
Halifax Landfill 2044 Branch Road Halifax, Vermont

VTDEC Project# NS95-0165
Solid Waste Facility ID# WH280
KAS Job# 610110045

FALL 2023 SEMI-ANNUAL WATER QUALITY MONITORING REPORT

December 29, 2023

Prepared for:

Town of Halifax
P.O. Box 45
Halifax, VT 05358



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Introduction

KAS, Inc. (KAS) conducted a semi-annual water quality monitoring event on October 4, 2023 at the Halifax closed landfill (Site Location Map and Site Map in Appendix A). Pursuant to the current landfill certification, issued by the Vermont Department of Environmental Conservation (VT DEC) on July 11, 2017, a groundwater sample was collected from monitoring well MW-3 and analyzed for per- and polyfluorinated compounds (PFAS). In addition, a drinking water sample was collected from the Town Garage and Rafus residence and also analyzed for PFAS, as requested by the Town of Halifax.

Background

The unlined landfill was closed in 1995 and, since then, post-closure monitoring has been conducted for various water quality parameters (e.g., metals, chemical oxygen demand, chloride, etc.), which have since been shown to be below Vermont Groundwater Enforceable Standard (VGES) and/or exhibiting a long-term stable or decreasing trend. However, in October 2016, when the landfill first began testing for PFAS, the emerging contaminants were confirmed to be in groundwater at levels above VGES. Post-closure monitoring continues to be required (e.g., facility is not eligible for custodial care status) due to elevated PFAS levels that persist in the groundwater.

PFAS compounds subject to regulation in Vermont include perfluorooctanoic acid (PFOA), perfluorooctanesulfonic acid (PFOS), perfluorohexanesulfonic acid (PFHxS), perfluoroheptanoic acid (PFHpA), and perfluorononanoic acid (PFNA). The VGES for PFAS is 20 nanograms per liter (ng/L) for the sum of the five regulated PFAS. There are numerous other PFAS compounds that are not regulated in Vermont, some of which are considered replacements for PFAS that have been phased out of production and use.

Currently, groundwater monitoring is limited to MW-3. Groundwater is presumed to flow easterly and MW-3 is considered to be the farthest downgradient well. Based on historical sampling done in December 2016 and in November 2019, regulated PFAS levels at MW-4 were found to be below VGES (e.g., 10.05 ng/L and 6.99 ng/L, respectively).

Since 2016, monitoring has also periodically included nearby residential/private drinking water samples. In general, drinking water sampling has been conducted at the request of the Town and is not specified in the VT DEC post-closure monitoring plan requirements.

Groundwater Sampling & Results

Field measurements

The groundwater at MW-3 was field analyzed for temperature, pH, and specific conductance using a properly calibrated YSI® Pro Multi-Meter. The depth to water was gauged using a Geotech™ water level indicator.

Depth to water in MW-3 was measured at 6.25 feet below top of casing (btoc). At the time of sampling, the water temperature was 14.7 degrees Celsius, with a pH of 6.20 standard units. All measurements were within the range of historical fluctuations. Field measurement data is presented in tables and a graph in Appendix B.



Laboratory results

A groundwater sample was collected from MW-3 via low-flow sampling techniques (peristaltic pump) to minimize turbidity in the sample. The groundwater sample was analyzed for PFAS via a lab-specific isotope dilution method. The laboratory reported a total regulated PFAS concentration of 77 ng/L in the sample collected from MW-3, which exceeds the VGES of 20 ng/l. No PFAS were detected above laboratory method detection limits in the equipment rinse blank sample, which indicates cross contamination of PFAS from the sampler, sampling equipment, and/or ambient air was not a concern during sample collection. Current and historical analytical data are presented in a table and graph in Appendix B. A copy of the laboratory report is provided in Appendix C.

Drinking Water Sampling & Results

On October 4, 2023, KAS collected a drinking water sample from the private supply wells for the Town Garage and Rafus residence. The sample at the Town Garage was collected from the pressure tank. The sample at the Rafus residence was collected from an outdoor spigot. Typically, sample collection from the pressure tank is preferred, if feasible due to possible downstream cross-contamination. However, this is not considered to be of concern since PFAS was not detected in the Rafus sample (see results discussion below).

The drinking water samples were analyzed for PFAS via EPA Method 537.1. PFAS concentrations were all below the laboratory detection limit in the Town Garage and Rafus sample. A field blank sample was prepared by KAS at the time of each sample collection but was not analyzed by the lab since there were no PFAS detections in the drinking water samples.

PFAS Trends & Discussions

The total regulated PFAS concentration reported in the October 2023 groundwater sample is within the range of historical fluctuations (30 – 236 ng/L). PFAS levels have decreased overall from the most recent peak in June 2022. Additional data is needed to determine if this decrease will continue as a long-term trend. PFAS concentrations are consistently higher in the spring and lower in the fall, which suggests that PFAS levels are influenced by fluctuations in precipitation, groundwater elevations, and/or leachate generation.

Consistent with previous findings, of the regulated PFAS compounds, PFOA and PFOS continue to exhibit the highest concentrations. This is also consistent with a Vermont landfill leachate study, which found PFOA and PFOS to be the predominant PFAS.¹ Other studies have found that unregulated PFAS, that are reported to be replacement compounds for PFOA and PFAS, may exceed the regulated PFAS concentrations.² For the October 2023 sampling, a full PFAS list (or 34 compounds) was analyzed and reported by the lab. The total regulated PFAS accounted for 86% of all PFAS reported by the lab. This indicates that although there are other non-regulated PFAS, analyzing for the shorter list of VT-regulated PFAS is adequate for monitoring PFAS impacts from the Halifax closed landfill.

At this time, nearby residential/private supply wells do not appear to be impacted by PFAS. The following table is a summary of supply well sampling conducted to date.

¹ PFAS Waste Source Testing Report, New England Waste Services of Vermont, Inc., by Sanborn, Head & Associates, Inc., October 2019, available online <https://dec.vermont.gov/press-release/department-environmental-conservation-releases-reports-pfas-chemicals>

² Poly- and Perfluoroalkyl Substances at Wastewater Treatment Facilities and Landfill Leachate, by Weston & Sampson, January 30, 2020, available online <https://dec.vermont.gov/press-release/department-environmental-conservation-releases-reports-pfas-chemicals>



Table 1 – Summary of Private Drinking Water Sampling

Sample ID	Address	Sampling Dates	VT-Regulated PFAS Results
Town Garage	2044 Branch Road (south of landfill)	8/30/2017, 11/18/2021, 5/25/2023, 10/4/2023	On 11/18/2021, PFOA was detected at 1.5 ng/L. For the remaining samples, PFAS was non-detect (below laboratory reporting limits).
Rafus	637 Hubbard Hill Road (north/northwest of landfill)	12/7/2016, 8/30/2017, 10/23/2018, 10/28/2019, 5/28/2020, 11/18/2021, 5/25/2023, 10/4/2023	For all samples, PFAS was non-detect (below laboratory reporting limits).
Phelan	1547 Branch Road (northeast of landfill)	10/23/2018, 11/18/2021	For all samples, PFAS was non-detect (below laboratory reporting limits).
Tamburrino	2136 Branch Road (south of landfill)	8/30/2017	PFAS was non-detect (below laboratory reporting limits).

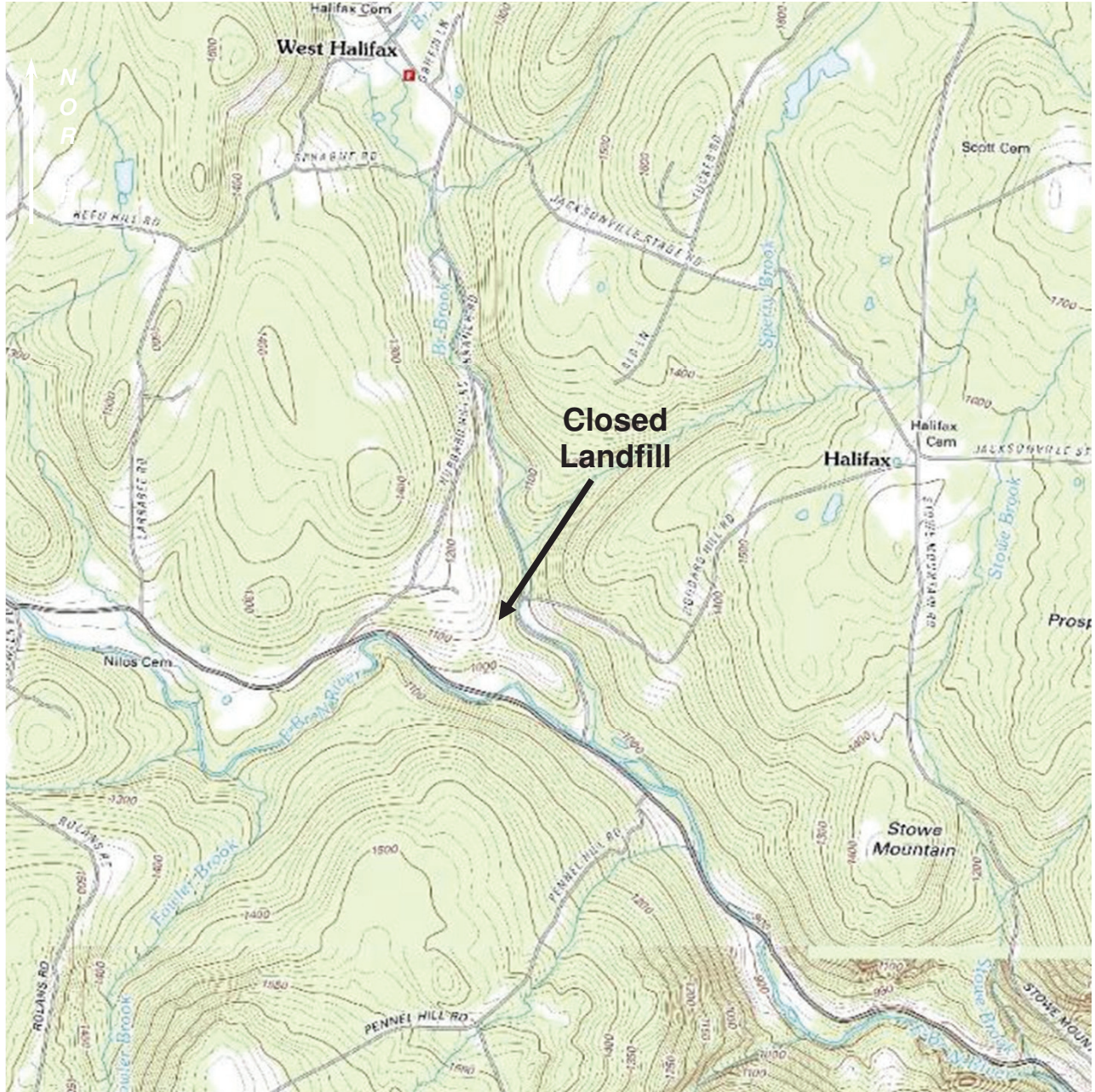
Recommendations

Without a continued source of PFAS in the closed landfill, PFAS levels in groundwater are expected to decrease slowly over time. However, given the persistent nature of PFAS in the environment, this may take many years. Based on data collected to date, PFAS sampling at an annual frequency (e.g., every spring) is likely adequate to monitor long-term trends. However, concurrence and approval must be obtained from the VT DEC.



APPENDIX A

Site Location Map and Site Map



KAS Job Number: 610110045

Source: <http://anrmaps.vermont.gov/websites/anra5/>



TOWN OF HALIFAX CLOSED LANDFILL
2044 Branch Road, Halifax, VT

Site Location Map

Date: 05/25/16	Drawing No. 0	Scale: NTS	By: CS
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MONITORING WELL



SURFACE WATER SAMPLE

* monitoring well and surface water locations are approximate



HALIFAX CLOSED LANDFILL

2044 Branch Road, Halifax, VT

SITE MAP

VTDEC Project: NS95-0165
 KAS Job Number: 610110045
 Source: Google Earth

Date: 07/31/17

Drawing No. 2

Scale: NTS

By: RT



APPENDIX B

Historical Sampling Data



GROUNDWATER QUALITY SUMMARY

HALIFAX LANDFILL
HALIFAX, VT

MW-3

Table with columns: Parameter (PPM unless noted), VGES, PAL, and SAMPLING DATE (Aug-93 to Jun-03). Rows include pH, Conductivity, COD, Chloride, Sodium, Ca Hardness, and various dissolved metals.

Table with columns: Parameter (PPM unless noted), VGES, PAL, and SAMPLING DATE (11/3/03 to 5/8/12). Rows include pH, Conductivity, Temperature, Depth to Water, COD, Chloride, Sodium, Ca Hardness, and various dissolved metals.

Notes:

Only detected or previously detected volatile organic compounds are listed.
btoc = below top of casing
ND-cxx = Not Detected< Detection Limit
VGES = Vermont Groundwater Enforcement Standard (December 2016)
PAL = Preventative Action Level (December 2016)
NA = No VGES/PAL available
Results reported above detection limits are indicated in bold.

ns = not sampled
nt = not tested during sampling round
* = secondary groundwater quality standards (mg/L or ppm)
** = maximum acceptable change (units as noted)
*** = All perfluorinated compound values reported in ng/L. Analysis via EPA Method 537 (short list)
VGES and PALs pertain to total metals and are provided for reference only
E - The reported value exceeds largest calibration standard. Extrapolation of the calibration curve was employed to obtain the reported value.

Legend table with three rows:
- Light gray box: = exceeds PAL
- Medium gray box: = exceeds VGES
- Dark gray box: = exceeds max acceptable change

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GROUNDWATER QUALITY SUMMARY

HALIFAX LANDFILL
HALIFAX, VT

MW-3 (continued)

Parameter (PPM unless noted)	VGES	PAL	SAMPLING DATE:																
			10/9/12	5/30/13	10/16/13	5/15/14	10/21/14	5/28/15	10/29/15	May-16	10/19/16	5/30/2017	10/25/2017	5/30/2018	10/23/2018	5/29/2019	10/28/2019	5/28/2020	10/27/2020
pH	NA	NA	6.06	6.71	6.09	6.05	5.73	6.56	6.71	ns	nt	7.04	6.51	6.55	6.53	6.52	7.14	6.75	6.35
Conductivity (µS/cm)	NA	NA	293	215.6	625	358.1	187	376	340.6	ns	nt	470.7	500	388	160.7	306.8	425.9	317.6	251.5
Temperature (degrees C)	NA	NA	11.5	15.7	11.3	12.5	13.2	10.7	13.0	ns	nt	9.9	13.2	10.9	9.7	10.5	10.0	13.0	10.3
Depth to Water (feet btoc)	NA	NA	5.63	4.38	5.49	5.23	5.34	5.55	4.51	ns	6.87	5.07	4.85	6.50	5.62	5.57	5.04	6.18	6.30
COD	NA	NA	nt	nt	nt	nt	nt	nt	nt	ns	nt	nt	nt	nt	nt	nt	nt	nt	nt
Chloride	NA	NA	19	12	6.5	5.7	6.7	4.5	52	ns	nt	nt	nt	nt	nt	nt	nt	nt	nt
Sodium	NA	NA	12	13	nt	nt	nt	nt	nt	ns	nt	nt	nt	nt	nt	nt	nt	nt	nt
Dissolved Chromium	0.1	0.05	nt	ND<0.005	nt	nt	nt	nt	nt	ns	nt	nt	nt	nt	nt	nt	nt	nt	nt
Dissolved Copper	1.3	0.65	nt	ND<0.020	nt	nt	nt	nt	nt	ns	nt	nt	nt	nt	nt	nt	nt	nt	nt
Dissolved Iron	NA	NA	ND<0.020	ND<0.020	0.030	0.086	0.020	ND<0.020	ND<0.020	ns	nt	nt	nt	nt	nt	nt	nt	nt	nt
Dissolved Manganese	0.3	0.15	ND<0.020	ND<0.020	ND<0.020	ND<0.020	ND<0.020	ND<0.020	ND<0.020	ns	nt	nt	nt	nt	nt	nt	nt	nt	nt
Dissolved Nickel	0.1	0.05	nt	ND<0.005	nt	nt	nt	nt	nt	ns	nt	nt	nt	nt	nt	nt	nt	nt	nt
Dissolved Zinc	NA	NA	nt	ND<0.020	nt	nt	nt	nt	nt	ns	nt	nt	nt	nt	nt	nt	nt	nt	nt
Dissolved Arsenic	0.05	0.005	nt	ND<0.001	nt	nt	nt	nt	nt	ns	nt	nt	nt	nt	nt	nt	nt	nt	nt
Dissolved Cadmium	0.005	0.001	nt	ND<0.002	nt	nt	nt	nt	nt	ns	nt	nt	nt	nt	nt	nt	nt	nt	nt
Dissolved Lead	0.015	0.002	nt	ND<0.001	nt	nt	nt	nt	nt	ns	nt	nt	nt	nt	nt	nt	nt	nt	nt
Perfluorobutanesulfonic acid (PFBS)*	NA	NA	nt	nt	nt	nt	nt	nt	nt	ns	ND<11	ND<6.6	ND<6.6	3.75	ND<6.6	ND<6.6	ND<5.1	3.55	1.87
Perfluorohexanesulfonic acid (PFHxS)*	-	-	nt	nt	nt	nt	nt	nt	nt	ns	ND<3.8	11.7	9.2	13.1	12.3	10.1	4.8	14.9	8.49
Perfluoroheptanoic acid (PFHpA)*	-	-	nt	nt	nt	nt	nt	nt	nt	ns	2.06	22	13.2	41.2	15.1	21.4	10.3	9.38	7.64
Perfluorooctanoic acid (PFOA)*	-	-	nt	nt	nt	nt	nt	nt	nt	ns	11.5	78.2	44.9	134	76.8	106	52.8	58.1	42.6
Perfluorooctanesulfonic acid (PFOS)*	-	-	nt	nt	nt	nt	nt	nt	nt	ns	16.7	32.1	37	33.3	36.4	30	37.8	33.7	34.5
Perfluorononanoic acid (PFNA)*	-	-	nt	nt	nt	nt	nt	nt	nt	ns	ND<2.3	ND<1.5	ND<1.5	1.9	ND<1.5	ND<1.5	ND<1.8	ND<2.0	0.93
Total Regulated PFC Compounds	20	2	nt	nt	nt	nt	nt	nt	nt	ns	30.3	144	104	224	140.6	167	105.7	116.1	94.2

Parameter (ng/L unless noted)	VGES	PAL	SAMPLING DATE:						
			6/2/2021	11/18/21	6/7/22	10/26/22	5/25/23	10/4/23	
pH	NA	NA	6.62	6.29	6.42	6.82	6.47	6.20	
Spec. Conductivity (µS/cm)	NA	NA	259.2	319.9	346	-	209.8	264.0	
Temperature (degrees C)	NA	NA	13.5	10.8	18.1	13.2	8.6	14.7	
Depth to Water (feet btoc)	NA	NA	5.68	5.19	6.76	6.44	5.89	6.25	
Perfluorobutanesulfonic acid (PFBS)*	NA	NA	4.44	4.71	3.7	ND<20	3.7	3.5	
Perfluorohexanesulfonic acid (PFHxS)*	-	-	15.9	16.5	16	ND<20	14	12	
Perfluoroheptanoic acid (PFHpA)*	-	-	9.52	8.73	23	ND<20	22	3.7	
Perfluorooctanoic acid (PFOA)*	-	-	48.1	46.2	140	60	89	22	
Perfluorooctanesulfonic acid (PFOS)*	-	-	41.6	39.3	54	48	49	39	
Perfluorononanoic acid (PFNA)*	-	-	1.03	1.3	2.8	ND<20	2.3	ND<1.9	
Total Regulated PFAS Compounds	20	2	116.2	112.0	236	108	176	77	

Notes:
 Only detected or previously detected volatile organic compounds are listed.
 btoc = below top of casing
 ND-xx = Not Detected< Detection Limit
 VGES = Vermont Groundwater Enforcement Standard (July 2019)
 PAL = Preventative Action Level (July 2019)
 NA = No VGES/PAL available
 Results reported above detection limits are indicated in bold.

ns = not sampled
 nt = not tested during sampling round

VGES and PALs pertain to total metals and are provided for reference only

E - The reported value exceeds largest calibration standard. Extrapolation of the calibration curve was employed to obtain the reported value.

* = All perfluorinated compound values reported in ng/L. Analysis via EPA Method 537 (short list). For PFHxS, PFHpA, PFOA, PFOS and PFNA, the VGES and PAL standards applies to the individual compounds and the sum of these compounds.

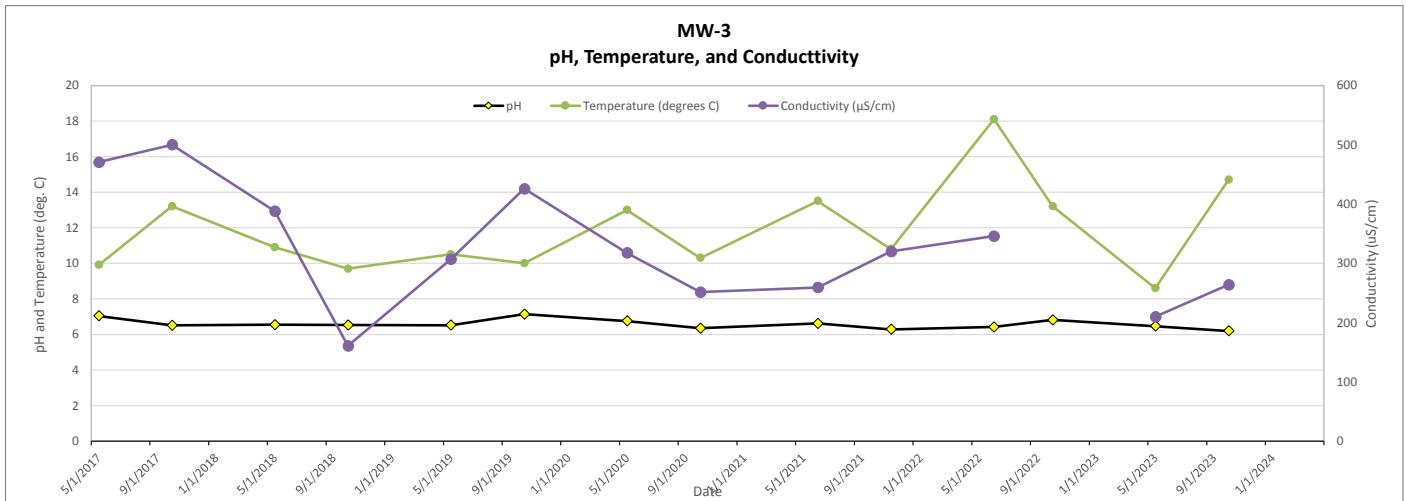
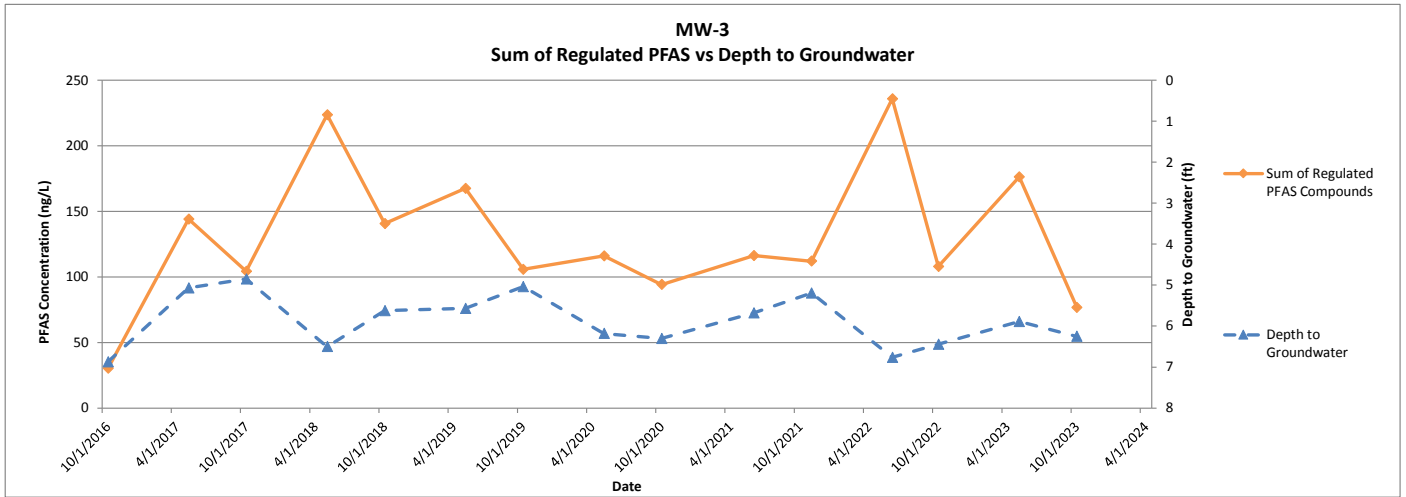
= exceeds current PAL
 = exceeds current VGES

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GROUNDWATER QUALITY SUMMARY

HALIFAX LANDFILL
HALIFAX, VT





APPENDIX C

Laboratory Report

December 27, 2023

Clare Santos
KAS Environmental
589 Avenue D
Williston, VT 05495

Project Location: Halifax, VT
Client Job Number:
Project Number: 610110045
Laboratory Work Order Number: 23J0953

Enclosed are results of analyses for samples as received by the laboratory on October 6, 2023. If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Kaitlyn A. Feliciano
Project Manager

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B356284	12
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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

KAS Environmental
589 Avenue D
Williston, VT 05495
ATTN: Clare Santos

REPORT DATE: 12/27/2023

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 610110045

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 23J0953

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

PROJECT LOCATION: Halifax, VT

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
MW-3	23J0953-01	Ground Water		SOP-454 PFAS	
ERB (MW-3)	23J0953-02	Water		SOP-454 PFAS	
Town Garage	23J0953-03	Drinking Water		EPA 537.1	

CASE NARRATIVE SUMMARY

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

For PFAS 537.1, sample -03 was extracted out of hold due to a laboratory error which is a deviation from method.

EPA 537.1

Qualifications:

H-06

Sample was extracted past the recommended holding time.

Analyte & Samples(s) Qualified:

23J0953-03RE1[Town Garage]

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:

M2-8:2FTS

23J0953-02[ERB (MW-3)]

S-29

Extracted Internal Standard is outside of control limits.

Analyte & Samples(s) Qualified:

M2-8:2FTS

S094972-CCV1

V-20

Continuing calibration verification (CCV) did not meet method specifications and was biased on the high side. Data validation is not affected since sample result was "not detected" for this compound.

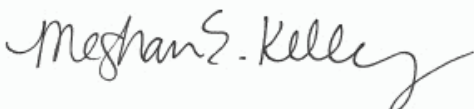
Analyte & Samples(s) Qualified:

Perfluorononanesulfonic acid (PFNS)

S094972-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.



Meghan E. Kelley
Reporting Specialist

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

Project Location: Halifax, VT

Sample Description:

Work Order: 23J0953

Date Received: 10/6/2023

Field Sample #: MW-3

Sampled: 10/4/2023 11:06

Sample ID: 23J0953-01

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	ND	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
Perfluorobutanesulfonic acid (PFBS)	3.5	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
Perfluoropentanoic acid (PFPeA)	2.2	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
Perfluorohexanoic acid (PFHxA)	2.8	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
11Cl-PF3OUdS (F53B Major)	ND	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
9Cl-PF3ONS (F53B Minor)	ND	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
Perfluorodecanoic acid (PFDA)	ND	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
Perfluorododecanoic acid (PFDoA)	ND	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
Perfluoroheptanesulfonic acid (PFHpS)	2.0	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
N-EtFOSAA (NEtFOSAA)	ND	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
N-MeFOSAA (NMeFOSAA)	ND	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
Perfluorotetradecanoic acid (PFTA)	ND	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
Perfluorotridecanoic acid (PFTrDA)	ND	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
Perfluorodecanesulfonic acid (PFDS)	ND	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
Perfluorooctanesulfonamide (FOSA)	ND	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
Perfluorononanesulfonic acid (PFNS)	ND	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
Perfluoro-1-butanefulfonamide (FBSA)	ND	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
Perfluorohexanesulfonic acid (PFHxS)	12	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
Perfluoropentanesulfonic acid (PFPeS)	2.4	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
Perfluoroundecanoic acid (PFUnA)	ND	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
Perfluoroheptanoic acid (PFHpA)	3.7	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
Perfluorooctanoic acid (PFOA)	22	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
Perfluorooctanesulfonic acid (PFOS)	39	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW
Perfluorononanoic acid (PFNA)	ND	1.9	ng/L	1		SOP-454 PFAS	10/13/23	10/17/23 10:50	QNW

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

Project Location: Halifax, VT

Sample Description:

Work Order: 23J0953

Date Received: 10/6/2023

Field Sample #: ERB (MW-3)

Sampled: 10/4/2023 10:30

Sample ID: 23J0953-02

Sample Matrix: Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
Perfluorobutanesulfonic acid (PFBS)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
Perfluoropentanoic acid (PFPeA)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
Perfluorohexanoic acid (PFHxA)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
11Cl-PF3OUdS (F53B Major)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
9Cl-PF3ONS (F53B Minor)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
Perfluorodecanoic acid (PFDA)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
Perfluorododecanoic acid (PFDoA)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
Perfluoroheptanesulfonic acid (PFHpS)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
N-EtFOSAA (NEtFOSAA)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
N-MeFOSAA (NMeFOSAA)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
Perfluorotetradecanoic acid (PFTA)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
Perfluorotridecanoic acid (PFTrDA)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
Perfluorodecanesulfonic acid (PFDS)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
Perfluorooctanesulfonamide (FOSA)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
Perfluorononanesulfonic acid (PFNS)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
Perfluoro-1-butanefulfonamide (FBSA)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
Perfluorohexanesulfonic acid (PFHxS)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
Perfluoropentanesulfonic acid (PFPeS)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
Perfluoroundecanoic acid (PFUnA)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
Perfluoroheptanoic acid (PFHpA)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
Perfluorooctanoic acid (PFOA)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
Perfluorooctanesulfonic acid (PFOS)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW
Perfluorononanoic acid (PFNA)	ND	1.8	ng/L	1		SOP-454 PFAS	10/26/23	10/27/23 14:01	QNW

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

Project Location: Halifax, VT

Sample Description:

Work Order: 23J0953

Date Received: 10/6/2023

Field Sample #: Town Garage

Sampled: 10/4/2023 12:03

Sample ID: 23J0953-03

Sample Matrix: Drinking Water

Sample Flags: H-06

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	MCL/SMCL		Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
		RL	MA ORSG							
Perfluorobutanesulfonic acid (PFBS)	ND	1.9		ng/L	1		EPA 537.1	10/26/23	10/30/23 19:54	QNW
Perfluorohexanoic acid (PFHxA)	ND	1.9		ng/L	1		EPA 537.1	10/26/23	10/30/23 19:54	QNW
Perfluorohexanesulfonic acid (PFHxS)	ND	1.9		ng/L	1		EPA 537.1	10/26/23	10/30/23 19:54	QNW
Perfluoroheptanoic acid (PFHpA)	ND	1.9		ng/L	1		EPA 537.1	10/26/23	10/30/23 19:54	QNW
Perfluorooctanoic acid (PFOA)	ND	1.9		ng/L	1		EPA 537.1	10/26/23	10/30/23 19:54	QNW
Perfluorooctanesulfonic acid (PFOS)	ND	1.9		ng/L	1		EPA 537.1	10/26/23	10/30/23 19:54	QNW
Perfluorononanoic acid (PFNA)	ND	1.9		ng/L	1		EPA 537.1	10/26/23	10/30/23 19:54	QNW
Perfluorodecanoic acid (PFDA)	ND	1.9		ng/L	1		EPA 537.1	10/26/23	10/30/23 19:54	QNW
N-EtFOSAA (NEtFOSAA)	ND	1.9		ng/L	1		EPA 537.1	10/26/23	10/30/23 19:54	QNW
Perfluoroundecanoic acid (PFUnA)	ND	1.9		ng/L	1		EPA 537.1	10/26/23	10/30/23 19:54	QNW
N-MeFOSAA (NMeFOSAA)	ND	1.9		ng/L	1		EPA 537.1	10/26/23	10/30/23 19:54	QNW
Perfluorododecanoic acid (PFDoA)	ND	1.9		ng/L	1		EPA 537.1	10/26/23	10/30/23 19:54	QNW
Perfluorotridecanoic acid (PFTrDA)	ND	1.9		ng/L	1		EPA 537.1	10/26/23	10/30/23 19:54	QNW
Perfluorotetradecanoic acid (PFTA)	ND	1.9		ng/L	1		EPA 537.1	10/26/23	10/30/23 19:54	QNW
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.9		ng/L	1		EPA 537.1	10/26/23	10/30/23 19:54	QNW
11Cl-PF3OUdS (F53B Major)	ND	1.9		ng/L	1		EPA 537.1	10/26/23	10/30/23 19:54	QNW
9Cl-PF3ONS (F53B Minor)	ND	1.9		ng/L	1		EPA 537.1	10/26/23	10/30/23 19:54	QNW
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.9		ng/L	1		EPA 537.1	10/26/23	10/30/23 19:54	QNW
Surrogates		% Recovery		Recovery Limits		Flag/Qual				
13C-PFHxA		92.5		70-130					10/30/23 19:54	
M3HFPO-DA		92.1		70-130					10/30/23 19:54	
13C-PFDA		89.9		70-130					10/30/23 19:54	
D5-NEtFOSAA		82.0		70-130					10/30/23 19:54	

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

Sample Extraction Data
Prep Method:EPA 537.1 **Analytical Method:**EPA 537.1

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
23J0953-03RE1 [Town Garage]	B356284	265	1.00	10/26/23

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

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
23J0953-01 [MW-3]	B354543	267	1.00	10/13/23

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

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
23J0953-02 [ERB (MW-3)]	B356041	273	1.00	10/26/23

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

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
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Batch B354543 - SOP 454-PFAAS
Blank (B354543-BLK1)

Prepared: 10/13/23 Analyzed: 10/17/23

Perfluorobutanoic acid (PFBA)	ND	1.9	ng/L							
Perfluorobutanesulfonic acid (PFBS)	ND	1.9	ng/L							
Perfluoropentanoic acid (PFPeA)	ND	1.9	ng/L							
Perfluorohexanoic acid (PFHxA)	ND	1.9	ng/L							
11Cl-PF3OUdS (F53B Major)	ND	1.9	ng/L							
9Cl-PF3ONS (F53B Minor)	ND	1.9	ng/L							
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.9	ng/L							
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.9	ng/L							
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	1.9	ng/L							
Perfluorodecanoic acid (PFDA)	ND	1.9	ng/L							
Perfluorododecanoic acid (PFDoA)	ND	1.9	ng/L							
Perfluoro(2-ethoxyethane)sulfonic acid (PFEEESA)	ND	1.9	ng/L							
Perfluoroheptanesulfonic acid (PFHpS)	ND	1.9	ng/L							
N-EtFOSAA (NEtFOSAA)	ND	1.9	ng/L							
N-MeFOSAA (NMeFOSAA)	ND	1.9	ng/L							
Perfluorotetradecanoic acid (PFTA)	ND	1.9	ng/L							
Perfluorotridecanoic acid (PFTrDA)	ND	1.9	ng/L							
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.9	ng/L							
Perfluorodecanesulfonic acid (PFDS)	ND	1.9	ng/L							
Perfluorooctanesulfonamide (FOSA)	ND	1.9	ng/L							
Perfluorononanesulfonic acid (PFNS)	ND	1.9	ng/L							
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	1.9	ng/L							
Perfluoro-1-butanesulfonamide (FBSA)	ND	1.9	ng/L							
Perfluorohexanesulfonic acid (PFHxS)	ND	1.9	ng/L							
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.9	ng/L							
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.9	ng/L							
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	1.9	ng/L							
Perfluoropentanesulfonic acid (PFPeS)	ND	1.9	ng/L							
Perfluoroundecanoic acid (PFUnA)	ND	1.9	ng/L							
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.9	ng/L							
Perfluoroheptanoic acid (PFHpA)	ND	1.9	ng/L							
Perfluorooctanoic acid (PFOA)	ND	1.9	ng/L							
Perfluorooctanesulfonic acid (PFOS)	ND	1.9	ng/L							
Perfluorononanoic acid (PFNA)	ND	1.9	ng/L							

LCS (B354543-BS1)

Prepared: 10/13/23 Analyzed: 10/17/23

Perfluorobutanoic acid (PFBA)	10.7	2.0	ng/L	9.79	109	73-129
Perfluorobutanesulfonic acid (PFBS)	9.25	2.0	ng/L	8.67	107	72-130
Perfluoropentanoic acid (PFPeA)	10.5	2.0	ng/L	9.79	107	72-129
Perfluorohexanoic acid (PFHxA)	10.8	2.0	ng/L	9.79	111	72-129
11Cl-PF3OUdS (F53B Major)	8.97	2.0	ng/L	9.22	97.2	43.3-138
9Cl-PF3ONS (F53B Minor)	9.13	2.0	ng/L	9.13	100	52-140
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	13.0	2.0	ng/L	9.22	141	53.7-152
Hexafluoropropylene oxide dimer acid (HFPO-DA)	11.1	2.0	ng/L	9.79	113	42.1-145
8:2 Fluorotelomersulfonic acid (8:2FTS A)	9.34	2.0	ng/L	9.40	99.3	67-138
Perfluorodecanoic acid (PFDA)	10.1	2.0	ng/L	9.79	103	71-129
Perfluorododecanoic acid (PFDoA)	10.9	2.0	ng/L	9.79	111	72-134
Perfluoro(2-ethoxyethane)sulfonic acid (PFEEESA)	11.3	2.0	ng/L	8.71	130	52.7-147

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

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
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Batch B354543 - SOP 454-PFAAS
LCS (B354543-BS1)

Prepared: 10/13/23 Analyzed: 10/17/23

Perfluoroheptanesulfonic acid (PFHpS)	9.95	2.0	ng/L	9.35		106	69-134			
N-EtFOSAA (NEtFOSAA)	12.5	2.0	ng/L	9.79		128	61-135			
N-MeFOSAA (NMeFOSAA)	12.3	2.0	ng/L	9.79		126	65-136			
Perfluorotetradecanoic acid (PFTA)	10.5	2.0	ng/L	9.79		107	71-132			
Perfluorotridecanoic acid (PFTrDA)	11.0	2.0	ng/L	9.79		112	65-144			
4:2 Fluorotelomersulfonic acid (4:2FTS A)	9.98	2.0	ng/L	9.15		109	63-143			
Perfluorodecanesulfonic acid (PFDS)	8.50	2.0	ng/L	9.45		90.0	53-142			
Perfluorooctanesulfonamide (FOSA)	11.5	2.0	ng/L	9.79		117	67-137			
Perfluorononanesulfonic acid (PFNS)	10.7	2.0	ng/L	9.40		114	69-127			
Perfluoro-1-hexanesulfonamide (FHxSA)	10.9	2.0	ng/L	9.79		111	50-150			
Perfluoro-1-butanefulfonamide (FBSA)	11.0	2.0	ng/L	9.79		113	50-150			
Perfluorohexanesulfonic acid (PFHxS)	10.7	2.0	ng/L	8.96		120	68-131			
Perfluoro-4-oxapentanoic acid (PFMPA)	12.2	2.0	ng/L	9.79		125	53.8-150			
Perfluoro-5-oxahexanoic acid (PFMBA)	12.9	2.0	ng/L	9.79		132	54.5-152			
6:2 Fluorotelomersulfonic acid (6:2FTS A)	10.6	2.0	ng/L	9.30		114	64-140			
Perfluoropentanesulfonic acid (PFPeS)	9.73	2.0	ng/L	9.20		106	71-127			
Perfluoroundecanoic acid (PFUnA)	11.3	2.0	ng/L	9.79		116	69-133			
Nonafluoro-3,6-dioxahexanoic acid (NFDHA)	13.0	2.0	ng/L	9.79		133	50.5-159			
Perfluoroheptanoic acid (PFHpA)	10.7	2.0	ng/L	9.79		109	72-130			
Perfluorooctanoic acid (PFOA)	10.7	2.0	ng/L	9.79		109	71-133			
Perfluorooctanesulfonic acid (PFOS)	9.17	2.0	ng/L	9.06		101	65-140			
Perfluorononanoic acid (PFNA)	11.1	2.0	ng/L	9.79		113	69-130			

Batch B356041 - SOP 454-PFAAS
Blank (B356041-BLK1)

Prepared: 10/26/23 Analyzed: 10/27/23

Perfluorobutanoic acid (PFBA)	ND	1.9	ng/L							
Perfluorobutanesulfonic acid (PFBS)	ND	1.9	ng/L							
Perfluoropentanoic acid (PFPeA)	ND	1.9	ng/L							
Perfluorohexanoic acid (PFHxA)	ND	1.9	ng/L							
11Cl-PF3OUdS (F53B Major)	ND	1.9	ng/L							
9Cl-PF3ONS (F53B Minor)	ND	1.9	ng/L							
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.9	ng/L							
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.9	ng/L							
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	1.9	ng/L							
Perfluorodecanoic acid (PFDA)	ND	1.9	ng/L							
Perfluorododecanoic acid (PFDoA)	ND	1.9	ng/L							
Perfluoro(2-ethoxyethane)sulfonic acid (PFEEESA)	ND	1.9	ng/L							
Perfluoroheptanesulfonic acid (PFHpS)	ND	1.9	ng/L							
N-EtFOSAA (NEtFOSAA)	ND	1.9	ng/L							
N-MeFOSAA (NMeFOSAA)	ND	1.9	ng/L							
Perfluorotetradecanoic acid (PFTA)	ND	1.9	ng/L							
Perfluorotridecanoic acid (PFTrDA)	ND	1.9	ng/L							
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.9	ng/L							
Perfluorodecanesulfonic acid (PFDS)	ND	1.9	ng/L							
Perfluorooctanesulfonamide (FOSA)	ND	1.9	ng/L							
Perfluorononanesulfonic acid (PFNS)	ND	1.9	ng/L							
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	1.9	ng/L							
Perfluoro-1-butanefulfonamide (FBSA)	ND	1.9	ng/L							
Perfluorohexanesulfonic acid (PFHxS)	ND	1.9	ng/L							

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

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 B356041 - SOP 454-PFAAS										
Blank (B356041-BLK1)										
Prepared: 10/26/23 Analyzed: 10/27/23										
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.9	ng/L							
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.9	ng/L							
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	1.9	ng/L							
Perfluoropentanesulfonic acid (PFPeS)	ND	1.9	ng/L							
Perfluoroundecanoic acid (PFUnA)	ND	1.9	ng/L							
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.9	ng/L							
Perfluoroheptanoic acid (PFHpA)	ND	1.9	ng/L							
Perfluorooctanoic acid (PFOA)	ND	1.9	ng/L							
Perfluorooctanesulfonic acid (PFOS)	ND	1.9	ng/L							
Perfluorononanoic acid (PFNA)	ND	1.9	ng/L							
LCS (B356041-BS1)										
Prepared: 10/26/23 Analyzed: 10/27/23										
Perfluorobutanoic acid (PFBA)	9.80	1.9	ng/L	9.68		101	73-129			
Perfluorobutanesulfonic acid (PFBS)	8.32	1.9	ng/L	8.57		97.1	72-130			
Perfluoropentanoic acid (PFPeA)	9.64	1.9	ng/L	9.68		99.6	72-129			
Perfluorohexanoic acid (PFHxA)	9.27	1.9	ng/L	9.68		95.8	72-129			
11Cl-PF3OUdS (F53B Major)	7.98	1.9	ng/L	9.12		87.6	43.3-138			
9Cl-PF3ONS (F53B Minor)	8.03	1.9	ng/L	9.02		89.0	52-140			
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	8.76	1.9	ng/L	9.12		96.0	53.7-152			
Hexafluoropropylene oxide dimer acid (HFPO-DA)	8.14	1.9	ng/L	9.68		84.1	42.1-145			
8:2 Fluorotelomersulfonic acid (8:2FTS A)	9.21	1.9	ng/L	9.29		99.1	67-138			
Perfluorodecanoic acid (PFDA)	10.0	1.9	ng/L	9.68		103	71-129			
Perfluorododecanoic acid (PFDoA)	11.2	1.9	ng/L	9.68		116	72-134			
Perfluoro(2-ethoxyethane)sulfonic acid (PFEEESA)	8.86	1.9	ng/L	8.61		103	52.7-147			
Perfluoroheptanesulfonic acid (PFHpS)	8.83	1.9	ng/L	9.24		95.5	69-134			
N-EtFOSAA (NEtFOSAA)	11.4	1.9	ng/L	9.68		117	61-135			
N-MeFOSAA (NMeFOSAA)	10.8	1.9	ng/L	9.68		112	65-136			
Perfluorotetradecanoic acid (PFTA)	10.7	1.9	ng/L	9.68		111	71-132			
Perfluorotridecanoic acid (PFTrDA)	10.4	1.9	ng/L	9.68		108	65-144			
4:2 Fluorotelomersulfonic acid (4:2FTS A)	9.70	1.9	ng/L	9.05		107	63-143			
Perfluorodecanesulfonic acid (PFDS)	8.19	1.9	ng/L	9.34		87.7	53-142			
Perfluorooctanesulfonamide (FOSA)	10.1	1.9	ng/L	9.68		104	67-137			
Perfluorononanesulfonic acid (PFNS)	7.70	1.9	ng/L	9.29		82.9	69-127			
Perfluoro-1-hexanesulfonamide (FHxSA)	7.98	1.9	ng/L	9.68		82.4	50-150			
Perfluoro-1-butanesulfonamide (FBSA)	8.25	1.9	ng/L	9.68		85.2	50-150			
Perfluorohexanesulfonic acid (PFHxS)	8.19	1.9	ng/L	8.86		92.4	68-131			
Perfluoro-4-oxapentanoic acid (PFMPA)	9.41	1.9	ng/L	9.68		97.3	53.8-150			
Perfluoro-5-oxahexanoic acid (PFMBA)	10.6	1.9	ng/L	9.68		110	54.5-152			
6:2 Fluorotelomersulfonic acid (6:2FTS A)	8.83	1.9	ng/L	9.20		96.1	64-140			
Perfluoropentanesulfonic acid (PFPeS)	8.63	1.9	ng/L	9.10		94.8	71-127			
Perfluoroundecanoic acid (PFUnA)	10.1	1.9	ng/L	9.68		104	69-133			
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	9.36	1.9	ng/L	9.68		96.7	50.5-159			
Perfluoroheptanoic acid (PFHpA)	9.76	1.9	ng/L	9.68		101	72-130			
Perfluorooctanoic acid (PFOA)	9.50	1.9	ng/L	9.68		98.1	71-133			
Perfluorooctanesulfonic acid (PFOS)	8.03	1.9	ng/L	8.95		89.7	65-140			
Perfluorononanoic acid (PFNA)	9.94	1.9	ng/L	9.68		103	69-130			

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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
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Batch B356041 - SOP 454-PFAAS
LCS Dup (B356041-BSD1)

Prepared: 10/26/23 Analyzed: 10/27/23

Perfluorobutanoic acid (PFBA)	9.57	1.9	ng/L	9.68		98.8	73-129	2.44	30	
Perfluorobutanesulfonic acid (PFBS)	7.96	1.9	ng/L	8.57		92.9	72-130	4.44	30	
Perfluoropentanoic acid (PFPeA)	9.26	1.9	ng/L	9.68		95.6	72-129	4.07	30	
Perfluorohexanoic acid (PFHxA)	9.05	1.9	ng/L	9.68		93.5	72-129	2.39	30	
11Cl-PF3OUdS (F53B Major)	7.78	1.9	ng/L	9.12		85.3	43.3-138	2.63	30	
9Cl-PF3ONS (F53B Minor)	7.83	1.9	ng/L	9.02		86.8	52-140	2.44	30	
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	8.75	1.9	ng/L	9.12		96.0	53.7-152	0.0227	30	
Hexafluoropropylene oxide dimer acid (HFPO-DA)	8.74	1.9	ng/L	9.68		90.2	42.1-145	7.02	30	
8:2 Fluorotelomersulfonic acid (8:2FTS A)	9.24	1.9	ng/L	9.29		99.5	67-138	0.370	30	
Perfluorodecanoic acid (PFDA)	9.36	1.9	ng/L	9.68		96.7	71-129	6.57	30	
Perfluorododecanoic acid (PFDoA)	10.5	1.9	ng/L	9.68		108	72-134	6.92	30	
Perfluoro(2-ethoxyethane)sulfonic acid (PFEEESA)	8.27	1.9	ng/L	8.62		95.9	52.7-147	6.91	30	
Perfluoroheptanesulfonic acid (PFHpS)	8.34	1.9	ng/L	9.24		90.2	69-134	5.74	30	
N-EtFOSAA (NEtFOSAA)	10.4	1.9	ng/L	9.68		107	61-135	9.16	30	
N-MeFOSAA (NMeFOSAA)	10.3	1.9	ng/L	9.68		106	65-136	4.76	30	
Perfluorotetradecanoic acid (PFTA)	10.6	1.9	ng/L	9.68		110	71-132	0.682	30	
Perfluorotridecanoic acid (PFTrDA)	9.67	1.9	ng/L	9.68		99.9	65-144	7.51	30	
4:2 Fluorotelomersulfonic acid (4:2FTS A)	8.57	1.9	ng/L	9.05		94.7	63-143	12.3	30	
Perfluorodecanesulfonic acid (PFDS)	7.91	1.9	ng/L	9.34		84.7	53-142	3.51	30	
Perfluorooctanesulfonamide (FOSA)	9.31	1.9	ng/L	9.68		96.1	67-137	7.78	30	
Perfluorononanesulfonic acid (PFNS)	7.47	1.9	ng/L	9.29		80.4	69-127	3.07	30	
Perfluoro-1-hexanesulfonamide (FHxSA)	7.28	1.9	ng/L	9.68		75.2	50-150	9.10	30	
Perfluoro-1-butanesulfonamide (FBSA)	7.58	1.9	ng/L	9.68		78.3	50-150	8.44	30	
Perfluorohexanesulfonic acid (PFHxS)	8.20	1.9	ng/L	8.86		92.5	68-131	0.134	30	
Perfluoro-4-oxapentanoic acid (PFMPA)	9.06	1.9	ng/L	9.68		93.6	53.8-150	3.79	30	
Perfluoro-5-oxahexanoic acid (PFMBA)	10.1	1.9	ng/L	9.68		104	54.5-152	5.25	30	
6:2 Fluorotelomersulfonic acid (6:2FTS A)	9.08	1.9	ng/L	9.20		98.8	64-140	2.78	30	
Perfluoropentanesulfonic acid (PFPeS)	8.41	1.9	ng/L	9.10		92.5	71-127	2.51	30	
Perfluoroundecanoic acid (PFUnA)	9.50	1.9	ng/L	9.68		98.1	69-133	5.81	30	
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	8.74	1.9	ng/L	9.68		90.3	50.5-159	6.89	30	
Perfluoroheptanoic acid (PFHpA)	9.72	1.9	ng/L	9.68		100	72-130	0.405	30	
Perfluorooctanoic acid (PFOA)	9.06	1.9	ng/L	9.68		93.6	71-133	4.70	30	
Perfluorooctanesulfonic acid (PFOS)	8.06	1.9	ng/L	8.95		90.0	65-140	0.401	30	
Perfluorononanoic acid (PFNA)	9.42	1.9	ng/L	9.68		97.3	69-130	5.44	30	

Batch B356284 - EPA 537.1
Blank (B356284-BLK1)

Prepared: 10/26/23 Analyzed: 10/30/23

Perfluorobutanesulfonic acid (PFBS)	ND	1.8	ng/L							
Perfluorohexanoic acid (PFHxA)	ND	1.8	ng/L							
Perfluorohexanesulfonic acid (PFHxS)	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							
Perfluorodecanoic acid (PFDA)	ND	1.8	ng/L							
N-EtFOSAA (NEtFOSAA)	ND	1.8	ng/L							
Perfluoroundecanoic acid (PFUnA)	ND	1.8	ng/L							
N-MeFOSAA (NMeFOSAA)	ND	1.8	ng/L							
Perfluorododecanoic acid (PFDoA)	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 B356284 - EPA 537.1										
Blank (B356284-BLK1)										
Prepared: 10/26/23 Analyzed: 10/30/23										
Perfluorotridecanoic acid (PFTTrDA)	ND	1.8	ng/L							
Perfluorotetradecanoic acid (PFTA)	ND	1.8	ng/L							
Hexafluoropropylene oxide dimer acid (HFPO-DA)	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							
Surrogate: 13C-PFHxA	36.8		ng/L	36.8		99.8	70-130			
Surrogate: M3HFPO-DA	40.1		ng/L	36.8		109	70-130			
Surrogate: 13C-PFDA	38.3		ng/L	36.8		104	70-130			
Surrogate: D5-NEtFOSAA	154		ng/L	147		104	70-130			
LCS (B356284-BS1)										
Prepared: 10/26/23 Analyzed: 10/30/23										
Perfluorobutanesulfonic acid (PFBS)	1.52	1.9	ng/L	1.70		89.2	50-150			
Perfluorohexanoic acid (PFHxA)	1.75	1.9	ng/L	1.92		91.1	50-150			
Perfluorohexanesulfonic acid (PFHxS)	1.91	1.9	ng/L	1.75		109	50-150			
Perfluoroheptanoic acid (PFHpA)	1.89	1.9	ng/L	1.92		98.4	50-150			
Perfluorooctanoic acid (PFOA)	1.75	1.9	ng/L	1.92		91.1	50-150			
Perfluorooctanesulfonic acid (PFOS)	1.65	1.9	ng/L	1.78		92.6	50-150			
Perfluorononanoic acid (PFNA)	1.74	1.9	ng/L	1.92		90.6	50-150			
Perfluorodecanoic acid (PFDA)	1.64	1.9	ng/L	1.92		85.2	50-150			
N-EtFOSAA (NEtFOSAA)	1.54	1.9	ng/L	1.92		80.2	50-150			
Perfluoroundecanoic acid (PFUnA)	1.66	1.9	ng/L	1.92		86.7	50-150			
N-MeFOSAA (NMeFOSAA)	1.71	1.9	ng/L	1.92		88.9	50-150			
Perfluorododecanoic acid (PFDoA)	1.44	1.9	ng/L	1.92		75.0	50-150			
Perfluorotridecanoic acid (PFTTrDA)	1.71	1.9	ng/L	1.92		88.9	50-150			
Perfluorotetradecanoic acid (PFTA)	1.62	1.9	ng/L	1.92		84.2	50-150			
Hexafluoropropylene oxide dimer acid (HFPO-DA)	1.67	1.9	ng/L	1.92		87.0	50-150			
11Cl-PF3OUdS (F53B Major)	1.54	1.9	ng/L	1.81		85.3	50-150			
9Cl-PF3ONS (F53B Minor)	1.81	1.9	ng/L	1.79		101	50-150			
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	1.56	1.9	ng/L	1.81		85.9	50-150			
Surrogate: 13C-PFHxA	37.5		ng/L	38.4		97.8	70-130			
Surrogate: M3HFPO-DA	38.8		ng/L	38.4		101	70-130			
Surrogate: 13C-PFDA	37.6		ng/L	38.4		98.0	70-130			
Surrogate: D5-NEtFOSAA	161		ng/L	154		105	70-130			
LCS Dup (B356284-BS1)										
Prepared: 10/26/23 Analyzed: 10/30/23										
Perfluorobutanesulfonic acid (PFBS)	1.50	1.9	ng/L	1.65		91.3	50-150	0.887	50	
Perfluorohexanoic acid (PFHxA)	1.74	1.9	ng/L	1.86		93.9	50-150	0.285	50	
Perfluorohexanesulfonic acid (PFHxS)	1.88	1.9	ng/L	1.70		111	50-150	1.66	50	
Perfluoroheptanoic acid (PFHpA)	1.71	1.9	ng/L	1.86		92.0	50-150	9.95	50	
Perfluorooctanoic acid (PFOA)	1.61	1.9	ng/L	1.86		86.5	50-150	8.31	50	
Perfluorooctanesulfonic acid (PFOS)	1.77	1.9	ng/L	1.72		103	50-150	7.22	50	
Perfluorononanoic acid (PFNA)	1.26	1.9	ng/L	1.86		68.0	50-150	31.6	50	
Perfluorodecanoic acid (PFDA)	2.12	1.9	ng/L	1.86		114	50-150	25.8	50	
N-EtFOSAA (NEtFOSAA)	1.44	1.9	ng/L	1.86		77.5	50-150	6.64	50	
Perfluoroundecanoic acid (PFUnA)	1.73	1.9	ng/L	1.86		93.3	50-150	4.09	50	
N-MeFOSAA (NMeFOSAA)	1.83	1.9	ng/L	1.86		98.5	50-150	7.02	50	
Perfluorododecanoic acid (PFDoA)	1.71	1.9	ng/L	1.86		91.9	50-150	17.1	50	
Perfluorotridecanoic acid (PFTTrDA)	1.81	1.9	ng/L	1.86		97.2	50-150	5.70	50	
Perfluorotetradecanoic acid (PFTA)	1.76	1.9	ng/L	1.86		94.9	50-150	8.71	50	

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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 B356284 - EPA 537.1										
LCS Dup (B356284-BSD1)										
Prepared: 10/26/23 Analyzed: 10/30/23										
Hexafluoropropylene oxide dimer acid (HFPO-DA)	1.50	1.9	ng/L	1.86		80.6	50-150	10.9	50	
11Cl-PF3OUdS (F53B Major)	1.65	1.9	ng/L	1.75		94.1	50-150	6.59	50	
9Cl-PF3ONS (F53B Minor)	1.70	1.9	ng/L	1.73		98.1	50-150	5.94	50	
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	1.60	1.9	ng/L	1.76		91.3	50-150	2.94	50	
Surrogate: 13C-PFHxA	38.7		ng/L	37.2		104	70-130			
Surrogate: M3HFPO-DA	39.2		ng/L	37.2		105	70-130			
Surrogate: 13C-PFDA	41.6		ng/L	37.2		112	70-130			
Surrogate: D5-NEtFOSAA	166		ng/L	149		111	70-130			

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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.
H-06	Sample was extracted past the recommended holding time.
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-20	Continuing calibration verification (CCV) did not meet method specifications and was biased on the high side. Data validation is not affected since sample result was "not detected" 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
MW-3 (23J0953-01)									
Lab File ID: 23J0953-01.d Analyzed: 10/17/23 10:50									
M8FOSA	559068.3	3.9566	734,093.00	3.9566	76	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	160711.5	2.3982	164,584.00	2.4064	98	50 - 150	-0.0082	+/-0.50	
M2PFTA	1539661	4.2165	2,132,944.00	4.224583	72	50 - 150	-0.0081	+/-0.50	
M2-8:2FTS	435575.6	3.715167	366,216.00	3.71515	119	50 - 150	0.0000	+/-0.50	
MPFBA	546664.9	1.008617	1,022,426.00	1.016933	53	50 - 150	-0.0083	+/-0.50	
M3HFPO-DA	310065.6	2.7411	384,668.00	2.7493	81	50 - 150	-0.0082	+/-0.50	
M6PFDA	1526828	3.715683	1,921,541.00	3.715683	79	50 - 150	0.0000	+/-0.50	
M3PFBS	329093.3	1.8121	380,850.00	1.820383	86	50 - 150	-0.0083	+/-0.50	
M7PFUnA	1543092	3.849867	1,757,433.00	3.857817	88	50 - 150	-0.0079	+/-0.50	
M2-6:2FTS	138896.3	3.36415	124,000.00	3.36415	112	50 - 150	0.0000	+/-0.50	
M5PFPeA	753520.3	1.640383	928,698.00	1.64865	81	50 - 150	-0.0083	+/-0.50	
M5PFHxA	1426089	2.482	1,673,637.00	2.498433	85	50 - 150	-0.0164	+/-0.50	
M3PFHxS	222979.1	3.1292	258,497.00	3.137283	86	50 - 150	-0.0081	+/-0.50	
M4PFHpA	1535702	3.097167	1,795,742.00	3.1053	86	50 - 150	-0.0081	+/-0.50	
M8PFOA	1552156	3.372883	1,847,706.00	3.380933	84	50 - 150	-0.0081	+/-0.50	
M8PFOS	200448.8	3.563817	241,901.00	3.563817	83	50 - 150	0.0000	+/-0.50	
M9PFNA	1283069	3.56485	1,459,459.00	3.56485	88	50 - 150	0.0000	+/-0.50	
MPFDoA	1335550	3.98475	1,799,838.00	3.98475	74	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	363346.3	3.857367	389,076.00	3.865317	93	50 - 150	-0.0080	+/-0.50	
D3-NMeFOSAA	448180	3.785583	523,236.00	3.785583	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
ERB (MW-3) (23J0953-02)									
			Lab File ID: 23J0953-02.d			Analyzed: 10/27/23 14:01			
M8FOSA	546511.8	3.948583	738,191.00	3.948583	74	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	146806.1	2.431	121,312.00	2.431017	121	50 - 150	0.0000	+/-0.50	
M2PFTA	1318916	4.232617	1,559,613.00	4.232617	85	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	745353.9	3.7231	399,594.00	3.7231	187	50 - 150	0.0000	+/-0.50	*
MPFBA	818796.7	1.025233	989,288.00	1.016917	83	50 - 150	0.0083	+/-0.50	
M3HFPO-DA	258549.5	2.76565	269,762.00	2.773833	96	50 - 150	-0.0082	+/-0.50	
M6PFDA	1413886	3.723617	1,712,368.00	3.723633	83	50 - 150	0.0000	+/-0.50	
M3PFBS	308244.4	1.83695	350,216.00	1.83695	88	50 - 150	0.0000	+/-0.50	
M7PFUnA	1271933	3.86575	1,429,378.00	3.86575	89	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	130518	3.372183	111,098.00	3.372183	117	50 - 150	0.0000	+/-0.50	
M5PFPeA	791194	1.6652	918,696.00	1.6652	86	50 - 150	0.0000	+/-0.50	
M5PFHxA	1233312	2.51485	1,410,817.00	2.51485	87	50 - 150	0.0000	+/-0.50	
M3PFHxS	209487.5	3.14535	233,838.00	3.14535	90	50 - 150	0.0000	+/-0.50	
M4PFHpA	1296755	3.105283	1,411,666.00	3.113417	92	50 - 150	-0.0081	+/-0.50	
M8PFOA	1466646	3.388967	1,617,011.00	3.388967	91	50 - 150	0.0000	+/-0.50	
M8PFOS	213108	3.5723	251,085.00	3.5723	85	50 - 150	0.0000	+/-0.50	
M9PFNA	1321539	3.573333	1,361,050.00	3.573333	97	50 - 150	0.0000	+/-0.50	
MPFDoA	1089843	4.0007	1,309,262.00	4.0007	83	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	322043.9	3.873417	346,724.00	3.873417	93	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	351601.3	3.793517	367,116.00	3.801483	96	50 - 150	-0.0080	+/-0.50	
Town Garage (23J0953-03RE1)									
			Lab File ID: 23J0953-03RE1.d			Analyzed: 10/30/23 19:54			
13C-PFOA	612403.9	3.1129	537,664.00	3.10425	114	50 - 150	0.0086	+/-0.50	
13C-PFOS	252142.6	3.433683	231,723.00	3.4255	109	50 - 150	0.0082	+/-0.50	
D3-NMeFOSAA	929790.3	3.7326	774,962.00	3.732583	120	50 - 150	0.0000	+/-0.50	

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

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 (B354543-BLK1)			Lab File ID: B354543-BLK1.d			Analyzed: 10/17/23 00:41			
M8FOSA	579995.7	3.9646	651,620.00	3.9646	89	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	172312.2	2.414617	117,365.00	2.3736	147	50 - 150	0.0410	+/-0.50	
M2PFTA	1497643	4.200366	1,714,605.00	4.200366	87	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	126372.5	3.707183	184,421.00	3.6989	69	50 - 150	0.0083	+/-0.50	
MPFBA	907023.5	1.008617	889,121.00	1.0003	102	50 - 150	0.0083	+/-0.50	
M3HFPO-DA	337688.9	2.757483	269,770.00	2.72475	125	50 - 150	0.0327	+/-0.50	
M6PFDA	1373643	3.7077	1,477,410.00	3.69945	93	50 - 150	0.0082	+/-0.50	
M3PFBS	370914.3	1.820383	318,381.00	1.787233	117	50 - 150	0.0332	+/-0.50	
M7PFUnA	1433094	3.8419	1,466,664.00	3.833933	98	50 - 150	0.0080	+/-0.50	
M2-6:2FTS	111064.1	3.364133	97,228.00	3.356083	114	50 - 150	0.0080	+/-0.50	
M5PFPeA	846305	1.640383	787,391.00	1.615567	107	50 - 150	0.0248	+/-0.50	
M5PFHxA	1555131	2.498433	1,391,879.00	2.465567	112	50 - 150	0.0329	+/-0.50	
M3PFHxS	249720.5	3.14535	229,246.00	3.121133	109	50 - 150	0.0242	+/-0.50	
M4PFHpA	1642454	3.105283	1,525,875.00	3.089033	108	50 - 150	0.0162	+/-0.50	
M8PFOA	1700659	3.380917	1,522,592.00	3.364817	112	50 - 150	0.0161	+/-0.50	
M8PFOS	218743.1	3.5638	206,360.00	3.555817	106	50 - 150	0.0080	+/-0.50	
M9PFNA	1305858	3.564833	1,315,722.00	3.55685	99	50 - 150	0.0080	+/-0.50	
MPFDoA	1197277	3.96875	1,428,997.00	3.96875	84	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	306992.8	3.8494	337,694.00	3.841433	91	50 - 150	0.0080	+/-0.50	
D3-NMeFOSAA	463458.3	3.7776	421,444.00	3.769633	110	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 (B354543-BS1)			Lab File ID: B354543-BS1.d			Analyzed: 10/17/23 00:34			
M8FOSA	535279.2	3.9646	651,620.00	3.9646	82	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	153708.9	2.422817	117,365.00	2.3736	131	50 - 150	0.0492	+/-0.50	
M2PFTA	1361496	4.20035	1,714,605.00	4.200366	79	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	123961.4	3.707183	184,421.00	3.6989	67	50 - 150	0.0083	+/-0.50	
MPFBA	833515.3	1.008617	889,121.00	1.0003	94	50 - 150	0.0083	+/-0.50	
M3HFPO-DA	315069.8	2.76565	269,770.00	2.72475	117	50 - 150	0.0409	+/-0.50	
M6PFDA	1183973	3.7077	1,477,410.00	3.69945	80	50 - 150	0.0082	+/-0.50	
M3PFBS	335669.1	1.820383	318,381.00	1.787233	105	50 - 150	0.0332	+/-0.50	
M7PFUnA	1300686	3.841883	1,466,664.00	3.833933	89	50 - 150	0.0080	+/-0.50	
M2-6:2FTS	111700	3.3722	97,228.00	3.356083	115	50 - 150	0.0161	+/-0.50	
M5PFPeA	763967.1	1.64865	787,391.00	1.615567	97	50 - 150	0.0331	+/-0.50	
M5PFHxA	1404166	2.506633	1,391,879.00	2.465567	101	50 - 150	0.0411	+/-0.50	
M3PFHxS	224744.5	3.145367	229,246.00	3.121133	98	50 - 150	0.0242	+/-0.50	
M4PFHpA	1474347	3.113417	1,525,875.00	3.089033	97	50 - 150	0.0244	+/-0.50	
M8PFOA	1465033	3.380917	1,522,592.00	3.364817	96	50 - 150	0.0161	+/-0.50	
M8PFOS	201984.8	3.5638	206,360.00	3.555817	98	50 - 150	0.0080	+/-0.50	
M9PFNA	1175446	3.56485	1,315,722.00	3.55685	89	50 - 150	0.0080	+/-0.50	
MPFDoA	1125548	3.96875	1,428,997.00	3.96875	79	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	293471.3	3.849383	337,694.00	3.841433	87	50 - 150	0.0080	+/-0.50	
D3-NMeFOSAA	418204.5	3.7776	421,444.00	3.769633	99	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 (B356041-BLK1)			Lab File ID: B356041-BLK1.d			Analyzed: 10/27/23 13:32			
M8FOSA	580028.4	3.948583	738,191.00	3.948583	79	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	131916.2	2.431	121,312.00	2.431017	109	50 - 150	0.0000	+/-0.50	
M2PFTA	1173519	4.232617	1,559,613.00	4.232617	75	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	401624.9	3.7231	399,594.00	3.7231	101	50 - 150	0.0000	+/-0.50	
MPFBA	784336.6	1.025233	989,288.00	1.016917	79	50 - 150	0.0083	+/-0.50	
M3HFPO-DA	255836	2.773833	269,762.00	2.773833	95	50 - 150	0.0000	+/-0.50	
M6PFDA	1445286	3.723617	1,712,368.00	3.723633	84	50 - 150	0.0000	+/-0.50	
M3PFBS	298425	1.83695	350,216.00	1.83695	85	50 - 150	0.0000	+/-0.50	
M7PFUnA	1155619	3.86575	1,429,378.00	3.86575	81	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	121512.5	3.372183	111,098.00	3.372183	109	50 - 150	0.0000	+/-0.50	
M5PFPeA	757004.9	1.6652	918,696.00	1.6652	82	50 - 150	0.0000	+/-0.50	
M5PFHxA	1208786	2.51485	1,410,817.00	2.51485	86	50 - 150	0.0000	+/-0.50	
M3PFHxS	203584.8	3.14535	233,838.00	3.14535	87	50 - 150	0.0000	+/-0.50	
M4PFHpA	1281641	3.113417	1,411,666.00	3.113417	91	50 - 150	0.0000	+/-0.50	
M8PFOA	1461013	3.388967	1,617,011.00	3.388967	90	50 - 150	0.0000	+/-0.50	
M8PFOS	202480.4	3.5723	251,085.00	3.5723	81	50 - 150	0.0000	+/-0.50	
M9PFNA	1241051	3.573333	1,361,050.00	3.573333	91	50 - 150	0.0000	+/-0.50	
MPFDoA	983581.8	4.0007	1,309,262.00	4.0007	75	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	258760.6	3.873417	346,724.00	3.873417	75	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	297262.3	3.793517	367,116.00	3.801483	81	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 (B356041-BS1)			Lab File ID: B356041-BS1.d			Analyzed: 10/27/23 13:18			
M8FOSA	487874	3.948583	738,191.00	3.948583	66	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	116924.2	2.431	121,312.00	2.431017	96	50 - 150	0.0000	+/-0.50	
M2PFTA	1093541	4.232617	1,559,613.00	4.232617	70	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	382874	3.7231	399,594.00	3.7231	96	50 - 150	0.0000	+/-0.50	
MPFBA	738028.7	1.016917	989,288.00	1.016917	75	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	240794.1	2.773833	269,762.00	2.773833	89	50 - 150	0.0000	+/-0.50	
M6PFDA	1323797	3.723617	1,712,368.00	3.723633	77	50 - 150	0.0000	+/-0.50	
M3PFBS	282977.8	1.83695	350,216.00	1.83695	81	50 - 150	0.0000	+/-0.50	
M7PFUnA	1011389	3.86575	1,429,378.00	3.86575	71	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	115213.7	3.372183	111,098.00	3.372183	104	50 - 150	0.0000	+/-0.50	
M5PFPeA	711679.8	1.6652	918,696.00	1.6652	77	50 - 150	0.0000	+/-0.50	
M5PFHxA	1122837	2.51485	1,410,817.00	2.51485	80	50 - 150	0.0000	+/-0.50	
M3PFHxS	193430.2	3.14535	233,838.00	3.14535	83	50 - 150	0.0000	+/-0.50	
M4PFHpA	1194251	3.113417	1,411,666.00	3.113417	85	50 - 150	0.0000	+/-0.50	
M8PFOA	1356183	3.388967	1,617,011.00	3.388967	84	50 - 150	0.0000	+/-0.50	
M8PFOS	198154.3	3.5723	251,085.00	3.5723	79	50 - 150	0.0000	+/-0.50	
M9PFNA	1101279	3.573333	1,361,050.00	3.573333	81	50 - 150	0.0000	+/-0.50	
MPFDoA	883160.7	4.0007	1,309,262.00	4.0007	67	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	243648.8	3.873417	346,724.00	3.873417	70	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	291932	3.793517	367,116.00	3.801483	80	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 Dup (B356041-BSD1)									
			Lab File ID: B356041-BSD1.d			Analyzed: 10/27/23 13:25			
M8FOSA	503039.7	3.948583	738,191.00	3.948583	68	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	121404.5	2.431017	121,312.00	2.431017	100	50 - 150	0.0000	+/-0.50	
M2PF _T A	1088076	4.232617	1,559,613.00	4.232617	70	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	382736.5	3.7231	399,594.00	3.7231	96	50 - 150	0.0000	+/-0.50	
MPFBA	728558.4	1.025233	989,288.00	1.016917	74	50 - 150	0.0083	+/-0.50	
M3HFPO-DA	230373.9	2.773833	269,762.00	2.773833	85	50 - 150	0.0000	+/-0.50	
M6PFDA	1350473	3.723617	1,712,368.00	3.723633	79	50 - 150	0.0000	+/-0.50	
M3PFBS	281553.3	1.83695	350,216.00	1.83695	80	50 - 150	0.0000	+/-0.50	
M7PF _U nA	1045433	3.86575	1,429,378.00	3.86575	73	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	111397.4	3.372183	111,098.00	3.372183	100	50 - 150	0.0000	+/-0.50	
M5PF _P eA	707167.2	1.6652	918,696.00	1.6652	77	50 - 150	0.0000	+/-0.50	
M5PF _H xA	1129017	2.51485	1,410,817.00	2.51485	80	50 - 150	0.0000	+/-0.50	
M3PF _H xS	188135.8	3.14535	233,838.00	3.14535	80	50 - 150	0.0000	+/-0.50	
M4PF _H pA	1172171	3.113417	1,411,666.00	3.113417	83	50 - 150	0.0000	+/-0.50	
M8PFOA	1359340	3.388967	1,617,011.00	3.388967	84	50 - 150	0.0000	+/-0.50	
M8PFOS	193600.8	3.5723	251,085.00	3.5723	77	50 - 150	0.0000	+/-0.50	
M9PFNA	1129943	3.573333	1,361,050.00	3.573333	83	50 - 150	0.0000	+/-0.50	
MPFDoA	903947.1	4.0007	1,309,262.00	4.0007	69	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	250028.6	3.873417	346,724.00	3.873417	72	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	293418.8	3.793517	367,116.00	3.801483	80	50 - 150	-0.0080	+/-0.50	
Blank (B356284-BLK1)									
			Lab File ID: B356284-BLK1.d			Analyzed: 10/30/23 19:47			
13C-PFOA	570673.1	3.112917	537,664.00	3.10425	106	50 - 150	0.0087	+/-0.50	
13C-PFOS	237655	3.433683	231,723.00	3.4255	103	50 - 150	0.0082	+/-0.50	
D3-NMeFOSAA	856049.6	3.7326	774,962.00	3.732583	110	50 - 150	0.0000	+/-0.50	
LCS (B356284-BS1)									
			Lab File ID: B356284-BS1.d			Analyzed: 10/30/23 19:32			
13C-PFOA	574557.1	3.104267	537,664.00	3.10425	107	50 - 150	0.0000	+/-0.50	
13C-PFOS	242791.4	3.4255	231,723.00	3.4255	105	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	825597	3.732583	774,962.00	3.732583	107	50 - 150	0.0000	+/-0.50	
LCS Dup (B356284-BSD1)									
			Lab File ID: B356284-BSD1.d			Analyzed: 10/30/23 19:40			
13C-PFOA	557730.9	3.104283	537,664.00	3.10425	104	50 - 150	0.0000	+/-0.50	
13C-PFOS	241819.4	3.433683	231,723.00	3.4255	104	50 - 150	0.0082	+/-0.50	
D3-NMeFOSAA	827422.9	3.732617	774,962.00	3.732583	107	50 - 150	0.0000	+/-0.50	

CERTIFICATIONS
Certified Analyses included in this Report

Analyte	Certifications
<i>EPA 537.1 in Drinking Water</i>	
Perfluorobutanesulfonic acid (PFBS)	VT-DW,NJ,CT,ME,PA,MI,MA,NY,NH,OH
Perfluorohexanoic acid (PFHxA)	VT-DW,NJ,CT,ME,PA,MI,MA,NY,NH,OH
Perfluorohexanesulfonic acid (PFHxS)	VT-DW,NJ,CT,ME,PA,MI,MA,NY,NH,OH
Perfluoroheptanoic acid (PFHpA)	VT-DW,NJ,CT,ME,PA,MI,MA,NY,NH,OH
Perfluorooctanoic acid (PFOA)	VT-DW,NJ,CT,ME,PA,MI,MA,NY,NH,OH
Perfluorooctanesulfonic acid (PFOS)	VT-DW,NJ,CT,ME,PA,MI,MA,NY,NH,OH
Perfluorononanoic acid (PFNA)	VT-DW,NJ,CT,ME,PA,MI,MA,NY,NH,OH
Perfluorodecanoic acid (PFDA)	VT-DW,NJ,CT,ME,PA,MI,MA,NY,NH,OH
N-EtFOSAA (NEtFOSAA)	VT-DW,NJ,CT,ME,PA,MI,MA,NY,NH,OH
Perfluoroundecanoic acid (PFUnA)	VT-DW,NJ,CT,ME,PA,MI,MA,NY,NH,OH
N-MeFOSAA (NMeFOSAA)	VT-DW,NJ,CT,ME,PA,MI,MA,NY,NH,OH
Perfluorododecanoic acid (PFDoA)	VT-DW,NJ,CT,ME,PA,MI,MA,NY,NH,OH
Perfluorotridecanoic acid (PFTrDA)	VT-DW,NJ,CT,ME,PA,MI,MA,NY,NH,OH
Perfluorotetradecanoic acid (PFTA)	VT-DW,NJ,CT,ME,PA,MI,MA,NY,NH,OH
Hexafluoropropylene oxide dimer acid (HFPO-DA)	VT-DW,NJ,CT,ME,PA,MI,MA,NY,NH,OH
11Cl-PF3OUdS (F53B Major)	VT-DW,NJ,CT,ME,PA,MI,MA,NY,NH,OH
9Cl-PF3ONS (F53B Minor)	VT-DW,NJ,CT,ME,PA,MI,MA,NY,NH,OH
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	VT-DW,NJ,CT,ME,PA,MI,MA,NY,NH,OH
<i>SOP-454 PFAS in Water</i>	
Perfluorobutanoic acid (PFBA)	NH-P,PA,NY
Perfluorobutanesulfonic acid (PFBS)	NH-P,PA,NY
Perfluoropentanoic acid (PFPeA)	NH-P,PA,NY
Perfluorohexanoic acid (PFHxA)	NH-P,PA,NY
11Cl-PF3OUdS (F53B Major)	NH-P,PA,NY
9Cl-PF3ONS (F53B Minor)	NH-P,PA
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	NH-P,PA,NY
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NH-P,PA,NY
8:2 Fluorotelomersulfonic acid (8:2FTS A)	NH-P,PA
Perfluorodecanoic acid (PFDA)	NH-P,PA,NY
Perfluorododecanoic acid (PFDoA)	NH-P,PA,NY
Perfluoro(2-ethoxyethane)sulfonic acid (PFEEESA)	NH-P,PA,NY
Perfluoroheptanesulfonic acid (PFHpS)	NH-P,PA,NY
N-EtFOSAA (NEtFOSAA)	NH-P,PA,NY
N-MeFOSAA (NMeFOSAA)	NH-P,PA,NY
Perfluorotetradecanoic acid (PFTA)	NH-P,PA,NY
Perfluorotridecanoic acid (PFTrDA)	NH-P,PA,NY
4:2 Fluorotelomersulfonic acid (4:2FTS A)	NH-P,PA,NY
Perfluorodecanesulfonic acid (PFDS)	NH-P,PA
Perfluorooctanesulfonamide (FOSA)	NH-P,PA
Perfluorononanesulfonic acid (PFNS)	NH-P,PA
Perfluoro-1-hexanesulfonamide (FHxSA)	NH-P,PA
Perfluoro-1-butanefulfonamide (FBSA)	NH-P,PA
Perfluorohexanesulfonic acid (PFHxS)	NH-P,PA,NY
Perfluoro-4-oxapentanoic acid (PFMPA)	NH-P,PA,NY
Perfluoro-5-oxahexanoic acid (PFMBA)	NH-P,PA,NY
6:2 Fluorotelomersulfonic acid (6:2FTS A)	NH-P,PA,NY

CERTIFICATIONS
Certified Analyses included in this Report

Analyte	Certifications
<i>SOP-454 PFAS in Water</i>	
Perfluoropentanesulfonic acid (PFPeS)	NH-P,PA,NY
Perfluoroundecanoic acid (PFUnA)	NH-P,PA,NY
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	NH-P,PA
Perfluoroheptanoic acid (PFHpA)	NH-P,PA,NY
Perfluorooctanoic acid (PFOA)	NH-P,PA,NY
Perfluorooctanesulfonic acid (PFOS)	NH-P,PA,NY
Perfluorononanoic acid (PFNA)	NH-P,PA,NY

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

Code	Description	Number	Expires
MA	Massachusetts DEP	M-MA100	06/30/2024
CT	Connecticut Department of Public Health	PH-0821	12/31/2024
NY	New York State Department of Health	10899 NELAP	04/1/2024
NH	New Hampshire Environmental Lab	2516 NELAP	02/5/2024
NJ	New Jersey DEP	MA007 NELAP	06/30/2024
VT-DW	Vermont Department of Health Drinking Water	VT-255716	06/12/2024
ME	State of Maine	MA00100	06/9/2025
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2024
PA	Commonwealth of Pennsylvania DEP	68-05812	06/30/2024
MI	Dept. of Env, Great Lakes, and Energy	9100	06/30/2024
OH	Ohio Environmental Protection Agency	87781	04/1/2024



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

Company Name: **KAS Inc.**
 Address: **Williamston, VT**
 Phone: **202-383-0476**
 Project Name: **Haitax Landfill**
 Project Location: **Haitax, VT**
 Project Number: **61010015**
 Project Manager: **C. Santos**
 Pace Quote Name/Number:
 Invoice Recipient:
 Sampled By: **OS, WF**

<http://www.paceabs.com>

CHAIN OF CUSTODY RECORD

39 Spruce Street
 East Longmeadow, MA 01028

Doc # 381 Rev 5_07/13/2021

Requested Turnaround Time: 7-Day 10-Day PFAS 10-Day (std) Due Date: Rush-Approval Required 3-Day 4-Day Orthophosphate Samples: Field Filtered Lab to Filter 1-Day 2-Day Lab to Filter Data Delivery: PDF EXCEL SOXHLET CLP Like Data Pkg Required: NON SOXHLET Email To: **elias@kascustomerling.com** Fax To #:

ANALYSIS REQUESTED

Matrix Code	Field Filtered	Lab to Filter	Field Filtered	Lab to Filter	MA MCP Required	MCP Certification Form Required	CT RCP Required	RCP Certification Form Required	MA State DW Required	Other
1106	Grab	GW	↓	↓	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1203	↓	DW	↓	↓	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1202	↓	↓	↓	↓	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Preservation Code: Counter 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)


Client Comments:

Analyte ERB + FB only if there is a detection in sample.

Detection Limit Requirements: MA CT Other: **VT**
 PMSID #
 Project Entity: Government Municipality Federal City
 21 J Brownfield
 MWRA School MBTA
 WRTA Other
 Chromatogram
 AIHA-LAP, LLC

Relinquished by: (signature) **[Signature]** Date/Time: **10/4/23 1700**
 Received by: (signature) **[Signature]** Date/Time: **10-6-23**
 Relinquished by: (signature) **[Signature]** Date/Time: **10-6-23**
 Received by: (signature) **[Signature]** Date/Time: **10/4/23 10**
 Relinquished by: (signature) **[Signature]** Date/Time: **10/6/23 12:15**
 Received by: (signature) **[Signature]** Date/Time: **10/16/23 16:05**
 Relinquished by: (signature) **[Signature]** Date/Time:
 Received by: (signature) **[Signature]** Date/Time:

Disclaimers: 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 who 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.

	DC#_Title: ENV-FRM-ELON-0001 v07_Sample Receiving Checklist
	Effective Date: 07/13/2023

Log In Back-Sheet

Client KAS Inc

Project Halifax Landfill

MCP/RCP Required no

Deliverable Package Requirement none

Location Halifax, VT

PWSID# (When Applicable) n/a

Arrival Method:

Courier Fed Ex Walk In Other

Received By / Date / Time AKM 10/11/23 1215

Back-Sheet By / Date / Time AKM 10/16/23 1551

Temperature Method Gun # 4

Temp < 6° C Actual Temperature 1.6

Rush Samples: Yes / No Notify No

Short Hold: Yes / No Notify No

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

	True	False
Received on Ice	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Received in Cooler	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Custody Seal: DATE TIME	<input type="checkbox"/>	<input checked="" type="checkbox"/>
COC Relinquished	<input checked="" type="checkbox"/>	<input type="checkbox"/>
COC/Samples Labels Agree	<input checked="" type="checkbox"/>	<input type="checkbox"/>
All Samples in Good Condition	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Samples Received within Holding Time	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Is there enough Volume	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Proper Media/Container Used	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Splitting Samples Required	<input type="checkbox"/>	<input checked="" type="checkbox"/>
MS/MSD	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Trip Blanks	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Lab to Filters	<input type="checkbox"/>	<input checked="" type="checkbox"/>
COC Legible	<input checked="" type="checkbox"/>	<input type="checkbox"/>
COC Included: (Check all included)		
Client <input checked="" type="checkbox"/>	Analysis <input checked="" type="checkbox"/>	Sampler Name <input checked="" type="checkbox"/>
Project <input checked="" type="checkbox"/>	IDs <input checked="" type="checkbox"/>	Collection Date/Time <input checked="" type="checkbox"/>
All Samples Proper pH:	<input type="checkbox"/> (N/A)	<input type="checkbox"/>

Notes regarding Samples/COC outside of SOP:

Additional Container Notes

Note: West Virginia requires all samples to have their temperature taken. Note any outliers.

December 28, 2023

Clare Santos
KAS Environmental
589 Avenue D
Williston, VT 05495

Project Location: Halifax, VT
Client Job Number:
Project Number: 610110045
Laboratory Work Order Number: 23J0941

Enclosed are results of analyses for samples as received by the laboratory on October 6, 2023. 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

KAS Environmental
589 Avenue D
Williston, VT 05495
ATTN: Clare Santos

REPORT DATE: 12/28/2023

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 610110045

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 23J0941

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

PROJECT LOCATION: Halifax, VT

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
Rafus Well	23J0941-01	Drinking Water		EPA 537.1	

CASE NARRATIVE SUMMARY

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

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

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

Project Location: Halifax, VT

Sample Description:

Work Order: 23J0941

Date Received: 10/6/2023

Field Sample #: Rafus Well

Sampled: 10/4/2023 12:50

Sample ID: 23J0941-01

Sample Matrix: Drinking Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	MCL/SMCL		Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
		RL	MA ORSG							
Perfluorobutanesulfonic acid (PFBS)	ND	1.9		ng/L	1		EPA 537.1	10/11/23	10/12/23 14:36	AMS
Perfluorohexanesulfonic acid (PFHxS)	ND	1.9		ng/L	1		EPA 537.1	10/11/23	10/12/23 14:36	AMS
Perfluoroheptanoic acid (PFHpA)	ND	1.9		ng/L	1		EPA 537.1	10/11/23	10/12/23 14:36	AMS
Perfluorooctanoic acid (PFOA)	ND	1.9		ng/L	1		EPA 537.1	10/11/23	10/12/23 14:36	AMS
Perfluorooctanesulfonic acid (PFOS)	ND	1.9		ng/L	1		EPA 537.1	10/11/23	10/12/23 14:36	AMS
Perfluorononanoic acid (PFNA)	ND	1.9		ng/L	1		EPA 537.1	10/11/23	10/12/23 14:36	AMS
Surrogates		% Recovery		Recovery Limits		Flag/Qual				
13C-PFHxA		81.4		70-130					10/12/23 14:36	
M3HFPO-DA		89.8		70-130					10/12/23 14:36	
13C-PFDA		87.4		70-130					10/12/23 14:36	
D5-NEtFOSAA		87.9		70-130					10/12/23 14:36	

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Sample Extraction Data

Prep Method:EPA 537.1 Analytical Method:EPA 537.1

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
23J0941-01 [Rafus Well]	B354488	260	1.00	10/11/23

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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 B354488 - EPA 537.1										
Blank (B354488-BLK1)										
Prepared: 10/11/23 Analyzed: 10/12/23										
Perfluorobutanesulfonic acid (PFBS)	ND	1.9	ng/L							
Perfluorohexanoic acid (PFHxA)	ND	1.9	ng/L							
Perfluorohexanesulfonic acid (PFHxS)	ND	1.9	ng/L							
Perfluoroheptanoic acid (PFHpA)	ND	1.9	ng/L							
Perfluorooctanoic acid (PFOA)	ND	1.9	ng/L							
Perfluorooctanesulfonic acid (PFOS)	ND	1.9	ng/L							
Perfluorononanoic acid (PFNA)	ND	1.9	ng/L							
Perfluorodecanoic acid (PFDA)	ND	1.9	ng/L							
N-EtFOSAA (NEtFOSAA)	ND	1.9	ng/L							
Perfluoroundecanoic acid (PFUnA)	ND	1.9	ng/L							
N-MeFOSAA (NMeFOSAA)	ND	1.9	ng/L							
Perfluorododecanoic acid (PFDoA)	ND	1.9	ng/L							
Perfluorotridecanoic acid (PFTrDA)	ND	1.9	ng/L							
Perfluorotetradecanoic acid (PFTA)	ND	1.9	ng/L							
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.9	ng/L							
11Cl-PF3OUdS (F53B Major)	ND	1.9	ng/L							
9Cl-PF3ONS (F53B Minor)	ND	1.9	ng/L							
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.9	ng/L							
Surrogate: 13C-PFHxA	29.8		ng/L	38.6		77.2	70-130			
Surrogate: M3HFPO-DA	31.8		ng/L	38.6		82.3	70-130			
Surrogate: 13C-PFDA	34.2		ng/L	38.6		88.5	70-130			
Surrogate: D5-NEtFOSAA	129		ng/L	154		83.7	70-130			
LCS (B354488-BS1)										
Prepared: 10/11/23 Analyzed: 10/12/23										
Perfluorobutanesulfonic acid (PFBS)	1.21	1.9	ng/L	1.68		72.0	50-150			
Perfluorohexanoic acid (PFHxA)	1.52	1.9	ng/L	1.90		80.0	50-150			
Perfluorohexanesulfonic acid (PFHxS)	1.35	1.9	ng/L	1.73		78.2	50-150			
Perfluoroheptanoic acid (PFHpA)	1.45	1.9	ng/L	1.90		76.5	50-150			
Perfluorooctanoic acid (PFOA)	2.27	1.9	ng/L	1.90		120	50-150			
Perfluorooctanesulfonic acid (PFOS)	1.50	1.9	ng/L	1.76		85.1	50-150			
Perfluorononanoic acid (PFNA)	1.44	1.9	ng/L	1.90		75.9	50-150			
Perfluorodecanoic acid (PFDA)	1.91	1.9	ng/L	1.90		101	50-150			
N-EtFOSAA (NEtFOSAA)	1.35	1.9	ng/L	1.90		71.2	50-150			
Perfluoroundecanoic acid (PFUnA)	1.37	1.9	ng/L	1.90		72.4	50-150			
N-MeFOSAA (NMeFOSAA)	1.57	1.9	ng/L	1.90		83.0	50-150			
Perfluorododecanoic acid (PFDoA)	1.34	1.9	ng/L	1.90		70.7	50-150			
Perfluorotridecanoic acid (PFTrDA)	1.39	1.9	ng/L	1.90		73.5	50-150			
Perfluorotetradecanoic acid (PFTA)	0.953	1.9	ng/L	1.90		50.3	50-150			
Hexafluoropropylene oxide dimer acid (HFPO-DA)	1.87	1.9	ng/L	1.90		98.8	50-150			
11Cl-PF3OUdS (F53B Major)	1.21	1.9	ng/L	1.79		67.9	50-150			
9Cl-PF3ONS (F53B Minor)	1.38	1.9	ng/L	1.77		77.8	50-150			
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	1.44	1.9	ng/L	1.79		80.6	50-150			
Surrogate: 13C-PFHxA	29.8		ng/L	37.9		78.7	70-130			
Surrogate: M3HFPO-DA	33.1		ng/L	37.9		87.2	70-130			
Surrogate: 13C-PFDA	31.6		ng/L	37.9		83.4	70-130			
Surrogate: D5-NEtFOSAA	108		ng/L	152		71.2	70-130			

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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 B354488 - EPA 537.1										
LCS Dup (B354488-BSD1)										
					Prepared: 10/11/23 Analyzed: 10/12/23					
Perfluorobutanesulfonic acid (PFBS)	1.36	1.9	ng/L	1.72		78.9	50-150	11.4	50	
Perfluorohexanoic acid (PFHxA)	1.65	1.9	ng/L	1.94		85.0	50-150	8.18	50	
Perfluorohexanesulfonic acid (PFHxS)	1.44	1.9	ng/L	1.77		81.1	50-150	5.92	50	
Perfluoroheptanoic acid (PFHpA)	1.45	1.9	ng/L	1.94		74.8	50-150	0.0395	50	
Perfluorooctanoic acid (PFOA)	1.61	1.9	ng/L	1.94		83.0	50-150	34.0	50	
Perfluorooctanesulfonic acid (PFOS)	1.36	1.9	ng/L	1.80		75.6	50-150	9.62	50	
Perfluorononanoic acid (PFNA)	1.73	1.9	ng/L	1.94		89.4	50-150	18.4	50	
Perfluorodecanoic acid (PFDA)	2.17	1.9	ng/L	1.94		112	50-150	12.7	50	
N-EtFOSAA (NEtFOSAA)	1.64	1.9	ng/L	1.94		84.8	50-150	19.6	50	
Perfluoroundecanoic acid (PFUnA)	1.71	1.9	ng/L	1.94		88.3	50-150	21.9	50	
N-MeFOSAA (NMeFOSAA)	1.47	1.9	ng/L	1.94		75.7	50-150	7.04	50	
Perfluorododecanoic acid (PFDoA)	1.58	1.9	ng/L	1.94		81.5	50-150	16.3	50	
Perfluorotridecanoic acid (PFTrDA)	1.70	1.9	ng/L	1.94		87.9	50-150	20.0	50	
Perfluorotetradecanoic acid (PFTA)	1.41	1.9	ng/L	1.94		72.8	50-150	38.6	50	
Hexafluoropropylene oxide dimer acid (HFPO-DA)	1.94	1.9	ng/L	1.94		100	50-150	3.58	50	
11Cl-PF3OUdS (F53B Major)	1.45	1.9	ng/L	1.83		79.6	50-150	18.1	50	
9Cl-PF3ONS (F53B Minor)	1.59	1.9	ng/L	1.81		88.2	50-150	14.8	50	
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	1.62	1.9	ng/L	1.83		88.3	50-150	11.3	50	
Surrogate: 13C-PFHxA	34.4		ng/L	38.7		88.9	70-130			
Surrogate: M3HFPO-DA	37.1		ng/L	38.7		95.8	70-130			
Surrogate: 13C-PFDA	37.1		ng/L	38.7		95.8	70-130			
Surrogate: D5-NEtFOSAA	135		ng/L	155		87.0	70-130			

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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.

CERTIFICATIONS
Certified Analyses included in this Report

Analyte	Certifications
<i>EPA 537.1 in Drinking Water</i>	
Perfluorobutanesulfonic acid (PFBS)	VT-DW,NJ,CT,ME,PA,MI,MA,NY,NH,OH
Perfluorohexanesulfonic acid (PFHxS)	VT-DW,NJ,CT,ME,PA,MI,MA,NY,NH,OH
Perfluoroheptanoic acid (PFHpA)	VT-DW,NJ,CT,ME,PA,MI,MA,NY,NH,OH
Perfluorooctanoic acid (PFOA)	VT-DW,NJ,CT,ME,PA,MI,MA,NY,NH,OH
Perfluorooctanesulfonic acid (PFOS)	VT-DW,NJ,CT,ME,PA,MI,MA,NY,NH,OH
Perfluorononanoic acid (PFNA)	VT-DW,NJ,CT,ME,PA,MI,MA,NY,NH,OH

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

Code	Description	Number	Expires
MA	Massachusetts DEP	M-MA100	06/30/2024
CT	Connecticut Department of Public Health	PH-0821	12/31/2024
NY	New York State Department of Health	10899 NELAP	04/1/2024
NH	New Hampshire Environmental Lab	2516 NELAP	02/5/2024
NJ	New Jersey DEP	MA007 NELAP	06/30/2024
VT-DW	Vermont Department of Health Drinking Water	VT-255716	06/12/2024
ME	State of Maine	MA00100	06/9/2025
PA	Commonwealth of Pennsylvania DEP	68-05812	06/30/2024
MI	Dept. of Env, Great Lakes, and Energy	9100	06/30/2024
OH	Ohio Environmental Protection Agency	87781	04/1/2024

