possible sample concentration within the Conc Code column above:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

NELAC and AIHA-LAP, LLC Accredited

Project Entity
Government ☐ Municipality ☐ MWRA ☐ WRTA ☐
Federal ☐ 21 J ☐ School ☐
City ☐ Brownfield ☐ MBTA ☐

Other
☐ Chromatogram
☐ AIHA-LAP,LLC

Lab Comments:

Disclaimer: Pace Analytical is not responsible for any omitted information on the Chain of Custody. The Chain of Custody is a legal document that must be complete and accurate and is used to determine what analyses the laboratory will perform. Any missing information is not the laboratory's responsibility. Pace Analytical values your partnership on each project and will try to assist with missing information, but will not be held accountable.

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Doc# 277 Rev 6 July 2022

Login Sample Receipt Checklist - (Rejection Criteria Listing - Using Acceptance Policy) Any False Statement will be brought to the attention of the Client - State True or False

Client Received By HWG GW Date 08/09/22 Time 1515

How were the samples received? In Cooler ____ No Cooler ____ On Ice ____ No Ice ____ Direct From Sample ____ Ambient ____ Melted Ice ____

Were samples within Tempurature? Within 2-6°C T By Gun # 3 Actual Temp - 3.4

Was Custody Seal In tact? N/A By Blank # ____ Actual Temp - ____

Was COC Relinquished ? T Were Samples Tampered with? N/A

Are there broken/leaking/loose caps on any samples? F Does Chain Agree With Samples? T

Is COC in ink/ Legible? T Were samples received within holding time? T

Did COC include all pertinent Information? Client? T Analysis? T Sampler Name? T

Project? T ID's? T Collection Dates/Times? T

Are Sample labels filled out and legible? T

Are there Lab to Filters? F Who was notified? ____

Are there Rushes? F Who was notified? ____

Are there Short Holds? F Who was notified? ____

Samples are received within holding time? T Is there enough Volume? T

Is there Headspace where applicable? N/A MS/MSD? F

Proper Media/Containers Used? T splitting samples require F

Were trip blanks receive F On COC? F

Do All Samples Have the proper pH? Acid N/A Base N/A

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic	4	4oz Amb/Clear	
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear	
DI-		Other Plastic		Other Glass		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Unused Media

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic		4oz Amb/Clear	
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear	
DI-		Other Plastic		Other Glass		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Comments:

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December 6, 2022

Bryan Massa
Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563

Project Location: Hyannis, MA
Client Job Number:
Project Number: 22071
Laboratory Work Order Number: 22K0795

Enclosed are results of analyses for samples as received by the laboratory on November 3, 2022. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Kaitlyn A. Feliciano
Project Manager

Table of Contents

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563
ATTN: Bryan Massa

REPORT DATE: 12/6/2022

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 22071

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 22K0795

The results of analyses performed on the following samples submitted to CON-TEST, a Pace Analytical Laboratory, are found in this report.

PROJECT LOCATION: Hyannis, MA

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
HW-W(M)	22K0795-01	Ground Water		SOP-454 PFAS	
ME-1	22K0795-02	Ground Water		SOP-454 PFAS	
ME-2	22K0795-03	Ground Water		SOP-454 PFAS	
ME-3	22K0795-04	Ground Water		SOP-454 PFAS	

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CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Qualifications:

L-01

Laboratory fortified blank/laboratory control sample recovery outside of control limits. Data validation is not affected since all results are "not detected" for all samples in this batch for this compound and bias is on the high side.

Analyte & Samples(s) Qualified:

4,8-Dioxa-3H-perfluorononanoic ac
B322221-BS1

N-EtFOSAA (NEtFOSAA)
B322221-BS1

N-MeFOSAA (NMeFOSAA)
B322221-BS1

Nonafluoro-3,6-dioxaheptanoic aci
B322221-BS1

Perfluorononanesulfonic acid (PFN
B322221-BS1

L-05

Laboratory fortified blank/laboratory control sample recovery is outside of control limits. Reported value for this compound is likely to be biased on the high side.

Analyte & Samples(s) Qualified:

Perfluoroheptanesulfonic acid (PFI
22K0795-01[HW-W(M)], 22K0795-02[ME-1], 22K0795-03[ME-2], 22K0795-04[ME-3], B322221-BS1

Perfluoropetanesulfonic acid (PFP
22K0795-01[HW-W(M)], 22K0795-02[ME-1], 22K0795-03[ME-2], 22K0795-04[ME-3], B322221-BS1

PF-17

Extracted Internal Standard recovery is outside of control limits. Data is not significantly affected since associated analyte is not detected and bias is on the high side.

Analyte & Samples(s) Qualified:

M2-8:2FTS
S080004-IBL1

PF-19

Sample re-analyzed at a dilution that was re-fortified with internal standard.

Analyte & Samples(s) Qualified:

22K0795-03RE1[ME-2]

PF-23

Qualifier ion ratio <50% of associated calibration. Detection is suspect.

Analyte & Samples(s) Qualified:

Perfluorodecanesulfonic acid (PFD
22K0795-03[ME-2]

S-29

Extracted Internal Standard is outside of control limits.

Analyte & Samples(s) Qualified:

M2-4:2FTS
22K0795-02[ME-1], 22K0795-03[ME-2]

M2-6:2FTS
22K0795-02[ME-1]

M2-8:2FTS
S080004-CCV2

M2PFTA
B322221-BLK1

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

V-05

Continuing calibration verification (CCV) did not meet method specifications and was biased on the low side for this compound.

Analyte & Samples(s) Qualified:

6:2 Fluorotelomersulfonic acid (6:2
22K0795-01[HW-W(M)], 22K0795-02[ME-1], 22K0795-04[ME-3], S079888-CCV1

Perfluorotetradecanoic acid (PFTA
22K0795-01[HW-W(M)], 22K0795-02[ME-1], 22K0795-03[ME-2], 22K0795-04[ME-3], S079888-CCV1

The results of analyses reported only relate to samples submitted to Con-Test, a Pace Analytical Laboratory, for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Lisa A. Worthington
Technical Representative

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Hyannis, MA | Sample Description: | Work Order: 22K0795

Date Received: 11/3/2022

Field Sample #: HW-W(M) | Sampled: 10/31/2022 13:15

Sample ID: 22K0795-01

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	15	1.7	0.54	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
Perfluorobutanesulfonic acid (PFBS)	0.52	1.7	0.49	ng/L	1	J	SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
Perfluoropentanoic acid (PFPeA)	40	1.7	0.56	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
Perfluorohexanoic acid (PFHxA)	24	1.7	0.55	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
11Cl-PF3OUdS (F53B Major)	ND	1.7	0.58	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
9Cl-PF3ONS (F53B Minor)	ND	1.7	0.46	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.7	0.30	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.7	0.71	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
8:2 Fluorotelomersulfonic acid (8:2FTS A)	1.1	1.7	0.57	ng/L	1	J	SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
Perfluorodecanoic acid (PFDA)	ND	1.7	0.63	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
Perfluorododecanoic acid (PFDoA)	ND	1.7	0.61	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.7	0.55	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
Perfluoroheptanesulfonic acid (PFHpS)	0.49	1.7	0.38	ng/L	1	L-05, J	SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
N-EtFOSAA (NEtFOSAA)	ND	1.7	0.47	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
N-MeFOSAA (NMeFOSAA)	ND	1.7	0.53	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
Perfluorotetradecanoic acid (PFTA)	ND	1.7	0.52	ng/L	1	V-05	SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
Perfluorotridecanoic acid (PFTrDA)	ND	1.7	0.44	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.7	0.52	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
Perfluorodecanesulfonic acid (PFDS)	ND	1.7	0.46	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
Perfluorooctanesulfonamide (FOSA)	130	1.7	0.66	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
Perfluorononanesulfonic acid (PFNS)	ND	1.7	0.73	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
Perfluoro-1-hexanesulfonamide (FHxSA)	1.2	1.7	0.93	ng/L	1	J	SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
Perfluoro-1-butanesulfonamide (FBSA)	ND	1.7	0.44	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
Perfluorohexanesulfonic acid (PFHxS)	25	1.7	0.51	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.7	0.50	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.7	0.47	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
6:2 Fluorotelomersulfonic acid (6:2FTS A)	7.2	1.7	1.2	ng/L	1	V-05	SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
Perfluoropetanesulfonic acid (PFPeS)	0.69	1.7	0.58	ng/L	1	L-05, J	SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
Perfluoroundecanoic acid (PFUnA)	1.6	1.7	0.61	ng/L	1	J	SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.7	0.48	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
Perfluoroheptanoic acid (PFHpA)	13	1.7	0.43	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
Perfluorooctanoic acid (PFOA)	7.1	1.7	0.62	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
Perfluorooctanesulfonic acid (PFOS)	130	1.7	0.36	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB
Perfluorononanoic acid (PFNA)	2.0	1.7	0.59	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:15	RRB

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Project Location: Hyannis, MA | Sample Description: | Work Order: 22K0795

Date Received: 11/3/2022

Field Sample #: ME-1 | Sampled: 11/2/2022 10:35

Sample ID: 22K0795-02

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	21	1.7	0.54	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
Perfluorobutanesulfonic acid (PFBS)	3.1	1.7	0.48	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
Perfluoropentanoic acid (PFPeA)	63	1.7	0.55	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
Perfluorohexanoic acid (PFHxA)	38	1.7	0.55	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
11Cl-PF3OUdS (F53B Major)	ND	1.7	0.57	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
9Cl-PF3ONS (F53B Minor)	ND	1.7	0.45	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.7	0.29	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.7	0.70	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	1.7	0.56	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
Perfluorodecanoic acid (PFDA)	1.0	1.7	0.62	ng/L	1	J	SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
Perfluorododecanoic acid (PFDoA)	ND	1.7	0.60	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.7	0.54	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
Perfluoroheptanesulfonic acid (PFHpS)	3.4	1.7	0.37	ng/L	1	L-05	SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
N-EtFOSAA (NEtFOSAA)	ND	1.7	0.46	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
N-MeFOSAA (NMeFOSAA)	ND	1.7	0.52	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
Perfluorotetradecanoic acid (PFTA)	ND	1.7	0.51	ng/L	1	V-05	SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
Perfluorotridecanoic acid (PFTrDA)	ND	1.7	0.44	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.7	0.51	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
Perfluorodecanesulfonic acid (PFDS)	ND	1.7	0.45	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
Perfluorooctanesulfonamide (FOSA)	ND	1.7	0.66	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
Perfluorononanesulfonic acid (PFNS)	ND	1.7	0.72	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
Perfluoro-1-hexanesulfonamide (FHxSA)	1.6	1.7	0.92	ng/L	1	J	SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
Perfluoro-1-butanesulfonamide (FBSA)	1.9	1.7	0.44	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
Perfluorohexanesulfonic acid (PFHxS)	40	1.7	0.51	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.7	0.50	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.7	0.46	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
6:2 Fluorotelomersulfonic acid (6:2FTS A)	26	1.7	1.2	ng/L	1	V-05	SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
Perfluoropetanesulfonic acid (PFPeS)	3.6	1.7	0.57	ng/L	1	L-05	SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
Perfluoroundecanoic acid (PFUnA)	ND	1.7	0.60	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.7	0.47	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
Perfluoroheptanoic acid (PFHpA)	17	1.7	0.43	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
Perfluorooctanoic acid (PFOA)	21	1.7	0.61	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
Perfluorooctanesulfonic acid (PFOS)	87	1.7	0.36	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB
Perfluorononanoic acid (PFNA)	15	1.7	0.59	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:23	RRB

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Project Location: Hyannis, MA | Sample Description: | Work Order: 22K0795

Date Received: 11/3/2022

Field Sample #: ME-2 | Sampled: 11/2/2022 11:00

Sample ID: 22K0795-03

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	26	1.7	0.56	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
Perfluorobutanesulfonic acid (PFBS)	6.2	1.7	0.50	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
Perfluoropentanoic acid (PFPeA)	94	1.7	0.57	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
Perfluorohexanoic acid (PFHxA)	66	1.7	0.57	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
11Cl-PF3OUdS (F53B Major)	ND	1.7	0.60	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
9Cl-PF3ONS (F53B Minor)	ND	1.7	0.47	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.7	0.31	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.7	0.73	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
8:2 Fluorotelomersulfonic acid (8:2FTS A)	21	1.7	0.59	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
Perfluorodecanoic acid (PFDA)	1.4	1.7	0.65	ng/L	1	J	SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
Perfluorododecanoic acid (PFDoA)	ND	1.7	0.63	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.7	0.56	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
Perfluoroheptanesulfonic acid (PFHpS)	6.5	1.7	0.39	ng/L	1	L-05	SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
N-EtFOSAA (NEtFOSAA)	ND	1.7	0.48	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
N-MeFOSAA (NMeFOSAA)	ND	1.7	0.54	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
Perfluorotetradecanoic acid (PFTA)	ND	1.7	0.53	ng/L	1	V-05	SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
Perfluorotridecanoic acid (PFTrDA)	ND	1.7	0.46	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.7	0.53	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
Perfluorodecanesulfonic acid (PFDS)	0.58	1.7	0.47	ng/L	1	PF-23, J	SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
Perfluorooctanesulfonamide (FOSA)	ND	1.7	0.68	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
Perfluorononanesulfonic acid (PFNS)	ND	1.7	0.75	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
Perfluoro-1-hexanesulfonamide (FHxSA)	1.0	1.7	0.95	ng/L	1	J	SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
Perfluoro-1-butanesulfonamide (FBSA)	4.8	1.7	0.46	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
Perfluorohexanesulfonic acid (PFHxS)	71	1.7	0.53	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.7	0.52	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.7	0.48	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
6:2 Fluorotelomersulfonic acid (6:2FTS A)	250	17	13	ng/L	10		SOP-454 PFAS	11/10/22	11/28/22 17:20	RRB
Perfluoropetanesulfonic acid (PFPeS)	6.8	1.7	0.60	ng/L	1	L-05	SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
Perfluoroundecanoic acid (PFUnA)	ND	1.7	0.62	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.7	0.49	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
Perfluoroheptanoic acid (PFHpA)	36	1.7	0.44	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
Perfluorooctanoic acid (PFOA)	32	1.7	0.64	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
Perfluorooctanesulfonic acid (PFOS)	93	1.7	0.37	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB
Perfluorononanoic acid (PFNA)	23	1.7	0.61	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:30	RRB

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Project Location: Hyannis, MA | Sample Description: | Work Order: 22K0795

Date Received: 11/3/2022

Field Sample #: ME-3 | Sampled: 11/2/2022 10:55

Sample ID: 22K0795-04

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	9.0	1.7	0.55	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
Perfluorobutanesulfonic acid (PFBS)	2.3	1.7	0.49	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
Perfluoropentanoic acid (PFPeA)	25	1.7	0.57	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
Perfluorohexanoic acid (PFHxA)	19	1.7	0.56	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
11Cl-PF3OUdS (F53B Major)	ND	1.7	0.59	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
9Cl-PF3ONS (F53B Minor)	ND	1.7	0.47	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.7	0.30	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.7	0.72	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	1.7	0.58	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
Perfluorodecanoic acid (PFDA)	ND	1.7	0.64	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
Perfluorododecanoic acid (PFDoA)	ND	1.7	0.62	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.7	0.56	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
Perfluoroheptanesulfonic acid (PFHpS)	2.3	1.7	0.38	ng/L	1	L-05	SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
N-EtFOSAA (NEtFOSAA)	ND	1.7	0.47	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
N-MeFOSAA (NMeFOSAA)	ND	1.7	0.54	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
Perfluorotetradecanoic acid (PFTA)	ND	1.7	0.53	ng/L	1	V-05	SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
Perfluorotridecanoic acid (PFTrDA)	ND	1.7	0.45	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.7	0.53	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
Perfluorodecanesulfonic acid (PFDS)	ND	1.7	0.47	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
Perfluorooctanesulfonamide (FOSA)	5.3	1.7	0.68	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
Perfluorononanesulfonic acid (PFNS)	ND	1.7	0.74	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
Perfluoro-1-hexanesulfonamide (FHxSA)	3.5	1.7	0.94	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
Perfluoro-1-butanesulfonamide (FBSA)	1.1	1.7	0.45	ng/L	1	J	SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
Perfluorohexanesulfonic acid (PFHxS)	32	1.7	0.52	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.7	0.51	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.7	0.47	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
6:2 Fluorotelomersulfonic acid (6:2FTS A)	3.5	1.7	1.3	ng/L	1	V-05	SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
Perfluoropetanesulfonic acid (PFPeS)	2.8	1.7	0.59	ng/L	1	L-05	SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
Perfluoroundecanoic acid (PFUnA)	ND	1.7	0.62	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.7	0.49	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
Perfluoroheptanoic acid (PFHpA)	8.2	1.7	0.44	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
Perfluorooctanoic acid (PFOA)	14	1.7	0.63	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
Perfluorooctanesulfonic acid (PFOS)	86	1.7	0.37	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB
Perfluorononanoic acid (PFNA)	7.0	1.7	0.60	ng/L	1		SOP-454 PFAS	11/10/22	11/22/22 21:37	RRB

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Sample Extraction Data

Prep Method: SOP 454-PFAAS **Analytical Method: SOP-454 PFAS**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
22K0795-01 [HW-W(M)]	B322221	294	1.00	11/10/22
22K0795-02 [ME-1]	B322221	298	1.00	11/10/22
22K0795-03 [ME-2]	B322221	286	1.00	11/10/22
22K0795-03RE1 [ME-2]	B322221	286	1.00	11/10/22
22K0795-04 [ME-3]	B322221	289	1.00	11/10/22

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QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B322221 - SOP 454-PFAAS											
Blank (B322221-BLK1)				Prepared: 11/10/22 Analyzed: 11/22/22							
Perfluorobutanoic acid (PFBA)	ND	1.8	ng/L								
Perfluorobutanesulfonic acid (PFBS)	ND	1.8	ng/L								
Perfluoropentanoic acid (PFPeA)	ND	1.8	ng/L								
Perfluorohexanoic acid (PFHxA)	ND	1.8	ng/L								
11Cl-PF3OUdS (F53B Major)	ND	1.8	ng/L								
9Cl-PF3ONS (F53B Minor)	ND	1.8	ng/L								
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.8	ng/L								
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.8	ng/L								
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	1.8	ng/L								
Perfluorodecanoic acid (PFDA)	ND	1.8	ng/L								
Perfluorododecanoic acid (PFDoA)	ND	1.8	ng/L								
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.8	ng/L								
Perfluoroheptanesulfonic acid (PFHpS)	ND	1.8	ng/L								
N-EtFOSAA (NEtFOSAA)	ND	1.8	ng/L								
N-MeFOSAA (NMeFOSAA)	ND	1.8	ng/L								
Perfluorotetradecanoic acid (PFTA)	ND	1.8	ng/L								
Perfluorotridecanoic acid (PFTrDA)	ND	1.8	ng/L								
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.8	ng/L								
Perfluorodecanesulfonic acid (PFDS)	ND	1.8	ng/L								
Perfluorooctanesulfonamide (FOSA)	ND	1.8	ng/L								
Perfluorononanesulfonic acid (PFNS)	ND	1.8	ng/L								
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	1.8	ng/L								
Perfluoro-1-butanesulfonamide (FBSA)	ND	1.8	ng/L								
Perfluorohexanesulfonic acid (PFHxS)	ND	1.8	ng/L								
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.8	ng/L								
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.8	ng/L								
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	1.8	ng/L								
Perfluoropetanesulfonic acid (PFPeS)	ND	1.8	ng/L								
Perfluoroundecanoic acid (PFUnA)	ND	1.8	ng/L								
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.8	ng/L								
Perfluoroheptanoic acid (PFHpA)	ND	1.8	ng/L								
Perfluorooctanoic acid (PFOA)	ND	1.8	ng/L								
Perfluorooctanesulfonic acid (PFOS)	ND	1.8	ng/L								
Perfluorononanoic acid (PFNA)	ND	1.8	ng/L								
LCS (B322221-BS1)				Prepared: 11/10/22 Analyzed: 11/22/22							
Perfluorobutanoic acid (PFBA)	11.2	1.8	ng/L	8.94		126		73-129			
Perfluorobutanesulfonic acid (PFBS)	9.81	1.8	ng/L	7.92		124		72-130			
Perfluoropentanoic acid (PFPeA)	11.2	1.8	ng/L	8.94		126		72-129			
Perfluorohexanoic acid (PFHxA)	11.4	1.8	ng/L	8.94		128		72-129			
11Cl-PF3OUdS (F53B Major)	10.2	1.8	ng/L	8.43		121		55.1-141			
9Cl-PF3ONS (F53B Minor)	9.56	1.8	ng/L	8.34		115		59.6-146			
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	12.0	1.8	ng/L	8.43		**143**	*	60.3-131			L-01
Hexafluoropropylene oxide dimer acid (HFPO-DA)	8.72	1.8	ng/L	8.94		97.5		37.6-167			
8:2 Fluorotelomersulfonic acid (8:2FTS A)	9.92	1.8	ng/L	8.59		115		67-138			
Perfluorodecanoic acid (PFDA)	11.1	1.8	ng/L	8.94		124		71-129			
Perfluorododecanoic acid (PFDoA)	11.9	1.8	ng/L	8.94		133		72-134			
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	10.0	1.8	ng/L	7.96		126		49.4-154			

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QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B322221 - SOP 454-PFAAS											
LCS (B322221-BS1)				Prepared: 11/10/22 Analyzed: 11/22/22							
Perfluoroheptanesulfonic acid (PFHpS)	12.4	1.8	ng/L	8.54		**145**	*	69-134			L-05
N-EtFOSAA (NEtFOSAA)	14.4	1.8	ng/L	8.94		**161**	*	61-135			L-01
N-MeFOSAA (NMeFOSAA)	13.6	1.8	ng/L	8.94		**152**	*	65-136			L-01
Perfluorotetradecanoic acid (PFTA)	9.43	1.8	ng/L	8.94		105		71-132			
Perfluorotridecanoic acid (PFTrDA)	11.2	1.8	ng/L	8.94		125		65-144			
4:2 Fluorotelomersulfonic acid (4:2FTS A)	10.4	1.8	ng/L	8.36		125		63-143			
Perfluorodecanesulfonic acid (PFDS)	10.8	1.8	ng/L	8.63		125		53-142			
Perfluorooctanesulfonamide (FOSA)	12.0	1.8	ng/L	8.94		134		67-137			
Perfluorononanesulfonic acid (PFNS)	11.6	1.8	ng/L	8.59		**135**	*	69-127			L-01
Perfluoro-1-hexanesulfonamide (FHxSA)	11.4	1.8	ng/L	8.94		128		61.7-156			
Perfluoro-1-butanesulfonamide (FBSA)	10.3	1.8	ng/L	8.94		115		61.3-145			
Perfluorohexanesulfonic acid (PFHxS)	10.2	1.8	ng/L	8.18		125		68-131			
Perfluoro-4-oxapentanoic acid (PFMPA)	11.9	1.8	ng/L	8.94		133		59.8-147			
Perfluoro-5-oxahexanoic acid (PFMBA)	12.1	1.8	ng/L	8.94		135		59.5-146			
6:2 Fluorotelomersulfonic acid (6:2FTS A)	11.0	1.8	ng/L	8.50		129		64-140			
Perfluoropetanesulfonic acid (PFPeS)	10.9	1.8	ng/L	8.41		**130**	*	71-127			L-05
Perfluoroundecanoic acid (PFUnA)	10.8	1.8	ng/L	8.94		121		69-133			
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	14.4	1.8	ng/L	8.94		**161**	*	58.5-143			L-01
Perfluoroheptanoic acid (PFHpA)	11.2	1.8	ng/L	8.94		125		72-130			
Perfluorooctanoic acid (PFOA)	11.4	1.8	ng/L	8.94		128		71-133			
Perfluorooctanesulfonic acid (PFOS)	9.77	1.8	ng/L	8.27		118		65-140			
Perfluorononanoic acid (PFNA)	11.6	1.8	ng/L	8.94		130		69-130			

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit is at the level of quantitation (LOQ)
DL	Detection Limit is the lower limit of detection determined by the MDL study
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
J	Detected but below the Reporting Limit (lowest calibration standard); therefore, result is an estimated concentration (CLP J-Flag).
L-01	Laboratory fortified blank/laboratory control sample recovery outside of control limits. Data validation is not affected since all results are "not detected" for all samples in this batch for this compound and bias is on the high side.
L-05	Laboratory fortified blank/laboratory control sample recovery is outside of control limits. Reported value for this compound is likely to be biased on the high side.
PF-17	Extracted Internal Standard recovery is outside of control limits. Data is not significantly affected since associated analyte is not detected and bias is on the high side.
PF-19	Sample re-analyzed at a dilution that was re-fortified with internal standard.
PF-23	Qualifier ion ratio <50% of associated calibration. Detection is suspect.
S-29	Extracted Internal Standard is outside of control limits.
V-05	Continuing calibration verification (CCV) did not meet method specifications and was biased on the low side for this compound.

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
HW-W(M) (22K0795-01)			Lab File ID: 22K0795-01.d			Analyzed: 11/22/22 21:15			
M8FOSA	242628.7	3.99655	312,418.00	3.99655	78	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	59221.52	2.472183	101,803.00	2.463967	58	50 - 150	0.0082	+/-0.50	
M2PFTA	996176.9	4.313416	1,079,117.00	4.313416	92	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	135391.9	3.802783	183,419.00	3.802783	74	50 - 150	0.0000	+/-0.50	
MPFBA	446265.3	1.0834	495,260.00	1.0834	90	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	107163.6	2.806567	93,486.00	2.798383	115	50 - 150	0.0082	+/-0.50	
M6PFDA	618055.6	3.803317	706,312.00	3.803317	88	50 - 150	0.0000	+/-0.50	
M3PFBS	113744.7	1.886667	118,777.00	1.878383	96	50 - 150	0.0083	+/-0.50	
M7PFUnA	656017.3	3.938033	742,292.00	3.938033	88	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	47826.84	3.445283	73,821.00	3.445283	65	50 - 150	0.0000	+/-0.50	
M5PFPeA	372485	1.714833	393,340.00	1.706567	95	50 - 150	0.0083	+/-0.50	
M5PFHxA	678328.1	2.555917	714,540.00	2.5477	95	50 - 150	0.0082	+/-0.50	
M3PFHxS	102611.1	3.21025	113,170.00	3.21025	91	50 - 150	0.0000	+/-0.50	
M4PFHpA	793998.5	3.170783	827,607.00	3.170783	96	50 - 150	0.0000	+/-0.50	
M8PFOA	732700.6	3.461933	780,447.00	3.453817	94	50 - 150	0.0081	+/-0.50	
M8PFOS	94713.53	3.65215	106,681.00	3.65215	89	50 - 150	0.0000	+/-0.50	
M9PFNA	535718.6	3.653183	605,116.00	3.653183	89	50 - 150	0.0000	+/-0.50	
MPFDoA	678873.5	4.07265	759,435.00	4.07265	89	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	158150.8	3.9455	199,185.00	3.9455	79	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	195917.6	3.873767	240,973.00	3.873767	81	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
ME-1 (22K0795-02)			Lab File ID: 22K0795-02.d			Analyzed: 11/22/22 21:23			
M8FOSA	189754.8	3.99655	312,418.00	3.99655	61	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	47072.7	2.472183	101,803.00	2.463967	46	50 - 150	0.0082	+/-0.50	*
M2PFTA	693366.2	4.305333	1,079,117.00	4.313416	64	50 - 150	-0.0081	+/-0.50	
M2-8:2FTS	108664.5	3.794817	183,419.00	3.802783	59	50 - 150	-0.0080	+/-0.50	
MPFBA	360559.7	1.0834	495,260.00	1.0834	73	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	83129.78	2.806567	93,486.00	2.798383	89	50 - 150	0.0082	+/-0.50	
M6PFDA	443263.4	3.79535	706,312.00	3.803317	63	50 - 150	-0.0080	+/-0.50	
M3PFBS	92378.12	1.878383	118,777.00	1.878383	78	50 - 150	0.0000	+/-0.50	
M7PFUnA	467103.5	3.938033	742,292.00	3.938033	63	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	36103.75	3.445283	73,821.00	3.445283	49	50 - 150	0.0000	+/-0.50	*
M5PFPeA	297692.6	1.714833	393,340.00	1.706567	76	50 - 150	0.0083	+/-0.50	
M5PFHxA	559820.7	2.5477	714,540.00	2.5477	78	50 - 150	0.0000	+/-0.50	
M3PFHxS	80950.85	3.21025	113,170.00	3.21025	72	50 - 150	0.0000	+/-0.50	
M4PFHpA	625861.2	3.170783	827,607.00	3.170783	76	50 - 150	0.0000	+/-0.50	
M8PFOA	590770.7	3.453817	780,447.00	3.453817	76	50 - 150	0.0000	+/-0.50	
M8PFOS	75379.69	3.644167	106,681.00	3.65215	71	50 - 150	-0.0080	+/-0.50	
M9PFNA	408873.6	3.6452	605,116.00	3.653183	68	50 - 150	-0.0080	+/-0.50	
MPFDoA	473102.6	4.07265	759,435.00	4.07265	62	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	113218.2	3.9455	199,185.00	3.9455	57	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	138816.6	3.873767	240,973.00	3.873767	58	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
ME-2 (22K0795-03)			Lab File ID: 22K0795-03.d			Analyzed: 11/22/22 21:30			
M8FOSA	177443.1	3.99655	312,418.00	3.99655	57	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	43274.26	2.463967	101,803.00	2.463967	43	50 - 150	0.0000	+/-0.50	*
M2PFTA	708922.6	4.305333	1,079,117.00	4.313416	66	50 - 150	-0.0081	+/-0.50	
M2-8:2FTS	101997.2	3.794817	183,419.00	3.802783	56	50 - 150	-0.0080	+/-0.50	
MPFBA	333940	1.0834	495,260.00	1.0834	67	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	82652	2.798383	93,486.00	2.798383	88	50 - 150	0.0000	+/-0.50	
M6PFDA	469435.3	3.795333	706,312.00	3.803317	66	50 - 150	-0.0080	+/-0.50	
M3PFBS	88444.45	1.878383	118,777.00	1.878383	74	50 - 150	0.0000	+/-0.50	
M7PFUnA	493671.4	3.938033	742,292.00	3.938033	67	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	68808.36	3.445283	73,821.00	3.445283	93	50 - 150	0.0000	+/-0.50	
M5PFPeA	281011.8	1.706567	393,340.00	1.706567	71	50 - 150	0.0000	+/-0.50	
M5PFHxA	521159.8	2.539483	714,540.00	2.5477	73	50 - 150	-0.0082	+/-0.50	
M3PFHxS	82679.05	3.201883	113,170.00	3.21025	73	50 - 150	-0.0084	+/-0.50	
M4PFHpA	617289.3	3.170783	827,607.00	3.170783	75	50 - 150	0.0000	+/-0.50	
M8PFOA	586121.1	3.453817	780,447.00	3.453817	75	50 - 150	0.0000	+/-0.50	
M8PFOS	72119.32	3.644167	106,681.00	3.65215	68	50 - 150	-0.0080	+/-0.50	
M9PFNA	426628.6	3.6452	605,116.00	3.653183	71	50 - 150	-0.0080	+/-0.50	
MPFDoA	485945.3	4.06465	759,435.00	4.07265	64	50 - 150	-0.0080	+/-0.50	
D5-NEtFOSAA	118636.6	3.9455	199,185.00	3.9455	60	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	148889.8	3.8656	240,973.00	3.873767	62	50 - 150	-0.0082	+/-0.50	
ME-2 (22K0795-03RE1)			Lab File ID: 22K0795-03RE1.d			Analyzed: 11/28/22 17:20			
M2-6:2FTS	82454.66	3.4205	87,113.00	3.420517	95	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
ME-3 (22K0795-04)			Lab File ID: 22K0795-04.d			Analyzed: 11/22/22 21:37			
M8FOSA	222479.5	3.99655	312,418.00	3.99655	71	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	58037	2.463967	101,803.00	2.463967	57	50 - 150	0.0000	+/-0.50	
M2PFTA	868041.6	4.305333	1,079,117.00	4.313416	80	50 - 150	-0.0081	+/-0.50	
M2-8:2FTS	141147.9	3.794817	183,419.00	3.802783	77	50 - 150	-0.0080	+/-0.50	
MPFBA	421169.1	1.0834	495,260.00	1.0834	85	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	98751.81	2.798383	93,486.00	2.798383	106	50 - 150	0.0000	+/-0.50	
M6PFDA	575530.3	3.795333	706,312.00	3.803317	81	50 - 150	-0.0080	+/-0.50	
M3PFBS	110735.9	1.878383	118,777.00	1.878383	93	50 - 150	0.0000	+/-0.50	
M7PFUnA	603375.5	3.938033	742,292.00	3.938033	81	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	46615.85	3.437283	73,821.00	3.445283	63	50 - 150	-0.0080	+/-0.50	
M5PFPeA	367275.8	1.706567	393,340.00	1.706567	93	50 - 150	0.0000	+/-0.50	
M5PFHxA	669560.7	2.5477	714,540.00	2.5477	94	50 - 150	0.0000	+/-0.50	
M3PFHxS	103943.5	3.201883	113,170.00	3.21025	92	50 - 150	-0.0084	+/-0.50	
M4PFHpA	777203.7	3.170783	827,607.00	3.170783	94	50 - 150	0.0000	+/-0.50	
M8PFOA	700519.6	3.453817	780,447.00	3.453817	90	50 - 150	0.0000	+/-0.50	
M8PFOS	92026.52	3.644167	106,681.00	3.65215	86	50 - 150	-0.0080	+/-0.50	
M9PFNA	542897.1	3.6452	605,116.00	3.653183	90	50 - 150	-0.0080	+/-0.50	
MPFDoA	608166.8	4.07265	759,435.00	4.07265	80	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	139124.8	3.9455	199,185.00	3.9455	70	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	180276.8	3.8656	240,973.00	3.873767	75	50 - 150	-0.0082	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Blank (B322221-BLK1)			Lab File ID: B322221-BLK1.d			Analyzed: 11/22/22 18:51			
M8FOSA	213335	3.99655	312,418.00	3.99655	68	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	87716.46	2.472183	101,803.00	2.480383	86	50 - 150	-0.0082	+/-0.50	
M2PFTA	473825.2	4.313416	1,079,117.00	4.313416	44	50 - 150	0.0000	+/-0.50	*
M2-8:2FTS	173409.5	3.802783	183,419.00	3.802783	95	50 - 150	0.0000	+/-0.50	
MPFBA	486533.2	1.0834	495,260.00	1.0834	98	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	98440.46	2.81475	93,486.00	2.81475	105	50 - 150	0.0000	+/-0.50	
M6PFDA	600000.1	3.803317	706,312.00	3.803317	85	50 - 150	0.0000	+/-0.50	
M3PFBS	108015.8	1.886667	118,777.00	1.894967	91	50 - 150	-0.0083	+/-0.50	
M7PFUnA	568612.3	3.946033	742,292.00	3.946033	77	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	59491.58	3.445283	73,821.00	3.453267	81	50 - 150	-0.0080	+/-0.50	
M5PFPeA	367885.9	1.714833	393,340.00	1.7231	94	50 - 150	-0.0083	+/-0.50	
M5PFHxA	675459.5	2.555917	714,540.00	2.555917	95	50 - 150	0.0000	+/-0.50	
M3PFHxS	98206.73	3.21025	113,170.00	3.21025	87	50 - 150	0.0000	+/-0.50	
M4PFHpA	781830.1	3.17885	827,607.00	3.17885	94	50 - 150	0.0000	+/-0.50	
M8PFOA	727787	3.461933	780,447.00	3.461933	93	50 - 150	0.0000	+/-0.50	
M8PFOS	94735.94	3.65215	106,681.00	3.65215	89	50 - 150	0.0000	+/-0.50	
M9PFNA	522597.2	3.653183	605,116.00	3.653183	86	50 - 150	0.0000	+/-0.50	
MPFDoA	409676.9	4.08065	759,435.00	4.08065	54	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	157785.5	3.9535	199,185.00	3.9535	79	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	229708.1	3.88175	240,973.00	3.88175	95	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
LCS (B322221-BS1)			Lab File ID: B322221-BS1.d			Analyzed: 11/22/22 18:44			
M8FOSA	203310.1	3.99655	312,418.00	3.99655	65	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	84878.7	2.480383	101,803.00	2.480383	83	50 - 150	0.0000	+/-0.50	
M2PFTA	852204.3	4.313416	1,079,117.00	4.313416	79	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	178483.7	3.802783	183,419.00	3.802783	97	50 - 150	0.0000	+/-0.50	
MPFBA	451281.2	1.0834	495,260.00	1.0834	91	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	104238.1	2.806567	93,486.00	2.81475	112	50 - 150	-0.0082	+/-0.50	
M6PFDA	592720.9	3.803317	706,312.00	3.803317	84	50 - 150	0.0000	+/-0.50	
M3PFBS	101770.8	1.886667	118,777.00	1.894967	86	50 - 150	-0.0083	+/-0.50	
M7PFUnA	645478.8	3.946033	742,292.00	3.946033	87	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	61007.17	3.453267	73,821.00	3.453267	83	50 - 150	0.0000	+/-0.50	
M5PFPeA	341912	1.714833	393,340.00	1.7231	87	50 - 150	-0.0083	+/-0.50	
M5PFHxA	618369.1	2.555917	714,540.00	2.555917	87	50 - 150	0.0000	+/-0.50	
M3PFHxS	96874.05	3.21025	113,170.00	3.21025	86	50 - 150	0.0000	+/-0.50	
M4PFHpA	721475.4	3.17885	827,607.00	3.17885	87	50 - 150	0.0000	+/-0.50	
M8PFOA	693171.6	3.461933	780,447.00	3.461933	89	50 - 150	0.0000	+/-0.50	
M8PFOS	91005.44	3.65215	106,681.00	3.65215	85	50 - 150	0.0000	+/-0.50	
M9PFNA	520457.9	3.653183	605,116.00	3.653183	86	50 - 150	0.0000	+/-0.50	
MPFDoA	612593.7	4.08065	759,435.00	4.08065	81	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	162349.9	3.9535	199,185.00	3.9535	82	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	219998	3.88175	240,973.00	3.88175	91	50 - 150	0.0000	+/-0.50	

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SOP-454 PFAS in Water	
Perfluorobutanoic acid (PFBA)	NH-P
Perfluorobutanesulfonic acid (PFBS)	NH-P
Perfluoropentanoic acid (PFPeA)	NH-P
Perfluorohexanoic acid (PFHxA)	NH-P
11Cl-PF3OUdS (F53B Major)	NH-P
9Cl-PF3ONS (F53B Minor)	NH-P
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	NH-P
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NH-P
8:2 Fluorotelomersulfonic acid (8:2FTS A)	NH-P
Perfluorodecanoic acid (PFDA)	NH-P
Perfluorododecanoic acid (PFDoA)	NH-P
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	NH-P
Perfluoroheptanesulfonic acid (PFHpS)	NH-P
N-EtFOSAA (NEtFOSAA)	NH-P
N-MeFOSAA (NMeFOSAA)	NH-P
Perfluorotetradecanoic acid (PFTA)	NH-P
Perfluorotridecanoic acid (PFTrDA)	NH-P
4:2 Fluorotelomersulfonic acid (4:2FTS A)	NH-P
Perfluorodecanesulfonic acid (PFDS)	NH-P
Perfluorooctanesulfonamide (FOSA)	NH-P
Perfluorononanesulfonic acid (PFNS)	NH-P
Perfluoro-1-hexanesulfonamide (FHxSA)	NH-P
Perfluoro-1-butanesulfonamide (FBSA)	NH-P
Perfluorohexanesulfonic acid (PFHxS)	NH-P
Perfluoro-4-oxapentanoic acid (PFMPA)	NH-P
Perfluoro-5-oxahexanoic acid (PFMBA)	NH-P
6:2 Fluorotelomersulfonic acid (6:2FTS A)	NH-P
Perfluoropetanesulfonic acid (PFPeS)	NH-P
Perfluoroundecanoic acid (PFUnA)	NH-P
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	NH-P
Perfluoroheptanoic acid (PFHpA)	NH-P
Perfluorooctanoic acid (PFOA)	NH-P
Perfluorooctanesulfonic acid (PFOS)	NH-P
Perfluorononanoic acid (PFNA)	NH-P

Con-Test, a Pace Environmental Laboratory, operates under the following certifications and accreditations:

Code	Description	Number	Expires
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2023

22K0795

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Access COC's and Support Requests

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CHAIN OF CUSTODY RECORD

39 Spruce Street
East Longmeadow, MA 01028

Doc # 381 Rev 5_07/13/2021

Page 1 of 1

Company Name:	Horsley Witten Group
Address:	90 Route 6A Sandwich MA
Phone:	508 833-6600
Project Name:	HYA
Project Location:	Hyannis, MA
Project Number:	22071
Project Manager:	Bryan Massa
Pace Quote Name/Number:	
Invoice Recipient:	
Sampled By:	Sarah Brandt/Caroline Armstrong

Requested Turnaround Time
7-Day ☐ 10-Day ☐
PFAS 10-Day (std) ☒ Due Date:

Rush: Approval Required
1-Day ☐ 3-Day ☐
2-Day ☐ 4-Day ☐

Data Delivery
Format: PDF ☒ EXCEL ☒
Other:
CLP Like Data Pkg Required: ☐
Email To: bmassa@horsleywitten.com
Fax To #:

Dissolved Metals Samples
○ Field Filtered
○ Lab to Filter

Orthophosphate Samples
○ Field Filtered
○ Lab to Filter

PCB ONLY
SOXHLET ☐
NON SOXHLET ☐

ANALYSIS REQUESTED

Pace Work Order#		Client Sample ID / Description	Beginning Date/Time	Ending Date/Time	COMP/GRAB	[1]Matrix Code	Conc Code	VIALS	GLASS	PLASTIC	BACTERIA	ENCORE	PFAS (isompreddlu.)
	1	HW-W(m)	10/31/22	13:15	Grab	GW				X			X
	2	ME-1	11/2/22	10:35	Grab	GW				X			X
	3	ME-2	11/2/22	11:00	Grab	GW				X			X
	4	ME-3	11/2/22	10:55	Grab	GW				X			X

[2] Preservation Code

Courier Use Only
Total Number Of:
VIALS
GLASS
PLASTIC
BACTERIA
ENCORE

Glassware in the fridge? (Y) N
Glassware in freezer? Y / N
Prepackaged Cooler? (Y) N

*Pace Analytical is not responsible for missing samples from prepacked coolers

[1] Matrix Codes:
GW = Ground Water
WW = Waste Water
DW = Drinking Water
A = Air
S = Soil
SL = Sludge
SOL = Solid
O = Other (please define)

[2] Preservation Codes:
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium Bisulfate
X = Sodium Hydroxide
T = Sodium Thiosulfate
O = Other (please define)

Relinquished by: (signature)	Date/Time:
Caroline Armstrong	11/3/22 1030
Received by: (signature)	Date/Time:
Chad Lunger	11/3/22 1030
Relinquished by: (signature)	Date/Time:
Chad Lunger	11/3/22 1620
Received by: (signature)	Date/Time:
[illegible]	11/3/22 1620
Relinquished by: (signature)	Date/Time:
Received by: (signature)	Date/Time:
Relinquished by: (signature)	Date/Time:
Received by: (signature)	Date/Time:

Client Comments:

Detection Limit Requirements
MA GW-1
CT
Other:

Special Requirements
☒ MA MCP Required
MCP Certification Form Required
☐ CT RCP Required
RCP Certification Form Required
☐ MA State DW Required
PWSID #

Please use the following codes to indicate possible sample concentration within the Conc Code column above:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

NELAC and AIHA-LAP, LLC Accredited

Project Entity
Government ☐ Municipality ☐ MWRA ☐ WRTA ☐
Federal ☐ 21 J ☐ School ☐
City ☐ Brownfield ☐ MBTA ☐

Other
☐ Chromatogram
☐ AIHA-LAP,LLC

Lab Comments:

Disclaimer: Pace Analytical is not responsible for any omitted information on the Chain of Custody. The Chain of Custody is a legal document that must be complete and accurate and is used to determine what analyses the laboratory will perform. Any missing information is not the laboratory's responsibility. Pace Analytical values your partnership on each project and will try to assist with missing information, but will not be held accountable.

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39 Spruce St.
East Longmeadow, MA. 01028
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F: 413-525-6405
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Pace PEOPLE ADVANCING SCIENCE

Doc# 277 Rev 6 July 2022

Login Sample Receipt Checklist - (Rejection Criteria Listing - Using Acceptance Policy) Any False Statement will be brought to the attention of the Client - State True or False

Client: Horsley Witten
Received By: JL Date: 11/3/22 Time: 1620

How were the samples received? In Cooler: T No Cooler: On Ice: T No Ice:
Direct From Sample: Ambient: Melted Ice:
Were samples within Tempurature? Within 2-6°C: T By Gun #: 2 Actual Temp - 4.5
By Blank #: Actual Temp -
Was Custody Seal In tact? NA Were Samples Tampered with? NA
Was COC Relinquished ? T Does Chain Agree With Samples? T
Are there broken/leaking/loose caps on any samples? F
Is COC in ink/ Legible? T Were samples received within holding time? T
Did COC include all pertinent Information? Client? T Analysis? T Sampler Name? T
Project? T ID's? T Collection Dates/Times? T
Are Sample labels filled out and legible? T
Are there Lab to Filters? F Who was notified?
Are there Rushes? F Who was notified?
Are there Short Holds? F Who was notified?
Samples are received within holding time? T Is there enough Volume? T
Is there Headspace where applicable? NA MS/MSD? F
Proper Media/Containers Used? T splitting samples required? F
Were trip blanks receive F On COC? F
Do All Samples Have the proper pH? NA Acid Base

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic	8	4oz Amb/Clear	
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear	
DI-		Other Plastic		Other Glass		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Unused Media

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic		4oz Amb/Clear	
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear	
DI-		Other Plastic		Other Glass		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Comments:

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

December 2, 2022

Bryan Massa
Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563

Project Location: Hyannis, MA
Client Job Number:
Project Number: 22071
Laboratory Work Order Number: 22K0796

Enclosed are results of analyses for samples as received by the laboratory on November 3, 2022. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Kaitlyn A. Feliciano
Project Manager

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563
ATTN: Bryan Massa

REPORT DATE: 12/2/2022

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 22071

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 22K0796

The results of analyses performed on the following samples submitted to CON-TEST, a Pace Analytical Laboratory, are found in this report.

PROJECT LOCATION: Hyannis, MA

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
HW-I(s)	22K0796-01	Ground Water		SOP-454 PFAS	
HW-I(m)	22K0796-02	Ground Water		SOP-454 PFAS	
HW-I(d)	22K0796-03	Ground Water		SOP-454 PFAS	
HW-3	22K0796-04	Ground Water		SOP-454 PFAS	
HW-P(s)	22K0796-05	Ground Water		SOP-454 PFAS	
HW-P(m)	22K0796-06	Ground Water		SOP-454 PFAS	

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CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

SOP-454 PFAS

Qualifications:

L-02

Laboratory fortified blank/laboratory control sample recovery and duplicate recoveries outside of control limits. Data validation is not affected since all results are "not detected" for associated samples in this batch and bias is on the high side.

Analyte & Samples(s) Qualified:

4,8-Dioxa-3H-perfluorononanoic a
B322381-BS1, B322381-BSD1

N-MeFOSAA (NMeFOSAA)
B322381-BS1, B322381-BSD1

L-07

Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD between the two LFB/LCS results is within method specified criteria.

Analyte & Samples(s) Qualified:

N-EtFOSAA (NEtFOSAA)
B322381-BSD1

PF-17

Extracted Internal Standard recovery is outside of control limits. Data is not significantly affected since associated analyte is not detected and bias is on the high side.

Analyte & Samples(s) Qualified:

M2-6:2FTS
22K0796-01[HW-I(s)], 22K0796-04[HW-3]

M2-8:2FTS
S080051-IBL1

M3HFPO-DA
22K0796-03[HW-I(d)]

PF-19

Sample re-analyzed at a dilution that was re-fortified with internal standard.

Analyte & Samples(s) Qualified:

22K0796-04RE1[HW-3]

S-29

Extracted Internal Standard is outside of control limits.

Analyte & Samples(s) Qualified:

M2-8:2FTS
S080051-CCV2

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

The results of analyses reported only relate to samples submitted to Con-Test, a Pace Analytical Laboratory, for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Lisa A. Worthington
Technical Representative

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Hyannis, MA | Sample Description: | Work Order: 22K0796

Date Received: 11/3/2022

Field Sample #: HW-I(s) | Sampled: 10/31/2022 11:45

Sample ID: 22K0796-01

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	37	1.8	0.56	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
Perfluorobutanesulfonic acid (PFBS)	1.3	1.8	0.50	ng/L	1	J	SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
Perfluoropentanoic acid (PFPeA)	130	1.8	0.58	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
Perfluorohexanoic acid (PFHxA)	84	1.8	0.57	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
11Cl-PF3OUdS (F53B Major)	ND	1.8	0.60	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
9Cl-PF3ONS (F53B Minor)	ND	1.8	0.48	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.8	0.31	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.8	0.74	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
8:2 Fluorotelomersulfonic acid (8:2FTS A)	1.5	1.8	0.59	ng/L	1	J	SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
Perfluorodecanoic acid (PFDA)	ND	1.8	0.65	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
Perfluorododecanoic acid (PFDoA)	ND	1.8	0.63	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.8	0.57	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
Perfluoroheptanesulfonic acid (PFHpS)	9.6	1.8	0.39	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
N-EtFOSAA (NEtFOSAA)	ND	1.8	0.48	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
N-MeFOSAA (NMeFOSAA)	ND	1.8	0.55	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
Perfluorotetradecanoic acid (PFTA)	ND	1.8	0.54	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
Perfluorotridecanoic acid (PFTrDA)	ND	1.8	0.46	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.8	0.54	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
Perfluorodecanesulfonic acid (PFDS)	ND	1.8	0.48	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
Perfluorooctanesulfonamide (FOSA)	ND	1.8	0.69	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
Perfluorononanesulfonic acid (PFNS)	ND	1.8	0.75	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
Perfluoro-1-hexanesulfonamide (FHxSA)	9.2	1.8	0.96	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
Perfluoro-1-butanesulfonamide (FBSA)	1.6	1.8	0.46	ng/L	1	J	SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
Perfluorohexanesulfonic acid (PFHxS)	26	1.8	0.53	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.8	0.52	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.8	0.48	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	1.8	1.3	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
Perfluoropetanesulfonic acid (PFPeS)	1.9	1.8	0.60	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
Perfluoroundecanoic acid (PFUnA)	ND	1.8	0.63	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.8	0.50	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
Perfluoroheptanoic acid (PFHpA)	65	1.8	0.45	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
Perfluorooctanoic acid (PFOA)	67	1.8	0.64	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
Perfluorooctanesulfonic acid (PFOS)	36	1.8	0.38	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL
Perfluorononanoic acid (PFNA)	40	1.8	0.62	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:46	DRL

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Project Location: Hyannis, MA | Sample Description: | Work Order: 22K0796

Date Received: 11/3/2022

Field Sample #: HW-I(m) | Sampled: 10/31/2022 12:30

Sample ID: 22K0796-02

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	ND	1.8	0.56	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
Perfluorobutanesulfonic acid (PFBS)	ND	1.8	0.50	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
Perfluoropentanoic acid (PFPeA)	ND	1.8	0.57	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
Perfluorohexanoic acid (PFHxA)	ND	1.8	0.57	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
11Cl-PF3OUdS (F53B Major)	ND	1.8	0.60	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
9Cl-PF3ONS (F53B Minor)	ND	1.8	0.47	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.8	0.31	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.8	0.73	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	1.8	0.59	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
Perfluorodecanoic acid (PFDA)	ND	1.8	0.65	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
Perfluorododecanoic acid (PFDoA)	ND	1.8	0.63	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.8	0.56	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
Perfluoroheptanesulfonic acid (PFHpS)	ND	1.8	0.39	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
N-EtFOSAA (NEtFOSAA)	ND	1.8	0.48	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
N-MeFOSAA (NMeFOSAA)	ND	1.8	0.54	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
Perfluorotetradecanoic acid (PFTA)	ND	1.8	0.53	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
Perfluorotridecanoic acid (PFTrDA)	ND	1.8	0.46	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.8	0.53	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
Perfluorodecanesulfonic acid (PFDS)	ND	1.8	0.47	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
Perfluorooctanesulfonamide (FOSA)	ND	1.8	0.68	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
Perfluorononanesulfonic acid (PFNS)	ND	1.8	0.75	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	1.8	0.95	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
Perfluoro-1-butanesulfonamide (FBSA)	ND	1.8	0.46	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
Perfluorohexanesulfonic acid (PFHxS)	4.2	1.8	0.53	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.8	0.52	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.8	0.48	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	1.8	1.3	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
Perfluoropetanesulfonic acid (PFPeS)	ND	1.8	0.60	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
Perfluoroundecanoic acid (PFUnA)	ND	1.8	0.62	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.8	0.49	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
Perfluoroheptanoic acid (PFHpA)	0.67	1.8	0.44	ng/L	1	J	SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
Perfluorooctanoic acid (PFOA)	0.76	1.8	0.64	ng/L	1	J	SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
Perfluorooctanesulfonic acid (PFOS)	4.3	1.8	0.37	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL
Perfluorononanoic acid (PFNA)	ND	1.8	0.61	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 18:53	DRL

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Project Location: Hyannis, MA | Sample Description: | Work Order: 22K0796

Date Received: 11/3/2022

Field Sample #: HW-I(d) | Sampled: 10/31/2022 13:30

Sample ID: 22K0796-03

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	8.8	1.7	0.56	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
Perfluorobutanesulfonic acid (PFBS)	1.9	1.7	0.50	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
Perfluoropentanoic acid (PFPeA)	23	1.7	0.57	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
Perfluorohexanoic acid (PFHxA)	18	1.7	0.57	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
11Cl-PF3OUdS (F53B Major)	ND	1.7	0.60	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
9Cl-PF3ONS (F53B Minor)	ND	1.7	0.47	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.7	0.31	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.7	0.73	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	1.7	0.59	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
Perfluorodecanoic acid (PFDA)	ND	1.7	0.65	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
Perfluorododecanoic acid (PFDoA)	ND	1.7	0.63	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.7	0.56	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
Perfluoroheptanesulfonic acid (PFHpS)	2.4	1.7	0.39	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
N-EtFOSAA (NEtFOSAA)	ND	1.7	0.48	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
N-MeFOSAA (NMeFOSAA)	ND	1.7	0.54	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
Perfluorotetradecanoic acid (PFTA)	ND	1.7	0.53	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
Perfluorotridecanoic acid (PFTrDA)	ND	1.7	0.46	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.7	0.53	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
Perfluorodecanesulfonic acid (PFDS)	ND	1.7	0.47	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
Perfluorooctanesulfonamide (FOSA)	ND	1.7	0.68	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
Perfluorononanesulfonic acid (PFNS)	ND	1.7	0.75	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	1.7	0.95	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
Perfluoro-1-butanesulfonamide (FBSA)	ND	1.7	0.46	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
Perfluorohexanesulfonic acid (PFHxS)	45	1.7	0.53	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.7	0.52	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.7	0.48	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	1.7	1.3	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
Perfluoropetanesulfonic acid (PFPeS)	2.3	1.7	0.60	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
Perfluoroundecanoic acid (PFUnA)	ND	1.7	0.62	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.7	0.49	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
Perfluoroheptanoic acid (PFHpA)	9.3	1.7	0.44	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
Perfluorooctanoic acid (PFOA)	9.6	1.7	0.64	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
Perfluorooctanesulfonic acid (PFOS)	63	1.7	0.37	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL
Perfluorononanoic acid (PFNA)	1.1	1.7	0.61	ng/L	1	J	SOP-454 PFAS	11/17/22	11/28/22 19:01	DRL

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Project Location: Hyannis, MA | Sample Description: | Work Order: 22K0796

Date Received: 11/3/2022

Field Sample #: HW-3 | Sampled: 10/31/2022 11:45

Sample ID: 22K0796-04

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	77	1.9	0.59	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
Perfluorobutanesulfonic acid (PFBS)	3.3	1.9	0.53	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
Perfluoropentanoic acid (PFPeA)	330	19	6.1	ng/L	10		SOP-454 PFAS	11/17/22	12/1/22 12:32	RRB
Perfluorohexanoic acid (PFHxA)	170	1.9	0.61	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
11Cl-PF3OUdS (F53B Major)	ND	1.9	0.64	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
9Cl-PF3ONS (F53B Minor)	ND	1.9	0.50	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.9	0.33	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.9	0.78	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
8:2 Fluorotelomersulfonic acid (8:2FTS A)	2.7	1.9	0.62	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
Perfluorodecanoic acid (PFDA)	ND	1.9	0.69	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
Perfluorododecanoic acid (PFDoA)	ND	1.9	0.67	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.9	0.60	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
Perfluoroheptanesulfonic acid (PFHpS)	0.78	1.9	0.41	ng/L	1	J	SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
N-EtFOSAA (NEtFOSAA)	ND	1.9	0.51	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
N-MeFOSAA (NMeFOSAA)	ND	1.9	0.58	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
Perfluorotetradecanoic acid (PFTA)	ND	1.9	0.57	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
Perfluorotridecanoic acid (PFTrDA)	ND	1.9	0.49	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.9	0.57	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
Perfluorodecanesulfonic acid (PFDS)	ND	1.9	0.50	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
Perfluorooctanesulfonamide (FOSA)	ND	1.9	0.73	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
Perfluorononanesulfonic acid (PFNS)	ND	1.9	0.80	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	1.9	1.0	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
Perfluoro-1-butanesulfonamide (FBSA)	2.1	1.9	0.49	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
Perfluorohexanesulfonic acid (PFHxS)	24	1.9	0.56	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.9	0.55	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.9	0.51	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	1.9	1.4	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
Perfluoropetanesulfonic acid (PFPeS)	6.1	1.9	0.64	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
Perfluoroundecanoic acid (PFUnA)	2.1	1.9	0.66	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.9	0.53	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
Perfluoroheptanoic acid (PFHpA)	54	1.9	0.47	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
Perfluorooctanoic acid (PFOA)	22	1.9	0.68	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
Perfluorooctanesulfonic acid (PFOS)	28	1.9	0.40	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL
Perfluorononanoic acid (PFNA)	9.7	1.9	0.65	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:08	DRL

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Project Location: Hyannis, MA | Sample Description: | Work Order: 22K0796

Date Received: 11/3/2022

Field Sample #: HW-P(s) | Sampled: 11/2/2022 12:10

Sample ID: 22K0796-05

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	9.2	1.8	0.57	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
Perfluorobutanesulfonic acid (PFBS)	ND	1.8	0.51	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
Perfluoropentanoic acid (PFPeA)	18	1.8	0.58	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
Perfluorohexanoic acid (PFHxA)	8.0	1.8	0.58	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
11Cl-PF3OUdS (F53B Major)	ND	1.8	0.61	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
9Cl-PF3ONS (F53B Minor)	ND	1.8	0.48	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.8	0.31	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.8	0.74	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	1.8	0.60	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
Perfluorodecanoic acid (PFDA)	ND	1.8	0.66	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
Perfluorododecanoic acid (PFDoA)	ND	1.8	0.64	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.8	0.57	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
Perfluoroheptanesulfonic acid (PFHpS)	ND	1.8	0.39	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
N-EtFOSAA (NEtFOSAA)	ND	1.8	0.49	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
N-MeFOSAA (NMeFOSAA)	ND	1.8	0.55	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
Perfluorotetradecanoic acid (PFTA)	ND	1.8	0.54	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
Perfluorotridecanoic acid (PFTrDA)	ND	1.8	0.47	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.8	0.54	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
Perfluorodecanesulfonic acid (PFDS)	ND	1.8	0.48	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
Perfluorooctanesulfonamide (FOSA)	ND	1.8	0.69	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
Perfluorononanesulfonic acid (PFNS)	ND	1.8	0.76	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	1.8	0.97	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
Perfluoro-1-butanesulfonamide (FBSA)	ND	1.8	0.47	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
Perfluorohexanesulfonic acid (PFHxS)	ND	1.8	0.54	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.8	0.52	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.8	0.49	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
6:2 Fluorotelomersulfonic acid (6:2FTS A)	1.6	1.8	1.3	ng/L	1	J	SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
Perfluoropetanesulfonic acid (PFPeS)	ND	1.8	0.61	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
Perfluoroundecanoic acid (PFUnA)	ND	1.8	0.63	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.8	0.50	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
Perfluoroheptanoic acid (PFHpA)	4.4	1.8	0.45	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
Perfluorooctanoic acid (PFOA)	3.7	1.8	0.65	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
Perfluorooctanesulfonic acid (PFOS)	0.48	1.8	0.38	ng/L	1	J	SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL
Perfluorononanoic acid (PFNA)	1.6	1.8	0.62	ng/L	1	J	SOP-454 PFAS	11/17/22	11/28/22 19:15	DRL

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Project Location: Hyannis, MA | Sample Description: | Work Order: 22K0796

Date Received: 11/3/2022

Field Sample #: HW-P(m) | Sampled: 11/2/2022 11:45

Sample ID: 22K0796-06

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	8.4	1.8	0.56	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
Perfluorobutanesulfonic acid (PFBS)	ND	1.8	0.50	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
Perfluoropentanoic acid (PFPeA)	21	1.8	0.57	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
Perfluorohexanoic acid (PFHxA)	12	1.8	0.57	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
11Cl-PF3OUdS (F53B Major)	ND	1.8	0.60	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
9Cl-PF3ONS (F53B Minor)	ND	1.8	0.47	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.8	0.31	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.8	0.73	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	1.8	0.59	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
Perfluorodecanoic acid (PFDA)	ND	1.8	0.65	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
Perfluorododecanoic acid (PFDoA)	ND	1.8	0.63	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.8	0.56	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
Perfluoroheptanesulfonic acid (PFHpS)	ND	1.8	0.39	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
N-EtFOSAA (NEtFOSAA)	ND	1.8	0.48	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
N-MeFOSAA (NMeFOSAA)	ND	1.8	0.54	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
Perfluorotetradecanoic acid (PFTA)	ND	1.8	0.53	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
Perfluorotridecanoic acid (PFTrDA)	ND	1.8	0.46	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.8	0.53	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
Perfluorodecanesulfonic acid (PFDS)	ND	1.8	0.47	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
Perfluorooctanesulfonamide (FOSA)	ND	1.8	0.68	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
Perfluorononanesulfonic acid (PFNS)	ND	1.8	0.75	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	1.8	0.95	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
Perfluoro-1-butanesulfonamide (FBSA)	ND	1.8	0.46	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
Perfluorohexanesulfonic acid (PFHxS)	1.1	1.8	0.53	ng/L	1	J	SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.8	0.52	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.8	0.48	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	1.8	1.3	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
Perfluoropetanesulfonic acid (PFPeS)	ND	1.8	0.60	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
Perfluoroundecanoic acid (PFUnA)	ND	1.8	0.62	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.8	0.49	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
Perfluoroheptanoic acid (PFHpA)	8.3	1.8	0.44	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
Perfluorooctanoic acid (PFOA)	8.0	1.8	0.64	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
Perfluorooctanesulfonic acid (PFOS)	2.2	1.8	0.37	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL
Perfluorononanoic acid (PFNA)	9.5	1.8	0.61	ng/L	1		SOP-454 PFAS	11/17/22	11/28/22 19:22	DRL

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Sample Extraction Data

Prep Method: SOP 454-PFAAS **Analytical Method: SOP-454 PFAS**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
22K0796-01 [HW-I(s)]	B322381	284	1.00	11/17/22
22K0796-02 [HW-I(m)]	B322381	285	1.00	11/17/22
22K0796-03 [HW-I(d)]	B322381	286	1.00	11/17/22
22K0796-04 [HW-3]	B322381	268	1.00	11/17/22
22K0796-04RE1 [HW-3]	B322381	268	1.00	11/17/22
22K0796-05 [HW-P(s)]	B322381	281	1.00	11/17/22
22K0796-06 [HW-P(m)]	B322381	285	1.00	11/17/22

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QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B322381 - SOP 454-PFAAS											
Blank (B322381-BLK1)				Prepared: 11/17/22 Analyzed: 11/28/22							
Perfluorobutanoic acid (PFBA)	ND	1.8	ng/L								
Perfluorobutanesulfonic acid (PFBS)	ND	1.8	ng/L								
Perfluoropentanoic acid (PFPeA)	ND	1.8	ng/L								
Perfluorohexanoic acid (PFHxA)	ND	1.8	ng/L								
11Cl-PF3OUdS (F53B Major)	ND	1.8	ng/L								
9Cl-PF3ONS (F53B Minor)	ND	1.8	ng/L								
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.8	ng/L								
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.8	ng/L								
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	1.8	ng/L								
Perfluorodecanoic acid (PFDA)	ND	1.8	ng/L								
Perfluorododecanoic acid (PFDoA)	ND	1.8	ng/L								
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.8	ng/L								
Perfluoroheptanesulfonic acid (PFHpS)	ND	1.8	ng/L								
N-EtFOSAA (NEtFOSAA)	ND	1.8	ng/L								
N-MeFOSAA (NMeFOSAA)	ND	1.8	ng/L								
Perfluorotetradecanoic acid (PFTA)	ND	1.8	ng/L								
Perfluorotridecanoic acid (PFTrDA)	ND	1.8	ng/L								
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.8	ng/L								
Perfluorodecanesulfonic acid (PFDS)	ND	1.8	ng/L								
Perfluorooctanesulfonamide (FOSA)	ND	1.8	ng/L								
Perfluorononanesulfonic acid (PFNS)	ND	1.8	ng/L								
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	1.8	ng/L								
Perfluoro-1-butanesulfonamide (FBSA)	ND	1.8	ng/L								
Perfluorohexanesulfonic acid (PFHxS)	ND	1.8	ng/L								
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.8	ng/L								
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.8	ng/L								
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	1.8	ng/L								
Perfluoropetanesulfonic acid (PFPeS)	ND	1.8	ng/L								
Perfluoroundecanoic acid (PFUnA)	ND	1.8	ng/L								
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.8	ng/L								
Perfluoroheptanoic acid (PFHpA)	ND	1.8	ng/L								
Perfluorooctanoic acid (PFOA)	ND	1.8	ng/L								
Perfluorooctanesulfonic acid (PFOS)	ND	1.8	ng/L								
Perfluorononanoic acid (PFNA)	ND	1.8	ng/L								
LCS (B322381-BS1)				Prepared: 11/17/22 Analyzed: 11/28/22							
Perfluorobutanoic acid (PFBA)	10.5	1.8	ng/L	9.07		116		73-129			
Perfluorobutanesulfonic acid (PFBS)	9.01	1.8	ng/L	8.02		112		72-130			
Perfluoropentanoic acid (PFPeA)	10.4	1.8	ng/L	9.07		115		72-129			
Perfluorohexanoic acid (PFHxA)	10.2	1.8	ng/L	9.07		112		72-129			
11Cl-PF3OUdS (F53B Major)	8.25	1.8	ng/L	8.54		96.6		55.1-141			
9Cl-PF3ONS (F53B Minor)	9.02	1.8	ng/L	8.45		107		59.6-146			
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	11.4	1.8	ng/L	8.54		**133**	*	60.3-131			L-02
Hexafluoropropylene oxide dimer acid (HFPO-DA)	10.9	1.8	ng/L	9.07		121		37.6-167			
8:2 Fluorotelomersulfonic acid (8:2FTS A)	10.1	1.8	ng/L	8.70		116		67-138			
Perfluorodecanoic acid (PFDA)	11.0	1.8	ng/L	9.07		122		71-129			
Perfluorododecanoic acid (PFDoA)	10.5	1.8	ng/L	9.07		116		72-134			
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	9.19	1.8	ng/L	8.07		114		49.4-154			

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QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B322381 - SOP 454-PFAAS											
LCS (B322381-BS1)				Prepared: 11/17/22 Analyzed: 11/28/22							
Perfluoroheptanesulfonic acid (PFHpS)	11.5	1.8	ng/L	8.66		133		69-134			
N-EtFOSAA (NEtFOSAA)	11.4	1.8	ng/L	9.07		126		61-135			
N-MeFOSAA (NMeFOSAA)	13.0	1.8	ng/L	9.07		**143**	*	65-136			L-02
Perfluorotetradecanoic acid (PFTA)	9.87	1.8	ng/L	9.07		109		71-132			
Perfluorotridecanoic acid (PFTrDA)	9.47	1.8	ng/L	9.07		104		65-144			
4:2 Fluorotelomersulfonic acid (4:2FTS A)	9.92	1.8	ng/L	8.48		117		63-143			
Perfluorodecanesulfonic acid (PFDS)	8.35	1.8	ng/L	8.75		95.5		53-142			
Perfluorooctanesulfonamide (FOSA)	10.5	1.8	ng/L	9.07		116		67-137			
Perfluorononanesulfonic acid (PFNS)	10.7	1.8	ng/L	8.70		123		69-127			
Perfluoro-1-hexanesulfonamide (FHxSA)	10.1	1.8	ng/L	9.07		111		61.7-156			
Perfluoro-1-butanesulfonamide (FBSA)	9.91	1.8	ng/L	9.07		109		61.3-145			
Perfluorohexanesulfonic acid (PFHxS)	8.93	1.8	ng/L	8.30		108		68-131			
Perfluoro-4-oxapentanoic acid (PFMPA)	11.2	1.8	ng/L	9.07		124		59.8-147			
Perfluoro-5-oxahexanoic acid (PFMBA)	10.8	1.8	ng/L	9.07		119		59.5-146			
6:2 Fluorotelomersulfonic acid (6:2FTS A)	10.4	1.8	ng/L	8.61		121		64-140			
Perfluoropetanesulfonic acid (PFPeS)	9.23	1.8	ng/L	8.52		108		71-127			
Perfluoroundecanoic acid (PFUnA)	9.58	1.8	ng/L	9.07		106		69-133			
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	12.7	1.8	ng/L	9.07		140		58.5-143			
Perfluoroheptanoic acid (PFHpA)	10.2	1.8	ng/L	9.07		113		72-130			
Perfluorooctanoic acid (PFOA)	10.4	1.8	ng/L	9.07		115		71-133			
Perfluorooctanesulfonic acid (PFOS)	9.93	1.8	ng/L	8.39		118		65-140			
Perfluorononanoic acid (PFNA)	10.4	1.8	ng/L	9.07		114		69-130			
LCS Dup (B322381-BSD1)				Prepared: 11/17/22 Analyzed: 11/28/22							
Perfluorobutanoic acid (PFBA)	10.8	1.9	ng/L	9.34		116		73-129	3.01	30	
Perfluorobutanesulfonic acid (PFBS)	9.39	1.9	ng/L	8.26		114		72-130	4.21	30	
Perfluoropentanoic acid (PFPeA)	10.6	1.9	ng/L	9.34		114		72-129	2.25	30	
Perfluorohexanoic acid (PFHxA)	10.7	1.9	ng/L	9.34		114		72-129	4.62	30	
11Cl-PF3OUdS (F53B Major)	8.44	1.9	ng/L	8.79		95.9		55.1-141	2.24	30	
9Cl-PF3ONS (F53B Minor)	8.62	1.9	ng/L	8.70		99.0		59.6-146	4.62	30	
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	11.8	1.9	ng/L	8.79		**134**	*	60.3-131	3.95	30	L-02
Hexafluoropropylene oxide dimer acid (HFPO-DA)	10.9	1.9	ng/L	9.34		117		37.6-167	0.0477	30	
8:2 Fluorotelomersulfonic acid (8:2FTS A)	11.3	1.9	ng/L	8.96		126		67-138	11.0	30	
Perfluorodecanoic acid (PFDA)	10.8	1.9	ng/L	9.34		116		71-129	1.69	30	
Perfluorododecanoic acid (PFDoA)	11.2	1.9	ng/L	9.34		120		72-134	6.37	30	
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	9.55	1.9	ng/L	8.31		115		49.4-154	3.84	30	
Perfluoroheptanesulfonic acid (PFHpS)	11.2	1.9	ng/L	8.92		126		69-134	3.02	30	
N-EtFOSAA (NEtFOSAA)	12.9	1.9	ng/L	9.34		**139**	*	61-135	12.2	30	L-07
N-MeFOSAA (NMeFOSAA)	13.0	1.9	ng/L	9.34		**139**	*	65-136	0.514	30	L-02
Perfluorotetradecanoic acid (PFTA)	11.1	1.9	ng/L	9.34		119		71-132	11.5	30	
Perfluorotridecanoic acid (PFTrDA)	10.8	1.9	ng/L	9.34		115		65-144	12.7	30	
4:2 Fluorotelomersulfonic acid (4:2FTS A)	10.3	1.9	ng/L	8.73		118		63-143	3.39	30	
Perfluorodecanesulfonic acid (PFDS)	8.89	1.9	ng/L	9.01		98.7		53-142	6.21	30	
Perfluorooctanesulfonamide (FOSA)	11.5	1.9	ng/L	9.34		123		67-137	9.23	30	
Perfluorononanesulfonic acid (PFNS)	11.0	1.9	ng/L	8.96		123		69-127	2.84	30	
Perfluoro-1-hexanesulfonamide (FHxSA)	10.4	1.9	ng/L	9.34		112		61.7-156	3.19	30	
Perfluoro-1-butanesulfonamide (FBSA)	10.3	1.9	ng/L	9.34		110		61.3-145	3.78	30	
Perfluorohexanesulfonic acid (PFHxS)	9.26	1.9	ng/L	8.54		108		68-131	3.65	30	
Perfluoro-4-oxapentanoic acid (PFMPA)	11.7	1.9	ng/L	9.34		125		59.8-147	4.02	30	
Perfluoro-5-oxahexanoic acid (PFMBA)	11.3	1.9	ng/L	9.34		122		59.5-146	4.75	30	

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QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B322381 - SOP 454-PFAAS										
LCS Dup (B322381-BSD1)				Prepared: 11/17/22 Analyzed: 11/28/22						
6:2 Fluorotelomersulfonic acid (6:2FTS A)	9.96	1.9	ng/L	8.87		112	64-140	4.36	30	
Perfluoropetanesulfonic acid (PFPeS)	9.54	1.9	ng/L	8.78		109	71-127	3.29	30	
Perfluoroundecanoic acid (PFUnA)	10.1	1.9	ng/L	9.34		108	69-133	5.11	30	
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	13.3	1.9	ng/L	9.34		142	58.5-143	4.83	30	
Perfluoroheptanoic acid (PFHpA)	10.1	1.9	ng/L	9.34		108	72-130	1.83	30	
Perfluorooctanoic acid (PFOA)	10.8	1.9	ng/L	9.34		116	71-133	3.46	30	
Perfluorooctanesulfonic acid (PFOS)	9.68	1.9	ng/L	8.64		112	65-140	2.53	30	
Perfluorononanoic acid (PFNA)	11.1	1.9	ng/L	9.34		119	69-130	6.51	30	

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit is at the level of quantitation (LOQ)
DL	Detection Limit is the lower limit of detection determined by the MDL study
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
J	Detected but below the Reporting Limit (lowest calibration standard); therefore, result is an estimated concentration (CLP J-Flag).
L-02	Laboratory fortified blank/laboratory control sample recovery and duplicate recoveries outside of control limits. Data validation is not affected since all results are "not detected" for associated samples in this batch and bias is on the high side.
L-07	Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD between the two LFB/LCS results is within method specified criteria.
PF-17	Extracted Internal Standard recovery is outside of control limits. Data is not significantly affected since associated analyte is not detected and bias is on the high side.
PF-19	Sample re-analyzed at a dilution that was re-fortified with internal standard.
S-29	Extracted Internal Standard is outside of control limits.

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
HW-I(s) (22K0796-01)			Lab File ID: 22K0796-01.d			Analyzed: 11/28/22 18:46			
M8FOSA	316022.6	3.9806	328,882.00	3.988583	96	50 - 150	-0.0080	+/-0.50	
M2-4:2FTS	93173.54	2.431017	117,202.00	2.431017	79	50 - 150	0.0000	+/-0.50	
M2PFTA	962403.5	4.28115	1,179,309.00	4.281133	82	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	170662.2	3.77095	161,607.00	3.7789	106	50 - 150	-0.0080	+/-0.50	
MPFBA	554101.9	1.066783	461,996.00	1.066783	120	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	119713.7	2.765683	90,432.00	2.76565	132	50 - 150	0.0000	+/-0.50	
M6PFDA	756748.6	3.77945	679,406.00	3.779417	111	50 - 150	0.0000	+/-0.50	
M3PFBS	147684.9	1.853533	113,187.00	1.853533	130	50 - 150	0.0000	+/-0.50	
M7PFUnA	716008.1	3.9141	781,940.00	3.914067	92	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	279472.8	3.420533	87,113.00	3.4205	321	50 - 150	0.0000	+/-0.50	*
M5PFPeA	467588.8	1.68175	354,541.00	1.681733	132	50 - 150	0.0000	+/-0.50	
M5PFHxA	862377.1	2.50665	712,368.00	2.51485	121	50 - 150	-0.0082	+/-0.50	
M3PFHxS	140972	3.185767	116,118.00	3.185733	121	50 - 150	0.0000	+/-0.50	
M4PFHpA	1019995	3.146583	866,308.00	3.14655	118	50 - 150	0.0000	+/-0.50	
M8PFOA	934497	3.429883	798,016.00	3.437833	117	50 - 150	-0.0080	+/-0.50	
M8PFOS	121112.7	3.628233	103,021.00	3.6282	118	50 - 150	0.0000	+/-0.50	
M9PFNA	693390.3	3.629267	651,283.00	3.629233	106	50 - 150	0.0000	+/-0.50	
MPFDoA	695891.2	4.048717	828,207.00	4.048683	84	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	168645.1	3.921567	202,178.00	3.921533	83	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	214072.8	3.849733	260,668.00	3.8497	82	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
HW-I(m) (22K0796-02)			Lab File ID: 22K0796-02.d			Analyzed: 11/28/22 18:53			
M8FOSA	321824.4	3.980567	328,882.00	3.988583	98	50 - 150	-0.0080	+/-0.50	
M2-4:2FTS	80510.04	2.431017	117,202.00	2.431017	69	50 - 150	0.0000	+/-0.50	
M2PFTA	1157199	4.281116	1,179,309.00	4.281133	98	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	165104.9	3.770917	161,607.00	3.7789	102	50 - 150	-0.0080	+/-0.50	
MPFBA	539792.2	1.066783	461,996.00	1.066783	117	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	127608.8	2.76565	90,432.00	2.76565	141	50 - 150	0.0000	+/-0.50	
M6PFDA	750302.4	3.7794	679,406.00	3.779417	110	50 - 150	0.0000	+/-0.50	
M3PFBS	141898.4	1.853533	113,187.00	1.853533	125	50 - 150	0.0000	+/-0.50	
M7PFUnA	757034.7	3.91405	781,940.00	3.914067	97	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	55335.07	3.4205	87,113.00	3.4205	64	50 - 150	0.0000	+/-0.50	
M5PFPeA	465089.4	1.681733	354,541.00	1.681733	131	50 - 150	0.0000	+/-0.50	
M5PFHxA	857138.5	2.506633	712,368.00	2.51485	120	50 - 150	-0.0082	+/-0.50	
M3PFHxS	134010.5	3.185733	116,118.00	3.185733	115	50 - 150	0.0000	+/-0.50	
M4PFHpA	1003357	3.14655	866,308.00	3.14655	116	50 - 150	0.0000	+/-0.50	
M8PFOA	945029.6	3.437833	798,016.00	3.437833	118	50 - 150	0.0000	+/-0.50	
M8PFOS	122839.8	3.6282	103,021.00	3.6282	119	50 - 150	0.0000	+/-0.50	
M9PFNA	733048.8	3.629233	651,283.00	3.629233	113	50 - 150	0.0000	+/-0.50	
MPFDoA	795224.3	4.040683	828,207.00	4.048683	96	50 - 150	-0.0080	+/-0.50	
D5-NEtFOSAA	184893.5	3.921517	202,178.00	3.921533	91	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	234336.2	3.8497	260,668.00	3.8497	90	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
HW-I(d) (22K0796-03)			Lab File ID: 22K0796-03.d			Analyzed: 11/28/22 19:01			
M8FOSA	326186.3	3.980567	328,882.00	3.988583	99	50 - 150	-0.0080	+/-0.50	
M2-4:2FTS	94032.64	2.431017	117,202.00	2.431017	80	50 - 150	0.0000	+/-0.50	
M2PFTA	1186683	4.281116	1,179,309.00	4.281133	101	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	193588.1	3.778883	161,607.00	3.7789	120	50 - 150	0.0000	+/-0.50	
MPFBA	522389.1	1.066783	461,996.00	1.066783	113	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	144819.8	2.765667	90,432.00	2.76565	160	50 - 150	0.0000	+/-0.50	*
M6PFDA	785605.3	3.779417	679,406.00	3.779417	116	50 - 150	0.0000	+/-0.50	
M3PFBS	151884.9	1.853533	113,187.00	1.853533	134	50 - 150	0.0000	+/-0.50	
M7PFUnA	812392.1	3.914067	781,940.00	3.914067	104	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	65207.73	3.4205	87,113.00	3.4205	75	50 - 150	0.0000	+/-0.50	
M5PFPeA	484577.9	1.681733	354,541.00	1.681733	137	50 - 150	0.0000	+/-0.50	
M5PFHxA	895560.8	2.506633	712,368.00	2.51485	126	50 - 150	-0.0082	+/-0.50	
M3PFHxS	143640.8	3.185733	116,118.00	3.185733	124	50 - 150	0.0000	+/-0.50	
M4PFHpA	1036990	3.14655	866,308.00	3.14655	120	50 - 150	0.0000	+/-0.50	
M8PFOA	971499	3.42985	798,016.00	3.437833	122	50 - 150	-0.0080	+/-0.50	
M8PFOS	125189.9	3.6282	103,021.00	3.6282	122	50 - 150	0.0000	+/-0.50	
M9PFNA	729224.1	3.629233	651,283.00	3.629233	112	50 - 150	0.0000	+/-0.50	
MPFDoA	826722.9	4.048683	828,207.00	4.048683	100	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	207621.3	3.921533	202,178.00	3.921533	103	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	250272.4	3.8497	260,668.00	3.8497	96	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
HW-3 (22K0796-04)			Lab File ID: 22K0796-04.d			Analyzed: 11/28/22 19:08			
M8FOSA	297041	3.980567	328,882.00	3.988583	90	50 - 150	-0.0080	+/-0.50	
M2-4:2FTS	87903.63	2.431017	117,202.00	2.431017	75	50 - 150	0.0000	+/-0.50	
M2PFTA	1024804	4.281116	1,179,309.00	4.281133	87	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	185368.2	3.770917	161,607.00	3.7789	115	50 - 150	-0.0080	+/-0.50	
MPFBA	480661.1	1.066783	461,996.00	1.066783	104	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	131210.2	2.76565	90,432.00	2.76565	145	50 - 150	0.0000	+/-0.50	
M6PFDA	736549.8	3.77145	679,406.00	3.779417	108	50 - 150	-0.0080	+/-0.50	
M3PFBS	140826.7	1.853533	113,187.00	1.853533	124	50 - 150	0.0000	+/-0.50	
M7PFUnA	782383.3	3.914067	781,940.00	3.914067	100	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	179458.5	3.4205	87,113.00	3.4205	206	50 - 150	0.0000	+/-0.50	*
M5PFPeA	414879.4	1.681733	354,541.00	1.681733	117	50 - 150	0.0000	+/-0.50	
M5PFHxA	798930.3	2.506633	712,368.00	2.51485	112	50 - 150	-0.0082	+/-0.50	
M3PFHxS	130328.3	3.185733	116,118.00	3.185733	112	50 - 150	0.0000	+/-0.50	
M4PFHpA	952901.6	3.14655	866,308.00	3.14655	110	50 - 150	0.0000	+/-0.50	
M8PFOA	905660.1	3.42985	798,016.00	3.437833	113	50 - 150	-0.0080	+/-0.50	
M8PFOS	121603.6	3.6282	103,021.00	3.6282	118	50 - 150	0.0000	+/-0.50	
M9PFNA	686634.9	3.62125	651,283.00	3.629233	105	50 - 150	-0.0080	+/-0.50	
MPFDoA	762503.4	4.040683	828,207.00	4.048683	92	50 - 150	-0.0080	+/-0.50	
D5-NEtFOSAA	206337	3.921533	202,178.00	3.921533	102	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	230693.8	3.8497	260,668.00	3.8497	89	50 - 150	0.0000	+/-0.50	
HW-3 (22K0796-04RE1)			Lab File ID: 22K0796-04RE1.d			Analyzed: 12/01/22 12:32			
M5PFPeA	418060.9	1.714833	373,794.00	1.7231	112	50 - 150	-0.0083	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
HW-P(s) (22K0796-05)			Lab File ID: 22K0796-05.d			Analyzed: 11/28/22 19:15			
M8FOSA	306947.5	3.980567	328,882.00	3.988583	93	50 - 150	-0.0080	+/-0.50	
M2-4:2FTS	76802.77	2.431	117,202.00	2.431017	66	50 - 150	0.0000	+/-0.50	
M2PFTA	989825.6	4.281116	1,179,309.00	4.281133	84	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	166598.9	3.770917	161,607.00	3.7789	103	50 - 150	-0.0080	+/-0.50	
MPFBA	503522.8	1.066783	461,996.00	1.066783	109	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	132660	2.76565	90,432.00	2.76565	147	50 - 150	0.0000	+/-0.50	
M6PFDA	708394.6	3.779417	679,406.00	3.779417	104	50 - 150	0.0000	+/-0.50	
M3PFBS	134664.1	1.853533	113,187.00	1.853533	119	50 - 150	0.0000	+/-0.50	
M7PFUnA	756325.8	3.914067	781,940.00	3.914067	97	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	51622.24	3.4205	87,113.00	3.4205	59	50 - 150	0.0000	+/-0.50	
M5PFPeA	441900.7	1.681733	354,541.00	1.681733	125	50 - 150	0.0000	+/-0.50	
M5PFHxA	803921.3	2.506633	712,368.00	2.51485	113	50 - 150	-0.0082	+/-0.50	
M3PFHxS	125207.4	3.185733	116,118.00	3.185733	108	50 - 150	0.0000	+/-0.50	
M4PFHpA	936140.8	3.14655	866,308.00	3.14655	108	50 - 150	0.0000	+/-0.50	
M8PFOA	858479.5	3.42985	798,016.00	3.437833	108	50 - 150	-0.0080	+/-0.50	
M8PFOS	116471.8	3.6282	103,021.00	3.6282	113	50 - 150	0.0000	+/-0.50	
M9PFNA	644425.3	3.629233	651,283.00	3.629233	99	50 - 150	0.0000	+/-0.50	
MPFDoA	748739.7	4.040683	828,207.00	4.048683	90	50 - 150	-0.0080	+/-0.50	
D5-NEtFOSAA	166180.3	3.921533	202,178.00	3.921533	82	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	208582.9	3.8497	260,668.00	3.8497	80	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
HW-P(m) (22K0796-06)			Lab File ID: 22K0796-06.d			Analyzed: 11/28/22 19:22			
M8FOSA	342685.6	3.9806	328,882.00	3.988583	104	50 - 150	-0.0080	+/-0.50	
M2-4:2FTS	85103.01	2.431017	117,202.00	2.431017	73	50 - 150	0.0000	+/-0.50	
M2PFTA	1301122	4.28115	1,179,309.00	4.281133	110	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	183042	3.770933	161,607.00	3.7789	113	50 - 150	-0.0080	+/-0.50	
MPFBA	614005.3	1.066783	461,996.00	1.066783	133	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	128285.9	2.765667	90,432.00	2.76565	142	50 - 150	0.0000	+/-0.50	
M6PFDA	820836.1	3.779433	679,406.00	3.779417	121	50 - 150	0.0000	+/-0.50	
M3PFBS	159230.2	1.853533	113,187.00	1.853533	141	50 - 150	0.0000	+/-0.50	
M7PFUnA	861957	3.914083	781,940.00	3.914067	110	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	58345.4	3.420517	87,113.00	3.4205	67	50 - 150	0.0000	+/-0.50	
M5PFPeA	514616.8	1.68175	354,541.00	1.681733	145	50 - 150	0.0000	+/-0.50	
M5PFHxA	928508.5	2.50665	712,368.00	2.51485	130	50 - 150	-0.0082	+/-0.50	
M3PFHxS	148023.3	3.185733	116,118.00	3.185733	127	50 - 150	0.0000	+/-0.50	
M4PFHpA	1085199	3.146567	866,308.00	3.14655	125	50 - 150	0.0000	+/-0.50	
M8PFOA	1023231	3.429867	798,016.00	3.437833	128	50 - 150	-0.0080	+/-0.50	
M8PFOS	138029.9	3.628217	103,021.00	3.6282	134	50 - 150	0.0000	+/-0.50	
M9PFNA	757147.7	3.62925	651,283.00	3.629233	116	50 - 150	0.0000	+/-0.50	
MPFDoA	908053.9	4.040717	828,207.00	4.048683	110	50 - 150	-0.0080	+/-0.50	
D5-NEtFOSAA	188972.2	3.92155	202,178.00	3.921533	93	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	241863.4	3.849733	260,668.00	3.8497	93	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Blank (B322381-BLK1)			Lab File ID: B322381-BLK1.d			Analyzed: 11/28/22 18:39			
M8FOSA	327682.6	3.980567	328,882.00	3.988583	100	50 - 150	-0.0080	+/-0.50	
M2-4:2FTS	123008.9	2.431	117,202.00	2.431017	105	50 - 150	0.0000	+/-0.50	
M2PFTA	1036314	4.281116	1,179,309.00	4.281133	88	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	213718.8	3.778883	161,607.00	3.7789	132	50 - 150	0.0000	+/-0.50	
MPFBA	640084.6	1.066783	461,996.00	1.066783	139	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	124872.4	2.76565	90,432.00	2.76565	138	50 - 150	0.0000	+/-0.50	
M6PFDA	785956.9	3.7794	679,406.00	3.779417	116	50 - 150	0.0000	+/-0.50	
M3PFBS	141403.6	1.853533	113,187.00	1.853533	125	50 - 150	0.0000	+/-0.50	
M7PFUnA	855436	3.91405	781,940.00	3.914067	109	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	87708.57	3.4205	87,113.00	3.4205	101	50 - 150	0.0000	+/-0.50	
M5PFPeA	485757.3	1.681733	354,541.00	1.681733	137	50 - 150	0.0000	+/-0.50	
M5PFHxA	875016.8	2.506633	712,368.00	2.51485	123	50 - 150	-0.0082	+/-0.50	
M3PFHxS	134172.3	3.185733	116,118.00	3.185733	116	50 - 150	0.0000	+/-0.50	
M4PFHpA	1038696	3.14655	866,308.00	3.14655	120	50 - 150	0.0000	+/-0.50	
M8PFOA	994655.4	3.437833	798,016.00	3.437833	125	50 - 150	0.0000	+/-0.50	
M8PFOS	131467.9	3.6282	103,021.00	3.6282	128	50 - 150	0.0000	+/-0.50	
M9PFNA	760895.7	3.629233	651,283.00	3.629233	117	50 - 150	0.0000	+/-0.50	
MPFDoA	776765.3	4.048666	828,207.00	4.048683	94	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	227692.7	3.921517	202,178.00	3.921533	113	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	282951.8	3.8497	260,668.00	3.8497	109	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
LCS (B322381-BS1)			Lab File ID: B322381-BS1.d			Analyzed: 11/28/22 18:25			
M8FOSA	303792.5	3.988583	328,882.00	3.988583	92	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	129389	2.431	117,202.00	2.431017	110	50 - 150	0.0000	+/-0.50	
M2PFTA	1075708	4.281133	1,179,309.00	4.281133	91	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	225421.6	3.7789	161,607.00	3.7789	139	50 - 150	0.0000	+/-0.50	
MPFBA	609775.7	1.066783	461,996.00	1.066783	132	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	112294.9	2.76565	90,432.00	2.76565	124	50 - 150	0.0000	+/-0.50	
M6PFDA	745575.6	3.779417	679,406.00	3.779417	110	50 - 150	0.0000	+/-0.50	
M3PFBS	139820.6	1.853533	113,187.00	1.853533	124	50 - 150	0.0000	+/-0.50	
M7PFUnA	808818.3	3.914067	781,940.00	3.914067	103	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	92444.56	3.4205	87,113.00	3.4205	106	50 - 150	0.0000	+/-0.50	
M5PFPeA	463675.7	1.681733	354,541.00	1.681733	131	50 - 150	0.0000	+/-0.50	
M5PFHxA	839131.6	2.51485	712,368.00	2.51485	118	50 - 150	0.0000	+/-0.50	
M3PFHxS	133559.5	3.185733	116,118.00	3.185733	115	50 - 150	0.0000	+/-0.50	
M4PFHpA	1002382	3.14655	866,308.00	3.14655	116	50 - 150	0.0000	+/-0.50	
M8PFOA	965265.6	3.43785	798,016.00	3.437833	121	50 - 150	0.0000	+/-0.50	
M8PFOS	120615.2	3.6282	103,021.00	3.6282	117	50 - 150	0.0000	+/-0.50	
M9PFNA	726495.6	3.629233	651,283.00	3.629233	112	50 - 150	0.0000	+/-0.50	
MPFDoA	773426.5	4.048683	828,207.00	4.048683	93	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	218358.3	3.921533	202,178.00	3.921533	108	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	265674.6	3.8497	260,668.00	3.8497	102	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
LCS Dup (B322381-BSD1)			Lab File ID: B322381-BSD1.d			Analyzed: 11/28/22 18:32			
M8FOSA	335939.3	3.988567	328,882.00	3.988583	102	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	143174.4	2.431	117,202.00	2.431017	122	50 - 150	0.0000	+/-0.50	
M2PFTA	1237590	4.281116	1,179,309.00	4.281133	105	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	242824.8	3.778883	161,607.00	3.7789	150	50 - 150	0.0000	+/-0.50	
MPFBA	686158.6	1.066783	461,996.00	1.066783	149	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	130138.3	2.76565	90,432.00	2.76565	144	50 - 150	0.0000	+/-0.50	
M6PFDA	862935.7	3.779417	679,406.00	3.779417	127	50 - 150	0.0000	+/-0.50	
M3PFBS	157166.7	1.853533	113,187.00	1.853533	139	50 - 150	0.0000	+/-0.50	
M7PFUnA	904418.6	3.91405	781,940.00	3.914067	116	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	109576.9	3.4205	87,113.00	3.4205	126	50 - 150	0.0000	+/-0.50	
M5PFPeA	525167.8	1.681733	354,541.00	1.681733	148	50 - 150	0.0000	+/-0.50	
M5PFHxA	943271.6	2.506633	712,368.00	2.51485	132	50 - 150	-0.0082	+/-0.50	
M3PFHxS	151715.2	3.185733	116,118.00	3.185733	131	50 - 150	0.0000	+/-0.50	
M4PFHpA	1134506	3.14655	866,308.00	3.14655	131	50 - 150	0.0000	+/-0.50	
M8PFOA	1064475	3.437833	798,016.00	3.437833	133	50 - 150	0.0000	+/-0.50	
M8PFOS	142346.7	3.6282	103,021.00	3.6282	138	50 - 150	0.0000	+/-0.50	
M9PFNA	799708.6	3.629233	651,283.00	3.629233	123	50 - 150	0.0000	+/-0.50	
MPFDoA	896311.8	4.048666	828,207.00	4.048683	108	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	236656.7	3.921533	202,178.00	3.921533	117	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	302129.6	3.8497	260,668.00	3.8497	116	50 - 150	0.0000	+/-0.50	

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SOP-454 PFAS in Water	
Perfluorobutanoic acid (PFBA)	NH-P
Perfluorobutanesulfonic acid (PFBS)	NH-P
Perfluoropentanoic acid (PFPeA)	NH-P
Perfluorohexanoic acid (PFHxA)	NH-P
11Cl-PF3OUdS (F53B Major)	NH-P
9Cl-PF3ONS (F53B Minor)	NH-P
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	NH-P
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NH-P
8:2 Fluorotelomersulfonic acid (8:2FTS A)	NH-P
Perfluorodecanoic acid (PFDA)	NH-P
Perfluorododecanoic acid (PFDoA)	NH-P
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	NH-P
Perfluoroheptanesulfonic acid (PFHpS)	NH-P
N-EtFOSAA (NEtFOSAA)	NH-P
N-MeFOSAA (NMeFOSAA)	NH-P
Perfluorotetradecanoic acid (PFTA)	NH-P
Perfluorotridecanoic acid (PFTrDA)	NH-P
4:2 Fluorotelomersulfonic acid (4:2FTS A)	NH-P
Perfluorodecanesulfonic acid (PFDS)	NH-P
Perfluorooctanesulfonamide (FOSA)	NH-P
Perfluorononanesulfonic acid (PFNS)	NH-P
Perfluoro-1-hexanesulfonamide (FHxSA)	NH-P
Perfluoro-1-butanesulfonamide (FBSA)	NH-P
Perfluorohexanesulfonic acid (PFHxS)	NH-P
Perfluoro-4-oxapentanoic acid (PFMPA)	NH-P
Perfluoro-5-oxahexanoic acid (PFMBA)	NH-P
6:2 Fluorotelomersulfonic acid (6:2FTS A)	NH-P
Perfluoropetanesulfonic acid (PFPeS)	NH-P
Perfluoroundecanoic acid (PFUnA)	NH-P
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	NH-P
Perfluoroheptanoic acid (PFHpA)	NH-P
Perfluorooctanoic acid (PFOA)	NH-P
Perfluorooctanesulfonic acid (PFOS)	NH-P
Perfluorononanoic acid (PFNA)	NH-P

Con-Test, a Pace Environmental Laboratory, operates under the following certifications and accreditations:

Code	Description	Number	Expires
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2023

Pace Analytical®

22K07796

Phone: 413-525-2332
Fax: 413-525-6405
Access COC's and Support Requests

http://www.pacelabs.com

CHAIN OF CUSTODY RECORD

39 Spruce Street
East Longmeadow, MA 01028

Doc # 381 Rev 5_07/13/2021

Page 1 of 1

Company Name:	Horsley Witten Group
Address:	90 Route 6A
Phone:	508-833-6600
Project Name:	Barn II VA
Project Location:	Hyannis MA
Project Number:	22071
Project Manager:	Bryan Massa
Pace Quote Name/Number:	
Invoice Recipient:	
Sampled By:	Sarah Bertle Brandt + Caroline

Requested Turnaround Time

7-Day ☐ 10-Day ☐
PFAS 10-Day (std) ☑ Due Date:

Rush/Approval Required

1-Day ☐ 3-Day ☐
2-Day ☐ 4-Day ☐

Data Delivery

Format: PDF ☑ EXCEL ☑
Other:
CLP Like Data Pkg Required: ☐
Email To: bmassa@horsleywitten.com
Fax To #:

Dissolved Metals Samples

○ Field Filtered
○ Lab to Filter

Orthophosphate Samples

○ Field Filtered
○ Lab to Filter

PCB ONLY

SOXHLET ☐
NON SOXHLET ☐

ANALYSIS REQUESTED

Pace Work Order#	Client Sample ID / Description	Beginning Date/Time	Ending Date/Time	COMP/GRAB	[1]Matrix Code	Conc Code	VIALS	GLASS	PLASTIC	BACTERIA	ENCORE	PFAS (ISOPREP diluted)
1	HW-I(s)	10/31/22	11:45	Grab	GW				X			X
2	HW-I(m)	10/31/22	12:30	Grab	GW				X			X
3	HW-I(d)	10/31/22	13:30	Grab	GW				X			X
4	HW-3	10/31/22	11:45	Grab	GW				X			X
5	HW-P(s)	11/2/22	12:10	Grab	GW				X			X
6	HW-P(m)	11/2/22	11:45	Grab	GW				X			X

[2] Preservation Code

Courier Use Only
Total Number Of:
VIALS
GLASS
PLASTIC
BACTERIA
ENCORE

Glassware in the fridge? (Y) N
Glassware in freezer? Y / N
Prepackaged Cooler? (Y) N

*Pace Analytical is not responsible for missing samples from prepacked coolers

[1] Matrix Codes:
GW = Ground Water
WW = Waste Water
DW = Drinking Water
A = Air
S = Soil
SL = Sludge
SOL = Solid
O = Other (please define)

[2] Preservation Codes:
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium Bisulfate
X = Sodium Hydroxide
T = Sodium Thiosulfate
O = Other (please define)

Relinquished by: (signature)	Date/Time: 11/3/22 1030
Received by: (signature)	Date/Time: 11/3/22 1030
Relinquished by: (signature)	Date/Time: 11/3/22 1620
Received by: (signature)	Date/Time: 11/3/22 1620
Relinquished by: (signature)	Date/Time:
Received by: (signature)	Date/Time:
Relinquished by: (signature)	Date/Time:
Received by: (signature)	Date/Time:

Client Comments:

Detection Limit Requirements

#1: GW-1
#2:
#3:
Other:

Special Requirements

☑ MA MCP Required
MCP Certification Form Required
☐ CT RCP Required
RCP Certification Form Required
☐ MA State DW Required
PWSID #

Please use the following codes to indicate possible sample concentration within the Conc Code column above:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

NELAC and AIHA-LAP, LLC Accredited

Project Entity

Government	☐	Municipality	☐	MWRA	☐
Federal	☐	21 J	☐	School	☐
City	☐	Brownfield	☐	MBTA	☐
WRTA	☐				

Other
☐ Chromatogram
☐ AIHA-LAP,LLC

Lab Comments:

Disclaimer: Pace Analytical is not responsible for any omitted information on the Chain of Custody. The Chain of Custody is a legal document that must be complete and accurate and is used to determine what analyses the laboratory will perform. Any missing information is not the laboratory's responsibility. Pace Analytical values your partnership on each project and will try to assist with missing information, but will not be held accountable.

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39 Spruce St.
East Longmeadow, MA. 01028
P: 413-525-2332
F: 413-525-6405
www.pacelabs.com

Pace PEOPLE ADVANCING SCIENCE

Doc# 277 Rev 6 July 2022

Login Sample Receipt Checklist - (Rejection Criteria Listing - Using Acceptance Policy) Any False Statement will be brought to the attention of the Client - State True or False

Client Horsley Witten

Received By [illegible] Date 11/3/22 Time 1620

How were the samples received? In Cooler T No Cooler ____ On Ice T No Ice ____

Direct From Sample ____ Ambient ____ Melted Ice ____

Were samples within Tempurature? Within 2-6°C T By Gun # 2 Actual Temp - 1.5

By Blank # ____ Actual Temp - ____

Was Custody Seal In tact? NA Were Samples Tampered with? NA

Was COC Relinquished ? T Does Chain Agree With Samples? T

Are there broken/leaking/loose caps on any samples? F

Is COC in ink/ Legible? T Were samples received within holding time? T

Did COC include all pertinent Information? Client? T Analysis? T Sampler Name? T

Project? T ID's? T Collection Dates/Times? T

Are Sample labels filled out and legible? T

Are there Lab to Filters? F Who was notified? ____

Are there Rushes? F Who was notified? ____

Are there Short Holds? F Who was notified? ____

Samples are received within holding time? T Is there enough Volume? T

Is there Headspace where applicable? NA MS/MSD? F

Proper Media/Containers Used? T splitting samples require F

Were trip blanks receive F On COC? F

Do All Samples Have the proper pH? NA Acid ____ Base ____

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic	12	4oz Amb/Clear	
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear	
DI-		Other Plastic		Other Glass		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Unused Media

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic		4oz Amb/Clear	
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear	
DI-		Other Plastic		Other Glass		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Comments:

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

March 7, 2023

Bryan Massa
Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563

Project Location: Hyannis, MA
Client Job Number:
Project Number: [none]
Laboratory Work Order Number: 23B0625

Enclosed are results of analyses for samples as received by the laboratory on February 3, 2023. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Kaitlyn A. Feliciano
Project Manager

Table of Contents

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563
ATTN: Bryan Massa

REPORT DATE: 3/7/2023

PURCHASE ORDER NUMBER:

PROJECT NUMBER: [none]

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 23B0625

The results of analyses performed on the following samples submitted to CON-TEST, a Pace Analytical Laboratory, are found in this report.

PROJECT LOCATION: Hyannis, MA

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
HW-I (S)	23B0625-01	Ground Water		SOP-454 PFAS	
HW-P (S)	23B0625-02	Ground Water		SOP-454 PFAS	

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CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Qualifications:

PF-17

Extracted Internal Standard recovery is outside of control limits. Data is not significantly affected since associated analyte is not detected and bias is on the high side.

Analyte & Samples(s) Qualified:

M3HFPO-DA
S083860-IBL1

PF-18

Duplicate analysis confirmed Extracted Internal Standard failure due to matrix effects.

Analyte & Samples(s) Qualified:

M2-4:2FTS
23B0625-01[HW-I (S)]

M2-8:2FTS
23B0625-01[HW-I (S)]

PF-19

Sample re-analyzed at a dilution that was re-fortified with internal standard.

Analyte & Samples(s) Qualified:

6:2 Fluorotelomersulfonic acid (6:2FTS A)
23B0625-01RE2[HW-I (S)]

S-29

Extracted Internal Standard is outside of control limits.

Analyte & Samples(s) Qualified:

D3-NMeFOSAA
23B0625-01[HW-I (S)]

D5-NEtFOSAA
23B0625-01[HW-I (S)]

M2-4:2FTS
S083860-CCV3

M2-6:2FTS
S084026-CCV1

M2PFTA
23B0625-01[HW-I (S)]

M6PFDA
23B0625-01[HW-I (S)]

M7PFUnA
23B0625-01[HW-I (S)]

M8FOSA
23B0625-01[HW-I (S)]

MPFDoA
23B0625-01[HW-I (S)]

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

V-26

Opening calibration verification was within control criteria. Closing calibration verification was outside of criteria and biased on the low side. Re-analysis yielded similar non-conformance, matrix interference confirmed.

Analyte & Samples(s) Qualified:

D3-NMeFOSAA
S084023-CCV5

D5-NEtFOSAA
S084023-CCV5

M2-4:2FTS
S084023-CCV5

M2-6:2FTS
S084023-CCV5

M2-8:2FTS
S084023-CCV5

M2PFTA
S084023-CCV5

M8FOSA
S084023-CCV5

Perfluoro-1-hexanesulfonamide (FHxSA)
S084023-CCV5

V-32

Opening calibration verification was within control criteria. Closing calibration verification was outside of criteria and biased on the high side. Re-analysis yielded similar non-conformance, matrix interference confirmed.

Analyte & Samples(s) Qualified:

9Cl-PF3ONS (F53B Minor)
S084023-CCV5

The results of analyses reported only relate to samples submitted to Con-Test, a Pace Analytical Laboratory, for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Lisa A. Worthington
Technical Representative

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Hyannis, MA | Sample Description: | Work Order: 23B0625

Date Received: 2/3/2023

Field Sample #: HW-I (S) | Sampled: 2/2/2023 12:30

Sample ID: 23B0625-01

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	17	1.8	0.65	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
Perfluorobutanesulfonic acid (PFBS)	ND	1.8	0.65	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
Perfluoropentanoic acid (PFPeA)	55	1.8	0.70	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
Perfluorohexanoic acid (PFHxA)	31	1.8	0.72	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
11Cl-PF3OUdS (F53B Major)	ND	1.8	0.66	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
9Cl-PF3ONS (F53B Minor)	ND	1.8	0.65	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.8	0.91	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.8	0.52	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
8:2 Fluorotelomersulfonic acid (8:2FTS A)	1.6	1.8	0.84	ng/L	1	J	SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
Perfluorodecanoic acid (PFDA)	ND	1.8	0.73	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
Perfluorododecanoic acid (PFDoA)	ND	1.8	0.81	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.8	0.64	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
Perfluoroheptanesulfonic acid (PFHpS)	4.1	1.8	0.72	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
N-EtFOSAA (NEtFOSAA)	ND	1.8	0.70	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
N-MeFOSAA (NMeFOSAA)	ND	1.8	0.92	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
Perfluorotetradecanoic acid (PFTA)	ND	1.8	0.84	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
Perfluorotridecanoic acid (PFTrDA)	ND	1.8	0.73	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.8	0.68	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
Perfluorodecanesulfonic acid (PFDS)	ND	1.8	0.91	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
Perfluorooctanesulfonamide (FOSA)	ND	1.8	0.89	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
Perfluorononanesulfonic acid (PFNS)	ND	1.8	0.90	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
Perfluoro-1-hexanesulfonamide (FHxSA)	2.8	1.8	0.92	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
Perfluoro-1-butanesulfonamide (FBSA)	ND	1.8	0.68	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
Perfluorohexanesulfonic acid (PFHxS)	11	1.8	0.63	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.8	0.63	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.8	0.57	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
6:2 Fluorotelomersulfonic acid (6:2FTS A)	480	18	11	ng/L	10	PF-19	SOP-454 PFAS	2/7/23	3/1/23 18:22	RRB
Perfluoropetanesulfonic acid (PFPeS)	0.79	1.8	0.67	ng/L	1	J	SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
Perfluoroundecanoic acid (PFUnA)	ND	1.8	0.75	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.8	0.68	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
Perfluoroheptanoic acid (PFHpA)	21	1.8	0.74	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
Perfluorooctanoic acid (PFOA)	16	1.8	1.2	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
Perfluorooctanesulfonic acid (PFOS)	24	1.8	0.75	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW
Perfluorononanoic acid (PFNA)	28	1.8	0.81	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:41	QNW

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Project Location: Hyannis, MA | Sample Description: | Work Order: 23B0625

Date Received: 2/3/2023

Field Sample #: HW-P (S) | Sampled: 2/2/2023 13:40

Sample ID: 23B0625-02

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	11	1.8	0.67	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
Perfluorobutanesulfonic acid (PFBS)	ND	1.8	0.66	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
Perfluoropentanoic acid (PFPeA)	29	1.8	0.71	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
Perfluorohexanoic acid (PFHxA)	16	1.8	0.73	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
11Cl-PF3OUdS (F53B Major)	ND	1.8	0.68	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
9Cl-PF3ONS (F53B Minor)	ND	1.8	0.66	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.8	0.93	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.8	0.53	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
8:2 Fluorotelomersulfonic acid (8:2FTS A)	1.3	1.8	0.86	ng/L	1	J	SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
Perfluorodecanoic acid (PFDA)	ND	1.8	0.74	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
Perfluorododecanoic acid (PFDoA)	ND	1.8	0.83	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.8	0.66	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
Perfluoroheptanesulfonic acid (PFHpS)	ND	1.8	0.73	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
N-EtFOSAA (NEtFOSAA)	ND	1.8	0.72	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
N-MeFOSAA (NMeFOSAA)	ND	1.8	0.94	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
Perfluorotetradecanoic acid (PFTA)	ND	1.8	0.85	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
Perfluorotridecanoic acid (PFTrDA)	ND	1.8	0.74	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.8	0.69	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
Perfluorodecanesulfonic acid (PFDS)	ND	1.8	0.93	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
Perfluorooctanesulfonamide (FOSA)	ND	1.8	0.91	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
Perfluorononanesulfonic acid (PFNS)	ND	1.8	0.92	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	1.8	0.94	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
Perfluoro-1-butanesulfonamide (FBSA)	ND	1.8	0.70	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
Perfluorohexanesulfonic acid (PFHxS)	2.2	1.8	0.64	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.8	0.64	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.8	0.58	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
6:2 Fluorotelomersulfonic acid (6:2FTS A)	19	1.8	1.1	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
Perfluoropetanesulfonic acid (PFPeS)	ND	1.8	0.68	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
Perfluoroundecanoic acid (PFUnA)	ND	1.8	0.77	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.8	0.70	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
Perfluoroheptanoic acid (PFHpA)	12	1.8	0.76	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
Perfluorooctanoic acid (PFOA)	14	1.8	1.2	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
Perfluorooctanesulfonic acid (PFOS)	3.7	1.8	0.76	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW
Perfluorononanoic acid (PFNA)	15	1.8	0.83	ng/L	1		SOP-454 PFAS	2/7/23	2/21/23 20:49	QNW

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Sample Extraction Data

Prep Method: SOP 454-PFAAS **Analytical Method: SOP-454 PFAS**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
23B0625-01 [HW-I (S)]	B330793	285	1.00	02/07/23
23B0625-01RE2 [HW-I (S)]	B330793	285	1.00	02/07/23
23B0625-02 [HW-P (S)]	B330793	279	1.00	02/07/23

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QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B330793 - SOP 454-PFAAS										
Blank (B330793-BLK1)				Prepared: 02/07/23 Analyzed: 02/21/23						
Perfluorobutanoic acid (PFBA)	ND	1.8	ng/L							
Perfluorobutanesulfonic acid (PFBS)	ND	1.8	ng/L							
Perfluoropentanoic acid (PFPeA)	ND	1.8	ng/L							
Perfluorohexanoic acid (PFHxA)	ND	1.8	ng/L							
11Cl-PF3OUdS (F53B Major)	ND	1.8	ng/L							
9Cl-PF3ONS (F53B Minor)	ND	1.8	ng/L							
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.8	ng/L							
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.8	ng/L							
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	1.8	ng/L							
Perfluorodecanoic acid (PFDA)	ND	1.8	ng/L							
Perfluorododecanoic acid (PFDoA)	ND	1.8	ng/L							
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.8	ng/L							
Perfluoroheptanesulfonic acid (PFHpS)	ND	1.8	ng/L							
N-EtFOSAA (NEtFOSAA)	ND	1.8	ng/L							
N-MeFOSAA (NMeFOSAA)	ND	1.8	ng/L							
Perfluorotetradecanoic acid (PFTA)	ND	1.8	ng/L							
Perfluorotridecanoic acid (PFTrDA)	ND	1.8	ng/L							
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.8	ng/L							
Perfluorodecanesulfonic acid (PFDS)	ND	1.8	ng/L							
Perfluorooctanesulfonamide (FOSA)	ND	1.8	ng/L							
Perfluorononanesulfonic acid (PFNS)	ND	1.8	ng/L							
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	1.8	ng/L							
Perfluoro-1-butanesulfonamide (FBSA)	ND	1.8	ng/L							
Perfluorohexanesulfonic acid (PFHxS)	ND	1.8	ng/L							
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.8	ng/L							
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.8	ng/L							
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	1.8	ng/L							
Perfluoropetanesulfonic acid (PFPeS)	ND	1.8	ng/L							
Perfluoroundecanoic acid (PFUnA)	ND	1.8	ng/L							
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.8	ng/L							
Perfluoroheptanoic acid (PFHpA)	ND	1.8	ng/L							
Perfluorooctanoic acid (PFOA)	ND	1.8	ng/L							
Perfluorooctanesulfonic acid (PFOS)	ND	1.8	ng/L							
Perfluorononanoic acid (PFNA)	ND	1.8	ng/L							
LCS (B330793-BS1)				Prepared: 02/07/23 Analyzed: 02/21/23						
Perfluorobutanoic acid (PFBA)	9.60	1.9	ng/L	9.67		99.2	73-129			
Perfluorobutanesulfonic acid (PFBS)	8.60	1.9	ng/L	8.56		100	72-130			
Perfluoropentanoic acid (PFPeA)	9.65	1.9	ng/L	9.67		99.8	72-129			
Perfluorohexanoic acid (PFHxA)	9.52	1.9	ng/L	9.67		98.4	72-129			
11Cl-PF3OUdS (F53B Major)	7.53	1.9	ng/L	9.11		82.7	55.1-141			
9Cl-PF3ONS (F53B Minor)	8.04	1.9	ng/L	9.02		89.2	59.6-146			
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	8.67	1.9	ng/L	9.11		95.1	60.3-131			
Hexafluoropropylene oxide dimer acid (HFPO-DA)	8.99	1.9	ng/L	9.67		93.0	37.6-167			
8:2 Fluorotelomersulfonic acid (8:2FTS A)	11.0	1.9	ng/L	9.29		119	67-138			
Perfluorodecanoic acid (PFDA)	10.4	1.9	ng/L	9.67		107	71-129			
Perfluorododecanoic acid (PFDoA)	10.2	1.9	ng/L	9.67		105	72-134			
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	8.37	1.9	ng/L	8.61		97.2	49.4-154			

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QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B330793 - SOP 454-PFAAS										
LCS (B330793-BS1)				Prepared: 02/07/23 Analyzed: 02/21/23						
Perfluoroheptanesulfonic acid (PFHpS)	8.54	1.9	ng/L	9.24		92.4	69-134			
N-EtFOSAA (NEtFOSAA)	12.0	1.9	ng/L	9.67		124	61-135			
N-MeFOSAA (NMeFOSAA)	10.3	1.9	ng/L	9.67		106	65-136			
Perfluorotetradecanoic acid (PFTA)	9.45	1.9	ng/L	9.67		97.7	71-132			
Perfluorotridecanoic acid (PFTrDA)	11.2	1.9	ng/L	9.67		116	65-144			
4:2 Fluorotelomersulfonic acid (4:2FTS A)	8.91	1.9	ng/L	9.04		98.5	63-143			
Perfluorodecanesulfonic acid (PFDS)	8.90	1.9	ng/L	9.33		95.3	53-142			
Perfluorooctanesulfonamide (FOSA)	9.25	1.9	ng/L	9.67		95.6	67-137			
Perfluorononanesulfonic acid (PFNS)	11.4	1.9	ng/L	9.29		123	69-127			
Perfluoro-1-hexanesulfonamide (FHxSA)	9.45	1.9	ng/L	9.67		97.7	61.7-156			
Perfluoro-1-butanesulfonamide (FBSA)	8.74	1.9	ng/L	9.67		90.4	61.3-145			
Perfluorohexanesulfonic acid (PFHxS)	9.41	1.9	ng/L	8.85		106	68-131			
Perfluoro-4-oxapentanoic acid (PFMPA)	9.89	1.9	ng/L	9.67		102	59.8-147			
Perfluoro-5-oxahexanoic acid (PFMBA)	9.97	1.9	ng/L	9.67		103	59.5-146			
6:2 Fluorotelomersulfonic acid (6:2FTS A)	9.93	1.9	ng/L	9.19		108	64-140			
Perfluoropetanesulfonic acid (PFPeS)	9.58	1.9	ng/L	9.09		105	71-127			
Perfluoroundecanoic acid (PFUnA)	11.3	1.9	ng/L	9.67		117	69-133			
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	10.3	1.9	ng/L	9.67		107	58.5-143			
Perfluoroheptanoic acid (PFHpA)	9.41	1.9	ng/L	9.67		97.2	72-130			
Perfluorooctanoic acid (PFOA)	8.85	1.9	ng/L	9.67		91.5	71-133			
Perfluorooctanesulfonic acid (PFOS)	8.76	1.9	ng/L	8.95		97.9	65-140			
Perfluorononanoic acid (PFNA)	10.3	1.9	ng/L	9.67		106	69-130			

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit is at the level of quantitation (LOQ)
DL	Detection Limit is the lower limit of detection determined by the MDL study
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
J	Detected but below the Reporting Limit (lowest calibration standard); therefore, result is an estimated concentration (CLP J-Flag).
PF-17	Extracted Internal Standard recovery is outside of control limits. Data is not significantly affected since associated analyte is not detected and bias is on the high side.
PF-18	Duplicate analysis confirmed Extracted Internal Standard failure due to matrix effects.
PF-19	Sample re-analyzed at a dilution that was re-fortified with internal standard.
S-29	Extracted Internal Standard is outside of control limits.
V-26	Opening calibration verification was within control criteria. Closing calibration verification was outside of criteria and biased on the low side. Re-analysis yielded similar non-conformance, matrix interference confirmed.
V-32	Opening calibration verification was within control criteria. Closing calibration verification was outside of criteria and biased on the high side. Re-analysis yielded similar non-conformance, matrix interference confirmed.

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
HW-I (S) (23B0625-01)			Lab File ID: 23B0625-01.d			Analyzed: 02/21/23 20:41			
M8FOSA	137446.9	4.076517	333,528.00	4.076533	41	50 - 150	0.0000	+/-0.50	*
M2-4:2FTS	41968.25	2.670733	137,596.00	2.670733	31	50 - 150	0.0000	+/-0.50	*
M2PFTA	5614.295	4.394683	874,363.00	4.3947	01	50 - 150	0.0000	+/-0.50	*
M2-8:2FTS	45050.18	3.86685	91,371.00	3.8751	49	50 - 150	-0.0083	+/-0.50	*
MPFBA	361554.4	1.149867	463,867.00	1.141567	78	50 - 150	0.0083	+/-0.50	
M3HFPO-DA	77226.93	2.97845	119,916.00	2.97845	64	50 - 150	0.0000	+/-0.50	
M6PFDA	246244.4	3.86735	605,719.00	3.867367	41	50 - 150	0.0000	+/-0.50	*
M3PFBS	95203.91	2.044233	131,474.00	2.044233	72	50 - 150	0.0000	+/-0.50	
M7PFUnA	162312.4	4.017983	639,020.00	4.018	25	50 - 150	0.0000	+/-0.50	*
M2-6:2FTS	78852.91	3.525617	63,587.00	3.525617	124	50 - 150	0.0000	+/-0.50	
M5PFPeA	286987.2	1.857667	382,657.00	1.857667	75	50 - 150	0.0000	+/-0.50	
M5PFHxA	459174.7	2.7636	653,228.00	2.755417	70	50 - 150	0.0082	+/-0.50	
M3PFHxS	70083.73	3.308383	118,783.00	3.308383	59	50 - 150	0.0000	+/-0.50	
M4PFHpA	447751.8	3.27725	725,238.00	3.27725	62	50 - 150	0.0000	+/-0.50	
M8PFOA	408659.9	3.534133	652,845.00	3.53415	63	50 - 150	0.0000	+/-0.50	
M8PFOS	54403.83	3.716267	99,916.00	3.716283	54	50 - 150	0.0000	+/-0.50	
M9PFNA	285192.1	3.717267	529,047.00	3.717283	54	50 - 150	0.0000	+/-0.50	
MPFDoA	62980.4	4.15315	660,611.00	4.153167	10	50 - 150	0.0000	+/-0.50	*
D5-NEtFOSAA	49361.19	4.025466	186,290.00	4.025483	26	50 - 150	0.0000	+/-0.50	*
D3-NMeFOSAA	65574.59	3.945883	234,402.00	3.9459	28	50 - 150	0.0000	+/-0.50	*
HW-I (S) (23B0625-01RE2)			Lab File ID: 23B0625-01RE2.d			Analyzed: 03/01/23 18:22			
M2-6:2FTS	68871.2	3.453267	81,394.00	3.453267	85	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
HW-P (S) (23B0625-02)			Lab File ID: 23B0625-02.d			Analyzed: 02/21/23 20:49			
M8FOSA	293015.9	4.076517	333,528.00	4.076533	88	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	72341.89	2.661333	137,596.00	2.670733	53	50 - 150	-0.0094	+/-0.50	
M2PFTA	665349.2	4.386567	874,363.00	4.3947	76	50 - 150	-0.0081	+/-0.50	
M2-8:2FTS	100098.4	3.866867	91,371.00	3.8751	110	50 - 150	-0.0082	+/-0.50	
MPFBA	505357.3	1.141567	463,867.00	1.141567	109	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	117095.8	2.970333	119,916.00	2.97845	98	50 - 150	-0.0081	+/-0.50	
M6PFDA	548101.2	3.867367	605,719.00	3.867367	90	50 - 150	0.0000	+/-0.50	
M3PFBS	135813.2	2.044217	131,474.00	2.044233	103	50 - 150	0.0000	+/-0.50	
M7PFUnA	590471.1	4.018	639,020.00	4.018	92	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	57200.61	3.517633	63,587.00	3.525617	90	50 - 150	-0.0080	+/-0.50	
M5PFPeA	397503	1.849383	382,657.00	1.857667	104	50 - 150	-0.0083	+/-0.50	
M5PFHxA	663463.4	2.755417	653,228.00	2.755417	102	50 - 150	0.0000	+/-0.50	
M3PFHxS	105013.1	3.30035	118,783.00	3.308383	88	50 - 150	-0.0080	+/-0.50	
M4PFHpA	662207.3	3.277267	725,238.00	3.27725	91	50 - 150	0.0000	+/-0.50	
M8PFOA	600771.9	3.53415	652,845.00	3.53415	92	50 - 150	0.0000	+/-0.50	
M8PFOS	108984.2	3.716283	99,916.00	3.716283	109	50 - 150	0.0000	+/-0.50	
M9PFNA	514606.8	3.717283	529,047.00	3.717283	97	50 - 150	0.0000	+/-0.50	
MPFDoA	515898	4.15315	660,611.00	4.153167	78	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	153671.6	4.025466	186,290.00	4.025483	82	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	151641.6	3.9459	234,402.00	3.9459	65	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Blank (B330793-BLK1)			Lab File ID: B330793-BLK1.d			Analyzed: 02/21/23 20:20			
M8FOSA	297854.5	4.0765	333,528.00	4.076533	89	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	71605.59	2.670733	137,596.00	2.670733	52	50 - 150	0.0000	+/-0.50	
M2PFTA	660430.9	4.394667	874,363.00	4.3947	76	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	122022.8	3.86685	91,371.00	3.8751	134	50 - 150	-0.0083	+/-0.50	
MPFBA	462768.8	1.141567	463,867.00	1.141567	100	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	111574.7	2.97845	119,916.00	2.97845	93	50 - 150	0.0000	+/-0.50	
M6PFDA	606835.9	3.867333	605,719.00	3.867367	100	50 - 150	0.0000	+/-0.50	
M3PFBS	125488.3	2.044217	131,474.00	2.044233	95	50 - 150	0.0000	+/-0.50	
M7PFUnA	581898.8	4.017983	639,020.00	4.018	91	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	52657.02	3.5256	63,587.00	3.525617	83	50 - 150	0.0000	+/-0.50	
M5PFPeA	377095.9	1.857667	382,657.00	1.857667	99	50 - 150	0.0000	+/-0.50	
M5PFHxA	630826.3	2.7636	653,228.00	2.755417	97	50 - 150	0.0082	+/-0.50	
M3PFHxS	98674.25	3.308383	118,783.00	3.308383	83	50 - 150	0.0000	+/-0.50	
M4PFHpA	639090.9	3.27725	725,238.00	3.27725	88	50 - 150	0.0000	+/-0.50	
M8PFOA	569103.1	3.534133	652,845.00	3.53415	87	50 - 150	0.0000	+/-0.50	
M8PFOS	100701.3	3.716267	99,916.00	3.716283	101	50 - 150	0.0000	+/-0.50	
M9PFNA	484720.4	3.71725	529,047.00	3.717283	92	50 - 150	0.0000	+/-0.50	
MPFDoA	583837.8	4.153133	660,611.00	4.153167	88	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	151892.4	4.02545	186,290.00	4.025483	82	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	201214.1	3.945883	234,402.00	3.9459	86	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
LCS (B330793-BS1)			Lab File ID: B330793-BS1.d			Analyzed: 02/21/23 20:12			
M8FOSA	300778.9	4.076533	333,528.00	4.076533	90	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	82358.86	2.67075	137,596.00	2.670733	60	50 - 150	0.0000	+/-0.50	
M2PFTA	712502.1	4.3947	874,363.00	4.3947	81	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	129772.1	3.8751	91,371.00	3.8751	142	50 - 150	0.0000	+/-0.50	
MPFBA	562243.8	1.149867	463,867.00	1.141567	121	50 - 150	0.0083	+/-0.50	
M3HFPO-DA	122203.8	2.978467	119,916.00	2.97845	102	50 - 150	0.0000	+/-0.50	
M6PFDA	635870.4	3.875633	605,719.00	3.867367	105	50 - 150	0.0083	+/-0.50	
M3PFBS	148790.6	2.044233	131,474.00	2.044233	113	50 - 150	0.0000	+/-0.50	
M7PFUnA	678273.8	4.018017	639,020.00	4.018	106	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	57729.82	3.52565	63,587.00	3.525617	91	50 - 150	0.0000	+/-0.50	
M5PFPeA	454205.7	1.857667	382,657.00	1.857667	119	50 - 150	0.0000	+/-0.50	
M5PFHxA	756008	2.763617	653,228.00	2.755417	116	50 - 150	0.0082	+/-0.50	
M3PFHxS	117208.6	3.308417	118,783.00	3.308383	99	50 - 150	0.0000	+/-0.50	
M4PFHpA	763989.4	3.277283	725,238.00	3.27725	105	50 - 150	0.0000	+/-0.50	
M8PFOA	682788.7	3.534167	652,845.00	3.53415	105	50 - 150	0.0000	+/-0.50	
M8PFOS	120823.6	3.7163	99,916.00	3.716283	121	50 - 150	0.0000	+/-0.50	
M9PFNA	569878.9	3.7173	529,047.00	3.717283	108	50 - 150	0.0000	+/-0.50	
MPFDoA	674170.4	4.153167	660,611.00	4.153167	102	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	185346.5	4.025483	186,290.00	4.025483	99	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	249412	3.945917	234,402.00	3.9459	106	50 - 150	0.0000	+/-0.50	

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SOP-454 PFAS in Water	
Perfluorobutanoic acid (PFBA)	NH-P
Perfluorobutanesulfonic acid (PFBS)	NH-P
Perfluoropentanoic acid (PFPeA)	NH-P
Perfluorohexanoic acid (PFHxA)	NH-P
11Cl-PF3OUdS (F53B Major)	NH-P
9Cl-PF3ONS (F53B Minor)	NH-P
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	NH-P
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NH-P
8:2 Fluorotelomersulfonic acid (8:2FTS A)	NH-P
Perfluorodecanoic acid (PFDA)	NH-P
Perfluorododecanoic acid (PFDoA)	NH-P
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	NH-P
Perfluoroheptanesulfonic acid (PFHpS)	NH-P
N-EtFOSAA (NEtFOSAA)	NH-P
N-MeFOSAA (NMeFOSAA)	NH-P
Perfluorotetradecanoic acid (PFTA)	NH-P
Perfluorotridecanoic acid (PFTrDA)	NH-P
4:2 Fluorotelomersulfonic acid (4:2FTS A)	NH-P
Perfluorodecanesulfonic acid (PFDS)	NH-P
Perfluorooctanesulfonamide (FOSA)	NH-P
Perfluorononanesulfonic acid (PFNS)	NH-P
Perfluoro-1-hexanesulfonamide (FHxSA)	NH-P
Perfluoro-1-butanesulfonamide (FBSA)	NH-P
Perfluorohexanesulfonic acid (PFHxS)	NH-P
Perfluoro-4-oxapentanoic acid (PFMPA)	NH-P
Perfluoro-5-oxahexanoic acid (PFMBA)	NH-P
6:2 Fluorotelomersulfonic acid (6:2FTS A)	NH-P
Perfluoropetanesulfonic acid (PFPeS)	NH-P
Perfluoroundecanoic acid (PFUnA)	NH-P
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	NH-P
Perfluoroheptanoic acid (PFHpA)	NH-P
Perfluorooctanoic acid (PFOA)	NH-P
Perfluorooctanesulfonic acid (PFOS)	NH-P
Perfluorononanoic acid (PFNA)	NH-P

Con-Test, a Pace Environmental Laboratory, operates under the following certifications and accreditations:

Code	Description	Number	Expires
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2023

23B0625 KAF

Pace Analytical®

Phone: 413-525-2332
Fax: 413-525-6405
Access COC's and Support Requests

http://www.pacelabs.com

CHAIN OF CUSTODY RECORD

39 Spruce Street
East Longmeadow, MA 01028

Doc # 381 Rev 5_07/13/2021

Company Name: Horsley Witten Group
Address: 90 Route 6A Sandwich MA
Phone: 508-833-6600
Project Name: HVIA
Project Location: Hyannis MA
Project Number:
Project Manager: Bryan Massa
Pace Quote Name/Number:
Invoice Recipient:
Sampled By: SB

Requested Turnaround Time
7-Day ☐ 10-Day ☐
PFAS 10-Day (std) ☑ Due Date:

Rush-Approval Required
1-Day ☐ 3-Day ☐
2-Day ☐ 4-Day ☐

Data Delivery
Format: PDF ☑ EXCEL ☑
Other:
CLP Like Data Pkg Required: ☐
Email To: bmassa@horsleywitten.com
Fax To #:

Dissolved Metals Samples
○ Field Filtered
○ Lab to Filter

Orthophosphate Samples
○ Field Filtered
○ Lab to Filter

PCB ONLY
SOXHLET ☐
NON SOXHLET ☐

ANALYSIS REQUESTED

Pace Work Order#	Client Sample ID / Description	Beginning Date/Time	Ending Date/Time	COMP/GRAB	¹Matrix Code	Conc Code	VIALS	GLASS	PLASTIC	BACTERIA	ENCORE	PFAS
1	HW-I(S)	2/2/23	12:30	Grab	GW				2			
2	HW-P(S)	2/2/23	13:40	Grab	GW				2			

² Preservation Code

Courier Use Only
Total Number Of:
VIALS
GLASS
PLASTIC 2
BACTERIA
ENCORE

Glassware in the fridge? (Y) N
Glassware in freezer? Y / N
Prepackaged Cooler? Y / N
*Pace Analytical is not responsible for missing samples from prepacked coolers

¹ Matrix Codes:
GW = Ground Water
WW = Waste Water
DW = Drinking Water
A = Air
S = Soil
SL = Sludge
SOL = Solid
O = Other (please define)

² Preservation Codes:
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium Bisulfate
X = Sodium Hydroxide
T = Sodium Thiosulfate
O = Other (please define)

Relinquished/Received	Date/Time
Relinquished by: (signature) [signature]	2/2/23 15:13
Received by: (signature) HW Cooler	2/2/23 15:13
Relinquished by: (signature) [signature]	2-3-23 1235
Received by: (signature) [signature]	2-3-23 1235
Relinquished by: (signature) [signature]	2-3-23 16
Received by: (signature) [signature] 4.7	2/3/23 1615
Relinquished by: (signature)	Date/Time:
Received by: (signature)	Date/Time:

Client Comments:

Detection Limit Requirements
MA: GW-1
CT:
Other:

Special Requirements
☑ MA MCP Required
MCP Certification Form Required
☐ CT RCP Required
RCP Certification Form Required
☐ MA State DW Required
PWSID #

Please use the following codes to indicate possible sample concentration within the Conc Code column above:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

NELAC and AIHA-LAP, LLC Accredited

Project Entity
Government ☐ Municipality ☐ MWRA ☐ WRTA ☐
Federal ☐ 21 J ☐ School ☐
City ☐ Brownfield ☐ MBTA ☐

Other
☐ Chromatogram
☐ AIHA-LAP,LLC

Lab Comments:

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39 Spruce St.
East Longmeadow, MA. 01028
P: 413-525-2332
F:413-525-6405
www.pacelabs.com

Log In Back-Sheet

Login Sample Receipt Checklist – (Rejection Criteria Listing – Using Acceptance Policy) Any False statement will be brought to the attention of the Client – True or False

Pace
PEOPLE ADVANCING SCIENCE

Client: Horsley Witten Group
Project: HVA
MCP/RCP Required: MA - MCP
Deliverable Package Requirement: GW-1
Location: Hyannis, MA
PWSID# (When Applicable): n/a
Arrival Method: Courier
Received By / Date / Time: ER 2/2/23 1615
Back-Sheet By / Date / Time: MKM 2/6/23 2218
Temperature Method: Gun # 3
Temp ≤ 6° C ☑ Actual Temperature: 4.7
Rush Samples: Yes / No: No Notify:
Short Hold: Yes / No: No Notify:

	True	False
Received on Ice	☑	☐
Received in Cooler	☑	☐
Custody Seal: DATE TIME	☐	☑
COC Relinquished	☑	☐
COC/Samples Labels Agree	☑	☐
All Samples in Good Condition	☑	☐
Samples Received within Holding Time	☑	☐
Is there enough Volume	☑	☐
Proper Media/Container Used	☑	☐
Splitting Samples Required	☐	☑
MS/MSD	☐	☑
Trip Blanks	☐	☑
Lab to Filters	☐	☑
COC Legible	☑	☐

Notes regarding Samples/COC outside of SOP:

COC Included: (Check all included)

Client ☑ Analysis ☑ Sampler Name ☑
Project ☑ IDs ☑ Collection Date/Time ☑

All Samples Proper PH n/a ☐ ☐

Container (Circle when applicable)	UnP	HCl	HNO3	H2SO4	NaOH	Trizma	NaS2O3	Other Preservative
1L Amber Plastic								
500 mL Amber Plastic								
250 mL Amber (Plastic)	4							
Other Amber Clear Plastic								
16oz Amber Clear								
8oz Amber Clear								
4oz Amber Clear								
2oz Amber Clear								
Col/Bacteria								
Flashpoint								
Plastic Bag								
SOC Kit								
Perchlorate								
Encore								
Frozen								

	Proper Headspace	UnP	HCl	MeOH	Bisulfate	DI	Thiosulfate	Sulfuric	Other
Vials									

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

March 7, 2023

Bryan Massa
Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563

Project Location: Hyannis, MA
Client Job Number:
Project Number: [none]
Laboratory Work Order Number: 23B0638

Enclosed are results of analyses for samples as received by the laboratory on February 3, 2023. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Kaitlyn A. Feliciano
Project Manager

Table of Contents

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563
ATTN: Bryan Massa

REPORT DATE: 3/7/2023

PURCHASE ORDER NUMBER:

PROJECT NUMBER: [none]

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 23B0638

The results of analyses performed on the following samples submitted to CON-TEST, a Pace Analytical Laboratory, are found in this report.

PROJECT LOCATION: Hyannis, MA

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
ME-1	23B0638-01	Ground Water		SOP-454 PFAS	
ME-3	23B0638-02	Ground Water		SOP-454 PFAS	
ME-2	23B0638-03	Ground Water		SOP-454 PFAS	

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CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

SOP-454 PFAS

Qualifications:

PF-17

Extracted Internal Standard recovery is outside of control limits. Data is not significantly affected since associated analyte is not detected and bias is on the high side.

Analyte & Samples(s) Qualified:

M3HFPO-DA
23B0638-01[ME-1], S083860-IBL1

PF-19

Sample re-analyzed at a dilution that was re-fortified with internal standard.

Analyte & Samples(s) Qualified:

6:2 Fluorotelomersulfonic acid (6:2FTS A)
23B0638-03RE1[ME-2]

PF-22

Qualifier ion ratio >150% of associated calibration. Detection is suspect.

Analyte & Samples(s) Qualified:

6:2 Fluorotelomersulfonic acid (6:2FTS A)
23B0638-01[ME-1]

Perfluorooctanesulfonamide (FOSA)
23B0638-02[ME-3]

S-29

Extracted Internal Standard is outside of control limits.

Analyte & Samples(s) Qualified:

M2-4:2FTS
23B0638-02[ME-3], S083860-CCV3

M2-6:2FTS
S084026-CCV1

M2PFTA
23B0638-01[ME-1]

V-05

Continuing calibration verification (CCV) did not meet method specifications and was biased on the low side for this compound.

Analyte & Samples(s) Qualified:

Perfluorodecanesulfonic acid (PFDS)
S083850-CCV2

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

The results of analyses reported only relate to samples submitted to Con-Test, a Pace Analytical Laboratory, for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Lisa A. Worthington
Technical Representative

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Hyannis, MA | Sample Description: | Work Order: 23B0638

Date Received: 2/3/2023

Field Sample #: ME-1 | Sampled: 2/2/2023 09:58

Sample ID: 23B0638-01

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	16	1.8	0.66	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
Perfluorobutanesulfonic acid (PFBS)	2.3	1.8	0.65	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
Perfluoropentanoic acid (PFPeA)	53	1.8	0.70	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
Perfluorohexanoic acid (PFHxA)	33	1.8	0.72	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
11Cl-PF3OUdS (F53B Major)	ND	1.8	0.67	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
9Cl-PF3ONS (F53B Minor)	ND	1.8	0.65	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.8	0.92	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.8	0.52	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	1.8	0.84	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
Perfluorodecanoic acid (PFDA)	ND	1.8	0.73	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
Perfluorododecanoic acid (PFDoA)	ND	1.8	0.82	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.8	0.65	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
Perfluoroheptanesulfonic acid (PFHpS)	1.5	1.8	0.72	ng/L	1	J	SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
N-EtFOSAA (NEtFOSAA)	ND	1.8	0.71	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
N-MeFOSAA (NMeFOSAA)	ND	1.8	0.92	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
Perfluorotetradecanoic acid (PFTA)	ND	1.8	0.84	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
Perfluorotridecanoic acid (PFTrDA)	ND	1.8	0.73	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.8	0.68	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
Perfluorodecanesulfonic acid (PFDS)	ND	1.8	0.91	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
Perfluorooctanesulfonamide (FOSA)	ND	1.8	0.90	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
Perfluorononanesulfonic acid (PFNS)	ND	1.8	0.90	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	1.8	0.93	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
Perfluoro-1-butanesulfonamide (FBSA)	1.4	1.8	0.69	ng/L	1	J	SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
Perfluorohexanesulfonic acid (PFHxS)	27	1.8	0.63	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.8	0.63	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.8	0.57	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
6:2 Fluorotelomersulfonic acid (6:2FTS A)	26	1.8	1.1	ng/L	1	PF-22	SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
Perfluoropetanesulfonic acid (PFPeS)	2.2	1.8	0.67	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
Perfluoroundecanoic acid (PFUnA)	ND	1.8	0.75	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.8	0.69	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
Perfluoroheptanoic acid (PFHpA)	15	1.8	0.74	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
Perfluorooctanoic acid (PFOA)	15	1.8	1.2	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
Perfluorooctanesulfonic acid (PFOS)	69	1.8	0.75	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW
Perfluorononanoic acid (PFNA)	9.8	1.8	0.81	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:52	QNW

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Project Location: Hyannis, MA | Sample Description: | Work Order: 23B0638

Date Received: 2/3/2023

Field Sample #: ME-3 | Sampled: 2/2/2023 10:15

Sample ID: 23B0638-02

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	8.9	1.8	0.67	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
Perfluorobutanesulfonic acid (PFBS)	2.6	1.8	0.66	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
Perfluoropentanoic acid (PFPeA)	26	1.8	0.71	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
Perfluorohexanoic acid (PFHxA)	19	1.8	0.73	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
11Cl-PF3OUdS (F53B Major)	ND	1.8	0.68	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
9Cl-PF3ONS (F53B Minor)	ND	1.8	0.66	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.8	0.93	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.8	0.53	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	1.8	0.86	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
Perfluorodecanoic acid (PFDA)	ND	1.8	0.74	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
Perfluorododecanoic acid (PFDoA)	ND	1.8	0.83	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.8	0.66	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
Perfluoroheptanesulfonic acid (PFHpS)	1.9	1.8	0.73	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
N-EtFOSAA (NEtFOSAA)	ND	1.8	0.72	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
N-MeFOSAA (NMeFOSAA)	ND	1.8	0.94	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
Perfluorotetradecanoic acid (PFTA)	ND	1.8	0.85	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
Perfluorotridecanoic acid (PFTrDA)	ND	1.8	0.74	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.8	0.69	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
Perfluorodecanesulfonic acid (PFDS)	ND	1.8	0.93	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
Perfluorooctanesulfonamide (FOSA)	3.6	1.8	0.91	ng/L	1	PF-22	SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
Perfluorononanesulfonic acid (PFNS)	ND	1.8	0.92	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
Perfluoro-1-hexanesulfonamide (FHxSA)	1.4	1.8	0.94	ng/L	1	J	SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
Perfluoro-1-butanesulfonamide (FBSA)	1.2	1.8	0.70	ng/L	1	J	SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
Perfluorohexanesulfonic acid (PFHxS)	32	1.8	0.64	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.8	0.64	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.8	0.58	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
6:2 Fluorotelomersulfonic acid (6:2FTS A)	4.0	1.8	1.1	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
Perfluoropetanesulfonic acid (PFPeS)	2.6	1.8	0.68	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
Perfluoroundecanoic acid (PFUnA)	ND	1.8	0.77	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.8	0.70	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
Perfluoroheptanoic acid (PFHpA)	8.7	1.8	0.76	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
Perfluorooctanoic acid (PFOA)	11	1.8	1.2	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
Perfluorooctanesulfonic acid (PFOS)	72	1.8	0.76	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW
Perfluorononanoic acid (PFNA)	6.3	1.8	0.83	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 19:59	QNW

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Project Location: Hyannis, MA | Sample Description: | Work Order: 23B0638

Date Received: 2/3/2023

Field Sample #: ME-2 | Sampled: 2/2/2023 10:30

Sample ID: 23B0638-03

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	23	1.8	0.67	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
Perfluorobutanesulfonic acid (PFBS)	4.6	1.8	0.67	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
Perfluoropentanoic acid (PFPeA)	79	1.8	0.72	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
Perfluorohexanoic acid (PFHxA)	56	1.8	0.74	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
11Cl-PF3OUdS (F53B Major)	ND	1.8	0.68	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
9Cl-PF3ONS (F53B Minor)	ND	1.8	0.67	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.8	0.94	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.8	0.53	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
8:2 Fluorotelomersulfonic acid (8:2FTS A)	12	1.8	0.86	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
Perfluorodecanoic acid (PFDA)	0.86	1.8	0.75	ng/L	1	J	SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
Perfluorododecanoic acid (PFDoA)	ND	1.8	0.83	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.8	0.66	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
Perfluoroheptanesulfonic acid (PFHpS)	4.8	1.8	0.74	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
N-EtFOSAA (NEtFOSAA)	ND	1.8	0.72	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
N-MeFOSAA (NMeFOSAA)	ND	1.8	0.94	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
Perfluorotetradecanoic acid (PFTA)	ND	1.8	0.86	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
Perfluorotridecanoic acid (PFTrDA)	ND	1.8	0.75	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.8	0.70	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
Perfluorodecanesulfonic acid (PFDS)	ND	1.8	0.93	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
Perfluorooctanesulfonamide (FOSA)	ND	1.8	0.92	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
Perfluorononanesulfonic acid (PFNS)	ND	1.8	0.92	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	1.8	0.95	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
Perfluoro-1-butanesulfonamide (FBSA)	3.7	1.8	0.70	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
Perfluorohexanesulfonic acid (PFHxS)	65	1.8	0.64	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.8	0.64	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.8	0.59	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
6:2 Fluorotelomersulfonic acid (6:2FTS A)	310	18	11	ng/L	10	PF-19	SOP-454 PFAS	2/7/23	3/1/23 18:29	RRB
Perfluoropetanesulfonic acid (PFPeS)	5.2	1.8	0.69	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
Perfluoroundecanoic acid (PFUnA)	ND	1.8	0.77	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.8	0.70	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
Perfluoroheptanoic acid (PFHpA)	27	1.8	0.76	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
Perfluorooctanoic acid (PFOA)	20	1.8	1.2	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
Perfluorooctanesulfonic acid (PFOS)	77	1.8	0.77	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW
Perfluorononanoic acid (PFNA)	14	1.8	0.83	ng/L	1		SOP-454 PFAS	2/7/23	2/23/23 20:06	QNW

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Sample Extraction Data

Prep Method: SOP 454-PFAAS **Analytical Method: SOP-454 PFAS**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
23B0638-01 [ME-1]	B330793	284	1.00	02/07/23
23B0638-02 [ME-3]	B330793	279	1.00	02/07/23
23B0638-03 [ME-2]	B330793	277	1.00	02/07/23
23B0638-03RE1 [ME-2]	B330793	277	1.00	02/07/23

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QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B330793 - SOP 454-PFAAS										
Blank (B330793-BLK1)				Prepared: 02/07/23 Analyzed: 02/21/23						
Perfluorobutanoic acid (PFBA)	ND	1.8	ng/L							
Perfluorobutanesulfonic acid (PFBS)	ND	1.8	ng/L							
Perfluoropentanoic acid (PFPeA)	ND	1.8	ng/L							
Perfluorohexanoic acid (PFHxA)	ND	1.8	ng/L							
11Cl-PF3OUdS (F53B Major)	ND	1.8	ng/L							
9Cl-PF3ONS (F53B Minor)	ND	1.8	ng/L							
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.8	ng/L							
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.8	ng/L							
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	1.8	ng/L							
Perfluorodecanoic acid (PFDA)	ND	1.8	ng/L							
Perfluorododecanoic acid (PFDoA)	ND	1.8	ng/L							
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.8	ng/L							
Perfluoroheptanesulfonic acid (PFHpS)	ND	1.8	ng/L							
N-EtFOSAA (NEtFOSAA)	ND	1.8	ng/L							
N-MeFOSAA (NMeFOSAA)	ND	1.8	ng/L							
Perfluorotetradecanoic acid (PFTA)	ND	1.8	ng/L							
Perfluorotridecanoic acid (PFTrDA)	ND	1.8	ng/L							
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.8	ng/L							
Perfluorodecanesulfonic acid (PFDS)	ND	1.8	ng/L							
Perfluorooctanesulfonamide (FOSA)	ND	1.8	ng/L							
Perfluorononanesulfonic acid (PFNS)	ND	1.8	ng/L							
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	1.8	ng/L							
Perfluoro-1-butanesulfonamide (FBSA)	ND	1.8	ng/L							
Perfluorohexanesulfonic acid (PFHxS)	ND	1.8	ng/L							
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.8	ng/L							
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.8	ng/L							
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	1.8	ng/L							
Perfluoropetanesulfonic acid (PFPeS)	ND	1.8	ng/L							
Perfluoroundecanoic acid (PFUnA)	ND	1.8	ng/L							
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.8	ng/L							
Perfluoroheptanoic acid (PFHpA)	ND	1.8	ng/L							
Perfluorooctanoic acid (PFOA)	ND	1.8	ng/L							
Perfluorooctanesulfonic acid (PFOS)	ND	1.8	ng/L							
Perfluorononanoic acid (PFNA)	ND	1.8	ng/L							
LCS (B330793-BS1)				Prepared: 02/07/23 Analyzed: 02/21/23						
Perfluorobutanoic acid (PFBA)	9.60	1.9	ng/L	9.67		99.2	73-129			
Perfluorobutanesulfonic acid (PFBS)	8.60	1.9	ng/L	8.56		100	72-130			
Perfluoropentanoic acid (PFPeA)	9.65	1.9	ng/L	9.67		99.8	72-129			
Perfluorohexanoic acid (PFHxA)	9.52	1.9	ng/L	9.67		98.4	72-129			
11Cl-PF3OUdS (F53B Major)	7.53	1.9	ng/L	9.11		82.7	55.1-141			
9Cl-PF3ONS (F53B Minor)	8.04	1.9	ng/L	9.02		89.2	59.6-146			
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	8.67	1.9	ng/L	9.11		95.1	60.3-131			
Hexafluoropropylene oxide dimer acid (HFPO-DA)	8.99	1.9	ng/L	9.67		93.0	37.6-167			
8:2 Fluorotelomersulfonic acid (8:2FTS A)	11.0	1.9	ng/L	9.29		119	67-138			
Perfluorodecanoic acid (PFDA)	10.4	1.9	ng/L	9.67		107	71-129			
Perfluorododecanoic acid (PFDoA)	10.2	1.9	ng/L	9.67		105	72-134			
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	8.37	1.9	ng/L	8.61		97.2	49.4-154			

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QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B330793 - SOP 454-PFAAS										
LCS (B330793-BS1)				Prepared: 02/07/23 Analyzed: 02/21/23						
Perfluoroheptanesulfonic acid (PFHpS)	8.54	1.9	ng/L	9.24		92.4	69-134			
N-EtFOSAA (NEtFOSAA)	12.0	1.9	ng/L	9.67		124	61-135			
N-MeFOSAA (NMeFOSAA)	10.3	1.9	ng/L	9.67		106	65-136			
Perfluorotetradecanoic acid (PFTA)	9.45	1.9	ng/L	9.67		97.7	71-132			
Perfluorotridecanoic acid (PFTrDA)	11.2	1.9	ng/L	9.67		116	65-144			
4:2 Fluorotelomersulfonic acid (4:2FTS A)	8.91	1.9	ng/L	9.04		98.5	63-143			
Perfluorodecanesulfonic acid (PFDS)	8.90	1.9	ng/L	9.33		95.3	53-142			
Perfluorooctanesulfonamide (FOSA)	9.25	1.9	ng/L	9.67		95.6	67-137			
Perfluorononanesulfonic acid (PFNS)	11.4	1.9	ng/L	9.29		123	69-127			
Perfluoro-1-hexanesulfonamide (FHxSA)	9.45	1.9	ng/L	9.67		97.7	61.7-156			
Perfluoro-1-butanesulfonamide (FBSA)	8.74	1.9	ng/L	9.67		90.4	61.3-145			
Perfluorohexanesulfonic acid (PFHxS)	9.41	1.9	ng/L	8.85		106	68-131			
Perfluoro-4-oxapentanoic acid (PFMPA)	9.89	1.9	ng/L	9.67		102	59.8-147			
Perfluoro-5-oxahexanoic acid (PFMBA)	9.97	1.9	ng/L	9.67		103	59.5-146			
6:2 Fluorotelomersulfonic acid (6:2FTS A)	9.93	1.9	ng/L	9.19		108	64-140			
Perfluoropetanesulfonic acid (PFPeS)	9.58	1.9	ng/L	9.09		105	71-127			
Perfluoroundecanoic acid (PFUnA)	11.3	1.9	ng/L	9.67		117	69-133			
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	10.3	1.9	ng/L	9.67		107	58.5-143			
Perfluoroheptanoic acid (PFHpA)	9.41	1.9	ng/L	9.67		97.2	72-130			
Perfluorooctanoic acid (PFOA)	8.85	1.9	ng/L	9.67		91.5	71-133			
Perfluorooctanesulfonic acid (PFOS)	8.76	1.9	ng/L	8.95		97.9	65-140			
Perfluorononanoic acid (PFNA)	10.3	1.9	ng/L	9.67		106	69-130			

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit is at the level of quantitation (LOQ)
DL	Detection Limit is the lower limit of detection determined by the MDL study
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
J	Detected but below the Reporting Limit (lowest calibration standard); therefore, result is an estimated concentration (CLP J-Flag).
PF-17	Extracted Internal Standard recovery is outside of control limits. Data is not significantly affected since associated analyte is not detected and bias is on the high side.
PF-19	Sample re-analyzed at a dilution that was re-fortified with internal standard.
PF-22	Qualifier ion ratio >150% of associated calibration. Detection is suspect.
S-29	Extracted Internal Standard is outside of control limits.
V-05	Continuing calibration verification (CCV) did not meet method specifications and was biased on the low side for this compound.

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
ME-1 (23B0638-01)			Lab File ID: 23B0638-01.d			Analyzed: 02/23/23 19:52			
M8FOSA	316797.3	4.0845	394,923.00	4.0845	80	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	88665.7	2.678933	165,484.00	2.678933	54	50 - 150	0.0000	+/-0.50	
M2PFTA	510301.4	4.394667	1,024,322.00	4.4028	50	50 - 150	-0.0081	+/-0.50	
M2-8:2FTS	173856.9	3.875067	215,848.00	3.88305	81	50 - 150	-0.0080	+/-0.50	
MPFBA	617263.6	1.149867	534,345.00	1.149867	116	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	176669.4	2.986567	107,660.00	2.986567	164	50 - 150	0.0000	+/-0.50	*
M6PFDA	758030.8	3.8756	766,328.00	3.883583	99	50 - 150	-0.0080	+/-0.50	
M3PFBS	163547	2.054933	149,852.00	2.054933	109	50 - 150	0.0000	+/-0.50	
M7PFUnA	758014.1	4.025967	839,980.00	4.025967	90	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	75212.4	3.5336	121,538.00	3.5336	62	50 - 150	0.0000	+/-0.50	
M5PFPeA	495960.8	1.86595	446,990.00	1.86595	111	50 - 150	0.0000	+/-0.50	
M5PFHxA	846623.5	2.771783	782,300.00	2.771783	108	50 - 150	0.0000	+/-0.50	
M3PFHxS	143788.6	3.316417	128,330.00	3.316417	112	50 - 150	0.0000	+/-0.50	
M4PFHpA	916002.5	3.2853	884,017.00	3.2853	104	50 - 150	0.0000	+/-0.50	
M8PFOA	874527.1	3.542133	743,619.00	3.542133	118	50 - 150	0.0000	+/-0.50	
M8PFOS	119433.9	3.724233	128,346.00	3.724233	93	50 - 150	0.0000	+/-0.50	
M9PFNA	700839.8	3.725233	663,153.00	3.725233	106	50 - 150	0.0000	+/-0.50	
MPFDoA	675864.4	4.1612	865,995.00	4.1612	78	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	195095.4	4.03345	210,785.00	4.03345	93	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	224562.9	3.953867	266,645.00	3.953867	84	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
ME-3 (23B0638-02)			Lab File ID: 23B0638-02.d			Analyzed: 02/23/23 19:59			
M8FOSA	316401.3	4.0845	394,923.00	4.0845	80	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	79661.73	2.678933	165,484.00	2.678933	48	50 - 150	0.0000	+/-0.50	*
M2PFTA	638719.6	4.394667	1,024,322.00	4.4028	62	50 - 150	-0.0081	+/-0.50	
M2-8:2FTS	132862.9	3.875067	215,848.00	3.88305	62	50 - 150	-0.0080	+/-0.50	
MPFBA	557327.7	1.158183	534,345.00	1.149867	104	50 - 150	0.0083	+/-0.50	
M3HFPO-DA	153635	2.986567	107,660.00	2.986567	143	50 - 150	0.0000	+/-0.50	
M6PFDA	680044.8	3.8756	766,328.00	3.883583	89	50 - 150	-0.0080	+/-0.50	
M3PFBS	145257.1	2.054933	149,852.00	2.054933	97	50 - 150	0.0000	+/-0.50	
M7PFUnA	730890.8	4.025967	839,980.00	4.025967	87	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	64178.63	3.5336	121,538.00	3.5336	53	50 - 150	0.0000	+/-0.50	
M5PFPeA	444789.1	1.86595	446,990.00	1.86595	100	50 - 150	0.0000	+/-0.50	
M5PFHxA	773748.5	2.771783	782,300.00	2.771783	99	50 - 150	0.0000	+/-0.50	
M3PFHxS	122184.5	3.316417	128,330.00	3.316417	95	50 - 150	0.0000	+/-0.50	
M4PFHpA	822518	3.2853	884,017.00	3.2853	93	50 - 150	0.0000	+/-0.50	
M8PFOA	792942.6	3.542133	743,619.00	3.542133	107	50 - 150	0.0000	+/-0.50	
M8PFOS	115313.2	3.724233	128,346.00	3.724233	90	50 - 150	0.0000	+/-0.50	
M9PFNA	589867.3	3.725233	663,153.00	3.725233	89	50 - 150	0.0000	+/-0.50	
MPFDoA	654421.4	4.1612	865,995.00	4.1612	76	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	163816.9	4.03345	210,785.00	4.03345	78	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	194311.3	3.953867	266,645.00	3.953867	73	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
ME-2 (23B0638-03)			Lab File ID: 23B0638-03.d			Analyzed: 02/23/23 20:06			
M8FOSA	374924.4	4.0845	394,923.00	4.0845	95	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	88818.82	2.678933	165,484.00	2.678933	54	50 - 150	0.0000	+/-0.50	
M2PFTA	761629.3	4.394667	1,024,322.00	4.4028	74	50 - 150	-0.0081	+/-0.50	
M2-8:2FTS	165355.2	3.875067	215,848.00	3.88305	77	50 - 150	-0.0080	+/-0.50	
MPFBA	627478.6	1.149867	534,345.00	1.149867	117	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	139831.8	2.986567	107,660.00	2.986567	130	50 - 150	0.0000	+/-0.50	
M6PFDA	836265.3	3.8756	766,328.00	3.883583	109	50 - 150	-0.0080	+/-0.50	
M3PFBS	167809.8	2.054933	149,852.00	2.054933	112	50 - 150	0.0000	+/-0.50	
M7PFUnA	824695	4.025983	839,980.00	4.025967	98	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	100227.3	3.5256	121,538.00	3.5336	82	50 - 150	-0.0080	+/-0.50	
M5PFPeA	513894.3	1.857667	446,990.00	1.86595	115	50 - 150	-0.0083	+/-0.50	
M5PFHxA	871201.4	2.7636	782,300.00	2.771783	111	50 - 150	-0.0082	+/-0.50	
M3PFHxS	143939.5	3.308383	128,330.00	3.316417	112	50 - 150	-0.0080	+/-0.50	
M4PFHpA	993224.3	3.2853	884,017.00	3.2853	112	50 - 150	0.0000	+/-0.50	
M8PFOA	898548.5	3.542133	743,619.00	3.542133	121	50 - 150	0.0000	+/-0.50	
M8PFOS	131449.5	3.724233	128,346.00	3.724233	102	50 - 150	0.0000	+/-0.50	
M9PFNA	725393.9	3.725233	663,153.00	3.725233	109	50 - 150	0.0000	+/-0.50	
MPFDoA	798421.3	4.1612	865,995.00	4.1612	92	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	207473.1	4.03345	210,785.00	4.03345	98	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	240607.9	3.953867	266,645.00	3.953867	90	50 - 150	0.0000	+/-0.50	
ME-2 (23B0638-03RE1)			Lab File ID: 23B0638-03RE1.d			Analyzed: 03/01/23 18:29			
M2-6:2FTS	72653.56	3.453267	81,394.00	3.453267	89	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Blank (B330793-BLK1)			Lab File ID: B330793-BLK1.d			Analyzed: 02/21/23 20:20			
M8FOSA	297854.5	4.0765	333,528.00	4.076533	89	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	71605.59	2.670733	137,596.00	2.670733	52	50 - 150	0.0000	+/-0.50	
M2PFTA	660430.9	4.394667	874,363.00	4.3947	76	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	122022.8	3.86685	91,371.00	3.8751	134	50 - 150	-0.0083	+/-0.50	
MPFBA	462768.8	1.141567	463,867.00	1.141567	100	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	111574.7	2.97845	119,916.00	2.97845	93	50 - 150	0.0000	+/-0.50	
M6PFDA	606835.9	3.867333	605,719.00	3.867367	100	50 - 150	0.0000	+/-0.50	
M3PFBS	125488.3	2.044217	131,474.00	2.044233	95	50 - 150	0.0000	+/-0.50	
M7PFUnA	581898.8	4.017983	639,020.00	4.018	91	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	52657.02	3.5256	63,587.00	3.525617	83	50 - 150	0.0000	+/-0.50	
M5PFPeA	377095.9	1.857667	382,657.00	1.857667	99	50 - 150	0.0000	+/-0.50	
M5PFHxA	630826.3	2.7636	653,228.00	2.755417	97	50 - 150	0.0082	+/-0.50	
M3PFHxS	98674.25	3.308383	118,783.00	3.308383	83	50 - 150	0.0000	+/-0.50	
M4PFHpA	639090.9	3.27725	725,238.00	3.27725	88	50 - 150	0.0000	+/-0.50	
M8PFOA	569103.1	3.534133	652,845.00	3.53415	87	50 - 150	0.0000	+/-0.50	
M8PFOS	100701.3	3.716267	99,916.00	3.716283	101	50 - 150	0.0000	+/-0.50	
M9PFNA	484720.4	3.71725	529,047.00	3.717283	92	50 - 150	0.0000	+/-0.50	
MPFDoA	583837.8	4.153133	660,611.00	4.153167	88	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	151892.4	4.02545	186,290.00	4.025483	82	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	201214.1	3.945883	234,402.00	3.9459	86	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-454 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
LCS (B330793-BS1)			Lab File ID: B330793-BS1.d			Analyzed: 02/21/23 20:12			
M8FOSA	300778.9	4.076533	333,528.00	4.076533	90	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	82358.86	2.67075	137,596.00	2.670733	60	50 - 150	0.0000	+/-0.50	
M2PFTA	712502.1	4.3947	874,363.00	4.3947	81	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	129772.1	3.8751	91,371.00	3.8751	142	50 - 150	0.0000	+/-0.50	
MPFBA	562243.8	1.149867	463,867.00	1.141567	121	50 - 150	0.0083	+/-0.50	
M3HFPO-DA	122203.8	2.978467	119,916.00	2.97845	102	50 - 150	0.0000	+/-0.50	
M6PFDA	635870.4	3.875633	605,719.00	3.867367	105	50 - 150	0.0083	+/-0.50	
M3PFBS	148790.6	2.044233	131,474.00	2.044233	113	50 - 150	0.0000	+/-0.50	
M7PFUnA	678273.8	4.018017	639,020.00	4.018	106	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	57729.82	3.52565	63,587.00	3.525617	91	50 - 150	0.0000	+/-0.50	
M5PFPeA	454205.7	1.857667	382,657.00	1.857667	119	50 - 150	0.0000	+/-0.50	
M5PFHxA	756008	2.763617	653,228.00	2.755417	116	50 - 150	0.0082	+/-0.50	
M3PFHxS	117208.6	3.308417	118,783.00	3.308383	99	50 - 150	0.0000	+/-0.50	
M4PFHpA	763989.4	3.277283	725,238.00	3.27725	105	50 - 150	0.0000	+/-0.50	
M8PFOA	682788.7	3.534167	652,845.00	3.53415	105	50 - 150	0.0000	+/-0.50	
M8PFOS	120823.6	3.7163	99,916.00	3.716283	121	50 - 150	0.0000	+/-0.50	
M9PFNA	569878.9	3.7173	529,047.00	3.717283	108	50 - 150	0.0000	+/-0.50	
MPFDoA	674170.4	4.153167	660,611.00	4.153167	102	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	185346.5	4.025483	186,290.00	4.025483	99	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	249412	3.945917	234,402.00	3.9459	106	50 - 150	0.0000	+/-0.50	

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SOP-454 PFAS in Water	
Perfluorobutanoic acid (PFBA)	NH-P
Perfluorobutanesulfonic acid (PFBS)	NH-P
Perfluoropentanoic acid (PFPeA)	NH-P
Perfluorohexanoic acid (PFHxA)	NH-P
11Cl-PF3OUdS (F53B Major)	NH-P
9Cl-PF3ONS (F53B Minor)	NH-P
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	NH-P
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NH-P
8:2 Fluorotelomersulfonic acid (8:2FTS A)	NH-P
Perfluorodecanoic acid (PFDA)	NH-P
Perfluorododecanoic acid (PFDoA)	NH-P
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	NH-P
Perfluoroheptanesulfonic acid (PFHpS)	NH-P
N-EtFOSAA (NEtFOSAA)	NH-P
N-MeFOSAA (NMeFOSAA)	NH-P
Perfluorotetradecanoic acid (PFTA)	NH-P
Perfluorotridecanoic acid (PFTrDA)	NH-P
4:2 Fluorotelomersulfonic acid (4:2FTS A)	NH-P
Perfluorodecanesulfonic acid (PFDS)	NH-P
Perfluorooctanesulfonamide (FOSA)	NH-P
Perfluorononanesulfonic acid (PFNS)	NH-P
Perfluoro-1-hexanesulfonamide (FHxSA)	NH-P
Perfluoro-1-butanesulfonamide (FBSA)	NH-P
Perfluorohexanesulfonic acid (PFHxS)	NH-P
Perfluoro-4-oxapentanoic acid (PFMPA)	NH-P
Perfluoro-5-oxahexanoic acid (PFMBA)	NH-P
6:2 Fluorotelomersulfonic acid (6:2FTS A)	NH-P
Perfluoropetanesulfonic acid (PFPeS)	NH-P
Perfluoroundecanoic acid (PFUnA)	NH-P
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	NH-P
Perfluoroheptanoic acid (PFHpA)	NH-P
Perfluorooctanoic acid (PFOA)	NH-P
Perfluorooctanesulfonic acid (PFOS)	NH-P
Perfluorononanoic acid (PFNA)	NH-P

Con-Test, a Pace Environmental Laboratory, operates under the following certifications and accreditations:

Code	Description	Number	Expires
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2023

23130638

Pace Analytical®

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Access COC's and Support Requests

http://www.pacelabs.com

CHAIN OF CUSTODY RECORD

39 Spruce Street
East Longmeadow, MA 01028

Doc # 381 Rev 5_07/13/2021

Page 1 of 1

Company Name: Horsley Witten Group
Address: 90 Route 6A Sandwich MA
Phone: 508-833-6600
Project Name: HYA
Project Location: Hyannis MA
Project Number:
Project Manager: Bryan Massa
Pace Quote Name/Number:
Invoice Recipient:
Sampled By: BB

Requested Turnaround Time
7-Day ☐ 10-Day ☐
PFAS 10-Day (std) ☑ Due Date:

Rush-Approval Required
1-Day ☐ 3-Day ☐
2-Day ☐ 4-Day ☐

Dissolved Metals Samples
○ Field Filtered
○ Lab to Filter

Orthophosphate Samples
○ Field Filtered
○ Lab to Filter

Data Delivery
Format: PDF ☑ EXCEL ☑
Other:
CLP Like Data Pkg Required: ☐
Email To: DMassa@horsley witten.com
Fax To #:

PCB ONLY
SOXHLET ☐
NON SOXHLET ☐

ANALYSIS REQUESTED

Pace Work Order#	Client Sample ID / Description	Beginning Date/Time	Ending Date/Time	COMP/GRAB	[1]Matrix Code	Conc Code	VIALS	GLASS	PLASTIC	BACTERIA	ENCORE	PCBs
1	ME-1	2/2/23	9:58	Grab	GW				X			X
2	ME-3	2/2/23	10:15	Grab	GW				X			X
3	ME-2	2/2/23	10:30	Grab	GW				X			X

[2] Preservation Code

Courier Use Only
Total Number Of:
VIALS
GLASS
PLASTIC
BACTERIA
ENCORE

Glassware in the fridge? Y / N
Glassware in freezer? Y / N
Prepackaged Cooler? Y / N

*Pace Analytical is not responsible for missing samples from prepacked coolers

[1] Matrix Codes:
GW = Ground Water
WW = Waste Water
DW = Drinking Water
A = Air
S = Soil
SL = Sludge
SOL = Solid
O = Other (please define)

[2] Preservation Codes:
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium Bisulfate
X = Sodium Hydroxide
T = Sodium Thiosulfate
O = Other (please define)

Relinquished by: (signature)	Date/Time:
Derek Brandt	2/2/23 15:13
Received by: (signature)	Date/Time:
HW cooler	2/2/23 15:13
Relinquished by: (signature)	Date/Time:
Tyler Wood	2-3-23 12:35
Received by: (signature)	Date/Time:
Paul Chatterton	2-3-23 12:35
Relinquished by: (signature)	Date/Time:
Paul Chatterton	2-3-23 16:1
Received by: (signature)	Date/Time:
FedEx 4.7	2/3/23 1615
Relinquished by: (signature)	Date/Time:
Received by: (signature)	Date/Time:

Client Comments:

Detection Limit Requirements
MA: GW-1
RCP:
Other:

Special Requirements
☑ MA MCP Required
MCP Certification Form Required
☐ CT RCP Required
RCP Certification Form Required
☐ MA State DW Required
PWSID #

Please use the following codes to indicate possible sample concentration within the Conc Code column above:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

NELAC and AIHA-LAP, LLC Accredited

Project Entity
Government ☐ Municipality ☐ MWRA ☐ WRTA ☐
Federal ☐ 21 J ☐ School ☐
City ☐ Brownfield ☐ MBTA ☐

Other
☐ Chromatogram
☐ AIHA-LAP,LLC

Lab Comments:

Disclaimer: Pace Analytical is not responsible for any omitted information on the Chain of Custody. The Chain of Custody is a legal document that must be complete and accurate and is used to determine what analyses the laboratory will perform. Any missing information is not the laboratory's responsibility. Pace Analytical values your partnership on each project and will try to assist with missing information, but will not be held accountable.

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KA

39 Spruce St.
East Longmeadow, MA. 01028
P: 413-525-2332
F:413-525-6405
www.pacelabs.com

Log In Back-Sheet

Login Sample Receipt Checklist – (Rejection Criteria Listing – Using Acceptance Policy) Any False statement will be brought to the attention of the Client – True or False

Pace
PEOPLE ADVANCING SCIENCE

Client Horsley Witten Group
Project HVA
MCP/RCP Required MA MCP
Deliverable Package Requirement GW-1
Location Barnstable, MA
PWSID# (When Applicable) n/a
Arrival Method Courier
Received By / Date / Time ER 2/3/23 1615
Back-Sheet By / Date / Time Mam 2/6/23 2359
Temperature Method Gun # 3
Temp < 6° C ☑ Actual Temperature 4.7
Rush Samples: Yes / No No Notify
Short Hold: Yes / No No Notify

Notes regarding Samples/COC outside of SOP:

	True	False
Received on Ice	☑	☐
Received in Cooler	☑	☐
Custody Seal: DATE TIME	☐	☑
COC Relinquished	☑	☐
COC/Samples Labels Agree	☑	☐
All Samples in Good Condition	☑	☐
Samples Received within Holding Time	☑	☐
Is there enough Volume	☑	☐
Proper Media/Container Used	☑	☐
Splitting Samples Required	☐	☑
MS/MSD	☐	☑
Trip Blanks	☐	☑
Lab to Filters	☐	☑
COC Legible	☑	☐

COC Included: (~~Check all~~ Included)

Client ☑ Analysis ☑ Sampler Name ☑
Project ☑ IDs ☑ Collection Date/Time ☑

All Samples Proper PH n/a ☐ ☐

Container (Circle when applicable)	UnP	HCl	HNO3	H2SO4	NaOH	Trizma	NaS2O3	Other Preservative
1L Amber Plastic								
500 mL Amber Plastic								
250 mL Amber (Plastic)	6							
Other Amber Clear Plastic								
16oz Amber Clear								
8oz Amber Clear								
4oz Amber Clear								
2oz Amber Clear								
Col/Bacteria								
Flashpoint								
Plastic Bag								
SOC Kit								
Perchlorate								
Encore								
Frozen								

	Proper Headspace	UnP	HCl	MeOH	Bisulfate	DI	Thiosulfate	Sulfuric	Other
Vials									

APPENDIX B

Battelle Forensic PFAS Analysis Report

PFAS Signature® Analysis Report
Hyannis Airport

Submitted to:
Horsley Witten Group, Inc.
90 Route 6A, Unit 1
Sandwich, MA 02563

Prepared by:

BATTELLE
505 King Avenue
Columbus, OH 43201

Date: December 08, 2022

Table of Contents

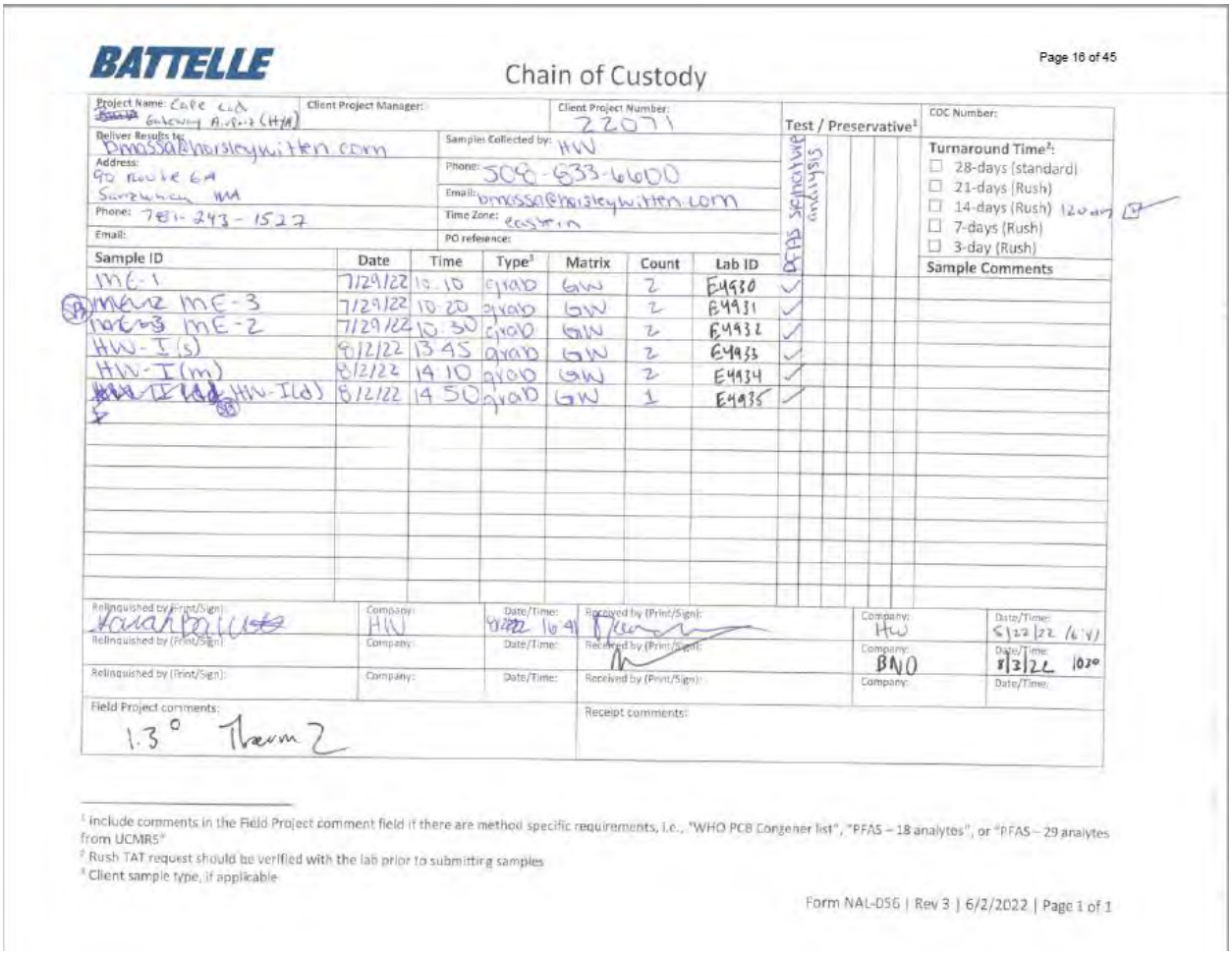
List of Tables

List of Figures

1.0 Brief Project Description

This report provides results of six samples submitted for PFAS Signature® analysis by Horsley Witten Group. The objective of the study was to perform per- and polyfluoroalkyl substances (PFAS) source discrimination analysis using Battelle's PFAS Signature® Tool. The data collected will be helpful to differentiate potential PFAS signatures at groundwater sampling locations and to inform forensic investigations.

2.0 Chain of Custody



BATTELLE

Chain of Custody

Page 16 of 45

Project Name: Cape Cod Gateway Airport (HW)
Client Project Manager:
Client Project Number: 22071
Deliver Results to: bmassa@horsleywitten.com
Samples Collected by: HW
Address: 90 Route 6A, Sandwich, MA
Phone: 781-243-1527
Phone: 508-833-6600
Email: bmassa@horsleywitten.com
Time Zone: Eastern
PO reference:
Test / Preservative[1]: PFAS signature analysis
COC Number:
Turnaround Time[2]: ☐ 28-days (standard) ☐ 21-days (Rush) ☐ 14-days (Rush) 120 day ☐ 7-days (Rush) ☐ 3-day (Rush)
Sample Comments

Sample ID	Date	Time	Type[3]	Matrix	Count	Lab ID
ME-1	7/29/22	10:10	grab	GW	2	E4930
ME-3	7/29/22	10:20	grab	GW	2	E4931
ME-2	7/29/22	10:30	grab	GW	2	E4932
HW-I(s)	8/2/22	13:45	grab	GW	2	E4933
HW-I(m)	8/2/22	14:10	grab	GW	2	E4934
HW-I(d)	8/2/22	14:50	grab	GW	1	E4935

Relinquished by (Print/Sign): Company: HW Date/Time: 8/2/22 16:41
Received by (Print/Sign): Company: HW Date/Time: 8/2/22 16:41
Relinquished by (Print/Sign): Company: Date/Time:
Received by (Print/Sign): Company: BNO Date/Time: 8/3/22 1020
Relinquished by (Print/Sign): Company: Date/Time:
Received by (Print/Sign): Company: Date/Time:
Field Project comments: 1.3° Therm 2
Receipt comments:

[1] Include comments in the Field Project comment field if there are method specific requirements, i.e., "WHO PCB Congener list", "PFAS – 18 analytes", or "PFAS – 29 analytes from UCMR5"
[2] Rush TAT request should be verified with the lab prior to submitting samples
[3] Client sample type, if applicable

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3.0 PFAS-Targeted Analysis

Targeted PFAS were measured in six samples collected from locations at Cape Cod Gateway Airport and surrounding downgradient locations (see Figure A-1 for a location map). In addition, a laboratory process blank and spiked laboratory control sample were prepared and analyzed alongside these samples for quality control. Targeted PFAS analysis was performed by liquid chromatography tandem mass spectrometry (LC/MS/MS) in the multiple reaction monitoring (MRM) mode and quantified using the isotope dilution method. Targeted PFAS analytes included 43 analytes listed in Table A-1. Detections, and detection limits for non-detects are summarized below in Table 1. The PFAS concentrations in these samples are reported in nanogram per liter (ng/L). The method detection limits (MDLs), limits of detection (LODs), and limits of quantitation (LOQs) are provided in Table A-1. The full targeted analysis data package was delivered separately to Horsley Witten Group on September 16, 2022.

Table 1. PFAS Concentrations of Aqueous Samples and Quality Control Samples

Battelle ID		E4930-FS		E4931-FS		E4932-FS		E4933-FS		E4934-FS		E4935-FS	
Client ID		ME-1		ME-3		ME-2		HW-I(s)		HW-I(m)		HW-I(d)	
Collection Date		07/29/2022		07/29/2022		07/29/2022		08/02/2022		08/02/2022		08/02/2022	
Analyte	CAS No.	Result (ng/L)	Qualifier	Result (ng/L)	Qualifier	Result (ng/L)	Qualifier	Result (ng/L)	Qualifier	Result (ng/L)	Qualifier	Result (ng/L)	Qualifier
NFDHA	151772-58-6	2.14	U	2.14	U	2.26	U	2.26	U	2.15	U	2.35	U
PFEESA	113507-82-7	2.14	U	2.14	U	2.26	U	2.26	U	2.15	U	2.35	U
PFMPA	377-73-1	2.14	U	2.14	U	2.26	U	2.26	U	2.15	U	2.35	U
PFMBA	863090-89-5	2.14	U	2.14	U	2.26	U	2.26	U	2.15	U	2.35	U
PFBA	375-22-4	17.4		9.75		15.0		62.7		3.01	U	8.10	
PFPeA	2706-90-3	48.9		23.3		55.1		237		1.15	J	20.9	
PFHxA	307-24-4	36.9		22.1		60.3		205		2.15	U	23.8	
PFHpA	375-85-9	16.4		10.0		27.5		299		1.74	J	13.1	
PFOA	335-67-1	21.5		14.2		30.6		256		2.15	U	16.8	
PFNA	375-95-1	12.2		7.99		15.4		146		0.739	J	1.21	J
PFDA	335-76-2	2.14	U	2.14	U	2.26	U	2.26	U	2.15	U	2.35	U
PFUnA	2058-94-8	2.14	U	2.14	U	2.26	U	2.26	U	2.15	U	2.35	U
PFDoA	307-55-1	2.14	U	2.14	U	2.26	U	2.26	U	2.15	U	2.35	U
PFTrDA	72629-94-8	2.14	U	2.14	U	2.26	U	2.26	U	2.15	U	2.35	U
PFTeDA	376-06-7	2.14	U	2.14	U	2.26	U	2.26	U	2.15	U	2.35	U
NMeFOSAA	2355-31-9	2.14	U	2.14	U	2.26	U	2.26	U	2.15	U	2.35	U
NEtFOSAA	2991-50-6	2.14	U	2.14	U	2.26	U	2.26	U	2.15	U	2.35	U
NMeFOSA	31506-32-8	2.14	U	2.14	U	2.26	U	2.26	U	2.15	U	2.35	U
NEtFOSA	4151-50-2	3.00	U	3.00	U	3.17	U	3.16	U	3.01	U	3.29	U
NMeFOSE	24448-09-7	2.14	U	2.14	U	2.26	U	2.26	U	2.15	U	2.35	U

Glossary of Data Qualifiers:
D - Dilution Run. Initial run outside the initial calibration range of the instrument
J – Estimated value; analyte detected below the Limit of Quantitation (LOQ)
U - Analyte not detected or detected below the Detection Limit (DL) value, Limit of Detection (LOD) reported below the Detection Limit (DL) value, Limit of Detection (LOD) reported

Table 1 (continued). PFAS Concentrations of Aqueous Samples and Quality Control Samples

Battelle ID		E4930-FS		E4931-FS		E4932-FS		E4933-FS		E4934-FS		E4935-FS	
Client ID		ME-1		ME-3		ME-2		HW-I(s)		HW-I(m)		HW-I(d)	
Collection Date		07/29/2022		07/29/2022		07/29/2022		08/02/2022		08/02/2022		08/02/2022	
Analyte	CAS No.	Result (ng/L)	Qualifier	Result (ng/L)	Qualifier	Result (ng/L)	Qualifier	Result (ng/L)	Qualifier	Result (ng/L)	Qualifier	Result (ng/L)	Qualifier
NEtFOSE	1691-99-2	3.00	U	3.00	U	3.17	U	3.16	U	3.01	U	3.29	U
PFOSA	754-91-6	3.00	U	5.95		3.17	U	3.16	U	3.01	U	3.29	U
PFBS	375-73-5	2.36	J	3.07	J	8.32		4.34	J	2.15	U	2.36	J
PFPeS	2706-91-4	2.71	J	3.63	J	6.18		10.7		2.15	U	3.16	J
PFHxS	355-46-4	37.9		39.1		60.1		129		6.31		66.2	
PFHpS	375-92-8	2.77	J	2.83	J	3.44	J	23.4		2.15	U	4.05	J
PFOS	1763-23-1	77.4		104		97.0		595		10.3		93.6	
PFNS	68259-12-1	2.14	U	2.14	U	2.26	U	2.26	U	2.15	U	2.35	U
PFDS	335-77-3	2.14	U	2.14	U	2.26	U	2.26	U	2.15	U	2.35	U
PFDoS	79780-39-5	2.14	U	2.14	U	2.26	U	2.26	U	2.15	U	2.35	U
4:2FTS	757124-72-4	2.14	U	2.14	U	2.26	U	2.26	U	2.15	U	2.35	U
6:2FTS	27619-97-2	21.7		4.91		43.4		4180	D	3.01	U	1.63	J
8:2FTS	39108-34-4	2.14	U	2.14	U	1.40	J	4.25	J	2.15	U	2.35	U
3:3 FTCA	356-02-5	3.00	U	3.00	U	3.17	U	3.16	U	3.01	U	3.29	U
5:3 FTCA	914637-49-3	2.14	U	2.14	U	2.26	U	2.26	U	2.15	U	2.35	U
7:3 FTCA	812-70-4	2.14	U	2.14	U	2.26	U	2.26	U	2.15	U	2.35	U
HFPO-DA	13252-13-6	2.14	U	2.14	U	2.26	U	2.26	U	2.15	U	2.35	U
Adona	919005-14-4	2.14	U	2.14	U	2.26	U	2.26	U	2.15	U	2.35	U
9Cl-PF3ONS	756426-58-1	2.14	U	2.14	U	2.26	U	2.26	U	2.15	U	2.35	U
11Cl-PF3OUdS	763051-92-9	2.14	U	2.14	U	2.26	U	2.26	U	2.15	U	2.35	U

Glossary of Data Qualifiers:
D - Dilution Run. Initial run outside the initial calibration range of the instrument
J – Estimated value; analyte detected below the Limit of Quantitation (LOQ)
U - Analyte not detected or detected below the Detection Limit (DL) value, Limit of Detection (LOD) reported below the Detection Limit (DL) value, Limit of Detection (LOD) reported

4.0 Suspect Screening High Resolution Mass Spectrometric Analysis (HRMS)

Suspect screening analysis was performed using an ultra-performance liquid chromatograph coupled to a quadrupole time-of-flight (QTOF) mass spectrometer with a mass resolution of >20,000. The samples were analyzed in full-scan mode in both positive and negative ionization modes. The acquired data were processed and searched against the library of 496 PFAS-related suspect analytes. The compounds were identified by in silico fragmentation of the structure file embedded in the library. The tool incorporates the use of homolog data filtering, which performs PFAS-focused data reduction, followed by peak confirmations. The detection criteria and the confidence levels used for the analyte identification are summarized below.

Detection Criteria

All detections are expected to fulfill these criteria:

- Mass error of ≤ 3 mDa.
- Isotope match intensity root mean squared (RMS) error of ≤ 20%.
- At least one expected product (fragment) ion found.
- Product ions are expected to have a mass error of ≤ 3 mDa and the precursor and all product ions should co-maximize in time and have similar peak profiles.
- Peak area should be greater than three times the associated negative control.

4.1 Analyte Identification Confidence Levels

Following peak assignments, CLs 1 through 4 were assigned for analyte identifications following Schymanski guidelines (Schymanski et al., 2014). The scale has four levels of identification confidence, where CL4 is the level with the lowest confidence (exact mass was identified) and CL1 is the level with the highest confidence (confirmed structure). The detected analytes in all samples are summarized in Table 2 for confidence levels (CLs) 1 through 3; for data including CL4, see Table A-2. Data of the quality control samples (procedural blanks, laboratory control spike and the instrument standard) are summarized in Table A-3. A detailed list of the analytes detected in the samples and laboratory spiked controls, abbreviations, and the references are summarized in Table A-4. The detections with CL4 are not considered for statistical analysis and source discrimination discussion given the low confidence level. All of the analytes detected are color coded to denote the specific CLs and the notes for the color scheme are provided as footnotes to the data reporting tables.

Results. The samples are classified into two groups based on the sample locations: HW-I(s) (shallow), HW-I(m) (mid depth at ~20 ft), and HW-I(d) (deep depth at ~50 ft) and three downgradient wells: ME-1, ME-2, ME-3.

HW-I Samples. Based on the data collected from both targeted and suspect screening analysis, HW-I samples show a mix of electrochemical fluorination (ECF) and Fluorotelomer (FT) based analytes. Wells HW-I(m) and HW-I(d) had few detections, making identification difficult, but from

the data, HW-I(m) appears distinct in chemistry from the other five samples, while HW-I(d) seems most like the ME samples.

ME Samples. Samples ME-1, ME-2 and ME-3 showed detections of analytes associated with a mix of both ECF- and FT-based analytes. FT-based analytes are not as dominant as in the HW-I(s) sample.

Discussion.

FT-based Analytes. The analyte n:2 FASO2PA-MePS (also referred to as n:2 FtSO2AoS), which is an intermediate transformation product of n:2 fluorotelomer thioether amido sulfonate (FtTAoS) (Harding-Marjanovic et al., 2015; Choi et al. 2022) was detected in both positive and negative modes of ionization in samples HW-I(s), ME-1, and ME-2. However, the parent analyte n:2 FtTAoS was not detected in any of the samples, indicating the faster rate of transformation of parent n:2 FtTAoS (few weeks), compared to the intermediate (n:2 FASO2PA-MePS, n:2 FTS) transformation rates (Harding-Marjanovic et al., 2015). Further, n:2 FTS is the transformation product of n:2 FASO2PA-MePS, which further biotransforms to result in perfluorinated carboxylic acids (PFCAs). The precursor analyte (FtTAoS) is sold under the tradename Lodyne, found in different aqueous film-forming foam (AFFF) formulations manufactured by Angus, Ansul, and Chemguard, and was widely used from 1984 onwards (Place and Field, 2012; Harding-Marjanovic et al., 2015). Detection of n:2 FASO2PA-MePS, n:2 FTS, and PFCA in HW-I(s) samples and ME samples suggests the transformation of precursors and downgradient migration of the transformation products (Choi et al., 2022).

Very low detection (peak response) of 6:2 FTAB was found in HW-I(m) and ME-1, while 8:2 FTAB was found only in HW-I(s), which shows FT-betaine chemistry contamination.

ECF-based Analytes. All samples showed detections of ECF-based precursor analytes found in AFFF formulations. Sample HW-I(s) predominantly showed C4 to C6 chemistry of N-SPAmP-FASA, N-SPAmP-FASAA, and N-SPAmP-FASAPS. N-SPAmP-FASAA C6 was detected in all three HW-I(s), HW-I(m), HW-I(d) samples, however it was not detected in downgradient ME wells. N-SHOPAmP-FASAHOPS C6 was detected in ME wells and HW-I(d) well; this analyte was not detected in HW-I(s) and HW-I(m) wells. Further, analytes perfluorosulfonamides (FASAs – FBSA, FHxSA, FOSA), which are the transformation products of ECF-based PFAS precursors, were detected in all ME wells and HW-I(s) well, suggesting ECF-based contamination in the downgradient ME wells (Rhoads et al., 2008). Understanding groundwater flow path and depths at this site might provide further information on the sources of PFAS.

Table *2*. Suspect Screening Analysis Data (Peak responses of the detected analytes)

Component name	Formula	Multiple Detects	Ionization	ME-1 20220920 0007 E4930FS	ME-3 20220920 0008 E4931FS	ME-2 20220920 0009 E4932FS	HW-I(s) 20220920 0010 E4933FS	HW-I(m) 20220920 0012 E4934FS	HW-I(d) 20220920 0013 E4935FS
6:2 FASO2PA-MePS	C15H18F13NO6S2	No	Positive	1.77E+04	ND	ND	2.57E+06	ND	ND
6:2 FTAB	C15H19F13N2O4S	No	Positive	3.23E+03	ND	ND	ND	1.30E+03	ND
8:2 FTAB	C17H19F17N2O4S	No	Positive	ND	ND	ND	3.21E+03	ND	ND
N-HOEAmP-FASA C5	C12H17F11N2O3S	Yes	Positive	1.23E+04	1.21E+04	ND	4.89E+03	ND	ND
N-SHOPAmP-FASAHOPS C6	C17H25F13N2O10S3	No	Positive	4.68E+04	2.32E+04	1.30E+04	ND	ND	9.87E+03
N-SPAmP-FASA C4	C12H19F9N2O5S2	No	Positive	ND	ND	ND	4.38E+04	ND	ND
N-SPAmP-FASAA C4	C14H21F9N2O7S2	No	Positive	ND	ND	ND	2.24E+04	ND	ND
N-SPAmP-FASAA C5	C15H21F11N2O7S2	No	Positive	ND	ND	ND	3.13E+04	ND	ND
N-SPAmP-FASAA C6	C16H21F13N2O7S2	Yes	Positive	ND	1.18E+04	ND	2.18E+04	ND	ND
N-SPAmP-FASAPS C4	C15H25F9N2O8S3	No	Positive	ND	ND	ND	1.14E+04	ND	ND
N-SPAmP-FASAPS C5	C16H25F11N2O8S3	No	Positive	ND	ND	ND	2.25E+04	ND	ND
N-SPAmP-FASAPS C6	C17H25F13N2O8S3	Yes	Positive	ND	ND	ND	1.27E+05	9.56E+03	1.55E+04
1HO-n:2 FTS C6	C8H5F13O4S	No	Negative	ND	ND	ND	3.43E+03	ND	ND
6:2 FASO2PA-MePS	C15H18F13NO6S2	No	Negative	1.40E+03	ND	1.37E+03	2.72E+05	ND	ND
6:2 FTS	C8H5F13O3S	No	Negative	3.76E+03	9.17E+02	7.64E+03	4.67E+05	ND	ND

Notes:	CL1
[1] – Isomers Observed	CL2b
ND denotes non-detect	CL3

Table 2 (continued). Suspect Screening Analysis Data (Peak responses of the detected analytes)

Component name	Formula	Multiple Detects	Ionization	ME-1 20220920 0007 E4930FS	ME-3 20220920 0008 E4931FS	ME-2 20220920 0009 E4932FS	HW-I(s) 20220920 0010 E4933FS	HW-I(m) 20220920 0012 E4934FS	HW-I(d) 20220920 0013 E4935FS
8:2 FTS	C10H5F17O3S	No	Negative	ND	ND	3.65E+02	8.65E+02	ND	ND
FBSA	C4H2F9NO2S	No	Negative	4.83E+02	5.34E+02	7.26E+02	2.69E+03	ND	ND
FHxSA	C6H2F13NO2S	Yes	Negative	5.73E+02	1.42E+03	3.70E+02	1.70E+04	ND	ND
FOSA	C8H2F17NO2S	No	Negative	ND	5.39E+03	1.44E+03	ND	ND	ND
N-SHOPAmP-FASAHOPS C6	C17H25F13N2O10S3	No	Negative	2.05E+03	1.05E+03	ND	ND	ND	ND
N-SP-FASA C6	C9H8F13NO5S2	No	Negative	ND	ND	ND	1.02E+03	ND	ND
N-SPAmP-FASAPS C6	C17H25F13N2O8S3	Yes	Negative	ND	ND	ND	4.79E+03	ND	ND
PFBA	C4HF7O2	No	Negative	6.20E+02	3.66E+02	5.73E+02	1.73E+03	ND	3.14E+02
PFBS	C4HF9O3S	No	Negative	1.44E+03	1.95E+03	3.13E+03	1.73E+03	ND	1.20E+03
PFHpA	C7HF13O2	No	Negative	5.51E+03	3.14E+03	6.56E+03	6.78E+04	4.03E+02	3.51E+03
PFHpS	C7HF15O3S	Yes	Negative	1.75E+03	2.11E+03	1.87E+03	1.29E+04	ND	2.29E+03
PFHxA	C6HF11O2	No	Negative	6.96E+03	4.63E+03	9.28E+03	3.25E+04	ND	3.87E+03
PFHxS	C6HF13O3S	Yes	Negative	3.07E+04	3.66E+04	3.83E+04	9.15E+04	3.72E+03	4.78E+04
PFNA	C9HF17O2	No	Negative	4.28E+03	3.00E+03	4.09E+03	3.55E+04	ND	5.36E+02
PFOA	C8HF15O2	Yes	Negative	6.32E+03	5.27E+03	6.82E+03	5.89E+04	ND	4.03E+03
PFOS	C8HF17O3S	Yes	Negative	7.45E+04	9.63E+04	6.08E+04	3.58E+05	8.06E+03	4.95E+04
PFPeA	C5HF9O2	Yes	Negative	4.49E+03	2.27E+03	4.80E+03	1.73E+04	ND	1.68E+03
PFPeS	C5HF11O3S	No	Negative	2.11E+03	2.95E+03	3.18E+03	7.30E+03	ND	2.22E+03

Notes:	CL1
[1] – Isomers Observed	CL2b
ND denotes non-detect	CL3

5.0 Machine Learning Analysis

Method Description. All samples in the source library were processed to extract distinct analytes. The labeled samples were then further processed using supervised machine learning techniques to generate a predictive model that can process an unknown sample and predict the source classification, based on the sample signature matches to the source library. In addition to the prediction, a CL was obtained in the prediction as well as several diagnostic measures that supplement the predictions from the model (Figure A-2), CLs in individual predictions, similarity metrics between different samples, hierarchical clustering, and the importance of analytes in the model's decision-making process.

Results. Table 3 shows a statistical comparison across samples. This shows sample HW-I(m), which is a mid-depth monitoring well sample, is found as an outlier from the other five samples, while HW-I(d), which is the deep monitoring well sample, has shown the most correlated signature with the ME samples (>50% score). All ME well samples show >50% similarity score. The HW-I samples collected at different depths show less similarities (<50%), while HW-I(s) and HW-I(m) show the least similarity with a 9.5% score. Hierarchical clustering, depicted in Figure 1, was performed against the Battelle library of AFFF formulations. This reflects formulation similarity for five of the samples to a FT-based AFFF formulation, while HW-I(m) appears to be a different FT-based AFFF formulation. In Figure 2, an unsupervised learning plot, the group of five also appears as a cluster near FT-based and ECF-based AFFF formulation datapoints, indicating a mix of FT-based and ECF-based AFFF sources. Finally, a supervised algorithm comparing the samples to environmental field samples of AFFF and non-AFFF origins places all but HW-I(m) in the mix or AFFF region (Figure 3).

Table 3. Sample Proximity Matrix Plot of unknown samples.

Lab ID	Sample ID	E4930FS_1	E4931FS_1	E4932FS_1	E4933FS_1	E4934FS_1	E4935FS_1
		ME-1	**ME-3**	**ME-2**	**HW-I(s)**	**HW-I(m)**	**HW-I(d)**
E4930FS_1	**ME-1**	100.0%	62.6%	58.3%	32.5%	27.4%	54.4%
E4931FS_1	**ME-3**	62.6%	100.0%	52.9%	37.0%	22.5%	60.3%
E4932FS_1	**ME-2**	58.3%	52.9%	100.0%	38.1%	18.0%	61.3%
E4933FS_1	**HW-I(s)**	32.5%	37.0%	38.1%	100.0%	9.5%	27.8%
E4934FS_1	**HW-I(m)**	27.4%	22.5%	18.0%	9.5%	100.0%	30.9%
E4935FS_1	**HW-I(d)**	54.4%	60.3%	61.3%	27.8%	30.9%	100.0%

Note: The legend shows the lighter the shade representing closer distance of the samples with the relevant source samples. Percentages show degree of similarity score.

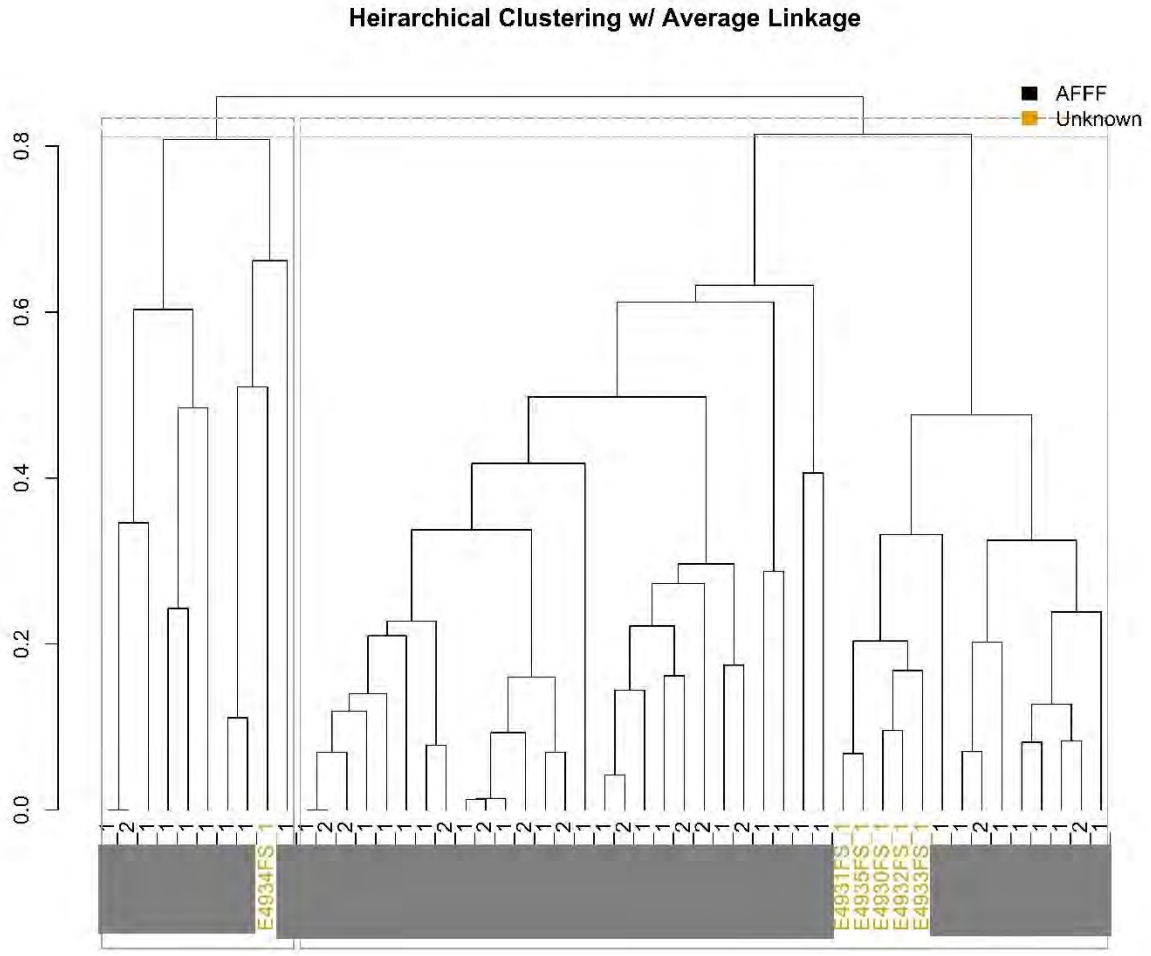

Figure 1. Hierarchical Cluster Plot from Machine Learning Analysis of Known AFFF and Unknown Samples. The data points from unknown samples are labelled with their sample identifications, and the data points in the library are shown with redacted IDs.

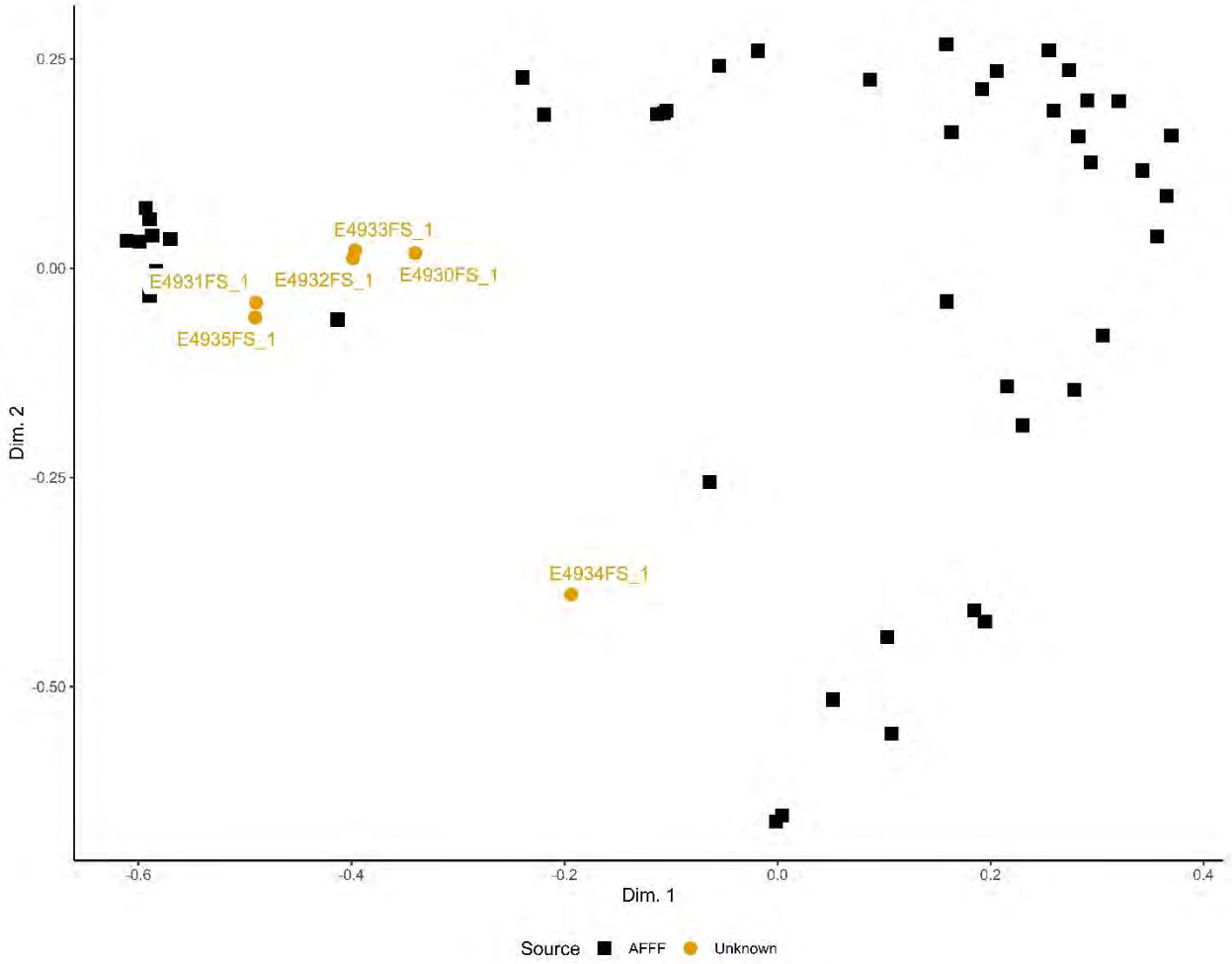

Figure 2. MDS Cluster Plot from Machine Learning Analysis of Known AFFF and Unknown Samples. The data points from unknown samples are labelled with their sample identifications, and the data points in the library are shown as black points.

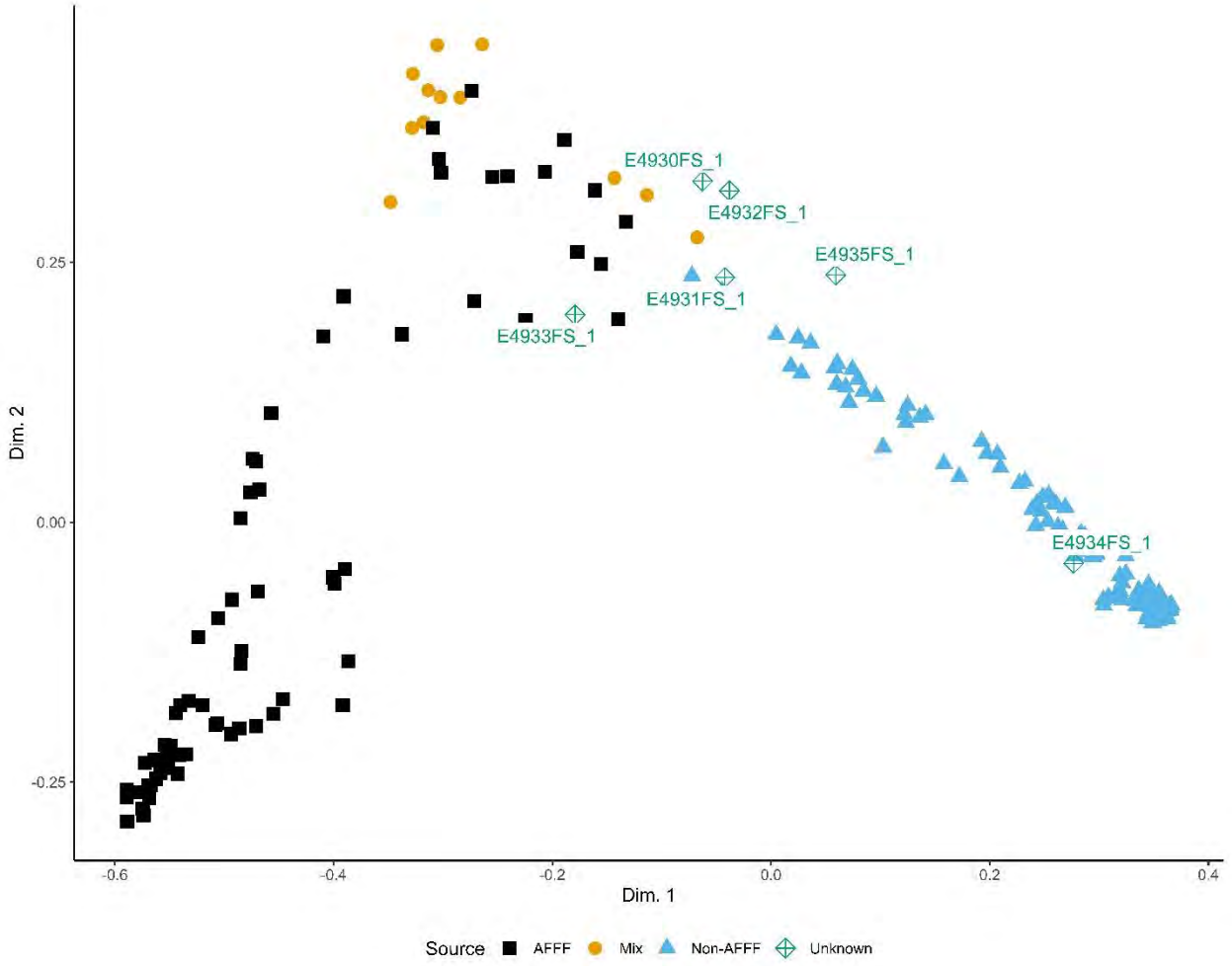

Figure 3. MDS Cluster Plot from Supervised Machine Learning Analysis of Known Field Environmental Samples and Unknown Samples. The data points from unknown samples are labelled with their sample identifications, and the data points in the library are shown with distinct IDs.

Conclusions: The results of the PFAS Signature® analysis are presented based on the high-resolution mass spectrometric data. Both suspect screening analysis and machine learning analysis are complementary analyses providing different lines of evidence. More information can be obtained by understanding the site history and looking at the groundwater flow conditions at the site to evaluate PFAS migration pathways. While all of these samples were PFAS-impacted, application of a high-resolution mass spectral suspect screening method has revealed slight differences in these samples to help discriminate the PFAS sources.

Appendix A – Supplemental Information

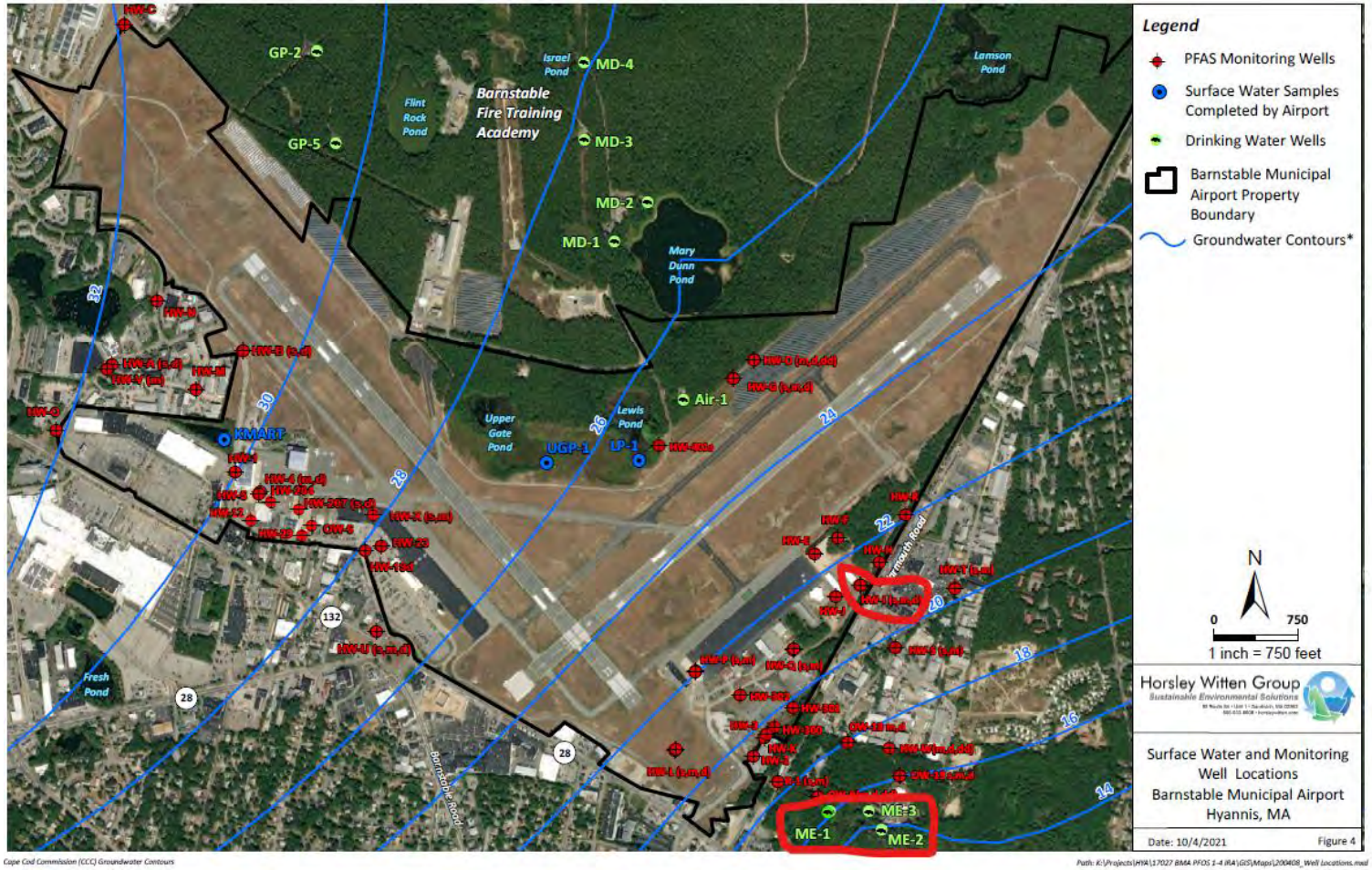

Figure A-1. Map showing Battelle Sample collection locations. Red boundary areas show the locations of six samples collected.

Table A-1. List of PFAS analytes and their method detection limits (MDLs), limits of detection(LODs), and limits of quantitation (LOQs) reported in nanogram per liter (ng/L) in aqueous matrices. Compliant with DoD QSM 5.3 Table B-15.

Analyte	CAS No.	MDL (ng/L)	LOD (ng/L)	LOQ (ng/L)
NFDHA	151772-58-6	0.761	2.50	5.00
PFEESA	113507-82-7	0.687	2.50	5.00
PFMPA	377-73-1	1.08	2.50	5.00
PFMBA	863090-89-5	0.92	2.50	5.00
PFBA	375-22-4	1.49	3.50	5.00
PFPeA	2706-90-3	1.26	3.50	5.00
PFHxA	307-24-4	0.902	2.50	5.00
PFHpA	375-85-9	0.930	2.50	5.00
PFOA	335-67-1	0.998	2.50	5.00
PFNA	375-95-1	0.823	2.50	5.00
PFDA	335-76-2	0.775	2.50	5.00
PFUnA	2058-94-8	0.743	2.50	5.00
PFDoA	307-55-1	0.751	2.50	5.00
PFTrDA	72629-94-8	0.733	2.50	5.00
PFTeDA	376-06-7	0.782	2.50	5.00
PFHxDA	67905-19-5	0.762	2.50	5.00
PFODA	16517-11-6	0.942	2.50	5.00
NMeFOSAA	2355-31-9	1.02	2.50	5.00
NEtFOSAA	2991-50-6	0.978	2.50	5.00
NMeFOSA	31506-32-8	1.05	2.50	5.00
NEtFOSA	4151-50-2	1.25	3.50	5.00
NMeFOSE	24448-09-7	1.06	2.50	5.00
NEtFOSE	1691-99-2	1.35	3.50	5.00
PFOSA	754-91-6	1.56	3.50	5.00
PFBS	375-73-5	0.856	2.50	5.00
PFPeS	2706-91-4	1.01	2.50	5.00
PFHxS	355-46-4	0.985	2.50	5.00
PFHpS	375-92-8	0.831	2.50	5.00
PFOS	1763-23-1	1.06	2.50	5.00
PFNS	68259-12-1	0.693	2.50	5.00
PFDS	335-77-3	0.770	2.50	5.00

Table A-1 (continued). List of PFAS analytes and their method detection limits (MDLs), limits of detection(LODs), and limits of quantitation (LOQs) reported in nanogram per liter (ng/L) in aqueous matrices.

Analyte	CAS No.	MDL (ng/L)	LOD (ng/L)	LOQ (ng/L)
PFDoS	79780-39-5	0.793	2.50	5.00
4:2FTS	757124-72-4	1.01	2.50	5.00
6:2FTS	27619-97-2	1.45	3.50	5.00
8:2FTS	39108-34-4	0.998	2.50	5.00
10:2FTS	108026-35-3	1.02	2.50	5.00
3:3 FTCA	356-02-5	1.49	3.50	5.00
5:3 FTCA	914637-49-3	1.11	2.50	5.00
7:3 FTCA	812-70-4	0.998	2.50	5.00
HFPO-DA	13252-13-6	0.855	2.50	5.00
ADONA	919005-14-4	0.859	2.50	5.00
9Cl-PF3ONS	756426-58-1	1.02	2.50	5.00
11Cl-PF3OUdS	763051-92-9	0.890	2.50	5.00

Analytes italicized in bold are included on our DoD ELAP scope of accreditation.

Table A-2. Suspect Screening Analysis, all Confidence Levels

Component name	Formula	Multiple Detects[1]	Ionization	ME-1 E4930-FS	ME-3 E4931-FS	ME-2 E4932-FS	HW-I(s) E4933-FS	HW-I(m) E4934-FS	HW-I(d) E4935-FS
1HO-n:2 FTS C6	C8H5F13O4S	No	Negative	ND	ND	ND	3.43E+03	ND	ND
6:2 FASO2PA-MePS	C15H18F13NO6S2	No	Negative	1.40E+03	ND	1.37E+03	2.72E+05	ND	ND
6:2 FTS	C8H5F13O3S	No	Negative	3.76E+03	9.17E+02	7.64E+03	4.67E+05	ND	ND
8:2 FTS	C10H5F17O3S	No	Negative	ND	ND	3.65E+02	8.65E+02	ND	ND
FBSA	C4H2F9NO2S	No	Negative	4.83E+02	5.34E+02	7.26E+02	2.69E+03	ND	ND
FHxSA	C6H2F13NO2S	Yes	Negative	5.73E+02	1.42E+03	3.70E+02	1.70E+04	ND	ND
FOSA	C8H2F17NO2S	No	Negative	ND	5.39E+03	1.44E+03	ND	ND	ND
N-SHOPAmP-FASAHOPS C6	C17H25F13N2O10S3	No	Negative	2.05E+03	1.05E+03	ND	ND	ND	ND
N-SP-FASA C6	C9H8F13NO5S2	No	Negative	ND	ND	ND	1.02E+03	ND	ND
N-SPAmP-FASAPS C6	C17H25F13N2O8S3	Yes	Negative	ND	ND	ND	4.79E+03	ND	ND
PFBA	C4HF7O2	No	Negative	6.20E+02	3.66E+02	5.73E+02	1.73E+03	ND	3.14E+02
PFBS	C4HF9O3S	No	Negative	1.44E+03	1.95E+03	3.13E+03	1.73E+03	ND	1.20E+03
PFHpA	C7HF13O2	No	Negative	5.51E+03	3.14E+03	6.56E+03	6.78E+04	4.03E+02	3.51E+03
PFHpS	C7HF15O3S	Yes	Negative	1.75E+03	2.11E+03	1.87E+03	1.29E+04	ND	2.29E+03
PFHxA	C6HF11O2	No	Negative	6.96E+03	4.63E+03	9.28E+03	3.25E+04	ND	3.87E+03
PFHxS	C6HF13O3S	Yes	Negative	3.07E+04	3.66E+04	3.83E+04	9.15E+04	3.72E+03	4.78E+04
PFNA	C9HF17O2	No	Negative	4.28E+03	3.00E+03	4.09E+03	3.55E+04	ND	5.36E+02
PFOA	C8HF15O2	Yes	Negative	6.32E+03	5.27E+03	6.82E+03	5.89E+04	ND	4.03E+03
PFOS	C8HF17O3S	Yes	Negative	7.45E+04	9.63E+04	6.08E+04	3.58E+05	8.06E+03	4.95E+04
PFPeA	C5HF9O2	Yes	Negative	4.49E+03	2.27E+03	4.80E+03	1.73E+04	ND	1.68E+03
PFPeS	C5HF11O3S	No	Negative	2.11E+03	2.95E+03	3.18E+03	7.30E+03	ND	2.22E+03
4:2 FASO2PA-MePS	C13H18F9NO6S2	No	Positive	ND	1.66E+04	ND	ND	ND	ND
6:2 FASO2PA-MePS	C15H18F13NO6S2	No	Positive	1.77E+04	ND	1.40E+04	2.57E+06	ND	ND

Notes:

[1] – Isomers Observed

ND denotes non-detect

CL1
CL2b
CL3
CL4

Table A-2. Suspect Screening Analysis, all Confidence Levels

Component name	Formula	Multiple Detects	Ionization	ME-1 E4930-FS	ME-3 E4931-FS	ME-2 E4932-FS	HW-I(s) E4933-FS	HW-I(m) E4934-FS	HW-I(d) E4935-FS
6:2 FTAB	C15H19F13N2O4S	No	Positive	3.23E+03	ND	ND	ND	1.30E+03	ND
6:2 FTMAc	C12H9F13O2	No	Positive	1.31E+04	1.38E+04	8.20E+03	ND	ND	ND
8:2 FTAB	C17H19F17N2O4S	No	Positive	ND	ND	ND	3.21E+03	ND	ND
N-CMAmP FASA C3	C10H15F7N2O4S	No	Positive	ND	1.45E+04	1.23E+04	ND	ND	ND
N-HOEAmP-FASA C3	C10H17F7N2O3S	No	Positive	2.75E+04	2.86E+04	3.67E+04	ND	ND	1.61E+04
N-HOEAmP-FASA C5	C12H17F11N2O3S	Yes	Positive	2.91E+04	3.10E+04	1.95E+04	4.89E+03	ND	ND
N-HOEAmP-FASA C8	C15H17F17N2O3S	No	Positive	ND	ND	ND	1.14E+04	ND	ND
N-HOEAmP-FASE C2	C11H21F5N2O4S	No	Positive	ND	1.61E+04	ND	ND	ND	ND
N-HOEAmP-FASE C5	C14H21F11N2O4S	Yes	Positive	1.67E+04	1.90E+04	1.43E+04	ND	ND	ND
N-SHOPAmP-FASA C4	C12H19F9N2O6S2	No	Positive	1.45E+04	1.55E+04	ND	ND	ND	ND
N-SHOPAmP-FASAHOPS C6	C17H25F13N2O10S3	No	Positive	4.68E+04	2.32E+04	1.30E+04	ND	8.26E+03	9.87E+03
N-SPAmP-FASA C4	C12H19F9N2O5S2	No	Positive	ND	ND	ND	4.38E+04	ND	ND
N-SPAmP-FASA C6	C14H19F13N2O5S2	No	Positive	ND	1.09E+04	ND	ND	ND	ND
N-SPAmP-FASAA C4	C14H21F9N2O7S2	No	Positive	ND	ND	ND	2.24E+04	ND	ND
N-SPAmP-FASAA C5	C15H21F11N2O7S2	No	Positive	ND	ND	ND	3.13E+04	ND	ND
N-SPAmP-FASAA C6	C16H21F13N2O7S2	Yes	Positive	ND	1.18E+04	ND	2.18E+04	ND	ND
N-SPAmP-FASAPS C4	C15H25F9N2O8S3	No	Positive	ND	ND	ND	1.14E+04	ND	ND
N-SPAmP-FASAPS C5	C16H25F11N2O8S3	No	Positive	ND	ND	ND	2.25E+04	ND	ND
N-SPAmP-FASAPS C6	C17H25F13N2O8S3	Yes	Positive	1.70E+04	2.19E+04	1.22E+04	1.27E+05	9.56E+03	1.55E+04
N-SPHOEAmP-FASA C6	C15H21F13N2O6S2	No	Positive	ND	ND	ND	3.98E+04	ND	ND
N-TAmP-N-MeFASA C7	C14H18F15N2O2S	No	Positive	1.20E+04	ND	1.11E+04	ND	ND	ND
PFPeSaAm	C10H13F11N2O2S	No	Positive	1.16E+04	1.24E+04	ND	ND	ND	ND

Notes:

[1] – Isomers Observed

ND denotes non-detect

CL1
CL2b
CL3
CL4

Table A-3. Suspect screening Analysis quality control samples summary

Component name	Formula	Multiple Detects	Ionization	Procedural Blank DJ508PB-FS	Laboratory Control Sample DJ509LCS-FS	NA Instrument Std
11Cl-F53B/8:2 Cl-PFESA	C10HClF20O4S	No	Negative	ND	2.93E+05	1.99E+05
4:2 FTS	C6H5F9O3S	No	Negative	ND	1.85E+04	1.14E+04
5:3 FTCA	C8H5F11O2	No	Negative	ND	4.38E+03	ND
6:2 FTS	C8H5F13O3S	No	Negative	ND	2.55E+04	1.44E+04
7:3 FTCA	C10H5F15O2	No	Negative	ND	1.14E+04	ND
8:2 FTS	C10H5F17O3S	No	Negative	ND	2.94E+04	2.08E+04
9Cl-F53B/6:2 Cl-PFESA	C8HClF16O4S	No	Negative	ND	2.16E+05	1.38E+05
ADONA	C7H2F12O4	No	Negative	ND	2.72E+04	1.83E+04
FBSA	C4H2F9NO2S	No	Negative	ND	ND	4.54E+04
FHxSA	C6H2F13NO2S	Yes	Negative	ND	ND	7.71E+04
FOSA	C8H2F17NO2S	No	Negative	ND	1.64E+05	1.17E+05
GenX	C6HF11O3	No	Negative	ND	1.89E+03	1.21E+03
N-EtFOSA	C10H6F17NO2S	No	Negative	ND	9.28E+04	ND
N-EtFOSAA	C12H8F17NO4S	No	Negative	ND	2.93E+04	2.58E+04
N-MeFOSA	C9H4F17NO2S	No	Negative	ND	1.07E+05	ND
N-MeFOSAA	C11H6F17NO4S	No	Negative	ND	3.46E+04	2.84E+04
NFDHA	C5HF9O4	No	Negative	ND	1.96E+03	1.29E+03
O-PFBS	C4HF9O4S	No	Negative	ND	1.04E+05	7.43E+04
PFBA	C4HF7O2	No	Negative	ND	5.57E+03	ND
PFBS	C4HF9O3S	No	Negative	ND	1.03E+05	7.20E+04
PFDA	C10HF19O2	No	Negative	ND	7.11E+04	4.88E+04
PFDS	C10HF21O3S	No	Negative	ND	3.06E+05	2.15E+05
PFDoDA	C12HF23O2	No	Negative	ND	1.01E+05	6.66E+04
PFDoDS	C12HF25O3S	No	Negative	ND	3.95E+05	ND
PFECHS	C8HF15O3S	No	Negative	ND	ND	1.31E+05
PFHpA	C7HF13O2	No	Negative	ND	6.37E+04	3.86E+04
PFHpS	C7HF15O3S	Yes	Negative	ND	2.14E+05	1.44E+05
PFHxA	C6HF11O2	No	Negative	ND	4.24E+04	2.69E+04
PFHxDA	C16HF31O2	No	Negative	ND	1.48E+05	ND

Notes

NA denotes not applicable as the analyte is not spiked
ND denotes non-detect
Standard Mix is the QC check at 20 µg/L in Negative mode analysis and 25 µg/L in Positive mode analysis
CL1
CL2b
CL3
CL4

Table A-3 (continued). Suspect screening Analysis quality control samples summary

Component name	Formula	Multiple Detects	Ionization	Process Blank DJ508PB-FS	Laboratory Control Sample DJ509LCS-FS	NA Instrument Std
PFHxS	C6HF13O3S	Yes	Negative	ND	1.65E+05	1.18E+05
PFMOBA	C5HF9O3	No	Negative	ND	3.76E+03	2.57E+03
PFNA	C9HF17O2	No	Negative	ND	6.86E+04	4.55E+04
PFNS	C9HF19O3S	No	Negative	ND	2.73E+05	2.06E+05
PFOA	C8HF15O2	Yes	Negative	ND	6.02E+04	3.98E+04
PFODA	C18HF35O2	No	Negative	ND	5.29E+04	ND
PFOS	C8HF17O3S	Yes	Negative	ND	1.63E+05	1.31E+05
PFPeA	C5HF9O2	Yes	Negative	ND	1.61E+04	1.10E+04
PFPeS	C5HF11O3S	No	Negative	ND	1.58E+05	1.10E+05
PFPrS	C3HF7O3S	No	Negative	ND	ND	4.81E+03
PFTeDA	C14HF27O2	No	Negative	ND	1.17E+05	7.66E+04
PFTrDA	C13HF25O2	No	Negative	ND	1.02E+05	7.04E+04
PFUnDA	C11HF21O2	No	Negative	ND	7.39E+04	5.08E+04
5:1:2 FTB	C12H13F12NO2	No	Positive	ND	ND	7.22E+05
5:3 FTB	C12H14F11NO2	No	Positive	ND	ND	7.32E+05
6:2 FTAB	C15H19F13N2O4S	No	Positive	ND	ND	6.17E+05
N-TAmP-FASA C6	C12H15F13N2O2S	No	Positive	ND	ND	1.14E+06
PFHxSaAm	C11H13F13N2O2S	No	Positive	ND	ND	8.79E+05

Notes

NA denotes not applicable as the analyte is not spiked
ND denotes non-detect
Standard Mix is the QC check at 20 µg/L in Negative mode analysis and 25 µg/L in Positive mode analysis
CL1
CL2b
CL3
CL4

Table A-4. Analyte key

	Component Name	Full Chemical Name	Formula	Expected Mass (Da)	CASRN(s)	Reference(s)
1	**11Cl-F53B/8:2 Cl-PFESA**	8:2 chlorinated polyfluorinated ether sulfonate	C10HClF20O4S	631.8965	763051-92-9	Standard Available
2	**1HO-n:2 FTS C6**	1-Octanesulfonic acid, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro-1-hydroxy-	C8H5F13O4S	443.9701	2089110-01-8	(Barzen-Hanson et al, 2017) 39
3	**4:2 FASO2PA-MePS**	2-methyl-2-[3-(3,3,4,4,5,5,6,6,6-nonafluorohexylsulfonyl)propanoylamino]propane-1-sulfonic acid (pubchem, not found via scifinder)	C13H18F9NO6S2	519.0432	Cf. 6:2: 1911606-13-7	(Barzen-Hanson et al, 2017) PR-11
4	**4:2 FTS**	1-Hexanesulfonic acid, 3,3,4,4,5,5,6,6,6-nonafluoro-	C6H5F9O3S	327.9816	757124-72-4	Standard Available
5	**5:1:2 FTB**	1-Octanaminium, N-(carboxymethyl)-3,4,4,5,5,6,6,7,7,8,8,8-dodecafluoro-N,N-dimethyl-, inner salt	C12H13F12NO2	431.0755	171184-02-4	Standard Available
6	**5:3 FTB**	1-Octanaminium, N-(carboxymethyl)-4,4,5,5,6,6,7,7,8,8,8-undecafluoro-N,N-dimethyl-, inner salt	C12H14F11NO2	413.0849	171184-14-8	Standard Available
7	**5:3 FTCA**	Octanoic acid, 4,4,5,5,6,6,7,7,8,8,8-undecafluoro-	C8H5F11O2	342.0114	914637-49-3	Standard Available
8	**6:2 FASO2PA-MePS**	1-Propanesulfonic acid, 2-methyl-2-[[1-oxo-3-[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]propyl]amino]-	C15H18F13NO6S2	619.0368	1911606-13-7	(Barzen-Hanson et al, 2017) PR-11
9	**6:2 FTAB**	1-Propanaminium, N-(carboxymethyl)-N,N-dimethyl-3-[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, inner salt	C15H19F13N2O4S	570.0858	34455-29-3	Standard Available
10	**6:2 FTMAc**	2-Propenoic acid, 2-methyl-, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl ester	C12H9F13O2	432.0395	2144-53-8	(Buck et al, 2011)

Table A-4. Analyte key

	Component Name	Full Chemical Name	Formula	Expected Mass (Da)	CASRN(s)	Reference(s)
11	**6:2 FTS**	1-Octanesulfonic acid, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro-	C8H5F13O3S	427.9752	27619-97-2	Standard Available
12	**7:3 FTCA**	Decanoic acid, 4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-pentadecafluoro-	C10H5F15O2	442.005	812-70-4	Standard Available
13	**8:2 FTAB**	1-Propanaminium, N-(carboxymethyl)-3-[[(3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl)sulfonyl]amino]-N,N-dimethyl-, inner salt	C17H19F17N2O4S	670.0794	34455-21-5	(Buck et al, 2011); (D'Agostino and Mabury, 2014) L
14	**8:2 FTS**	1-Decanesulfonic acid, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluoro-	C10H5F17O3S	527.9688	39108-34-4	Standard Available
15	**9Cl-F53B/6:2 Cl-PFESA**	6:2 chlorinated polyfluorinated ether sulfonate	C8HClF16O4S	531.9029	756426-58-1	Standard Available
16	**ADONA**	Propanoic acid, 2,2,3-trifluoro-3-[1,1,2,2,3,3-hexafluoro-3-(trifluoromethoxy)propoxy]-	C7H2F12O4	377.9761	919005-14-4	Standard Available
17	**FBSA**	1-Butanesulfonamide, 1,1,2,2,3,3,4,4,4-nonafluoro-	C4H2F9NO2S	298.9663	30334-69-1	Standard Available
18	**FHxSA**	1-Hexanesulfonamide, 1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluoro-	C6H2F13NO2S	398.9599	41997-13-1	Standard Available
19	**FOSA**	1-Octanesulfonamide, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-	C8H2F17NO2S	498.9535	754-91-6	Standard Available
20	**GenX**	Propanoic acid, 2,3,3,3-tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-	C6HF11O3	329.975	13252-13-6	Standard Available
21	**N-CMAmP FASA C3**	1-Propanaminium, N-(carboxymethyl)-3-[[(1,1,2,2,3,3,3-heptafluoropropyl)sulfonyl]amino]-N,N-dimethyl-	C10H15F7N2O4S	392.0641	2089109-21-5	(Barzen-Hanson et al, 2017) 16
22	**N-EtFOSA**	1-Octanesulfonamide, N-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-	C10H6F17NO2S	526.9848	4151-50-2	Standard Available

Table A-4. Analyte key

	Component Name	Full Chemical Name	Formula	Expected Mass (Da)	CASRN(s)	Reference(s)
23	**N-EtFOSAA**	Glycine, N-ethyl-N-[(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctyl)sulfonyl]-	C12H8F17NO4S	584.9903	2991-50-6	Standard Available
24	**NFDHA**	Perfluoro-3,6-dioxaheptanoic acid	C5HF9O4	295.9731	151772-58-6	Standard Available
25	**N-HOEAmP-FASA C3**	1-Propanaminium, 3-[[(1,1,2,2,3,3,3-heptafluoropropyl)sulfonyl]amino]-N-(2-hydroxyethyl)-N,N-dimethyl-	C10H17F7N2O3S	378.0848	2089109-08-8	(Barzen-Hanson et al, 2017) 11
26	**N-HOEAmP-FASA C5**	1-Propanaminium, N-(2-hydroxyethyl)-N,N-dimethyl-3-[[(1,1,2,2,3,3,4,4,5,5,5-undecafluoropentyl)sulfonyl]amino]-	C12H17F11N2O3S	478.0784	142519-28-6	(Barzen-Hanson et al, 2017) 11
27	**N-HOEAmP-FASA C8**	1-Propanaminium, 3-[[(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctyl)sulfonyl]amino]-N-(2-hydroxyethyl)-N,N-dimethyl-	C15H17F17N2O3S	628.0688	71864-97-6	(Barzen-Hanson et al, 2017) 11
28	**N-HOEAmP-FASE C2**	1-Propanaminium, N-(2-hydroxyethyl)-3-[(2-hydroxyethyl)[(1,1,2,2,2-pentafluoroethyl)sulfonyl]amino]-N,N-dimethyl-	C11H21F5N2O4S	372.1142	2089108-97-2	(Barzen-Hanson et al, 2017) 9
29	**N-HOEAmP-FASE C5**	1-Propanaminium, N-(2-hydroxyethyl)-3-[(2-hydroxyethyl)[(1,1,2,2,3,3,4,4,5,5,5-undecafluoropentyl)sulfonyl]amino]-N,N-dimethyl-	C14H21F11N2O4S	522.1046	2089109-00-0	(Barzen-Hanson et al, 2017) 9
30	**N-MeFOSA**	1-Octanesulfonamide, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-N-methyl-	C9H4F17NO2S	512.9691	31506-32-8	Standard Available
31	**N-MeFOSAA**	Glycine, N-[(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctyl)sulfonyl]-N-methyl-	C11H6F17NO4S	570.9746	2355-31-9	Standard Available

Table A-4. Analyte key

	Component Name	Full Chemical Name	Formula	Expected Mass (Da)	CASRN(s)	Reference(s)
32	**N-SHOPAmP-FASA C4**	1-Propanaminium, 2-hydroxy-N,N-dimethyl-N-[3-[[(1,1,2,2,3,3,4,4,4-nonafluorobutyl)sulfonyl]amino]propyl]-3-sulfo-, inner salt	C12H19F9N2O6S2	522.0541	2103241-12-7	(Barzen-Hanson et al, 2017) 3
33	**N-SHOPAmP-FASAHOPS C6**	1-Propanaminium, 2-hydroxy-N-[3-[(2-hydroxy-3-sulfopropyl)[(1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluorohexyl)sulfonyl]amino]propyl]-N,N-dimethyl-3-sulfo-, inner salt	C17H25F13N2O10S3	760.0464	2103241-10-5	(Barzen-Hanson et al, 2017) 29
34	**N-SPAmP-FASA C4**	1-Propanaminium, N,N-dimethyl-N-[3-[[(1,1,2,2,3,3,4,4,4-nonafluorobutyl)sulfonyl]amino]propyl]-3-sulfo-, inner salt	C12H19F9N2O5S2	506.0592	864069-52-3	(Barzen-Hanson et al, 2017) 2
35	**N-SPAmP-FASA C6**	1-Propanaminium, N,N-dimethyl-N-(3-sulfopropyl)-3-[[(1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluorohexyl)sulfonyl]amino]-, inner salt	C14H19F13N2O5S2	606.0528	2103241-08-1	(Barzen-Hanson et al, 2017) 2
36	**N-SPAmP-FASAA C4**	1-Propanaminium, 3-[(carboxymethyl)[(1,1,2,2,3,3,4,4,4-nonafluorobutyl)sulfonyl]amino]-N,N-dimethyl-N-(3-sulfopropyl)-, inner salt	C14H21F9N2O7S2	564.0646	2254560-17-1	(Barzen-Hanson et al, 2017) 32
37	**N-SPAmP-FASAA C5**	1-Propanaminium, 3-[(carboxymethyl)[(1,1,2,2,3,3,4,4,5,5,5-undecafluoropentyl)sulfonyl]amino]-N,N-dimethyl-N-(3-sulfopropyl)-, inner salt	C15H21F11N2O7S2	614.0615	2254560-23-9	(Barzen-Hanson et al, 2017) 32
38	**N-SPAmP-FASAA C6**	1-Propanaminium, 3-[(carboxymethyl)[(1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluorohexyl)sulfonyl]amino]-N,N-dimethyl-N-(3-sulfopropyl)-, inner salt	C16H21F13N2O7S2	664.0583	2254560-24-0	(Barzen-Hanson et al, 2017) 32
39	**N-SPAmP-FASAPS C4**	1-Propanaminium, N,N-dimethyl-N-[3-[[(1,1,2,2,3,3,4,4,4-nonafluorobutyl)sulfonyl](3-sulfopropyl)amino]propyl]-3-sulfo-, inner salt	C15H25F9N2O8S3	628.0629	2254560-15-9	(Barzen-Hanson et al, 2017) 5

Table A-4. Analyte key

	Component Name	Full Chemical Name	Formula	Expected Mass (Da)	CASRN(s)	Reference(s)
40	**N-SPAmP-FASAPS C5**	1-Propanaminium, N,N-dimethyl-N-(3-sulfopropyl)-3-[(3-sulfopropyl)[(1,1,2,2,3,3,4,4,5,5,5-undecafluoropentyl)sulfonyl]amino]-, inner salt	C16H25F11N2O8S3	678.0597	2254560-20-6	(Barzen-Hanson et al, 2017) 5
41	**N-SPAmP-FASAPS C6**	1-Propanaminium, N,N-dimethyl-N-(3-sulfopropyl)-3-[(3-sulfopropyl)[(1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluorohexyl)sulfonyl]amino]-, inner salt	C17H25F13N2O8S3	728.0565	2103241-11-6	(Barzen-Hanson et al, 2017) 5
42	**N-SP-FASA C6**	1-Propanesulfonic acid, 3-[[(1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluorohexyl)sulfonyl]amino]-	C9H8F13NO5S2	520.9636	2089108-64-3	(Barzen-Hanson et al, 2017) 1
43	**N-SPHOEAmP-FASA C6**	N-dimethylaminohydroxybutyl-perfluorohexanesulfonamidopropylsulfonate	C15H21F13N2O6S2	636.0633	2089108-76-7	(Barzen-Hanson et al, 2017) 4
44	**N-TAmP-FASA C6**	6:2 fluorotelomer sulfonamido propyl methyl amine	C12H15F13N2O2S	498.0647	38850-51-0	Standard Available
45	**N-TAmP-N-MeFASA C7**	N-trimethylammoniopropyl N-methylperfluoroheptanesulfonamide	C14H18F15N2O2S	563.0849	765219-81-6	(Barzen-Hanson et al, 2017) 12
46	**O-PFBS**	perfluorobutane ether sulfonate	C4HF9O4S	315.9452	85963-79-7	Standard Available
47	**PFBA**	Perfluorobutanoic acid	C4HF7O2	213.9865	335-10-4	Standard Available
48	**PFBS**	Perfluorobutanesulfonic acid	C4HF9O3S	299.9503	104729-49-9	Standard Available
49	**PFDA**	Perfluorodecanoic acid	C10HF19O2	513.9673	172155-07-6	Standard Available
50	**PFDoDA**	Perfluorododecanoic acid	C12HF23O2	613.9609	307-55-1	Standard Available
51	**PFDoDS**	Perfluorododecanesulfonic acid	C12HF25O3S	699.9247	79780-39-5	Standard Available

Table A-4. Analyte key

	Component Name	Full Chemical Name	Formula	Expected Mass (Da)	CASRN(s)	Reference(s)
52	**PFDS**	Perfluorodecanesulfonic acid	C10HF21O3S	599.9311	335-77-3	Standard Available
53	**PFECHS**	perfluoro ethyl cyclohexane sulfonate	C8HF15O3S	461.9407	646-83-3	Standard Available
54	**PFHpA**	Perfluoroheptanoic acid	C7HF13O2	363.9769	922168-41-0	Standard Available
55	**PFHpS**	Perfluoroheptanesulfonic acid	C7HF15O3S	449.9407	118334-96-6	Standard Available
56	**PFHxA**	Perfluorohexanoic acid	C6HF11O2	313.9801	307-24-4	Standard Available
57	**PFHxDA**	Perfluorohexadecanoic acid	C16HF31O2	813.9482	67905-19-5	Standard Available
58	**PFHxS**	Perfluorohexanesulfonic acid	C6HF13O3S	399.9439	355-46-4	Standard Available
59	**PFHxSaAm**	Perfluorohexane sulfonamido amine	C11H13F13N2O2S	484.049	50598-28-2	Standard Available
60	**PFMOBA**	Perfluoro-n-methoxy butanoic acid	C5HF9O3	279.9782	863090-89-5	Standard Available
61	**PFNA**	Perfluorononanoic acid	C9HF17O2	463.9705	15899-31-7	Standard Available
62	**PFNS**	Perfluorononanesulfonic acid	C9HF19O3S	549.9343	68259-12-1	Standard Available
63	**PFOA**	Perfluorooctanoic acid	C8HF15O2	413.9737	335-67-1	Standard Available
64	**PFODA**	Perfluorostearic acid	C18HF35O2	913.9418	16517-11-6	Standard Available
65	**PFOS**	Perfluorooctanesulfonic acid	C8HF17O3S	499.9375	927670-12-0	Standard Available
66	**PFPeA**	Perfluoropentanoic acid	C5HF9O2	263.9833	2706-90-3	Standard Available
67	**PFPeS**	Perfluoropentanesulfonic acid	C5HF11O3S	349.9471	2706-91-4	Standard Available
68	**PFPrS**	perfluoropropane sulfonate	C3HF7O3S	249.9535	423-41-6	Standard Available
69	**PFTeDA**	Perfluorotetradecanoic acid	C14HF27O2	713.9545	376-06-7	Standard Available
70	**PFTrDA**	Perfluorotridecanoic acid	C13HF25O2	663.9577	16486-96-7	Standard Available

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Cape Cod Gateway Airport - PFAS
Project No G00120.XX.XX.XXXX.NORWEL
PFAS by DoD QSM 5.3 Table B-15

GW

Batch 22-1319

Package DP-22-1361

Submitted to:
Horsely Witten Group, Inc.
90 Route 6A
Sandwich, MA 02563 U.S.A.

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

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Cape Cod Gateway Airport - PFAS
Project No G00120.XX.XX.XXXX.NORWEL
PFAS by DoD QSM 5.3 Table B-15

GW

Batch 22-1319

Package DP-22-1361

Submitted to:
Horsely Witten Group, Inc.
90 Route 6A
Sandwich, MA 02563 U.S.A.

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: Lauren Griffith 2022.09.12 12:04:08 -04'00'

QC Chemist Approval: Deb Huntress 2022.09.16 08:05:59 -04'00'

Project Manager Approval: Robert Lizotte, Jr. 2022.09.16 08:47:23 -04'00'

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Cape Cod Gateway Airport - PFAS
Project No G00120.XX.XX.XXXX.NORWEL
PFAS by DoD QSM 5.3 Table B-15

GW

Batch 22-1319

Package DP-22-1361

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Master Signature Page

Name (Printed)	Signature	Initials	Date
Jonathan Thorn		JRT	1/9/2020
Robert Lizotte, Jr.		BL	1.9.2020
Elyn M Fitch		EMF	1/9/2020
Carla Devine		CRD	1/9/2020
Denise Schumitz		DS	1/9/2020
Lauren Griffith		LMG	1.9.2020
Carrie P McCarthy		CPM	1/9/2020
Rich Restuccia		RR	1/9/2020
Sam Guimaraes		SAG	1/9/2020
Jordan Tower		JT	1/9/2020
Christie Usher		CU	1/9/2020
Kevin McInerney		KM	1/14/2020
Matt Schumitz		MDS	1/14/2020
Weidong Li		W.L	1/14/2020
Kayla Lamarre		KAL	1/14/2020
MUNAZ MUNTASIR		MM	01/14/2020
Kristen Nichols		KN	01/14/2020
Kelsey Harnden		KH	01/30/2020
Kevin Bailey		KB	1/30/2020
Stephanie Schultz		SAS	1/30/2020

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Name (Printed)	Signature	Initials	Date
Clinicco Brown		CB	01/30/20
Ryan Kelly		RK	01/30/20
KAREN HYPPOLITE		K.H.	01/31/20
Gail DeRuzzo		GD	01/31/2020
Tracy Stenner			1/31/2020
Ashley Wellington		AW	1131/2020
Daniel Cooney		DAC	1/31/2020
Peter Demers		PD	1/31/2020
Andy Delmer		AD	3/19/2021
Emily Reardon		ER	3/19/2021
Brenton Murphy		BM	3/19/2021
Haley Hart		HH	3/19/21
Allison Wamness		AW	3/19/21
Taylor Noonan		TN	3/19/21
FRANCO PALA		FP	3/19/21
Amina Chamanlal		AC	11/03/21
J Michelle Wentzell		MW	11-3-21
Zachary Dreiker		ZD	11/3/21
Drew Croke		DC	11/3/21
Zachary Willenberg		ZW	11/3/21

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Name (Printed)	Signature	Initials	Date
Hayley Beal	Hayley Beal	HB	5/9/2022
Nathaniel Kinsman	Nathaniel Kinsman	NK	5/9/2022
Debra Huntress	Debra Huntress	DHU	5/9/22
Vincent Urso	Vincent Urso	VU	5/9/22

Sample Summary

Client: Horsely Witten Group, Inc.
SDG: 22-1319
Project/Site: Cape Cod Gateway Airport - PFAS
CTO: NA

Lab Sample ID	Client Sample ID	Matrix	Collection Date	Receipt Date
DJ508PB-FS	Procedural Blank	WATER	8/8/2022	8/8/2022
DJ509LCS-FS	Laboratory Control Sample	WATER	8/8/2022	8/8/2022
E4930-FS	ME-1	GW	7/29/2022	8/3/2022
E4931-FS	ME-3	GW	7/29/2022	8/3/2022
E4932-FS	ME-2	GW	7/29/2022	8/3/2022
E4933-FS	HW-I(s)	GW	8/2/2022	8/3/2022
E4934-FS	HW-I(m)	GW	8/2/2022	8/3/2022
E4935-FS	HW-I(d)	GW	8/2/2022	8/3/2022

Work Plan

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WORK/QUALITY ASSURANCE PROJECT PLAN

1.0 GENERAL PROJECT INFORMATION

Project Title:	Cape Cod Gateway Airport - PFAS
Project Number:	G00120.XX.XX.XXXX.NORWEL
Client:	Horsely Witten Group, Inc. 90 Route 6A Unit 1 Sandwich, MA 02563 U.S.A.
Client Contact Information:	Bryan Massa Senior Environmental Professional (508) 833-6600(V) NA bmassa@horselywitten.com
Effective Date of QAPP:	8/3/2022
Version Number:	G00120.XX.XX.XXXX.NORWEL(L)-01
Project Manager:	Thorn, Jonathan
Laboratory Task Manager:	Thorn, Jonathan
Deliverable Due Date:	8/31/2022

2.0 SCOPE OF WORK

Overview:	Analysis of water samples for PFAS.
Matrix:	Water

2.1 TECHNICAL APPROACH

2.1.1 Sample Receipt, Storage, and Handling

The list of samples for this project plan are presented in Attachment 1.

Storage Directions:	Store refrigerated.
Sub_Sampling:	None
Procedures:	NA
Contact:	NA
Comment:	Extracts will be sent to Columbus after analysis.
Archiving:	None.
Disposal:	None.

2.1.2 Sample Preparation

None.

Samples Expected:	Samples Per Batch:	Batches Expected:
6	20	1

Batch quality control samples are defined in Table 1.

Target samples are presented in Attachment 1.

Table 1: Quality Control Samples

Type:	*Description:*	*Count:*	*Rgt:*	*Reference:*	*Comment:*
PB	Laboratory control reagent blank.	1 per batch	--	NA	
LCS	Laboratory Control Sample	1 per batch	No	NA	

2.1.3 Extraction/Preparation

2.1.3.1 Extraction

SOP No.-Rev:	**5-370-13**
SOP Title:	*Extraction of Poly and Perfluoroalkyl Substances from Environmental Matrices*
Sample Size:	250.00 ml
SIS and LCS/MS Compounds:	Defined in Table 2.
Deviations:	None.
Comments:	Samples must be prescreened prior to extraction.

Table 2: SIS and LCS/MS Spiking Level

Standard Type	Standard Contents		Spike Amount (ng)	Volume (uL)	Comment
PFAS DoD Surrogate (28 Targets)	LN97	SIS	~ 25.0 ng	50 uL	NA
PFAS DoD Surrogate (43 Targets)	LQ30	SIS	~ 25.0 ng	50 uL	NA
PFAS DoD Surrogate (18 Targets)	LR70	SIS	~ 25.0 ng	50 uL	NA
PFAS DoD Second	LR24	LCS/MS	~ 50 ng	250 uL	NA

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WORK/QUALITY ASSURANCE PROJECT PLAN

Standard Type	Standard Contents	Spike Amount (ng)	Volume (uL)	Comment
Source LCS/MS (43 Analytes)				

2.1.3.2 Cleanup

None.

RIS spiking levels are presented in Table 3.

Extract PIV (uL): 5000

Table 3: RIS Spiking Level

Standard Type	Standard Contents	Spike Amount (ng)	Volume (uL)	Comment
PFAS DoD Internal Standards	LR44 RIS	~ 25.0 ng	50 uL	NA

2.1.4 Instrumental Analysis

The list of analytes along with data quality criteria are presented in Attachment 2.

1) SOP_No-Rev: **5-369-09**

SOP_Title: *Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS)*

Deviations: None.

Comments: None.

2.2. DELIVERABLES

Deliverables Due:	8/31/2022
LIMS Reports:	*No*
Histograms:	*No*
Excel Tables:	*No*
EICs:	*No*
Chromatograms:	*No*
EDDs:	*No*
Comments:	• L2 Summary report • Excel tables

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WORK/QUALITY ASSURANCE PROJECT PLAN

3.0 QUALITY

The Method Quality Objectives are defined in Attachment 3.

4.0 ORGANIZATION AND COMMUNICATION

4.1 ORGANIZATION

The project team is defined in Table 4. Supervisors may make substitutions with Project Manager concurrence.

Table 4: Project Team and Roles

Staff Member	Role	Comment
Jonathan R. Thorn	Project Manager	NA
Hayley Beal	Sample Preparation	NA
Denise M. Schumitz	LC-MS/MS Analysis	NA
Matt D. Schumitz	Sample Custody	NA
Carla R. Devine	Quality Control Officer	NA
Zachary J. Willenberg	Quality Assurance Officer	NA

4.2 COMMUNICATION

A kick-off meeting will be held to discuss project scope and goals.

5.0 SCHEDULE

The project schedule is presented in Table 5.

Table 5. Schedule of Laboratory Activities

Activity:	Start Date:	End Date:	TAT (days):	Comment:
Sample Receipt	08/03/2022	08/03/2022	0	NA
Sample Preparation	08/03/2022	08/17/2022	14	NA
Instrument Analysis	08/17/2022	08/30/2022	13	NA
Quality Control Review	08/30/2022	08/31/2022	1	NA
Quality Assurance Review	08/31/2022	08/31/2022	0	NA

6.0 BUDGET

The labor budget for the analytical task is presented in Table 6.

Table 6. Labor Budget (Laboratory Analytical Task)

Labor Activity:	Hours/ Batch:	Batches:	Total Hours:	Comment:
Sample Receipt	1	1	1	NA
Sample Preparation	5	1	5	NA
Instrument Analysis	5	1	5	NA
Quality Control Review	1	1	1	NA
Quality Assurance Review	1	1	1	NA

7.0 STAFF DEVELOPMENT

None anticipated.

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WORK/QUALITY ASSURANCE PROJECT PLAN

Attachment 1: Target Samples

Shipment: **SHP-220803-02**

Status: Pending

Description: Cape Cod Gateway Airport

Range: E4930-E4935

Comment: NA

No:	BDO Id:	Client Sample ID:	Collection Date:	Matrix:	Storage Facility:	Location:	No:	Comments:
1	E4930	ME-1	07/29/2022 10:10 am	GW	R0119 (NA)			
2	E4931	ME-3	07/29/2022 10:20 am	GW	R0119 (NA)			
3	E4932	ME-2	07/29/2022 10:30 am	GW	R0119 (NA)			
4	E4933	HW-I(s)	08/02/2022 1:45 pm	GW	R0119 (NA)			
5	E4934	HW-I(m)	08/02/2022 2:10 pm	GW	R0119 (NA)			
6	E4935	HW-I(d)	08/02/2022 2:50 pm	GW	R0119 (NA)			

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WORK/QUALITY ASSURANCE PROJECT PLAN

Attachment 2: Test Codes

Project Test Code Name:	Master_369D
SOP Reference:	5-369 - Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS)
Description:	PFAS by DoD QSM 5.3 Table B-15
Matrix:	L - Liquid Samples, like water or sea water, prepared and anlyzed under the same class of detection limits.
Detection Limit Study:	5-369
Instrument:	LC-MS/MS
MQO Criteria	Universal_LC
Standard Report:	Standard Result Report

Method Specific Reporting

Result Units:	ng/L	***Unit Conversion:***	(none)		
Weight Basis:	LIQUID	***Result Format:***	Fixed Digits		
Standard Basis:	SIS	***# of Figures/Digits:***	2		
Oil Weight Basis:	No	***Oil Weight Source:***	Oil Weight		
U-Value Substition:	U-Flag=MD	***Histograms:***	No		
ECD_Reporting:	No				

Holding Times (days)

Sample:	14
Frozen:	14
Extract:	28

Data Flags

DL_Flag:	U
RL_Flag:	J
PB_Flag:	B
DIL_Flag:	D
HT_Flag:	T

No:	Analyte:	Report Name:	Type	RIS	SIS	Hidden:	Graph:
1	nonafluoro-3,6-dioxaheptanoic acid	NFDHA	T		13C5-PFHxA	No	No
2	Perfluoro (2-ethoxyethane) sulfonic acid	PFEESA	T		13C3-PFBS	No	No
3	Perfluoro-3-methoxypropanoic acid	PFMPA	T		13C4-PFBA	No	No
4	Perfluoro-4-methoxybutanoic acid	PFMBA	T		13C5-PFPeA	No	No
5	Perfluoro-n-butanoic Acid	PFBA	T		13C4-PFBA	No	No
6	Perfluoro-n-pentanoic acid	PFPeA	T		13C5-PFPeA	No	No
7	Perfluoro-n-hexanoic acid	PFHxA	T		13C5-PFHxA	No	No
8	Perfluoro-n-heptanoic Acid	PFHpA	T		13C4-PFHpA	No	No
9	Perfluoro-n-octanoic Acid	PFOA	T		13C8-PFOA	No	No
10	Perfluorononanoic Acid	PFNA	T		13C9-PFNA	No	No
11	Perfluoro-n-decanoic Acid	PFDA	T		13C6-PFDA	No	No
12	Perfluoro-n-undecanoic acid	PFUnA	T		13C7-PFUnA	No	No
13	Perfluoro-n-dodecanoic acid	PFDoA	T		13C2-PFDoA	No	No
14	Perfluoro-n-tridecanoic acid	PFTrDA	T		13C2-PFTeDA	No	No
15	Perfluoro-n-tetradecanoic acid	PFTeDA	T		13C2-PFTeDA	No	No
16	N-methylperfluoro-1-octanesulfonamidoacetic acid	NMeFOSAA	T		d3-MeFOSAA	No	No

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WORK/QUALITY ASSURANCE PROJECT PLAN

Attachment 2: Test Codes

Project Test Code Name: Master_369D

No:	Analyte:	Report Name:	Type	RIS	SIS	Hidden:	Graph:
17	N-ethylperfluoro-octanesulfonamidoacetic acid	NEtFOSAA	T		d5-EtFOSAA	No	No
18	N-methylperfluoro-1-octanesulfonamide	NMeFOSA	T		d3-MeFOSA	No	No
19	N-ethylperfluoro-1-octanesulfonamide	NEtFOSA	T		d5-EtFOSA	No	No
20	2-(N-methylperfluoro-1-octanesulfonamido)-ethanol	NMeFOSE	T		d7-MeFOSE	No	No
21	2-(N-ethylperfluoro-1-octanesulfonamido)-ethanol	NEtFOSE	T		d9-EtFOSE	No	No
22	Perfluoro-1-octanesulfonamide	PFOSA	T		13C8-FOSA	No	No
23	Perfluoro-1-butanesulfonate	PFBS	T		13C3-PFBS	No	No
24	perfluoro-1-pentanesulfonate	PFPeS	T		13C3-PFHxS	No	No
25	Perfluoro-1-hexanesulfonate	PFHxS	T		13C3-PFHxS	No	No
26	Perfluoro-1-heptanesulfonate	PFHpS	T		13C3-PFHxS	No	No
27	Perfluoro-1-octanesulfonate	PFOS	T		13C8-PFOS	No	No
28	Perfluoro-1-nonanesulfonate	PFNS	T		13C8-PFOS	No	No
29	Perfluoro-1-decanesulfonate	PFDS	T		13C8-PFOS	No	No
30	Perfluoro-1-dodecanesulfonate	PFDoS	T		13C8-PFOS	No	No
31	1H,1H,2H,2H-Perfluorohexane sulfonate	4:2FTS	T		13C2-4:2FTS	No	No
32	1H,1H,2H,2H-Perfluorooctane sulfonate	6:2FTS	T		13C2-6:2FTS	No	No
33	1H,1H,2H,2H-Perfluorodecane sulfonate	8:2FTS	T		13C2-8:2FTS	No	No
34	3-perfluoropropyl propanoic Acid	3:3 FTCA	T		13C5-PFHxA	No	No
35	3-Perfluoropentyl propanoic acid	5:3 FTCA	T		13C8-PFOA	No	No
36	3-Perfluoroheptyl propanoic acid	7:3 FTCA	T		13C6-PFDA	No	No
37	Hexafluoropropylene oxide dimer acid	HFPO-DA	T		13C3-HFPO-DA	No	No
38	Adona	Adona	T		13C8-PFOA	No	No
39	9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	9Cl-PF3ONS	T		13C8-PFOA	No	No
40	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	11Cl-PF3OUdS	T		13C8-PFOA	No	No
1	13C4-PFBA	13C4-PFBA	SIS	13C3-PFBA		No	No
2	13C5-PFPeA	13C5-PFPeA	SIS	13C3-PFBA		No	No
3	13C5-PFHxA	13C5-PFHxA	SIS	13C2-PFOA		No	No
4	13C4-PFHpA	13C4-PFHpA	SIS	13C2-PFOA		No	No
5	13C8-PFOA	13C8-PFOA	SIS	13C2-PFOA		No	No
6	13C9-PFNA	13C9-PFNA	SIS	13C2-PFOA		No	No
7	13C6-PFDA	13C6-PFDA	SIS	13C2-PFDA		No	No
8	13C7-PFUnA	13C7-PFUnA	SIS	13C2-PFDA		No	No
9	13C2-PFDoA	13C2-PFDoA	SIS	13C2-PFDA		No	No
10	13C2-PFTeDA	13C2-PFTeDA	SIS	13C2-PFDA		No	No
11	d3-MeFOSAA	d3-MeFOSAA	SIS	13C4-PFOS		No	No
12	d5-EtFOSAA	d5-EtFOSAA	SIS	13C4-PFOS		No	No
13	d3-MeFOSA	d3-MeFOSA	SIS	13C4-PFOS		No	No
14	d5-EtFOSA	d5-EtFOSA	SIS	13C4-PFOS		No	No

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WORK/QUALITY ASSURANCE PROJECT PLAN

Attachment 2: Test Codes

Project Test Code Name: Master_369D

No:	Analyte:	Report Name:	Type	RIS	SIS	Hidden:	Graph:
15	d7-MeFOSE	d7-MeFOSE	SIS	13C4-PFOS		No	No
16	d9-EtFOSE	d9-EtFOSE	SIS	13C4-PFOS		No	No
17	13C8-FOSA	13C8-FOSA	SIS	13C4-PFOS		No	No
18	13C3-PFBS	13C3-PFBS	SIS	13C4-PFOS		No	No
19	13C3-PFHxS	13C3-PFHxS	SIS	13C4-PFOS		No	No
20	13C8-PFOS	13C8-PFOS	SIS	13C4-PFOS		No	No
21	13C2-4:2FTS	13C2-4:2FTS	SIS	13C4-PFOS		No	No
22	13C2-6:2FTS	13C2-6:2FTS	SIS	13C4-PFOS		No	No
23	13C2-8:2FTS	13C2-8:2FTS	SIS	13C4-PFOS		No	No
24	13C3-HFPO-DA	13C3-HFPO-DA	SIS	13C2-PFOA		No	No

Total Analytes: 64

Subtract Peaks:

None

Sum Peaks:

None

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WORK/QUALITY ASSURANCE PROJECT PLAN

Attachment 2: Test Codes

Project Test Code Name: Master_369D

ICAL Acceptance Criteria:

Curve Fit:	Limit Mean(%):	Mean Qual:	Limit Ind.:	Ind. Qual:	Min Points:	Points Qual:	Comments:
Linear	NA	NA	0.99	N	5	N	y = Bx + C
Quadratic	NA	NA	0.99	N	6	N	y = Ax^2 + Bx + C

Continuing Calibration Verification Criteria:

CCV Name: 5-369

Frequency Hrs:		Mean PD(%):		Individual PD(%):		RIS/SIS RT Window (min):		Area Limit Low(%):	Area Limit High(%):		Comment:
12	(N)	30	(N)	30	(N)	0.04	(N)	-50	100	(N)	NA

Independent Calibration Verification:

ICC Name: 5-369

Mean PD Limit(%):		Ind. PD Limit(%):		RIS/SIS Window Limit (Secs):		Area Limit High(%):	Area Limit Low(%):		Comment:
30	(N)	30	(N)	0.04	(N)	-50	100	(N)	NA

Mass Discrimination Criteria:

None

Degredation Check Criteria:

None

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WORK/QUALITY ASSURANCE PROJECT PLAN

Attachment 3: Method Quality Objectives

MQO Application:	***Universal_LC***		
MQO:	**Acceptance Criteria:**	**Qual:**	**Corrective Action:**
Procedural Blank	Samples must be greater than five times the blank concentration (>5xPB).	B	Review with Project Manager; re-analyze or justify results in project records.
PB Measurement Quality Objective	Organic results in the Procedural Blank are less than 1/2 times the LOQ (<1/2xLOQ)	N	Review with Project Manager; re-analyze or justify results in project records.
Laboratory Control Sample	Recovery values 70-130%.	N	Review with project manager; re-analyze or justify reporting the results in project records.
Matrix Spike / Matrix Spike Duplicate Recovery	Organics 70-130%. Analyte concentration in MS/MSD must be greater than five times reported background concentration.	N	Review with Project Manager; re-analyze or justify reporting results in the project records.
	Organics Results in the Target is less than 5 times the Original	n	
Matrix Spike/Spike Duplicate Precision	Organics results less than 30% Relative Percent Difference (RPD). Analyte concentration in MS/MSD must be greater than five times reported background concentration.	N	Review with Project Manager; re-analyze or justify reporting results in the project records.
	Organics Results in the Target is less than 5 times the Original	n	
Standard Reference Material Accuracy	Organics Percent Difference less than 30% from a range of certified values on average. Analyte concentration must be greater than five times the Method Detection Limit (>5xMDL).	N	Review with Project Manager; re-analyze or justify reporting results in the project records.
	Organics Results in the Target is less than 5 times the MDL	n	
Analytical Duplicate Precision	Organics results less than 30% Relative Percent Difference (RPD). Analyte concentration must be > 5x MDL.	N	Review with Project Manager; re-analyze or justify reporting results in the project records.
	Organics Results in the Original is less than 5 times the MDL	n	

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WORK/QUALITY ASSURANCE PROJECT PLAN

Attachment 3: Method Quality Objectives

MQO Application:	***Universal_LC***		
MQO:	**Acceptance Criteria:**	**Qual:**	**Corrective Action:**
Analytical Triplicate Precision	Organics results less than 30% Relative Standard Deviation (RSD). Analyte concentration must be > 5x MDL.	N	Review with Project Manager; re-analyze or justify reporting results in the project records.
	Organics Results in the Original is less than 5 times the MDL	n	
Surrogate Compound Recovery	Recovery results between 50% and 150%.	N	Review with Project Manager; re-analyze or justify reporting results in the project records.
Control Oil	RPD < 30% for at least 90% of analytes	N	Results examined by project manager, task leader, or subcontractor lab manager. Reextraction, reanalysis, or justification documented.
Instrument Calibration	5-369-9: R-squared greater than or equal to 0.990		Results examined by project manager, task leader, or subcontractor lab manager. Reextraction, reanalysis, or justification documented.
Independent Calibration Check Solution	5-369-9: Individual PD less than or equal to 30%. Mean Percent Difference less than or equal to 30%.	N	Review with Project Manager; re-analyze or justify in project records.
Continuing Calibration Verification	5-369-9: Individual PD less than or equal to 30%. Mean Percent Difference less than or equal to 30%.	N	Review with Project Manager; re-analyze or justify in project records.

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ShpNo SHP-220803-02

Battelle Project No:

Sample Receipt Form

Approved: ☐ Authorized ☐

Project Number: 22071 **Client:** Horsley Witten

Received by: Thorn, Jonathan **Date/Time Received:** Wednesday, August 03, 2022 10:30 AM

No. of Shipping Containers: 1

SHIPMENT

Method of Delivery: Hand Delivered **Tracking Number:** NA

COC Forms: ☑ Shipped with samples ☐ No Forms

Cooler(s)/Box(es)

Cntr	Type	Tracking No.	Seal	Seal	Container	Therm.	Temp C	Smps
1 of 1	Cooler	NA	Tape	Intact	Intact	Therm_2	1.3	6

Samples

Sample Labels:
☑ Sample labels agree with COC forms
☐ Discrepancies (see Sample Custody Corrective Action Form)

Container Seals:
☐ Tape ☐ Custody Seals ☐ Other Seals (See sample Log)
☑ Seals intact for each shipping container
☐ Seals broken (See sample log for impacted samples)

Condition of Samples:
☑ Sample containers intact
☐ Sample containers broken/leaking (See Custody Corrective Action Form)

Temperature upon receipt (°C): 1.3 Temperature Blank used ☑ Yes ☐ No
(Note: If temperature upon receipt differs from required conditions, see sample log comment field)

Samples Acidified: ☐ Yes ☐ No ☑ Unknown

Initial pH 5-9?: ☐ Yes ☑ No ☐ NA
If no, individual sample adjustments on the Auxiliary Sample Receipt Form

Total Residual Chlorine Present?: ☐ Yes ☐ No ☑ NA
If yes, individual sample adjustments on the Auxiliary Sample Receipt Form

Head Space <1% in samples for water VOC analysis: ☐ Yes ☐ No ☑ NA
Individual sample deviations noted on sample log

Samples Containers:
Samples returned in PC-grade jars: ☐ Yes ☐ No ☑ Unknown /Lot No.: Unknown

Storage Location: Custody: Refrigerator - R0119 (NA) **BDO IDs Assigned:** E4930 - E4935

Samples logged in by: Schumitz, Matt **Date/Time:** 08/03/2022 10:30 AM

Approved By: **Approved On:**

Authorized By: **Authorized On:**

BATTELLE

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ShpNo SHP-220803-02

Battelle Project No:

Sample Receipt Form Details

Approved: ☐ Authorized ☐

Project Number: 22071 **Client:** Horsley Witten

Received by: Thorn, Jonathan **Date/Time Received:** Wednesday, August 03, 2022 10:30 AM

No. of Shipping Containers: 1

BDO Id:	Client Sample ID:	Collection Date:	Login Date:	Ctrs:	Matrix:	Temp:	pH:	TRC:	VOC:	Stored In:	Loc:	No:	Comments:
E4930	ME-1	07/29/22 10:10	08/03/22 11:32	2	GW	1.3	No	NA	NA	R0119 (NA)			
E4931	ME-3	07/29/22 10:20	08/03/22 11:32	2	GW	1.3	No	NA	NA	R0119 (NA)			
E4932	ME-2	07/29/22 10:30	08/03/22 11:33	2	GW	1.3	No	NA	NA	R0119 (NA)			
E4933	HW-I(s)	08/02/22 13:45	08/03/22 11:33	2	GW	1.3	No	NA	NA	R0119 (NA)			
E4934	HW-I(m)	08/02/22 14:10	08/03/22 11:33	2	GW	1.3	No	NA	NA	R0119 (NA)			
E4935	HW-I(d)	08/02/22 14:50	08/03/22 11:33	1	GW	1.3	No	NA	NA	R0119 (NA)			

Total Samples: 6

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Chain of Custody

Project Name: Cape Cod Gateway Airport (HYA)	Client Project Manager:	Client Project Number: 22071	COC Number:
Deliver Results to: bmassa@horsleywitten.com	Samples Collected by: HW		
Address: 90 Route 6A Sandwich MA	Phone: 508-833-6600		
	Email: bmassa@horsleywitten.com		
Phone: 781-243-1527	Time Zone: eastern		
Email:	PO reference:		

Test / Preservative[1]: PFAS signature analysis

Turnaround Time[2]:
- ☐ 28-days (standard)
- ☐ 21-days (Rush)
- ☐ 14-days (Rush)
- ☐ 7-days (Rush)
- ☐ 3-day (Rush)

120 day ☑

Sample ID	Date	Time	Type[3]	Matrix	Count	Lab ID	PFAS signature analysis	Sample Comments
ME-1	7/29/22	10:10	grab	GW	2	E4930	✓	
~~ME-2~~ ME-3	7/29/22	10:20	grab	GW	2	E4931	✓	
~~ME-3~~ ME-2	7/29/22	10:30	grab	GW	2	E4932	✓	
HW-I(s)	8/2/22	13:45	grab	GW	2	E4933	✓	
HW-I(m)	8/2/22	14:10	grab	GW	2	E4934	✓	
~~[illegible]~~ HW-I(d)	8/2/22	14:50	grab	GW	1	E4935	✓	

Relinquished by (Print/Sign):	Company:	Date/Time:	Received by (Print/Sign):	Company:	Date/Time:
Sarah Barrett	HW	8/2/22 16:41	[signature]	HW	8/2/22 16:41
			[signature]	BNO	8/3/22 1030

Field Project comments: 1.3° Therm 2

Receipt comments:

[1] include comments in the Field Project comment field if there are method specific requirements, i.e., "WHO PCB Congener list", "PFAS – 18 analytes", or "PFAS – 29 analytes from UCMR5"

[2] Rush TAT request should be verified with the lab prior to submitting samples

[3] Client sample type, if applicable

Data Tables

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Project Client: Horsely Witten Group, Inc.
Project Name: Cape Cod Gateway Airport - PFAS
Project No.: G00120.XX.XX.XXXX.NORWEL

Client ID	ME-1
Battelle ID	E4930-FS
Sample Type	SA
Collection Date	07/29/2022
Extraction Date	08/08/2022
Analytical Instrument	Sciex 5500 (AC) LC/MS/MS
% Moisture	NA
Matrix	GW
Sample Size	0.292
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
NFDHA	151772-58-6	2.14 U	E4930-FS(0)	1.000	9/3/2022	0.659	2.14	4.28
PFEESA	113507-82-7	2.14 U	E4930-FS(0)	1.000	9/3/2022	0.595	2.14	4.28
PFMPA	377-73-1	2.14 U	E4930-FS(0)	1.000	9/3/2022	0.933	2.14	4.28
PFMBA	863090-89-5	2.14 U	E4930-FS(0)	1.000	9/3/2022	0.797	2.14	4.28
PFBA	375-22-4	17.4	E4930-FS(0)	1.000	9/3/2022	1.29	3.00	4.28
PFPeA	2706-90-3	48.9	E4930-FS(0)	1.000	9/3/2022	1.10	3.00	4.28
PFHxA	307-24-4	36.9	E4930-FS(0)	1.000	9/3/2022	0.782	2.14	4.28
PFHpA	375-85-9	16.4	E4930-FS(0)	1.000	9/3/2022	0.806	2.14	4.28
PFOA	335-67-1	21.5	E4930-FS(0)	1.000	9/3/2022	0.865	2.14	4.28
PFNA	375-95-1	12.2	E4930-FS(0)	1.000	9/3/2022	0.713	2.14	4.28
PFDA	335-76-2	2.14 U	E4930-FS(0)	1.000	9/3/2022	0.671	2.14	4.28
PFUnA	2058-94-8	2.14 U	E4930-FS(0)	1.000	9/3/2022	0.644	2.14	4.28
PFDoA	307-55-1	2.14 U	E4930-FS(0)	1.000	9/3/2022	0.651	2.14	4.28
PFTrDA	72629-94-8	2.14 U	E4930-FS(0)	1.000	9/3/2022	0.635	2.14	4.28
PFTeDA	376-06-7	2.14 U	E4930-FS(0)	1.000	9/3/2022	0.677	2.14	4.28
NMeFOSAA	2355-31-9	2.14 U	E4930-FS(0)	1.000	9/3/2022	0.882	2.14	4.28
NEtFOSAA	2991-50-6	2.14 U	E4930-FS(0)	1.000	9/3/2022	0.848	2.14	4.28
NMeFOSA	31506-32-8	2.14 U	E4930-FS(0)	1.000	9/3/2022	0.908	2.14	4.28
NEtFOSA	4151-50-2	3.00 U	E4930-FS(0)	1.000	9/3/2022	1.08	3.00	4.28
NMeFOSE	24448-09-7	2.14 U	E4930-FS(0)	1.000	9/3/2022	0.916	2.14	4.28
NEtFOSE	1691-99-2	3.00 U	E4930-FS(0)	1.000	9/3/2022	1.17	3.00	4.28
PFOSA	754-91-6	3.00 U	E4930-FS(0)	1.000	9/3/2022	1.35	3.00	4.28
PFBS	375-73-5	2.36 J	E4930-FS(0)	1.000	9/3/2022	0.741	2.14	4.28
PFPeS	2706-91-4	2.71 J	E4930-FS(0)	1.000	9/3/2022	0.873	2.14	4.28
PFHxS	355-46-4	37.9	E4930-FS(0)	1.000	9/3/2022	0.854	2.14	4.28
PFHpS	375-92-8	2.77 J	E4930-FS(0)	1.000	9/3/2022	0.720	2.14	4.28
PFOS	1763-23-1	77.4	E4930-FS(0)	1.000	9/3/2022	0.916	2.14	4.28
PFNS	68259-12-1	2.14 U	E4930-FS(0)	1.000	9/3/2022	0.600	2.14	4.28
PFDS	335-77-3	2.14 U	E4930-FS(0)	1.000	9/3/2022	0.667	2.14	4.28
PFDoS	79780-39-5	2.14 U	E4930-FS(0)	1.000	9/3/2022	0.688	2.14	4.28
4:2FTS	757124-72-4	2.14 U	E4930-FS(0)	1.000	9/3/2022	0.873	2.14	4.28
6:2FTS	27619-97-2	21.7	E4930-FS(0)	1.000	9/3/2022	1.26	3.00	4.28
8:2FTS	39108-34-4	2.14 U	E4930-FS(0)	1.000	9/3/2022	0.865	2.14	4.28
3:3 FTCA	356-02-5	3.00 U	E4930-FS(0)	1.000	9/3/2022	1.29	3.00	4.28
5:3 FTCA	914637-49-3	2.14 U	E4930-FS(0)	1.000	9/3/2022	0.959	2.14	4.28
7:3 FTCA	812-70-4	2.14 U	E4930-FS(0)	1.000	9/3/2022	0.865	2.14	4.28
HFPO-DA	13252-13-6	2.14 U	E4930-FS(0)	1.000	9/3/2022	0.741	2.14	4.28
Adona	919005-14-4	2.14 U	E4930-FS(0)	1.000	9/3/2022	0.744	2.14	4.28
9Cl-PF3ONS	756426-58-1	2.14 U	E4930-FS(0)	1.000	9/3/2022	0.882	2.14	4.28
11Cl-PF3OUdS	763051-92-9	2.14 U	E4930-FS(0)	1.000	9/3/2022	0.771	2.14	4.28

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Project Client: Horsely Witten Group, Inc.
Project Name: Cape Cod Gateway Airport - PFAS
Project No.: G00120.XX.XX.XXXX.NORWEL

Client ID	ME-1
Battelle ID	E4930-FS
Sample Type	SA
Collection Date	07/29/2022
Extraction Date	08/08/2022
Analytical Instrument	Sciex 5500 (AC) LC/MS/MS

Surrogate Recoveries (%)	**Recovery**		**Extract ID**	**Analysis Date**
13C4-PFBA	59		E4930-FS(0)	9/3/2022
13C5-PFPeA	67		E4930-FS(0)	9/3/2022
13C5-PFHxA	58		E4930-FS(0)	9/3/2022
13C4-PFHpA	52		E4930-FS(0)	9/3/2022
13C8-PFOA	51		E4930-FS(0)	9/3/2022
13C9-PFNA	54		E4930-FS(0)	9/3/2022
13C6-PFDA	56		E4930-FS(0)	9/3/2022
13C7-PFUnA	61		E4930-FS(0)	9/3/2022
13C2-PFDoA	60		E4930-FS(0)	9/3/2022
13C2-PFTeDA	50		E4930-FS(0)	9/3/2022
d3-MeFOSAA	50		E4930-FS(0)	9/3/2022
d5-EtFOSAA	42	N	E4930-FS(0)	9/3/2022
d3-MeFOSA	38	N	E4930-FS(0)	9/3/2022
d5-EtFOSA	37	N	E4930-FS(0)	9/3/2022
d7-MeFOSE	46	N	E4930-FS(0)	9/3/2022
d9-EtFOSE	43	N	E4930-FS(0)	9/3/2022
13C8-FOSA	55		E4930-FS(0)	9/3/2022
13C3-PFBS	59		E4930-FS(0)	9/3/2022
13C3-PFHxS	57		E4930-FS(0)	9/3/2022
13C8-PFOS	59		E4930-FS(0)	9/3/2022
13C2-4:2FTS	70		E4930-FS(0)	9/3/2022
13C2-6:2FTS	66		E4930-FS(0)	9/3/2022
13C2-8:2FTS	78		E4930-FS(0)	9/3/2022
13C3-HFPO-DA	53		E4930-FS(0)	9/3/2022

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Project Client: Horsely Witten Group, Inc.
Project Name: Cape Cod Gateway Airport - PFAS
Project No.: G00120.XX.XX.XXXX.NORWEL

Client ID	ME-3
Battelle ID	E4931-FS
Sample Type	SA
Collection Date	07/29/2022
Extraction Date	08/08/2022
Analytical Instrument	Sciex 5500 (AC) LC/MS/MS
% Moisture	NA
Matrix	GW
Sample Size	0.292
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
NFDHA	151772-58-6	2.14 U	E4931-FS(0)	1.000	9/3/2022	0.659	2.14	4.28
PFEESA	113507-82-7	2.14 U	E4931-FS(0)	1.000	9/3/2022	0.595	2.14	4.28
PFMPA	377-73-1	2.14 U	E4931-FS(0)	1.000	9/3/2022	0.933	2.14	4.28
PFMBA	863090-89-5	2.14 U	E4931-FS(0)	1.000	9/3/2022	0.797	2.14	4.28
PFBA	375-22-4	9.75	E4931-FS(0)	1.000	9/3/2022	1.29	3.00	4.28
PFPeA	2706-90-3	23.3	E4931-FS(0)	1.000	9/3/2022	1.10	3.00	4.28
PFHxA	307-24-4	22.1	E4931-FS(0)	1.000	9/3/2022	0.782	2.14	4.28
PFHpA	375-85-9	10.0	E4931-FS(0)	1.000	9/3/2022	0.806	2.14	4.28
PFOA	335-67-1	14.2	E4931-FS(0)	1.000	9/3/2022	0.865	2.14	4.28
PFNA	375-95-1	7.99	E4931-FS(0)	1.000	9/3/2022	0.713	2.14	4.28
PFDA	335-76-2	2.14 U	E4931-FS(0)	1.000	9/3/2022	0.671	2.14	4.28
PFUnA	2058-94-8	2.14 U	E4931-FS(0)	1.000	9/3/2022	0.644	2.14	4.28
PFDoA	307-55-1	2.14 U	E4931-FS(0)	1.000	9/3/2022	0.651	2.14	4.28
PFTrDA	72629-94-8	2.14 U	E4931-FS(0)	1.000	9/3/2022	0.635	2.14	4.28
PFTeDA	376-06-7	2.14 U	E4931-FS(0)	1.000	9/3/2022	0.677	2.14	4.28
NMeFOSAA	2355-31-9	2.14 U	E4931-FS(0)	1.000	9/3/2022	0.882	2.14	4.28
NEtFOSAA	2991-50-6	2.14 U	E4931-FS(0)	1.000	9/3/2022	0.848	2.14	4.28
NMeFOSA	31506-32-8	2.14 U	E4931-FS(0)	1.000	9/3/2022	0.908	2.14	4.28
NEtFOSA	4151-50-2	3.00 U	E4931-FS(0)	1.000	9/3/2022	1.08	3.00	4.28
NMeFOSE	24448-09-7	2.14 U	E4931-FS(0)	1.000	9/3/2022	0.916	2.14	4.28
NEtFOSE	1691-99-2	3.00 U	E4931-FS(0)	1.000	9/3/2022	1.17	3.00	4.28
PFOSA	754-91-6	5.95	E4931-FS(0)	1.000	9/3/2022	1.35	3.00	4.28
PFBS	375-73-5	3.07 J	E4931-FS(0)	1.000	9/3/2022	0.741	2.14	4.28
PFPeS	2706-91-4	3.63 J	E4931-FS(0)	1.000	9/3/2022	0.873	2.14	4.28
PFHxS	355-46-4	39.1	E4931-FS(0)	1.000	9/3/2022	0.854	2.14	4.28
PFHpS	375-92-8	2.83 J	E4931-FS(0)	1.000	9/3/2022	0.720	2.14	4.28
PFOS	1763-23-1	104	E4931-FS(0)	1.000	9/3/2022	0.916	2.14	4.28
PFNS	68259-12-1	2.14 U	E4931-FS(0)	1.000	9/3/2022	0.600	2.14	4.28
PFDS	335-77-3	2.14 U	E4931-FS(0)	1.000	9/3/2022	0.667	2.14	4.28
PFDoS	79780-39-5	2.14 U	E4931-FS(0)	1.000	9/3/2022	0.688	2.14	4.28
4:2FTS	757124-72-4	2.14 U	E4931-FS(0)	1.000	9/3/2022	0.873	2.14	4.28
6:2FTS	27619-97-2	4.91	E4931-FS(0)	1.000	9/3/2022	1.26	3.00	4.28
8:2FTS	39108-34-4	2.14 U	E4931-FS(0)	1.000	9/3/2022	0.865	2.14	4.28
3:3 FTCA	356-02-5	3.00 U	E4931-FS(0)	1.000	9/3/2022	1.29	3.00	4.28
5:3 FTCA	914637-49-3	2.14 U	E4931-FS(0)	1.000	9/3/2022	0.959	2.14	4.28
7:3 FTCA	812-70-4	2.14 U	E4931-FS(0)	1.000	9/3/2022	0.865	2.14	4.28
HFPO-DA	13252-13-6	2.14 U	E4931-FS(0)	1.000	9/3/2022	0.741	2.14	4.28
Adona	919005-14-4	2.14 U	E4931-FS(0)	1.000	9/3/2022	0.744	2.14	4.28
9Cl-PF3ONS	756426-58-1	2.14 U	E4931-FS(0)	1.000	9/3/2022	0.882	2.14	4.28
11Cl-PF3OUdS	763051-92-9	2.14 U	E4931-FS(0)	1.000	9/3/2022	0.771	2.14	4.28

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Project Client: Horsely Witten Group, Inc.
Project Name: Cape Cod Gateway Airport - PFAS
Project No.: G00120.XX.XX.XXXX.NORWEL

Client ID	ME-3
Battelle ID	E4931-FS
Sample Type	SA
Collection Date	07/29/2022
Extraction Date	08/08/2022
Analytical Instrument	Sciex 5500 (AC) LC/MS/MS

Surrogate Recoveries (%)	**Recovery**	**Extract ID**	**Analysis Date**
13C4-PFBA	54	E4931-FS(0)	9/3/2022
13C5-PFPeA	71	E4931-FS(0)	9/3/2022
13C5-PFHxA	63	E4931-FS(0)	9/3/2022
13C4-PFHpA	60	E4931-FS(0)	9/3/2022
13C8-PFOA	60	E4931-FS(0)	9/3/2022
13C9-PFNA	58	E4931-FS(0)	9/3/2022
13C6-PFDA	60	E4931-FS(0)	9/3/2022
13C7-PFUnA	68	E4931-FS(0)	9/3/2022
13C2-PFDoA	66	E4931-FS(0)	9/3/2022
13C2-PFTeDA	55	E4931-FS(0)	9/3/2022
d3-MeFOSAA	67	E4931-FS(0)	9/3/2022
d5-EtFOSAA	61	E4931-FS(0)	9/3/2022
d3-MeFOSA	52	E4931-FS(0)	9/3/2022
d5-EtFOSA	49 N	E4931-FS(0)	9/3/2022
d7-MeFOSE	58	E4931-FS(0)	9/3/2022
d9-EtFOSE	56	E4931-FS(0)	9/3/2022
13C8-FOSA	65	E4931-FS(0)	9/3/2022
13C3-PFBS	62	E4931-FS(0)	9/3/2022
13C3-PFHxS	63	E4931-FS(0)	9/3/2022
13C8-PFOS	65	E4931-FS(0)	9/3/2022
13C2-4:2FTS	72	E4931-FS(0)	9/3/2022
13C2-6:2FTS	79	E4931-FS(0)	9/3/2022
13C2-8:2FTS	87	E4931-FS(0)	9/3/2022
13C3-HFPO-DA	61	E4931-FS(0)	9/3/2022

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It can be done

Project Client: Horsely Witten Group, Inc.
Project Name: Cape Cod Gateway Airport - PFAS
Project No.: G00120.XX.XX.XXXX.NORWEL

Client ID	ME-2
Battelle ID	E4932-FS
Sample Type	SA
Collection Date	07/29/2022
Extraction Date	08/08/2022
Analytical Instrument	Sciex 5500 (AC) LC/MS/MS
% Moisture	NA
Matrix	GW
Sample Size	0.276
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
NFDHA	151772-58-6	2.26 U	E4932-FS(0)	1.000	9/3/2022	0.697	2.26	4.53
PFEESA	113507-82-7	2.26 U	E4932-FS(0)	1.000	9/3/2022	0.630	2.26	4.53
PFMPA	377-73-1	2.26 U	E4932-FS(0)	1.000	9/3/2022	0.987	2.26	4.53
PFMBA	863090-89-5	2.26 U	E4932-FS(0)	1.000	9/3/2022	0.843	2.26	4.53
PFBA	375-22-4	15.0	E4932-FS(0)	1.000	9/3/2022	1.37	3.17	4.53
PFPeA	2706-90-3	55.1	E4932-FS(0)	1.000	9/3/2022	1.16	3.17	4.53
PFHxA	307-24-4	60.3	E4932-FS(0)	1.000	9/3/2022	0.827	2.26	4.53
PFHpA	375-85-9	27.5	E4932-FS(0)	1.000	9/3/2022	0.852	2.26	4.53
PFOA	335-67-1	30.6	E4932-FS(0)	1.000	9/3/2022	0.915	2.26	4.53
PFNA	375-95-1	15.4	E4932-FS(0)	1.000	9/3/2022	0.755	2.26	4.53
PFDA	335-76-2	2.26 U	E4932-FS(0)	1.000	9/3/2022	0.710	2.26	4.53
PFUnA	2058-94-8	2.26 U	E4932-FS(0)	1.000	9/3/2022	0.681	2.26	4.53
PFDoA	307-55-1	2.26 U	E4932-FS(0)	1.000	9/3/2022	0.688	2.26	4.53
PFTrDA	72629-94-8	2.26 U	E4932-FS(0)	1.000	9/3/2022	0.672	2.26	4.53
PFTeDA	376-06-7	2.26 U	E4932-FS(0)	1.000	9/3/2022	0.716	2.26	4.53
NMeFOSAA	2355-31-9	2.26 U	E4932-FS(0)	1.000	9/3/2022	0.933	2.26	4.53
NEtFOSAA	2991-50-6	2.26 U	E4932-FS(0)	1.000	9/3/2022	0.897	2.26	4.53
NMeFOSA	31506-32-8	2.26 U	E4932-FS(0)	1.000	9/3/2022	0.960	2.26	4.53
NEtFOSA	4151-50-2	3.17 U	E4932-FS(0)	1.000	9/3/2022	1.14	3.17	4.53
NMeFOSE	24448-09-7	2.26 U	E4932-FS(0)	1.000	9/3/2022	0.969	2.26	4.53
NEtFOSE	1691-99-2	3.17 U	E4932-FS(0)	1.000	9/3/2022	1.24	3.17	4.53
PFOSA	754-91-6	3.17 U	E4932-FS(0)	1.000	9/3/2022	1.43	3.17	4.53
PFBS	375-73-5	8.32	E4932-FS(0)	1.000	9/3/2022	0.784	2.26	4.53
PFPeS	2706-91-4	6.18	E4932-FS(0)	1.000	9/3/2022	0.924	2.26	4.53
PFHxS	355-46-4	60.1	E4932-FS(0)	1.000	9/3/2022	0.903	2.26	4.53
PFHpS	375-92-8	3.44 J	E4932-FS(0)	1.000	9/3/2022	0.762	2.26	4.53
PFOS	1763-23-1	97.0	E4932-FS(0)	1.000	9/3/2022	0.969	2.26	4.53
PFNS	68259-12-1	2.26 U	E4932-FS(0)	1.000	9/3/2022	0.635	2.26	4.53
PFDS	335-77-3	2.26 U	E4932-FS(0)	1.000	9/3/2022	0.706	2.26	4.53
PFDoS	79780-39-5	2.26 U	E4932-FS(0)	1.000	9/3/2022	0.727	2.26	4.53
4:2FTS	757124-72-4	2.26 U	E4932-FS(0)	1.000	9/3/2022	0.924	2.26	4.53
6:2FTS	27619-97-2	43.4	E4932-FS(0)	1.000	9/3/2022	1.33	3.17	4.53
8:2FTS	39108-34-4	1.40 J	E4932-FS(0)	1.000	9/3/2022	0.915	2.26	4.53
3:3 FTCA	356-02-5	3.17 U	E4932-FS(0)	1.000	9/3/2022	1.37	3.17	4.53
5:3 FTCA	914637-49-3	2.26 U	E4932-FS(0)	1.000	9/3/2022	1.01	2.26	4.53
7:3 FTCA	812-70-4	2.26 U	E4932-FS(0)	1.000	9/3/2022	0.915	2.26	4.53
HFPO-DA	13252-13-6	2.26 U	E4932-FS(0)	1.000	9/3/2022	0.784	2.26	4.53
Adona	919005-14-4	2.26 U	E4932-FS(0)	1.000	9/3/2022	0.787	2.26	4.53
9Cl-PF3ONS	756426-58-1	2.26 U	E4932-FS(0)	1.000	9/3/2022	0.933	2.26	4.53
11Cl-PF3OUdS	763051-92-9	2.26 U	E4932-FS(0)	1.000	9/3/2022	0.816	2.26	4.53

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Project Client: Horsely Witten Group, Inc.
Project Name: Cape Cod Gateway Airport - PFAS
Project No.: G00120.XX.XX.XXXX.NORWEL

Client ID	ME-2
Battelle ID	E4932-FS
Sample Type	SA
Collection Date	07/29/2022
Extraction Date	08/08/2022
Analytical Instrument	Sciex 5500 (AC) LC/MS/MS

Surrogate Recoveries (%)	**Recovery**		**Extract ID**	**Analysis Date**
13C4-PFBA	64		E4932-FS(0)	9/3/2022
13C5-PFPeA	75		E4932-FS(0)	9/3/2022
13C5-PFHxA	53		E4932-FS(0)	9/3/2022
13C4-PFHpA	45	N	E4932-FS(0)	9/3/2022
13C8-PFOA	46	N	E4932-FS(0)	9/3/2022
13C9-PFNA	47	N	E4932-FS(0)	9/3/2022
13C6-PFDA	48	N	E4932-FS(0)	9/3/2022
13C7-PFUnA	54		E4932-FS(0)	9/3/2022
13C2-PFDoA	53		E4932-FS(0)	9/3/2022
13C2-PFTeDA	51		E4932-FS(0)	9/3/2022
d3-MeFOSAA	53		E4932-FS(0)	9/3/2022
d5-EtFOSAA	47	N	E4932-FS(0)	9/3/2022
d3-MeFOSA	51		E4932-FS(0)	9/3/2022
d5-EtFOSA	54		E4932-FS(0)	9/3/2022
d7-MeFOSE	62		E4932-FS(0)	9/3/2022
d9-EtFOSE	58		E4932-FS(0)	9/3/2022
13C8-FOSA	66		E4932-FS(0)	9/3/2022
13C3-PFBS	51		E4932-FS(0)	9/3/2022
13C3-PFHxS	55		E4932-FS(0)	9/3/2022
13C8-PFOS	48	N	E4932-FS(0)	9/3/2022
13C2-4:2FTS	76		E4932-FS(0)	9/3/2022
13C2-6:2FTS	78		E4932-FS(0)	9/3/2022
13C2-8:2FTS	83		E4932-FS(0)	9/3/2022
13C3-HFPO-DA	47	N	E4932-FS(0)	9/3/2022

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It can be done

Project Client: Horsely Witten Group, Inc.
Project Name: Cape Cod Gateway Airport - PFAS
Project No.: G00120.XX.XX.XXXX.NORWEL

Client ID		HW-I(s)							
Battelle ID		E4933-FS							
Sample Type		SA							
Collection Date		08/02/2022							
Extraction Date		08/08/2022							
Analytical Instrument		Sciex 5500 (AC) LC/MS/MS							
% Moisture		NA							
Matrix		GW							
Sample Size		0.277							
Size Unit-Basis		L							
Analyte	CAS No.	Result (ng/L)		Extract ID	DF	Analysis Date	DL	LOD	LOQ
NFDHA	151772-58-6	2.26	U	E4933-FS(0)	1.000	9/3/2022	0.695	2.26	4.51
PFEESA	113507-82-7	2.26	U	E4933-FS(0)	1.000	9/3/2022	0.627	2.26	4.51
PFMPA	377-73-1	2.26	U	E4933-FS(0)	1.000	9/3/2022	0.984	2.26	4.51
PFMBA	863090-89-5	2.26	U	E4933-FS(0)	1.000	9/3/2022	0.840	2.26	4.51
PFBA	375-22-4	62.7		E4933-FS(0)	1.000	9/3/2022	1.36	3.16	4.51
PFPeA	2706-90-3	237		E4933-FS(0)	1.000	9/3/2022	1.16	3.16	4.51
PFHxA	307-24-4	205		E4933-FS(0)	1.000	9/3/2022	0.824	2.26	4.51
PFHpA	375-85-9	299		E4933-FS(0)	1.000	9/3/2022	0.849	2.26	4.51
PFOA	335-67-1	256		E4933-FS(0)	1.000	9/3/2022	0.912	2.26	4.51
PFNA	375-95-1	146		E4933-FS(0)	1.000	9/3/2022	0.752	2.26	4.51
PFDA	335-76-2	2.26	U	E4933-FS(0)	1.000	9/3/2022	0.708	2.26	4.51
PFUnA	2058-94-8	2.26	U	E4933-FS(0)	1.000	9/3/2022	0.679	2.26	4.51
PFDoA	307-55-1	2.26	U	E4933-FS(0)	1.000	9/3/2022	0.686	2.26	4.51
PFTrDA	72629-94-8	2.26	U	E4933-FS(0)	1.000	9/3/2022	0.670	2.26	4.51
PFTeDA	376-06-7	2.26	U	E4933-FS(0)	1.000	9/3/2022	0.714	2.26	4.51
NMeFOSAA	2355-31-9	2.26	U	E4933-FS(0)	1.000	9/3/2022	0.930	2.26	4.51
NEtFOSAA	2991-50-6	2.26	U	E4933-FS(0)	1.000	9/3/2022	0.894	2.26	4.51
NMeFOSA	31506-32-8	2.26	U	E4933-FS(0)	1.000	9/3/2022	0.957	2.26	4.51
NEtFOSA	4151-50-2	3.16	U	E4933-FS(0)	1.000	9/3/2022	1.14	3.16	4.51
NMeFOSE	24448-09-7	2.26	U	E4933-FS(0)	1.000	9/3/2022	0.966	2.26	4.51
NEtFOSE	1691-99-2	3.16	U	E4933-FS(0)	1.000	9/3/2022	1.24	3.16	4.51
PFOSA	754-91-6	3.16	U	E4933-FS(0)	1.000	9/3/2022	1.43	3.16	4.51
PFBS	375-73-5	4.34	J	E4933-FS(0)	1.000	9/3/2022	0.782	2.26	4.51
PFPeS	2706-91-4	10.7		E4933-FS(0)	1.000	9/3/2022	0.921	2.26	4.51
PFHxS	355-46-4	129		E4933-FS(0)	1.000	9/3/2022	0.900	2.26	4.51
PFHpS	375-92-8	23.4		E4933-FS(0)	1.000	9/3/2022	0.759	2.26	4.51
PFOS	1763-23-1	595		E4933-FS(0)	1.000	9/3/2022	0.966	2.26	4.51
PFNS	68259-12-1	2.26	U	E4933-FS(0)	1.000	9/3/2022	0.633	2.26	4.51
PFDS	335-77-3	2.26	U	E4933-FS(0)	1.000	9/3/2022	0.703	2.26	4.51
PFDoS	79780-39-5	2.26	U	E4933-FS(0)	1.000	9/3/2022	0.725	2.26	4.51
4:2FTS	757124-72-4	2.26	U	E4933-FS(0)	1.000	9/3/2022	0.921	2.26	4.51
6:2FTS	27619-97-2	4180	D	E4933-FS-D(3)	25.000	9/3/2022	33.2	79.0	113
8:2FTS	39108-34-4	4.25	J	E4933-FS(0)	1.000	9/3/2022	0.912	2.26	4.51
3:3 FTCA	356-02-5	3.16	U	E4933-FS(0)	1.000	9/3/2022	1.36	3.16	4.51
5:3 FTCA	914637-49-3	2.26	U	E4933-FS(0)	1.000	9/3/2022	1.01	2.26	4.51
7:3 FTCA	812-70-4	2.26	U	E4933-FS(0)	1.000	9/3/2022	0.912	2.26	4.51
HFPO-DA	13252-13-6	2.26	U	E4933-FS(0)	1.000	9/3/2022	0.781	2.26	4.51
Adona	919005-14-4	2.26	U	E4933-FS(0)	1.000	9/3/2022	0.784	2.26	4.51
9Cl-PF3ONS	756426-58-1	2.26	U	E4933-FS(0)	1.000	9/3/2022	0.930	2.26	4.51
11Cl-PF3OUdS	763051-92-9	2.26	U	E4933-FS(0)	1.000	9/3/2022	0.813	2.26	4.51

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Project Client: Horsely Witten Group, Inc.
Project Name: Cape Cod Gateway Airport - PFAS
Project No.: G00120.XX.XX.XXXX.NORWEL

Client ID	HW-I(s)
Battelle ID	E4933-FS
Sample Type	SA
Collection Date	08/02/2022
Extraction Date	08/08/2022
Analytical Instrument	Sciex 5500 (AC) LC/MS/MS

Surrogate Recoveries (%)	**Recovery**		**Extract ID**	**Analysis Date**
13C4-PFBA	55		E4933-FS(0)	9/3/2022
13C5-PFPeA	65		E4933-FS(0)	9/3/2022
13C5-PFHxA	58		E4933-FS(0)	9/3/2022
13C4-PFHpA	53		E4933-FS(0)	9/3/2022
13C8-PFOA	54		E4933-FS(0)	9/3/2022
13C9-PFNA	53		E4933-FS(0)	9/3/2022
13C6-PFDA	54		E4933-FS(0)	9/3/2022
13C7-PFUnA	59		E4933-FS(0)	9/3/2022
13C2-PFDoA	54		E4933-FS(0)	9/3/2022
13C2-PFTeDA	47	N	E4933-FS(0)	9/3/2022
d3-MeFOSAA	43	N	E4933-FS(0)	9/3/2022
d5-EtFOSAA	39	N	E4933-FS(0)	9/3/2022
d3-MeFOSA	58		E4933-FS(0)	9/3/2022
d5-EtFOSA	60		E4933-FS(0)	9/3/2022
d7-MeFOSE	63		E4933-FS(0)	9/3/2022
d9-EtFOSE	62		E4933-FS(0)	9/3/2022
13C8-FOSA	64		E4933-FS(0)	9/3/2022
13C3-PFBS	55		E4933-FS(0)	9/3/2022
13C3-PFHxS	60		E4933-FS(0)	9/3/2022
13C8-PFOS	55		E4933-FS(0)	9/3/2022
13C2-4:2FTS	64		E4933-FS(0)	9/3/2022
13C2-6:2FTS	90	D	E4933-FS-D(3)	9/3/2022
13C2-8:2FTS	78		E4933-FS(0)	9/3/2022
13C3-HFPO-DA	53		E4933-FS(0)	9/3/2022

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Project Client: Horsely Witten Group, Inc.
Project Name: Cape Cod Gateway Airport - PFAS
Project No.: G00120.XX.XX.XXXX.NORWEL

Client ID		HW-I(m)						
Battelle ID		E4934-FS						
Sample Type		SA						
Collection Date		08/02/2022						
Extraction Date		08/08/2022						
Analytical Instrument		Sciex 5500 (AC) LC/MS/MS						
% Moisture		NA						
Matrix		GW						
Sample Size		0.291						
Size Unit-Basis		L						
Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
NFDHA	151772-58-6	2.15 U	E4934-FS(0)	1.000	9/3/2022	0.662	2.15	4.30
PFEESA	113507-82-7	2.15 U	E4934-FS(0)	1.000	9/3/2022	0.597	2.15	4.30
PFMPA	377-73-1	2.15 U	E4934-FS(0)	1.000	9/3/2022	0.936	2.15	4.30
PFMBA	863090-89-5	2.15 U	E4934-FS(0)	1.000	9/3/2022	0.800	2.15	4.30
PFBA	375-22-4	3.01 U	E4934-FS(0)	1.000	9/3/2022	1.30	3.01	4.30
PFPeA	2706-90-3	1.15 J	E4934-FS(0)	1.000	9/3/2022	1.10	3.01	4.30
PFHxA	307-24-4	2.15 U	E4934-FS(0)	1.000	9/3/2022	0.784	2.15	4.30
PFHpA	375-85-9	1.74 J	E4934-FS(0)	1.000	9/3/2022	0.808	2.15	4.30
PFOA	335-67-1	2.15 U	E4934-FS(0)	1.000	9/3/2022	0.868	2.15	4.30
PFNA	375-95-1	0.739 J	E4934-FS(0)	1.000	9/3/2022	0.716	2.15	4.30
PFDA	335-76-2	2.15 U	E4934-FS(0)	1.000	9/3/2022	0.674	2.15	4.30
PFUnA	2058-94-8	2.15 U	E4934-FS(0)	1.000	9/3/2022	0.646	2.15	4.30
PFDoA	307-55-1	2.15 U	E4934-FS(0)	1.000	9/3/2022	0.653	2.15	4.30
PFTrDA	72629-94-8	2.15 U	E4934-FS(0)	1.000	9/3/2022	0.637	2.15	4.30
PFTeDA	376-06-7	2.15 U	E4934-FS(0)	1.000	9/3/2022	0.680	2.15	4.30
NMeFOSAA	2355-31-9	2.15 U	E4934-FS(0)	1.000	9/3/2022	0.885	2.15	4.30
NEtFOSAA	2991-50-6	2.15 U	E4934-FS(0)	1.000	9/3/2022	0.851	2.15	4.30
NMeFOSA	31506-32-8	2.15 U	E4934-FS(0)	1.000	9/3/2022	0.911	2.15	4.30
NEtFOSA	4151-50-2	3.01 U	E4934-FS(0)	1.000	9/3/2022	1.08	3.01	4.30
NMeFOSE	24448-09-7	2.15 U	E4934-FS(0)	1.000	9/3/2022	0.919	2.15	4.30
NEtFOSE	1691-99-2	3.01 U	E4934-FS(0)	1.000	9/3/2022	1.18	3.01	4.30
PFOSA	754-91-6	3.01 U	E4934-FS(0)	1.000	9/3/2022	1.36	3.01	4.30
PFBS	375-73-5	2.15 U	E4934-FS(0)	1.000	9/3/2022	0.744	2.15	4.30
PFPeS	2706-91-4	2.15 U	E4934-FS(0)	1.000	9/3/2022	0.876	2.15	4.30
PFHxS	355-46-4	6.31	E4934-FS(0)	1.000	9/3/2022	0.857	2.15	4.30
PFHpS	375-92-8	2.15 U	E4934-FS(0)	1.000	9/3/2022	0.723	2.15	4.30
PFOS	1763-23-1	10.3	E4934-FS(0)	1.000	9/3/2022	0.919	2.15	4.30
PFNS	68259-12-1	2.15 U	E4934-FS(0)	1.000	9/3/2022	0.602	2.15	4.30
PFDS	335-77-3	2.15 U	E4934-FS(0)	1.000	9/3/2022	0.669	2.15	4.30
PFDoS	79780-39-5	2.15 U	E4934-FS(0)	1.000	9/3/2022	0.690	2.15	4.30
4:2FTS	757124-72-4	2.15 U	E4934-FS(0)	1.000	9/3/2022	0.876	2.15	4.30
6:2FTS	27619-97-2	3.01 U	E4934-FS(0)	1.000	9/3/2022	1.26	3.01	4.30
8:2FTS	39108-34-4	2.15 U	E4934-FS(0)	1.000	9/3/2022	0.868	2.15	4.30
3:3 FTCA	356-02-5	3.01 U	E4934-FS(0)	1.000	9/3/2022	1.30	3.01	4.30
5:3 FTCA	914637-49-3	2.15 U	E4934-FS(0)	1.000	9/3/2022	0.962	2.15	4.30
7:3 FTCA	812-70-4	2.15 U	E4934-FS(0)	1.000	9/3/2022	0.868	2.15	4.30
HFPO-DA	13252-13-6	2.15 U	E4934-FS(0)	1.000	9/3/2022	0.743	2.15	4.30
Adona	919005-14-4	2.15 U	E4934-FS(0)	1.000	9/3/2022	0.747	2.15	4.30
9Cl-PF3ONS	756426-58-1	2.15 U	E4934-FS(0)	1.000	9/3/2022	0.885	2.15	4.30
11Cl-PF3OUdS	763051-92-9	2.15 U	E4934-FS(0)	1.000	9/3/2022	0.774	2.15	4.30

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Project Client: Horsely Witten Group, Inc.
Project Name: Cape Cod Gateway Airport - PFAS
Project No.: G00120.XX.XX.XXXX.NORWEL

Client ID	HW-I(m)
Battelle ID	E4934-FS
Sample Type	SA
Collection Date	08/02/2022
Extraction Date	08/08/2022
Analytical Instrument	Sciex 5500 (AC) LC/MS/MS

Surrogate Recoveries (%)	**Recovery**		**Extract ID**	**Analysis Date**
13C4-PFBA	55		E4934-FS(0)	9/3/2022
13C5-PFPeA	67		E4934-FS(0)	9/3/2022
13C5-PFHxA	52		E4934-FS(0)	9/3/2022
13C4-PFHpA	47	N	E4934-FS(0)	9/3/2022
13C8-PFOA	47	N	E4934-FS(0)	9/3/2022
13C9-PFNA	46	N	E4934-FS(0)	9/3/2022
13C6-PFDA	46	N	E4934-FS(0)	9/3/2022
13C7-PFUnA	58		E4934-FS(0)	9/3/2022
13C2-PFDoA	54		E4934-FS(0)	9/3/2022
13C2-PFTeDA	44	N	E4934-FS(0)	9/3/2022
d3-MeFOSAA	42	N	E4934-FS(0)	9/3/2022
d5-EtFOSAA	40	N	E4934-FS(0)	9/3/2022
d3-MeFOSA	52		E4934-FS(0)	9/3/2022
d5-EtFOSA	53		E4934-FS(0)	9/3/2022
d7-MeFOSE	61		E4934-FS(0)	9/3/2022
d9-EtFOSE	59		E4934-FS(0)	9/3/2022
13C8-FOSA	64		E4934-FS(0)	9/3/2022
13C3-PFBS	52		E4934-FS(0)	9/3/2022
13C3-PFHxS	50		E4934-FS(0)	9/3/2022
13C8-PFOS	49	N	E4934-FS(0)	9/3/2022
13C2-4:2FTS	59		E4934-FS(0)	9/3/2022
13C2-6:2FTS	66		E4934-FS(0)	9/3/2022
13C2-8:2FTS	81		E4934-FS(0)	9/3/2022
13C3-HFPO-DA	50		E4934-FS(0)	9/3/2022

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Project Client: Horsely Witten Group, Inc.
Project Name: Cape Cod Gateway Airport - PFAS
Project No.: G00120.XX.XX.XXXX.NORWEL

Client ID	HW-I(d)
Battelle ID	E4935-FS
Sample Type	SA
Collection Date	08/02/2022
Extraction Date	08/08/2022
Analytical Instrument	Sciex 5500 (AC) LC/MS/MS
% Moisture	NA
Matrix	GW
Sample Size	0.266
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
NFDHA	151772-58-6	2.35 U	E4935-FS(0)	1.000	9/3/2022	0.724	2.35	4.70
PFEESA	113507-82-7	2.35 U	E4935-FS(0)	1.000	9/3/2022	0.653	2.35	4.70
PFMPA	377-73-1	2.35 U	E4935-FS(0)	1.000	9/3/2022	1.02	2.35	4.70
PFMBA	863090-89-5	2.35 U	E4935-FS(0)	1.000	9/3/2022	0.875	2.35	4.70
PFBA	375-22-4	8.10	E4935-FS(0)	1.000	9/3/2022	1.42	3.29	4.70
PFPeA	2706-90-3	20.9	E4935-FS(0)	1.000	9/3/2022	1.20	3.29	4.70
PFHxA	307-24-4	23.8	E4935-FS(0)	1.000	9/3/2022	0.858	2.35	4.70
PFHpA	375-85-9	13.1	E4935-FS(0)	1.000	9/3/2022	0.884	2.35	4.70
PFOA	335-67-1	16.8	E4935-FS(0)	1.000	9/3/2022	0.949	2.35	4.70
PFNA	375-95-1	1.21 J	E4935-FS(0)	1.000	9/3/2022	0.783	2.35	4.70
PFDA	335-76-2	2.35 U	E4935-FS(0)	1.000	9/3/2022	0.737	2.35	4.70
PFUnA	2058-94-8	2.35 U	E4935-FS(0)	1.000	9/3/2022	0.707	2.35	4.70
PFDoA	307-55-1	2.35 U	E4935-FS(0)	1.000	9/3/2022	0.714	2.35	4.70
PFTrDA	72629-94-8	2.35 U	E4935-FS(0)	1.000	9/3/2022	0.697	2.35	4.70
PFTeDA	376-06-7	2.35 U	E4935-FS(0)	1.000	9/3/2022	0.743	2.35	4.70
NMeFOSAA	2355-31-9	2.35 U	E4935-FS(0)	1.000	9/3/2022	0.968	2.35	4.70
NEtFOSAA	2991-50-6	2.35 U	E4935-FS(0)	1.000	9/3/2022	0.930	2.35	4.70
NMeFOSA	31506-32-8	2.35 U	E4935-FS(0)	1.000	9/3/2022	0.996	2.35	4.70
NEtFOSA	4151-50-2	3.29 U	E4935-FS(0)	1.000	9/3/2022	1.18	3.29	4.70
NMeFOSE	24448-09-7	2.35 U	E4935-FS(0)	1.000	9/3/2022	1.01	2.35	4.70
NEtFOSE	1691-99-2	3.29 U	E4935-FS(0)	1.000	9/3/2022	1.29	3.29	4.70
PFOSA	754-91-6	3.29 U	E4935-FS(0)	1.000	9/3/2022	1.48	3.29	4.70
PFBS	375-73-5	2.36 J	E4935-FS(0)	1.000	9/3/2022	0.814	2.35	4.70
PFPeS	2706-91-4	3.16 J	E4935-FS(0)	1.000	9/3/2022	0.959	2.35	4.70
PFHxS	355-46-4	66.2	E4935-FS(0)	1.000	9/3/2022	0.937	2.35	4.70
PFHpS	375-92-8	4.05 J	E4935-FS(0)	1.000	9/3/2022	0.790	2.35	4.70
PFOS	1763-23-1	93.6	E4935-FS(0)	1.000	9/3/2022	1.01	2.35	4.70
PFNS	68259-12-1	2.35 U	E4935-FS(0)	1.000	9/3/2022	0.659	2.35	4.70
PFDS	335-77-3	2.35 U	E4935-FS(0)	1.000	9/3/2022	0.732	2.35	4.70
PFDoS	79780-39-5	2.35 U	E4935-FS(0)	1.000	9/3/2022	0.755	2.35	4.70
4:2FTS	757124-72-4	2.35 U	E4935-FS(0)	1.000	9/3/2022	0.959	2.35	4.70
6:2FTS	27619-97-2	1.63 J	E4935-FS(0)	1.000	9/3/2022	1.38	3.29	4.70
8:2FTS	39108-34-4	2.35 U	E4935-FS(0)	1.000	9/3/2022	0.949	2.35	4.70
3:3 FTCA	356-02-5	3.29 U	E4935-FS(0)	1.000	9/3/2022	1.42	3.29	4.70
5:3 FTCA	914637-49-3	2.35 U	E4935-FS(0)	1.000	9/3/2022	1.05	2.35	4.70
7:3 FTCA	812-70-4	2.35 U	E4935-FS(0)	1.000	9/3/2022	0.949	2.35	4.70
HFPO-DA	13252-13-6	2.35 U	E4935-FS(0)	1.000	9/3/2022	0.813	2.35	4.70
Adona	919005-14-4	2.35 U	E4935-FS(0)	1.000	9/3/2022	0.817	2.35	4.70
9Cl-PF3ONS	756426-58-1	2.35 U	E4935-FS(0)	1.000	9/3/2022	0.968	2.35	4.70
11Cl-PF3OUdS	763051-92-9	2.35 U	E4935-FS(0)	1.000	9/3/2022	0.847	2.35	4.70

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Project Client: Horsely Witten Group, Inc.
Project Name: Cape Cod Gateway Airport - PFAS
Project No.: G00120.XX.XX.XXXX.NORWEL

Client ID	HW-I(d)
Battelle ID	E4935-FS
Sample Type	SA
Collection Date	08/02/2022
Extraction Date	08/08/2022
Analytical Instrument	Sciex 5500 (AC) LC/MS/MS

Surrogate Recoveries (%)	**Recovery**		**Extract ID**	**Analysis Date**
13C4-PFBA	62		E4935-FS(0)	9/3/2022
13C5-PFPeA	72		E4935-FS(0)	9/3/2022
13C5-PFHxA	60		E4935-FS(0)	9/3/2022
13C4-PFHpA	55		E4935-FS(0)	9/3/2022
13C8-PFOA	55		E4935-FS(0)	9/3/2022
13C9-PFNA	55		E4935-FS(0)	9/3/2022
13C6-PFDA	56		E4935-FS(0)	9/3/2022
13C7-PFUnA	49	N	E4935-FS(0)	9/3/2022
13C2-PFDoA	38	N	E4935-FS(0)	9/3/2022
13C2-PFTeDA	18	N	E4935-FS(0)	9/3/2022
d3-MeFOSAA	40	N	E4935-FS(0)	9/3/2022
d5-EtFOSAA	29	N	E4935-FS(0)	9/3/2022
d3-MeFOSA	27	N	E4935-FS(0)	9/3/2022
d5-EtFOSA	24	N	E4935-FS(0)	9/3/2022
d7-MeFOSE	30	N	E4935-FS(0)	9/3/2022
d9-EtFOSE	26	N	E4935-FS(0)	9/3/2022
13C8-FOSA	59		E4935-FS(0)	9/3/2022
13C3-PFBS	58		E4935-FS(0)	9/3/2022
13C3-PFHxS	58		E4935-FS(0)	9/3/2022
13C8-PFOS	55		E4935-FS(0)	9/3/2022
13C2-4:2FTS	71		E4935-FS(0)	9/3/2022
13C2-6:2FTS	73		E4935-FS(0)	9/3/2022
13C2-8:2FTS	82		E4935-FS(0)	9/3/2022
13C3-HFPO-DA	57		E4935-FS(0)	9/3/2022

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Project Client: Horsely Witten Group, Inc.
Project Name: Cape Cod Gateway Airport - PFAS
Project No.: G00120.XX.XX.XXXX.NORWEL

Client ID	LS19 IB
Battelle ID	LS19 IB_09/02/2022
Sample Type	IB
Collection Date	NA
Extraction Date	NA
Analysis Date	09/02/2022
Analytical Instrument	Sciex 5500 (AC) LC/MS/MS
% Moisture	NA
Matrix	Water
Sample Size	0.250
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	DL	LOD	LOQ
NFDHA	151772-58-6	2.50 U	0.770	2.50	5.00
PFEESA	113507-82-7	2.50 U	0.695	2.50	5.00
PFMPA	377-73-1	2.50 U	1.09	2.50	5.00
PFMBA	863090-89-5	2.50 U	0.931	2.50	5.00
PFBA	375-22-4	3.50 U	1.51	3.50	5.00
PFPeA	2706-90-3	3.50 U	1.28	3.50	5.00
PFHxA	307-24-4	2.50 U	0.913	2.50	5.00
PFHpA	375-85-9	2.50 U	0.941	2.50	5.00
PFOA	335-67-1	2.50 U	1.01	2.50	5.00
PFNA	375-95-1	2.50 U	0.833	2.50	5.00
PFDA	335-76-2	2.50 U	0.784	2.50	5.00
PFUnA	2058-94-8	2.50 U	0.752	2.50	5.00
PFDoA	307-55-1	2.50 U	0.760	2.50	5.00
PFTrDA	72629-94-8	2.50 U	0.742	2.50	5.00
PFTeDA	376-06-7	2.50 U	0.791	2.50	5.00
NMeFOSAA	2355-31-9	2.50 U	1.03	2.50	5.00
NEtFOSAA	2991-50-6	2.50 U	0.990	2.50	5.00
NMeFOSA	31506-32-8	2.50 U	1.06	2.50	5.00
NEtFOSA	4151-50-2	3.50 U	1.26	3.50	5.00
NMeFOSE	24448-09-7	2.50 U	1.07	2.50	5.00
NEtFOSE	1691-99-2	3.50 U	1.37	3.50	5.00
PFOSA	754-91-6	3.50 U	1.58	3.50	5.00
PFBS	375-73-5	2.50 U	0.866	2.50	5.00
PFPeS	2706-91-4	2.50 U	1.02	2.50	5.00
PFHxS	355-46-4	2.50 U	0.997	2.50	5.00
PFHpS	375-92-8	2.50 U	0.841	2.50	5.00
PFOS	1763-23-1	2.50 U	1.07	2.50	5.00
PFNS	68259-12-1	2.50 U	0.701	2.50	5.00
PFDS	335-77-3	2.50 U	0.779	2.50	5.00
PFDoS	79780-39-5	2.50 U	0.803	2.50	5.00
4:2FTS	757124-72-4	2.50 U	1.02	2.50	5.00
6:2FTS	27619-97-2	3.50 U	1.47	3.50	5.00
8:2FTS	120226-60-0	2.50 U	1.01	2.50	5.00
3:3 FTCA	356-02-5	3.50 U	1.51	3.50	5.00
5:3 FTCA	914637-49-3	2.50 U	1.12	2.50	5.00
7:3 FTCA	812-70-4	2.50 U	1.01	2.50	5.00
HFPO-DA	13252-13-6	2.50 U	0.865	2.50	5.00
Adona	919005-14-4	2.50 U	0.869	2.50	5.00
9Cl-PF3ONS	756426-58-1	2.50 U	1.03	2.50	5.00
11Cl-PF3OUdS	763051-92-9	2.50 U	0.901	2.50	5.00

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Project Client: Horsely Witten Group, Inc.
Project Name: Cape Cod Gateway Airport - PFAS
Project No.: G00120.XX.XX.XXXX.NORWEL

Client ID	LS19 IB
Battelle ID	LS19 IB_09/02/2022
Sample Type	IB
Collection Date	NA
Extraction Date	NA
Analysis Date	09/02/2022
Analytical Instrument	Sciex 5500 (AC) LC/MS/MS
% Moisture	NA
Matrix	Water
Sample Size	0.250
Size Unit-Basis	L

Surrogate Recoveries (%)

13C4-PFBA	102
13C5-PFPeA	102
13C5-PFHxA	103
13C4-PFHpA	102
13C8-PFOA	104
13C9-PFNA	103
13C6-PFDA	101
13C7-PFUnA	105
13C2-PFDoA	108
13C2-PFTeDA	107
d3-MeFOSAA	103
d5-EtFOSAA	105
d3-MeFOSA	105
d5-EtFOSA	102
d7-MeFOSE	104
d9-EtFOSE	105
13C8-FOSA	107
13C3-PFBS	103
13C3-PFHxS	104
13C8-PFOS	105
13C2-4:2FTS	113
13C2-6:2FTS	107
13C2-8:2FTS	106
13C3-HFPO-DA	100

BATTELLE
It can be done

Project Client: Horsely Witten Group, Inc.
Project Name: Cape Cod Gateway Airport - PFAS
Project No.: G00120.XX.XX.XXXX.NORWEL

Client ID	Procedural Blank
Battelle ID	DJ508PB-FS
Sample Type	PB
Collection Date	08/08/2022
Extraction Date	08/08/2022
Analytical Instrument	Sciex 5500 (AC) LC/MS/MS
% Moisture	NA
Matrix	WATER
Sample Size	0.253
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
NFDHA	151772-58-6	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	0.761	2.47	4.94
PFEESA	113507-82-7	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	0.687	2.47	4.94
PFMPA	377-73-1	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	1.08	2.47	4.94
PFMBA	863090-89-5	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	0.920	2.47	4.94
PFBA	375-22-4	3.46 U	DJ508PB-FS(0)	1.000	9/3/2022	1.49	3.46	4.94
PFPeA	2706-90-3	3.46 U	DJ508PB-FS(0)	1.000	9/3/2022	1.26	3.46	4.94
PFHxA	307-24-4	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	0.902	2.47	4.94
PFHpA	375-85-9	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	0.930	2.47	4.94
PFOA	335-67-1	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	0.998	2.47	4.94
PFNA	375-95-1	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	0.823	2.47	4.94
PFDA	335-76-2	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	0.775	2.47	4.94
PFUnA	2058-94-8	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	0.743	2.47	4.94
PFDoA	307-55-1	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	0.751	2.47	4.94
PFTrDA	72629-94-8	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	0.733	2.47	4.94
PFTeDA	376-06-7	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	0.782	2.47	4.94
NMeFOSAA	2355-31-9	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	1.02	2.47	4.94
NEtFOSAA	2991-50-6	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	0.978	2.47	4.94
NMeFOSA	31506-32-8	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	1.05	2.47	4.94
NEtFOSA	4151-50-2	3.46 U	DJ508PB-FS(0)	1.000	9/3/2022	1.25	3.46	4.94
NMeFOSE	24448-09-7	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	1.06	2.47	4.94
NEtFOSE	1691-99-2	3.46 U	DJ508PB-FS(0)	1.000	9/3/2022	1.35	3.46	4.94
PFOSA	754-91-6	3.46 U	DJ508PB-FS(0)	1.000	9/3/2022	1.56	3.46	4.94
PFBS	375-73-5	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	0.856	2.47	4.94
PFPeS	2706-91-4	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	1.01	2.47	4.94
PFHxS	355-46-4	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	0.985	2.47	4.94
PFHpS	375-92-8	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	0.831	2.47	4.94
PFOS	1763-23-1	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	1.06	2.47	4.94
PFNS	68259-12-1	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	0.693	2.47	4.94
PFDS	335-77-3	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	0.770	2.47	4.94
PFDoS	79780-39-5	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	0.793	2.47	4.94
4:2FTS	757124-72-4	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	1.01	2.47	4.94
6:2FTS	27619-97-2	3.46 U	DJ508PB-FS(0)	1.000	9/3/2022	1.45	3.46	4.94
8:2FTS	39108-34-4	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	0.998	2.47	4.94
3:3 FTCA	356-02-5	3.46 U	DJ508PB-FS(0)	1.000	9/3/2022	1.49	3.46	4.94
5:3 FTCA	914637-49-3	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	1.11	2.47	4.94
7:3 FTCA	812-70-4	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	0.998	2.47	4.94
HFPO-DA	13252-13-6	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	0.855	2.47	4.94
Adona	919005-14-4	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	0.859	2.47	4.94
9Cl-PF3ONS	756426-58-1	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	1.02	2.47	4.94
11Cl-PF3OUdS	763051-92-9	2.47 U	DJ508PB-FS(0)	1.000	9/3/2022	0.890	2.47	4.94

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Project Client: Horsely Witten Group, Inc.
Project Name: Cape Cod Gateway Airport - PFAS
Project No.: G00120.XX.XX.XXXX.NORWEL

Client ID	Procedural Blank
Battelle ID	DJ508PB-FS
Sample Type	PB
Collection Date	08/08/2022
Extraction Date	08/08/2022
Analytical Instrument	Sciex 5500 (AC) LC/MS/MS

Surrogate Recoveries (%)	**Recovery**	**Extract ID**	**Analysis Date**
13C4-PFBA	54	DJ508PB-FS(0)	9/3/2022
13C5-PFPeA	64	DJ508PB-FS(0)	9/3/2022
13C5-PFHxA	72	DJ508PB-FS(0)	9/3/2022
13C4-PFHpA	69	DJ508PB-FS(0)	9/3/2022
13C8-PFOA	71	DJ508PB-FS(0)	9/3/2022
13C9-PFNA	70	DJ508PB-FS(0)	9/3/2022
13C6-PFDA	73	DJ508PB-FS(0)	9/3/2022
13C7-PFUnA	79	DJ508PB-FS(0)	9/3/2022
13C2-PFDoA	85	DJ508PB-FS(0)	9/3/2022
13C2-PFTeDA	76	DJ508PB-FS(0)	9/3/2022
d3-MeFOSAA	78	DJ508PB-FS(0)	9/3/2022
d5-EtFOSAA	75	DJ508PB-FS(0)	9/3/2022
d3-MeFOSA	52	DJ508PB-FS(0)	9/3/2022
d5-EtFOSA	51	DJ508PB-FS(0)	9/3/2022
d7-MeFOSE	53	DJ508PB-FS(0)	9/3/2022
d9-EtFOSE	52	DJ508PB-FS(0)	9/3/2022
13C8-FOSA	63	DJ508PB-FS(0)	9/3/2022
13C3-PFBS	70	DJ508PB-FS(0)	9/3/2022
13C3-PFHxS	74	DJ508PB-FS(0)	9/3/2022
13C8-PFOS	77	DJ508PB-FS(0)	9/3/2022
13C2-4:2FTS	71	DJ508PB-FS(0)	9/3/2022
13C2-6:2FTS	71	DJ508PB-FS(0)	9/3/2022
13C2-8:2FTS	82	DJ508PB-FS(0)	9/3/2022
13C3-HFPO-DA	70	DJ508PB-FS(0)	9/3/2022

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Project Client: Horsely Witten Group, Inc.
Project Name: Cape Cod Gateway Airport - PFAS
Project No.: G00120.XX.XX.XXXX.NORWEL

Client ID	Laboratory Control Sample
Battelle ID	DJ509LCS-FS
Sample Type	LCS
Collection Date	08/08/2022
Extraction Date	08/08/2022
Analytical Instrument	Sciex 5500 (AC) LC/MS/MS
% Moisture	NA
Matrix	WATER
Sample Size	0.243
Size Unit-Basis	L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	Target	Recovery	Qual	Control Limits Lower	Upper
NFDHA	151772-58-6	234	DJ509LCS-FS(0)	1.000	9/3/2022	247	95		70	130
PFEESA	113507-82-7	211	DJ509LCS-FS(0)	1.000	9/3/2022	220	96		70	130
PFMPA	377-73-1	253	DJ509LCS-FS(0)	1.000	9/3/2022	247	102		70	130
PFMBA	863090-89-5	249	DJ509LCS-FS(0)	1.000	9/3/2022	247	101		70	130
PFBA	375-22-4	219	DJ509LCS-FS(0)	1.000	9/3/2022	247	89		73	129
PFPeA	2706-90-3	198	DJ509LCS-FS(0)	1.000	9/3/2022	249	80		72	129
PFHxA	307-24-4	270	DJ509LCS-FS(0)	1.000	9/3/2022	247	109		72	129
PFHpA	375-85-9	264	DJ509LCS-FS(0)	1.000	9/3/2022	247	107		72	130
PFOA	335-67-1	277	DJ509LCS-FS(0)	1.000	9/3/2022	249	111		71	133
PFNA	375-95-1	263	DJ509LCS-FS(0)	1.000	9/3/2022	247	106		69	130
PFDA	335-76-2	249	DJ509LCS-FS(0)	1.000	9/3/2022	247	101		71	129
PFUnA	2058-94-8	286	DJ509LCS-FS(0)	1.000	9/3/2022	247	116		69	133
PFDoA	307-55-1	265	DJ509LCS-FS(0)	1.000	9/3/2022	247	107		72	134
PFTrDA	72629-94-8	302	DJ509LCS-FS(0)	1.000	9/3/2022	247	122		65	144
PFTeDA	376-06-7	292	DJ509LCS-FS(0)	1.000	9/3/2022	247	118		71	132
NMeFOSAA	2355-31-9	285	DJ509LCS-FS(0)	1.000	9/3/2022	247	115		65	136
NEtFOSAA	2991-50-6	272	DJ509LCS-FS(0)	1.000	9/3/2022	247	110		61	135
NMeFOSA	31506-32-8	273	DJ509LCS-FS(0)	1.000	9/3/2022	247	111		68	141
NEtFOSA	4151-50-2	239	DJ509LCS-FS(0)	1.000	9/3/2022	247	97		70	130
NMeFOSE	24448-09-7	214	DJ509LCS-FS(0)	1.000	9/3/2022	247	87		70	130
NEtFOSE	1691-99-2	212	DJ509LCS-FS(0)	1.000	9/3/2022	247	86		70	130
PFOSA	754-91-6	217	DJ509LCS-FS(0)	1.000	9/3/2022	247	88		67	137
PFBS	375-73-5	310	DJ509LCS-FS(0)	1.000	9/3/2022	247	126		72	130
PFPeS	2706-91-4	257	DJ509LCS-FS(0)	1.000	9/3/2022	247	104		71	127
PFHxS	355-46-4	279	DJ509LCS-FS(0)	1.000	9/3/2022	247	113		68	131
PFHpS	375-92-8	284	DJ509LCS-FS(0)	1.000	9/3/2022	247	115		69	134
PFOS	1763-23-1	228	DJ509LCS-FS(0)	1.000	9/3/2022	247	92		65	140
PFNS	68259-12-1	267	DJ509LCS-FS(0)	1.000	9/3/2022	249	107		69	127
PFDS	335-77-3	272	DJ509LCS-FS(0)	1.000	9/3/2022	249	109		53	142
PFDoS	79780-39-5	214	DJ509LCS-FS(0)	1.000	9/3/2022	240	89		70	130
4:2FTS	757124-72-4	223	DJ509LCS-FS(0)	1.000	9/3/2022	247	90		63	143
6:2FTS	27619-97-2	205	DJ509LCS-FS(0)	1.000	9/3/2022	247	83		64	140
8:2FTS	39108-34-4	200	DJ509LCS-FS(0)	1.000	9/3/2022	249	80		67	138
3:3 FTCA	356-02-5	248	DJ509LCS-FS(0)	1.000	9/3/2022	247	100		70	130
5:3 FTCA	914637-49-3	273	DJ509LCS-FS(0)	1.000	9/3/2022	247	111		70	130
7:3 FTCA	812-70-4	277	DJ509LCS-FS(0)	1.000	9/3/2022	247	112		70	130
HFPO-DA	13252-13-6	297	DJ509LCS-FS(0)	1.000	9/3/2022	247	120		60	126
Adona	919005-14-4	277	DJ509LCS-FS(0)	1.000	9/3/2022	247	112		61	130
9Cl-PF3ONS	756426-58-1	312	DJ509LCS-FS(0)	1.000	9/3/2022	247	126		60	126
11Cl-PF3OUdS	763051-92-9	309	DJ509LCS-FS(0)	1.000	9/3/2022	247	125		56	125

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Project Client: Horsely Witten Group, Inc.
Project Name: Cape Cod Gateway Airport - PFAS
Project No.: G00120.XX.XX.XXXX.NORWEL

Client ID	Laboratory Control Sample
Battelle ID	DJ509LCS-FS
Sample Type	LCS
Collection Date	08/08/2022
Extraction Date	08/08/2022
Analytical Instrument	Sciex 5500 (AC) LC/MS/MS

Surrogate Recoveries (%)	**Recovery**	**Extract ID**	**Analysis Date**
13C4-PFBA	50	DJ509LCS-FS(0)	9/3/2022
13C5-PFPeA	69	DJ509LCS-FS(0)	9/3/2022
13C5-PFHxA	64	DJ509LCS-FS(0)	9/3/2022
13C4-PFHpA	62	DJ509LCS-FS(0)	9/3/2022
13C8-PFOA	62	DJ509LCS-FS(0)	9/3/2022
13C9-PFNA	66	DJ509LCS-FS(0)	9/3/2022
13C6-PFDA	62	DJ509LCS-FS(0)	9/3/2022
13C7-PFUnA	71	DJ509LCS-FS(0)	9/3/2022
13C2-PFDoA	69	DJ509LCS-FS(0)	9/3/2022
13C2-PFTeDA	59	DJ509LCS-FS(0)	9/3/2022
d3-MeFOSAA	59	DJ509LCS-FS(0)	9/3/2022
d5-EtFOSAA	65	DJ509LCS-FS(0)	9/3/2022
d3-MeFOSA	60	DJ509LCS-FS(0)	9/3/2022
d5-EtFOSA	58	DJ509LCS-FS(0)	9/3/2022
d7-MeFOSE	61	DJ509LCS-FS(0)	9/3/2022
d9-EtFOSE	59	DJ509LCS-FS(0)	9/3/2022
13C8-FOSA	73	DJ509LCS-FS(0)	9/3/2022
13C3-PFBS	61	DJ509LCS-FS(0)	9/3/2022
13C3-PFHxS	61	DJ509LCS-FS(0)	9/3/2022
13C8-PFOS	65	DJ509LCS-FS(0)	9/3/2022
13C2-4:2FTS	70	DJ509LCS-FS(0)	9/3/2022
13C2-6:2FTS	76	DJ509LCS-FS(0)	9/3/2022
13C2-8:2FTS	89	DJ509LCS-FS(0)	9/3/2022
13C3-HFPO-DA	54	DJ509LCS-FS(0)	9/3/2022

Glossary of Data Qualifiers

Flag:	Application:
B	Analyte found in the sample at a concentration <10x the level found in the procedural blank
D	Dilution Run. Initial run outside the initial calibration range of the instrument
E	Estimate, result is greater than the highest concentration level in the calibration
J	Analyte detected below the Limit of Quantitation (LOQ)
MI	Significant Matrix Interference - value could not be determined.
N	Quality Control (QC) value is outside the accuracy or precision Data Quality Objective (DQO)
NA	Not Applicable
T	Holding Time (HT) exceeded
U	Analyte not detected or detected below the Detection Limit (DL) value, Limit of Detection (LOD) reported
Q	Ion ratio outside of criteria (50% difference from calibration expected ratio)

Miscellaneous Documentation

QA/QC Summary
Batch 22-1319

Project:	Cape Code Gateway Airport – PFAS Analysis
Client Project Manager:	Bryan Massa
Parameters:	PFAS
Laboratory:	Battelle, Norwell, MA
Matrix:	Water
Data Set:	DP-22-1361
Analytical SOP:	5-369
Method Reference:	PFAS to QSM 5.3 Table B-15

Sample Custody		
Collection Date	Receipt Date	Temp (°C)
7/29 and 8/2/2022	8/3/2022	1.3
Corrective Actions	None.	
Sample Storage	The samples were stored refrigerated until extraction.	
Related samples	None.	

	METHOD SUMMARIES
Sample Preparation	Water samples were fortified with surrogates in the original sample container from the field. The water was extracted using a Weak-anion exchange (WAX) solid phase extraction (SPE) cartridge. Target analytes are eluted from the WAX SPE using 1% NH_3OH in methanol. Extracts were acidified with acetic acid and further refined using dispersive Envi-carb to remove co-extracted interferences. Extracts were fortified with internal standards and transferred to LC-MS/MS for analysis.
Prep comments	pH of all samples prior to SPE extraction was verified between 6 and 8. Sample E4934-FS (HW-I(m)) was filled to the top of the container, approximately 1 mL of sample was lost during initial transfer to the SPE cartridge for extraction. Sample E4935-FS (HW-I(d)) was received in a 1 L container, 750 mL of sample was transferred to new containers, leaving approximately 250 mL in the original container.
Analysis	PFAS were measured by liquid chromatography tandem mass spectrometry (LC-MS/MS) in the multiple reaction monitoring (MRM). An initial calibration consisting of representative target analytes, labelled analogs, and internal standards was analyzed prior to analysis to demonstrate the linear range of analysis. Calibration verification was performed at the beginning and end of 10 injections and at the end of each sequence. Target PFAS were quantified using the isotope dilution method. Samples are reported in ng/L concentrations to three (3) significant figures.
Analysis Comments	Samples analyzed on Sciex 5500 (AC) LC-MS/MS. MeFOSAA, EtFOSAA, PFHxS, and PFOS in the LCS, and field samples when detected, were detected and reported as a combination of the branched and linear isomers.

QA/QC Summary
Batch 22-1319

	13C5-PFHxA, 13C7-PFUnA, 13C2-PFDoA, 13C2-PFTeDA, 13C3-PFBS, 13C3-PFHxS, D5-EtFOSA and 13C3-HFPO-DA. are quantified using 13C3-PFBA. 13C8-FOSA, d3-MeFOSA, d7-MeFOSE and d9-EtFOSE are quantified using 13C2-PFOA. PFEESA quantified using 13C8-PFOS. The following secondary transitions were not used in the calibration: • MeFOSAA in the L1 These points were excluded as the data point generated no signal in the standard. The secondary transition is monitored solely for peak identification, not quantification. There is no impact on the reported data. Secondary exceedances for calibrations, ICC, and CCV samples are not documented as the secondary transition is monitored solely for peak identification, not quantification. There is no impact on the reported data.

Holding Times	Extraction Date(s)	Analysis Date(s)
	8/8/2022	9/2 – 4/2022

Procedural Blank (PB)	A PB was prepared with this analytical batch to ensure the sample extraction and analysis methods are free of contamination.
≤ ½ the LOQ Samples >10x PB	No exceedances noted.
	No comments.

Laboratory Control Spike (LCS)	A LCS was prepared with this analytical batch. The percent recoveries of target analytes were calculated to measure accuracy.
Laboratory derived control limits for recovery	No exceedances noted.
	No comments.

Matrix Spike and Matrix Spike Duplicate (MS/MSD)	A MS/MSD was prepared with this analytical batch. The percent recoveries of target analytes were calculated to measure accuracy.
Laboratory derived control limits for recovery and <30% RPD	Project specific MS/MSD not included in this data set
	No comments.

Extracted Internal Standard Analytes	Labelled analog compounds were added prior to extraction. The recoveries are calculated to measure extraction efficiency.
50-150% of true value	Thirty-three (33) exceedances noted.
	Six samples had suppressed or enhanced recoveries for select extracted internal standards. The table below indicates if the extracted internal standard was within +/- 50% of the area of the L5 calibration point (“P”) or if the area showed suppression (“↓”) or enhancement (“↑”) for these extracted internal standards.

QA/QC Summary
Batch 22-1319

	E4930-FS (ME-1)	E4931-FS (ME-3)	E4932-FS (ME-2)	E4933-FS (HW-I(s))	E4934-FS (HW-I(m))	E4935-FS (HW-I(d))
13C4-PFHpA			↓		↓	
13C8-PFOA			P		P	
13C9-PFNA			P		P	
13C6-PFDA			P		P	
13C7-PFUnA						P
13C2-PFDoA						↓
13C2-PFTeDA				↓	↓	↓
d3-MeFOSAA				P	P	↓
d5-EtFOSAA	P		P	↓	↓	↓
d3-MeFOSA	↓					↓
d5-EtFOSA	↓					↓
d7-MeFOSE	P					↓
d9-EtFOSE	↓	P				↓
13C8-PFOS			P		P	
13C3-HFPO-DA			↓			

The remaining extracted internal standards in each impacted sample, fortified from the same solution, pass all criteria, suggesting that the suppression is matrix related to these analytes only. The sample extracts were re-analyzed for confirmation.

Internal Standard Analytes	Labelled analog compounds were added prior to analysis.
+/- 50% of the area of the L5 calibration point.	No exceedances noted.
	No comments.

Initial Calibration (ICAL)	The LC-MS/MS was calibrated with multi-level calibration curve for all compounds using linear or quadradic curve fitting.
+/- 30% of true value, $R^2 \geq 0.99$	No exceedances noted.
	No comments.

Independent Calibration Check (ICC)	The independent check was run after each initial calibration to verify the calibration. This standard is from a different source than the ICAL.
+/- 30% of true value	No exceedances noted.
	No comments.

Continuing Calibration Verification (CCV)	Continuing calibration standards were run at the beginning and end of 10 injections and at the end of the sequence to ensure that initial calibration is still valid.
+/- 30% of true value	No exceedances noted.
	No comments.

QA/QC Summary
Batch 22-1319

Instrument Blank (IB)	Immediately following the highest standard analyzed and daily prior to sample analysis.
≤ ½ the LOQ	No exceedances noted.
	No comments.

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Project Client: Horsely Witten Group, Inc.
Project Name: Cape Cod Gateway Airport - PFAS
Project Number: G00120.XX.XX.XXXX.NORWEL
Preparation Batch: 22-1319
Data Set: DP-22-1361
Test Code: Master_369D

QC Parameter:	Exceed:	Justification:
Procedural Blank	0	None
PB Measurement Quality Objective	0	None
Laboratory Control Sample	0	None
Matrix Spike / Matrix Spike Duplicate Recovery	NA	None
Matrix Spike / Matrix Spike Duplicate Precision	NA	None
Extracted Internal Standard Analytes (Surrogates)	33	Confirmed by analysis of a fresh aliquot of the samples. LMG 09/12/2022
Instrument Calibration	0	None
Instrument Blank	0	None
Independent Calibration Check	0	None
Continuing Calibration Verification	0	None

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BATTELLE - NORWELL OPERATIONS
MISCELLANEOUS DOCUMENTATION FORM

Project Title:	Cape Cod Gateway Airport - PFAS	**Data Set Number:**	DP-22-1361
Project Number:	G00120.XX.XX.XXXX.NORWEL	**Prep Batch Number:**	22-1319
Entered By:	Lauren Griffith	**Entered On:**	09/12/2022
Test Code (Matrix Type):	Master_369D(L)		

Samples that were manually integrated are noted on the quant reports with the comment (TRUE). Changes were made due to incorrect auto integration of a peak by the data system. The analyst's initials on this statement indicate that all integrations were reviewed and approved by the analyst performing the analysis
LMG 09/12/2022

Secondary exceedances for calibrations, ICC, and CCV samples are not documented as the secondary transition is monitored solely for peak identification, not quantification. There is no impact on the reported data

13C5-PFHxA, 13C7-PFUnA, 13C2-PFDoA, 13C2-PFTeDA, 13C2-PFHxDA, 13C3-PFBS, 13C3-PFHxS, D5-EtFOSA and 13C3-HFPO-DA are quantified using 13C3-PFBA
13C8-FOSA, D3-MeFOSA, D7-MeFOSE and D9-EtFOSE are quantified using 13C2-PFOA
PFEESA quantified using 13C8-PFOS

The following secondary transitions were not used in the calibration:
- MeFOSAA in the L1

These points were excluded as the data point generated no signal in the standard. The secondary transition is monitored solely for peak identification, not quantification. There is no impact on the reported data.

Task Leader Approval:

SupervisorApproval:

PM Approval:

Digitally signed by Jonathan Thorn
Date: 2022.09.14 11:53:13 -04'00'

BATTELLE
It can be done

Project Client: Horsely Witten Group, Inc.
Project Name: Cape Cod Gateway Airport - PFAS
Project No.: G00120.XX.XX.XXXX.NORWEL
Preparation Batch: 22-1319
Data Set: DP-22-1361

		DJ508PB-FS (Procedural Blank)	DJ509LCS-FS (Laboratory Control Sample)	E4930-FS (ME-1)	E4931-FS (ME-3)	E4932-FS (ME-2)	E4933-FS (HW-I(s))	E4934-FS (HW-I(m))	E4935-FS (HW-I(d))
NFDHA	151772-58-6	-	L	-	-	-	-	-	-
PFEESA	113507-82-7	-	L	-	-	-	-	-	-
PFMPA	377-73-1	-	L	-	-	-	-	-	-
PFMBA	863090-89-5	-	L	-	-	-	-	-	-
PFBA	375-22-4	-	L	L	L	L	L	-	L
PFPeA	2706-90-3	-	L	L	L	L	L	L	L
PFHxA	307-24-4	-	L	L	L	L	L	-	L
PFHpA	375-85-9	-	L	L	L	L	L	L	L
PFOA	335-67-1	-	L	L	L	L	L	-	L
PFNA	375-95-1	-	L	L	L	L	L	L	L
PFDA	335-76-2	-	L	-	-	-	-	-	-
PFUnA	2058-94-8	-	L	-	-	-	-	-	-
PFDoA	307-55-1	-	L	-	-	-	-	-	-
PFTrDA	72629-94-8	-	L	-	-	-	-	-	-
PFTeDA	376-06-7	-	L	-	-	-	-	-	-
NMeFOSAA	2355-31-9	-	L/Br	-	-	-	-	-	-
NEtFOSAA	2991-50-6	-	L/Br	-	-	-	-	-	-
NMeFOSA	31506-32-8	-	L	-	-	-	-	-	-
NEtFOSA	4151-50-2	-	L	-	-	-	-	-	-
NMeFOSE	24448-09-7	-	L	-	-	-	-	-	-
NEtFOSE	1691-99-2	-	L	-	-	-	-	-	-
PFOSA	754-91-6	-	L	-	L	-	-	-	-
PFBS	375-73-5	-	L	L	L	L	L	-	L
PFPeS	2706-91-4	-	L	L	L	L	L	-	L
PFHxS	355-46-4	-	L/Br	L/Br	L/Br	L/Br	L/Br	L/Br	L/Br
PFHpS	375-92-8	-	L	L	L	L	L	-	L
PFOS	1763-23-1	-	L/Br	L/Br	L/Br	L/Br	L/Br	L/Br	L/Br
PFNS	68259-12-1	-	L	-	-	-	-	-	-
PFDS	335-77-3	-	L	-	-	-	-	-	-
PFDoS	79780-39-5	-	L	-	-	-	-	-	-
4:2FTS	757124-72-4	-	L	-	-	-	-	-	-
6:2FTS	27619-97-2	-	L	L	L	L	L	-	L
8:2FTS	39108-34-4	-	L	-	-	L	L	-	-
3:3 FTCA	356-02-5	-	L	-	-	-	-	-	-
5:3 FTCA	914637-49-3	-	L	-	-	-	-	-	-
7:3 FTCA	812-70-4	-	L	-	-	-	-	-	-
HFPO-DA	13252-13-6	-	L	-	-	-	-	-	-
Adona	919005-14-4	-	L	-	-	-	-	-	-
9Cl-PF3ONS	756426-58-1	-	L	-	-	-	-	-	-
11Cl-PF3OUdS	763051-92-9	-	L	-	-	-	-	-	-

"L" :Linear
"Br": branched
"L/Br": Linear/Branched
"-": Not detected

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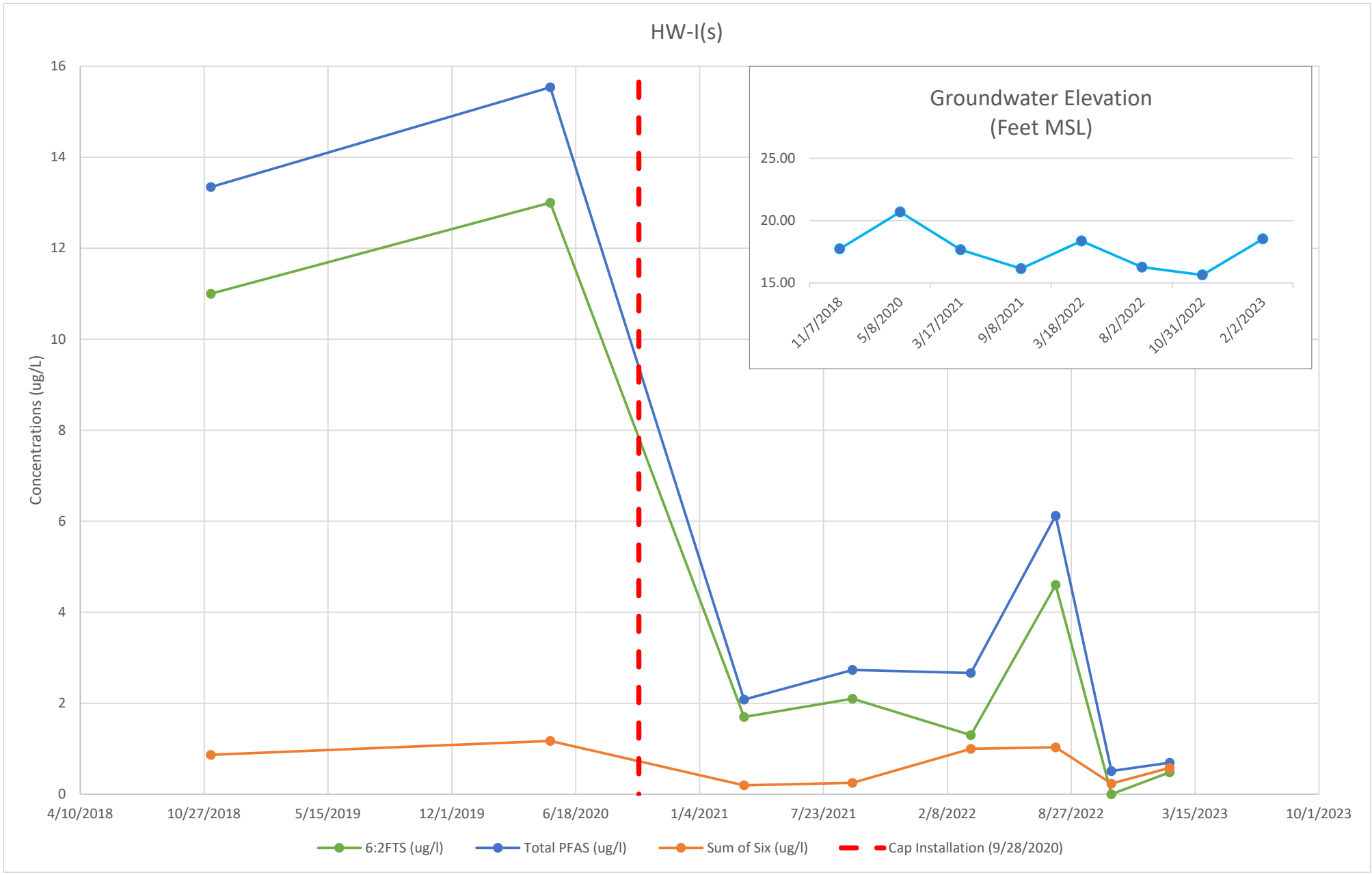
ACCREDITATIONS

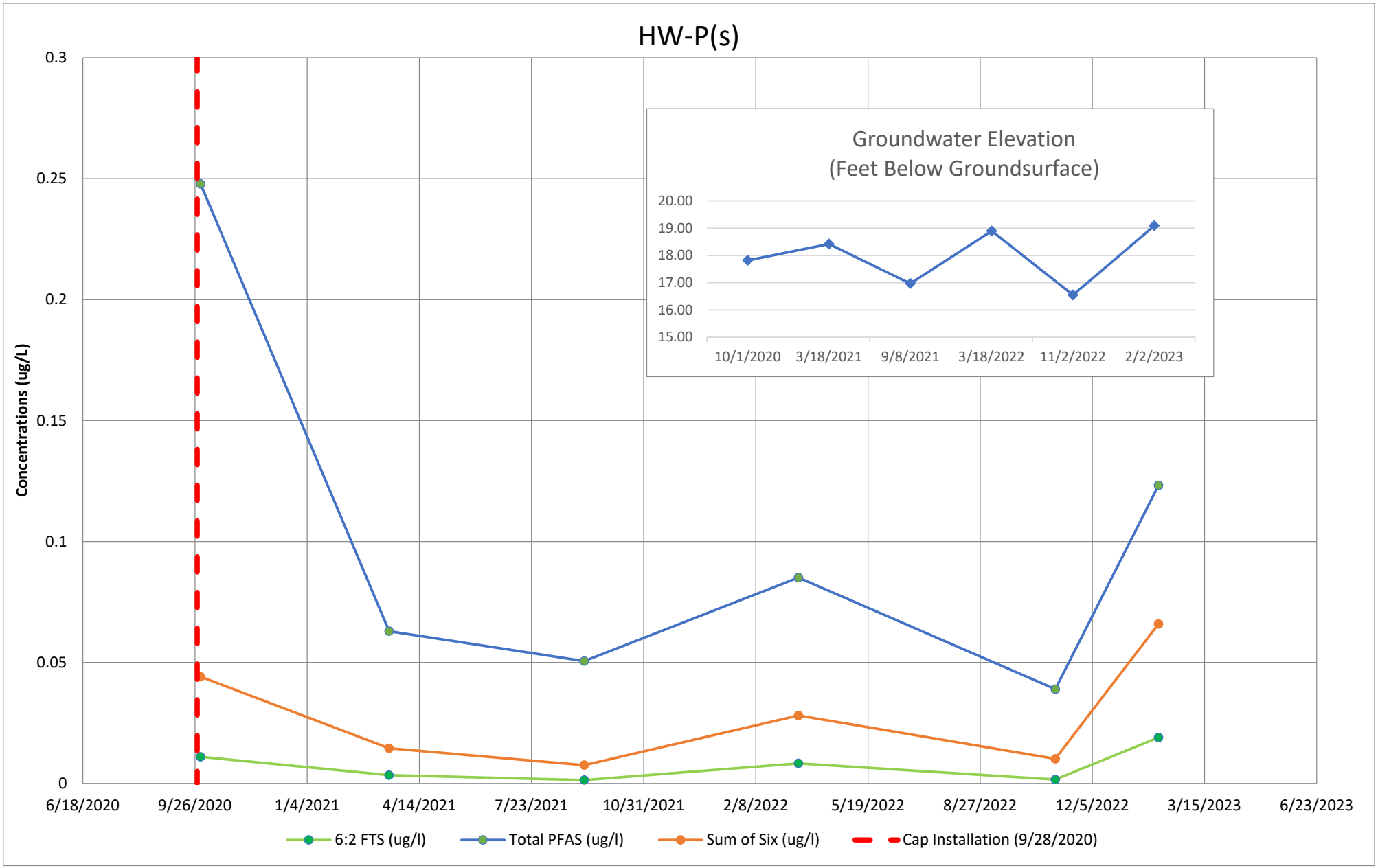
Accrediting Authority	Laboratory ID
U.S. Department of Defense Environmental Laboratory Accreditation Program (DoD-ELAP)	91667
State of Florida Department of Health	E87856
State of New York Department of Health	12105
State of Washington Department of Ecology	C1050
State of Maine	MA00056
State of Vermont	VT 87856
State of New Hampshire	2137
Commonwealth of Pennsylvania Department of Environmental Protection	68-05687
State of Alaska Department of Environmental Conservation	19-005
State of Rhode Island	E87856
State of California	3045

Current certificates and lists of accredited parameters are available upon request.

APPENDIX C

PFAS in Groundwater Trend Graphs for HW-I(s) and HW-P(s)


HW-I(s)
Concentrations (ug/L)
16
14
12
10
8
6
4
2
0
4/10/2018
10/27/2018
5/15/2019
12/1/2019
6/18/2020
1/4/2021
7/23/2021
2/8/2022
8/27/2022
3/15/2023
10/1/2023
Groundwater Elevation
(Feet MSL)
25.00
20.00
15.00
11/7/2018
5/8/2020
3/17/2021
9/8/2021
3/18/2022
8/2/2022
10/31/2022
2/2/2023
6:2FTS (ug/l)
Total PFAS (ug/l)
Sum of Six (ug/l)
Cap Installation (9/28/2020)


HW-P(s)
Concentrations (ug/L)
0.3
0.25
0.2
0.15
0.1
0.05
0
6/18/2020
9/26/2020
1/4/2021
4/14/2021
7/23/2021
10/31/2021
2/8/2022
5/19/2022
8/27/2022
12/5/2022
3/15/2023
6/23/2023
6:2 FTS (ug/l)
Total PFAS (ug/l)
Sum of Six (ug/l)
Cap Installation (9/28/2020)
Groundwater Elevation
(Feet Below Groundsurface)
20.00
19.00
18.00
17.00
16.00
15.00
10/1/2020
3/18/2021
9/8/2021
3/18/2022
11/2/2022
2/2/2023