

October 14th, 2022
August 4th, 2023 update
March 4th, 2024 update



BLACK EARTH COMPOST

Black Earth Compost LLC
Gloucester, MA, 01930

Report of Annual PFAS Analysis

2024 Update -

Please see the table at the end of this report for our 2024 results. We are happy to again report that PFAS levels continue to be low and consistent. Results from 2 farms show no PFAS buildup after applying Black Earth Compost for 5 to 10 years in a row.

2023 Update -

Please see the table at the end of this report for our 2023 results. Levels of all regulated PFAS are down, most all below even the detection limit. Levels of unregulated PFAS are also down. We are happy to see our levels are both consistent and remain in the low range. We are even happier to see levels going down which we attribute to more audits of our feedstocks that check products are certified compostable.

Original Report -

Black Earth Compost is taking a proactive approach to investigating the issue of PFAS in our world and as it relates to our composts and soils. We have been voluntarily analyzing and reporting our results and have worked with a consultant to put together this document. In it we provide data from our latest round of PFAS testing from our 3 compost sites (see Table 2) and compare it to Massachusetts limits for human safety defined by the state as: children inhaling and playing in the soil (see Table 1). The good news is our compost and soil blends are safe by these strict standards.

Additional research with our consultant found studies describing background levels of PFAS in the environment (see Table 3). Some PFAS can be detected in most soils and homes because they have been heavily used by society since the 1950's. For comparison, we then collected publicly available data from high-profile PFAS contamination that occurred on Maine farms and in central Massachusetts at a compost facility which made news this summer (see Table 4).

Finally, we show data that the levels of PFAS, taken by the US Center for Disease Control, in blood serum has dropped significantly since 2001 (see Table 5). This may indicate that we may be past peak exposure to the PFAS that are of most concern and are highly regulated.

There is much fear associated with PFAS, but it is important to remember that we have been living with them for over 70 years. More importantly we have been depending on them every minute of every day to create the modern lifestyle we enjoy and depend on. Any transition away needs to be orderly and phased and not have impossible expectations of getting back to a zero PFAS world.

Background Information

PFAS, or per- and poly-fluoroalkyl substances have been widely used since the 1950s and are now ubiquitous in the environment. The reason for their popularity and utility is the molecules are able to provide simultaneous grease and water resistance while also being resistant to degradation by life and heat. Due to their use in Teflon cooking ware, Gore-Tex containing outdoor gear, stain-resistant furniture, stain-resistant carpeting, food packaging, mascara, school floor waxes, firefighting foam, and scores of other widely used products, we are all exposed to PFAS daily. Fortunately, due to the apparent toxicity of some PFAS compounds, many of the compounds are already being phased out of production, and our exposure to these have been decreasing (see Table 5 for the reduction in the US population's blood serum level of PFAS compounds in the last two decades). PFAS compounds last a very long time in the world, so that even with this reduction, background levels still persist and in some media, such as household dust, levels are quite high (see Table 4). Due to this we still see them in our daily lives for many years to come.

It is important to realize that PFAS exists in our world in a range from high concentrations to low concentrations. On the high end of the spectrum, there has been extensive media coverage recently related to Towns that have high levels of PFAS that are a concern (see Table 4). These sites have been taking ingredients that are high in PFAS such as paper mill waste. On the other end of the spectrum, studies have found low levels of PFAS in rain water which means that all environmental media (soils, plants, animals, fresh water, salt water, etc.) will show detectable amounts. This is shown to be true in studies that analyze for PFAS across forest, rural and urban soils in Maine and Vermont (see Table 3). It's important to realize that low levels exist in most environmental media, including composts, and generally are not a concern to human health.

2022 Results

Black Earth Compost tests well below the limits set for human safety by the state of Massachusetts, the US EPA and the Canadian government. For the 6 PFAS compounds that are common and considered harmful, they are either **not detected** or are at least **180 fold below** the human safety limits set by the state. For example, the threshold for PFOA is 300 ug/kg (300 parts per billion); the PFOA level in our compost tests 1.6 ug/kg on average (see Table 2).

Massachusetts bases its human safety thresholds around a worst case scenario of soil being used at a daycare where children will be exposed to it through play and inhalation. The state then adds safety factors on top of that threshold to account for persons who may react differently or are particularly frail.

Black Earth Compost used in a soil directly on top of a drinking water supply does not contain enough concerning PFAS to accumulate to threatening levels. It is important to remember that compost is only applied to soil as an amendment, making up a fraction of the overall soil mass. To test this theory, we analyzed a farm soil that had used our compost about 10 times over 8 years (see Table 2). Levels of PFAS in this soil are still below the strict state thresholds to protect drinking water. On top of that, the levels found are lower than or in the range of background soil levels found at uncontaminated sites in Maine and Vermont (see Table 3).

There are 28 other PFAS molecules that EPA regularly advises testing for. 25 out of 28 of those are not detectable in Black Earth Compost or soil blends. The 3 that we do find are in low concentrations and are generally used on food and food packaging and thus people are already regularly exposed to them at higher concentrations on their food. These compounds are typically not regulated by states or countries because their toxicity is lower than those 6 PFAS that are near-universally regulated. Where safety standards do exist, Black Earth Compost is well below those thresholds as well. For example, the threshold for PFHxA is 800 ug/kg in Canada (one of the few countries to even regulate it) and our compost tests at 25 ug/kg; Threshold for PFBA in Canada is 114,000 ug/kg and our compost tests at 2.9 ug/kg.

Reducing PFAS impact - Getting to zero PFAS

Society will never get to zero PFAS. They have been heavily used in modern society in suburbs, cities, processed food supply chain and the single-use packaging culture. As we wean ourselves off of them and lower demand, manufacturers will respond and slowly start to produce less each day. When those production levels drop, PFAS will slowly disperse into the environment adding to the background 'chemical noise' found all over the Earth. Over 100's or 1000's of years that background amount will continue to decrease until it is only found in sedimentary rocks from our era. This is how persistent pollutants work.

Some people are demanding that all traces of PFAS be cleaned up and our world be set back to zero PFAS. That is impossible because PFAS is already in rain water from the Northern Hemisphere's continents down to Antarctica (Cousins et al.)¹. Reducing the manufacturing of PFAS is a smart first step. This stops new PFAS from entering into the environment and allows what is here to slowly disperse. Realistically though, a wind down of these PFAS containing products is going to take 10 to 20 years. On top of that, there may not be a replacement for many uses of PFAS. The reason they harm living beings and that they persist in the environment may be the same reason they provide the beneficial properties we want. Therefore, part of the solution is to lower our expectations of what we ask from consumer products.

Compostable Packaging

Black Earth Compost requires that any food packaging that you place in our bins is certified compostable. We only allow the following certifications because they have PFAS standards.

- Biodegradable Product Institute (BPI)
- Compost Manufacturer's Alliance (CMA)
- TÜV Austria/OK Compost
- EN 13432 or EN 14995



Legislative and Personal Actions

Black Earth Compost supports the following actions in government, schools, businesses and people...

- Legislative and Executive branch of government
 - The question of how to handle PFAS needs to be dealt with at the Executive level rather than legislative, judicial or with regulators. These later groups often have strict mandates that may prevent decision making where there are difficult tradeoffs for all decision pathways. There are too many complexities, PFAS is too pervasive and deeply integrated into modern living; Therefore Executive level thought, research and decision is required.
 - Scenario 1 – Mandate phase out of all PFAS from consumer food products and food packaging.
 - Scenario 2 – Require that if PFAS are to be used on consumer food and food packaging that they are first approved by FDA.
 - Either scenario should likely be phased in on a 5 year time frame in order to prevent shock to the supply chains. Going zero tolerance does not work for something that is used every minute of every day by people.
 - Regulate the term 'compostable' and 'biodegradable'. These terms are used very loosely on consumer single use items. Two side by side products at a supermarket can say 'compostable', but one likely has PFAS and the other does not because it is certified compostable.
- Restaurants and Cafeterias
 - For single use plastic to-go items, first try to utilize PLA (polylactic acid) based items that are certified compostable (BPI, CMA, TÜV, or the European compostable standards, see above). PLA doesn't need a PFAS coating and can be cheaper. If you do use paper or fiber-based containers (trays, plates, wrappers, etc.), ensure that they are certified compostable by our standards in order to avoid PFAS (see above)
- Schools
 - Consider whether daily or weekly waxing of your hallways and floors is necessary. Determine if there are non-PFAS containing alternatives to the wax and wax strippers.
 - If you choose to use single use trays to serve lunches, ensure they are certified compostable. If you find an affordable certified 5-compartment trays, contact Black Earth so we can share it. We have a New England distributor who wants to carry affordable trays and can buy in bulk.
- Consumers
 - Ask that single-use food packaging that you consume be certified compostable by BPI, CMA, TÜV or European standards (the ASTM 6400, developed by the American Society for Testing and Materials, does not consider anything regarding PFAS; nor does Forest Stewardship Council certification have anything to do with PFAS). So whether you are into composting or not, if you are against PFAS then you should be buying single use products that are certified by BPI, CMA, TÜV or the European standards. <https://blackearthcompost.com/compostables/>

- o Consider consuming less greasy food. Not only is the greasy food likely bad for your health, but the PFAS needed to contain it in its bag or box is likely bad for you too.
- o Consume less total number of products.
- o Consume more simply. Do you need that stylish waterproof jacket? Or will a poncho and boiled-wool tunic work?

-Andrew Brousseau

Compost Operations/Managing Partner

Black Earth Compost

Table 1	PFAS Regulated by MA						PFAS Monitored by EPA			
	PFHpA	PFHxS	PFOA	PFNA	PFOS	PFDA	25 other PFAS*	PFBA	PFPeA	PFHxA
	STATE AND INTERNATIONAL REGULATIONS									
	no std = no regulation/standard; measured in ng/g; dry weight basis (parts per billion)									
Massachusetts Soil Standard - Skin Contact and Inhalation	Soil	300	300	300	300	300	no std	no std	no std	no std
Federal - EPA - Skin Contact	Soil	no std	1,300	190	190	190	no std	no std	no std	no std
Canada - Human Contact Safety	Soil	800	2,300	700	80	2,000	no std	no std	114,000	800
Massachusetts Soil Standard - Over drinking water source	Soil	0.50	0.30	0.72	0.32	2.00	0.30	no std	no std	no std
Federal - EPA - Over drinking water source	Soil	no std	0.17	0.92	0.25	0.04	no std	no std	no std	no std

Table 2	BLACK EARTH COMPOST - 2022 + 2023 RESULTS										
	detc = not detected in this soil at the minimum detection limit; measured in ng/g; dry weight basis (parts per billion)										
Manchester site 2022	Compost	no detc	no detc	1	no detc	no detc	no detc	no detc	4	7	26
Manchester Site 2023	Compost	no detc	no detc	no detc	no detc	no detc	no detc	no detc	3	1	2
Manchesterr Site 2024	Compost	no detc	no detc	no detc	no detc	no detc	no detc	no detc	1	2	9
Manchester site 2022	Soil Blend	no detc	no detc	1	no detc	no detc	no detc	no detc	2	4	15
Manchester site 2023	Raw Loam	no detc	no detc	no detc	no detc	no detc	no detc	no detc	no detc	no detc	1
Groton site 2022	Compost	no detc	no detc	no detc	no detc	1	no detc	no detc	3	7	34
Groton site 2023	Compost	no detc	no detc	no detc	no detc	no detc	no detc	no detc	no detc	1	6
Groton site 2024	Compost	no detc	no detc	no detc	no detc	no detc	no detc	no detc	3	5	16
Framingham 2022	Compost	no detc	no detc	3	no detc	no detc	2	no detc	3	9	11
Framingham 2023	Compost	no detc	no detc	2	no detc	no detc	no detc	2	2	2	15
Framingham 2024	Compost	no detc	no detc	2	no detc	no detc	no detc	no detc	2	no detc	11
Farm 1 soil with long term Black Earth Compost use 2022	Soil	no detc	no detc	0.5	no detc	no detc	no detc	no detc	no detc	1	1
Farm 2 soil with long term Black Earth Compost use 2023	Soil	no detc	no detc	no detc	no detc	no detc	no detc	no detc	no detc	no detc	no detc

Table 3	BACKGROUND LEVELS										
	no data = not analyzed for this PFAS; measured in ng/g; dry weight basis (parts per billion)										
Vermont State Soil Background	Soil	0.19	0.12	0.39	0.16	0.68	0.095	no data	no data	no data	0.23
Maine State Soil Background	Soil	0.085	min	0.394	0.145	0.275	0.078	no data	0.137	0.098	0.219
Maine State Soil Background (urban)	Soil	no data	no data	no data	min	1.17	0.094	no data	no data	no data	no data
US Household Dust (2001)	Dust	50	46	142	8	201	7	no data	no data	no data	54

Table 4	PFAS IN THE NEWS										
	no data = not analyzed for this PFAS; measured in ng/g; dry weight basis (parts per billion)										
(Max concentration) Contaminated Soils - Fairfield Ctr, ME	Soil	no data	no data	64	62	1,020	134	no data	no data	no data	no data
Mass Natural Compost - Westminster, MA	Compost	5	0.3	13	4	26	9	no data	no data	no data	12
(Max concentration) Mass Natural Compost - Westminster, MA	Compost	7	0.5	26	9	62	18	no data	no data	no data	33

Table 5	PFAS IN HUMANS										
	no data = not analyzed for this PFAS; measured in ug/L (parts per billion)										
US population 1999-2000	Blood	no data	2.13	5.21	0.551	30.40	no data	no data	no data	no data	no data
US population 2017-2018	Blood	no data	1.08	1.42	0.411	4.25	0.193	no data	no data	no data	no data

Notes:

no detc' does not mean no PFAS, it just means it was not detected above the test's threshold
All data based on median levels unless otherwise noted

no std = no standard

no detc = below limit of detection (not detected)

no data = Not Tested

min = detected on less than 10% of samples (only applicable in background level testing)

* Black Earth Compost was analyzed for 25 other PFAS and does not contain the following: PFBS, F53B Major, F53B Minor, ADONA, HFPO-DA, 8:2FTS A, PFDA, PFDoA, PFEEsA, PFHpS, N-EtFOSAA, N-MeFOSAA, PFTA, PFTrDA, 4:2FTS A, PFDS, FOSA, PFNS, FHxSA, FBsA, PFMPA, 6:2 FTS A, PFPeS, PFUnA, nor NFDHA.

VT soil background levels from Zhu et al. 2019. *PFAS Background in Vermont Shallow Soils*

ME soil background levels from Sanborn Head. 2022. *Background levels of PFAS and PAHs in Maine Shallow Soils; study report.*

US household dust levels from Strynar and Lindstrom. 2008. *Perfluorinated compounds in house dust from Ohio and North Carolina, USA.*

Contaminated soils in Maine from Maine Department of Environmental Protection testing results summary

Mass Natural compost results from Tighe&Bond report to Massachusetts Department of Environmental Protection, September 16, 2002

Black Earth testing results from BE sampling utilized Pace Analytical labs

Blood serum levels from US Center for Disease Control (CDC). *National Report on Human Exposure to Environmental Chemicals*

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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:

M2-6:2FTS
24B0532-04[Water Blank]

SOP-466 PFAS

Qualifications:

MS-12
Matrix spike recovery and matrix spike duplicate recovery outside of control limits. Possibility of sample matrix effects that lead to a high bias for reported result or non-homogeneous sample aliquots cannot be eliminated.

Analyte & Samples(s) Qualified:

Perfluoropentanoic acid (PFPeA)
B365359-MS1, B365359-MSD1

MS-22
Either matrix spike or MS duplicate is outside of control limits, but the other is within limits. RPD between the two MS/MSD results is within method specified criteria.

Analyte & Samples(s) Qualified:

Perfluorohexanoic acid (PFHxA)
24B0532-01[Framingham], B365359-MSD1

PF-18
Re-analysis confirmed Extracted Internal Standard failure due to matrix effects.

Analyte & Samples(s) Qualified:

M2-6:2FTS
24B0532-01[Framingham], B365359-MS1, B365359-MSD1

M2-8:2FTS
24B0532-01[Framingham], B365359-MS1, B365359-MSD1

PF-20
Quantifying ion signal to noise ratio is <10. Detection is suspect.

Analyte & Samples(s) Qualified:

Perfluoropentanoic acid (PFPeA)
24B0532-02[Manchester]

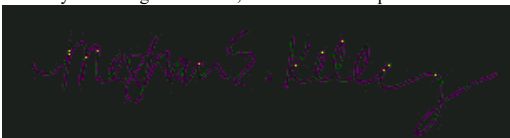
S-29
Extracted Internal Standard is outside of control limits.

Analyte & Samples(s) Qualified:

M2-6:2FTS
B365359-BS1

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:

Sample Description:

Work Order: 24B0532

Date Received: 2/5/2024

Field Sample #: Framingham

Sampled: 2/5/2024 00:00

Sample ID: 24B0532-01

Sample Matrix: Soil

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	2.2	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
Perfluorobutanesulfonic acid (PFBS)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
Perfluoropentanoic acid (PFPeA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
Perfluorohexanoic acid (PFHxA)	11	1.1	µg/kg dry	1	MS-22	SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
11Cl-PF3OUdS (F53B Major)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
9Cl-PF3ONS (F53B Minor)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
Perfluorodecanoic acid (PFDA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
Perfluorododecanoic acid (PFDoA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
Perfluoro(2-ethoxyethane)sulfonic acid (PFEEA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
Perfluoroheptanesulfonic acid (PFHpS)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
N-EtFOSAA (NEtFOSAA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
N-MeFOSAA (NMeFOSAA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
Perfluorotetradecanoic acid (PFTA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
Perfluorotridecanoic acid (PFTTrDA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
Perfluorodecanesulfonic acid (PFDS)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
Perfluorooctanesulfonamide (FOSA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
Perfluorononanesulfonic acid (PFNS)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
Perfluoro-1-butanefulfonamide (FBFA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
Perfluorohexanesulfonic acid (PFHxS)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
Perfluoropentanesulfonic acid (PFPeS)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
Perfluoroundecanoic acid (PFUnA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
Perfluoroheptanoic acid (PFHpA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
Perfluorooctanoic acid (PFOA)	1.5	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
Perfluorooctanesulfonic acid (PFOS)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW
Perfluorononanoic acid (PFNA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:23	QNW

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Project Location:

Sample Description:

Work Order: 24B0532

Date Received: 2/5/2024

Field Sample #: Framingham

Sampled: 2/5/2024 00:00

Sample ID: 24B0532-01

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	37.8		% Wt	1		SM 2540G	2/12/24	2/12/24 18:37	AGG

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

Project Location:

Sample Description:

Work Order: 24B0532

Date Received: 2/5/2024

Field Sample #: Manchester

Sampled: 2/5/2024 00:00

Sample ID: 24B0532-02

Sample Matrix: Soil

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	1.4	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
Perfluorobutanesulfonic acid (PFBS)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
Perfluoropentanoic acid (PFPeA)	1.8	0.97	µg/kg dry	1	PF-20	SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
Perfluorohexanoic acid (PFHxA)	9.4	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
11Cl-PF3OUdS (F53B Major)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
9Cl-PF3ONS (F53B Minor)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
Perfluorodecanoic acid (PFDA)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
Perfluorododecanoic acid (PFDoA)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
Perfluoro(2-ethoxyethane)sulfonic acid (PFEEA)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
Perfluoroheptanesulfonic acid (PFHpS)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
N-EtFOSAA (NEtFOSAA)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
N-MeFOSAA (NMeFOSAA)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
Perfluorotetradecanoic acid (PFTA)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
Perfluorotridecanoic acid (PFTrDA)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
Perfluorodecanesulfonic acid (PFDS)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
Perfluorooctanesulfonamide (FOSA)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
Perfluorononanesulfonic acid (PFNS)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
Perfluoro-1-butanefulfonamide (FBFA)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
Perfluorohexanesulfonic acid (PFHxS)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
Perfluoropentanesulfonic acid (PFPeS)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
Perfluoroundecanoic acid (PFUnA)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
Perfluoroheptanoic acid (PFHpA)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
Perfluorooctanoic acid (PFOA)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
Perfluorooctanesulfonic acid (PFOS)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW
Perfluorononanoic acid (PFNA)	ND	0.97	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:30	QNW

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

Project Location:

Sample Description:

Work Order: 24B0532

Date Received: 2/5/2024

Field Sample #: Manchester

Sampled: 2/5/2024 00:00

Sample ID: 24B0532-02

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	44.5		% Wt	1		SM 2540G	2/12/24	2/12/24 18:37	AGG

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

Project Location:

Sample Description:

Work Order: 24B0532

Date Received: 2/5/2024

Field Sample #: Groton

Sampled: 2/5/2024 00:00

Sample ID: 24B0532-03

Sample Matrix: Soil

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	3.0	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
Perfluorobutanesulfonic acid (PFBS)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
Perfluoropentanoic acid (PFPeA)	5.3	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
Perfluorohexanoic acid (PFHxA)	16	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
11Cl-PF3OUdS (F53B Major)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
9Cl-PF3ONS (F53B Minor)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
Perfluorodecanoic acid (PFDA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
Perfluorododecanoic acid (PFDoA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
Perfluoro(2-ethoxyethane)sulfonic acid (PFEEA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
Perfluoroheptanesulfonic acid (PFHpS)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
N-EtFOSAA (NEtFOSAA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
N-MeFOSAA (NMeFOSAA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
Perfluorotetradecanoic acid (PFTA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
Perfluorotridecanoic acid (PFTrDA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
Perfluorodecanesulfonic acid (PFDS)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
Perfluorooctanesulfonamide (FOSA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
Perfluorononanesulfonic acid (PFNS)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
Perfluoro-1-butanefulfonamide (FBFA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
Perfluorohexanesulfonic acid (PFHxS)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
Perfluoropentanesulfonic acid (PFPeS)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
Perfluoroundecanoic acid (PFUnA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
Perfluoroheptanoic acid (PFHpA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
Perfluorooctanoic acid (PFOA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
Perfluorooctanesulfonic acid (PFOS)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW
Perfluorononanoic acid (PFNA)	ND	1.1	µg/kg dry	1		SOP-466 PFAS	2/8/24	2/13/24 15:37	QNW

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

Project Location:

Sample Description:

Work Order: 24B0532

Date Received: 2/5/2024

Field Sample #: Groton

Sampled: 2/5/2024 00:00

Sample ID: 24B0532-03

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	38.5		% Wt	1		SM 2540G	2/12/24	2/12/24 18:37	AGG

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

Project Location:

Sample Description:

Work Order: 24B0532

Date Received: 2/5/2024

Field Sample #: Water Blank

Sampled: 2/5/2024 00:00

Sample ID: 24B0532-04

Sample Matrix: Field Blank

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	2/13/24	2/14/24 16:40	QNW
Perfluorobutanesulfonic acid (PFBS)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
Perfluoropentanoic acid (PFPeA)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
Perfluorohexanoic acid (PFHxA)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
11Cl-PF3OUdS (F53B Major)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
9Cl-PF3ONS (F53B Minor)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
Perfluorodecanoic acid (PFDA)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
Perfluorododecanoic acid (PFDoA)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
Perfluoro(2-ethoxyethane)sulfonic acid (PFEEA)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
Perfluoroheptanesulfonic acid (PFHpS)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
N-EtFOSAA (NEtFOSAA)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
N-MeFOSAA (NMeFOSAA)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
Perfluorotetradecanoic acid (PFTA)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
Perfluorotridecanoic acid (PFTTrDA)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
Perfluorodecanesulfonic acid (PFDS)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
Perfluorooctanesulfonamide (FOSA)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
Perfluorononanesulfonic acid (PFNS)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
Perfluoro-1-butanefulfonamide (FBFA)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
Perfluorohexanesulfonic acid (PFHxS)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
Perfluoropentanesulfonic acid (PFPeS)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
Perfluoroundecanoic acid (PFUnA)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
Perfluoroheptanoic acid (PFHpA)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
Perfluorooctanoic acid (PFOA)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
Perfluorooctanesulfonic acid (PFOS)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW
Perfluorononanoic acid (PFNA)	ND	1.9	ng/L	1		SOP-454 PFAS	2/13/24	2/14/24 16:40	QNW

Sample Extraction Data**Prep Method:**% Solids **Analytical Method:**SM 2540G

Lab Number [Field ID]	Batch	Date
24B0532-01 [Framingham]	B365503	02/12/24
24B0532-02 [Manchester]	B365503	02/12/24
24B0532-03 [Groton]	B365503	02/12/24

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

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
24B0532-04 [Water Blank]	B365559	270	1.00	02/13/24

Prep Method:SOP 466-PFAAS **Analytical Method:**SOP-466 PFAS

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
24B0532-01 [Framingham]	B365359	5.93	5.00	02/08/24
24B0532-02 [Manchester]	B365359	5.76	5.00	02/08/24
24B0532-03 [Groton]	B365359	5.68	5.00	02/08/24

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 B365359 - SOP 466-PFAAS
Blank (B365359-BLK1)

Prepared: 02/08/24 Analyzed: 02/13/24

Perfluorobutanoic acid (PFBA)	ND	0.43	µg/kg wet
Perfluorobutanesulfonic acid (PFBS)	ND	0.43	µg/kg wet
Perfluoropentanoic acid (PFPeA)	ND	0.43	µg/kg wet
Perfluorohexanoic acid (PFHxA)	ND	0.43	µg/kg wet
11Cl-PF3OUdS (F53B Major)	ND	0.43	µg/kg wet
9Cl-PF3ONS (F53B Minor)	ND	0.43	µg/kg wet
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	0.43	µg/kg wet
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	0.43	µg/kg wet
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	0.43	µg/kg wet
Perfluorodecanoic acid (PFDA)	ND	0.43	µg/kg wet
Perfluorododecanoic acid (PFDoA)	ND	0.43	µg/kg wet
Perfluoro(2-ethoxyethane)sulfonic acid (PFEEESA)	ND	0.43	µg/kg wet
Perfluoroheptanesulfonic acid (PFHpS)	ND	0.43	µg/kg wet
N-EtFOSAA (NEtFOSAA)	ND	0.43	µg/kg wet
N-MeFOSAA (NMeFOSAA)	ND	0.43	µg/kg wet
Perfluorotetradecanoic acid (PFTA)	ND	0.43	µg/kg wet
Perfluorotridecanoic acid (PFTrDA)	ND	0.43	µg/kg wet
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	0.43	µg/kg wet
Perfluorodecanesulfonic acid (PFDS)	ND	0.43	µg/kg wet
Perfluorooctanesulfonamide (FOSA)	ND	0.43	µg/kg wet
Perfluorononanesulfonic acid (PFNS)	ND	0.43	µg/kg wet
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	0.43	µg/kg wet
Perfluoro-1-butanesulfonamide (FBSA)	ND	0.43	µg/kg wet
Perfluorohexanesulfonic acid (PFHxS)	ND	0.43	µg/kg wet
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	0.43	µg/kg wet
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	0.43	µg/kg wet
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	0.43	µg/kg wet
Perfluoropentanesulfonic acid (PFPeS)	ND	0.43	µg/kg wet
Perfluoroundecanoic acid (PFUnA)	ND	0.43	µg/kg wet
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	0.43	µg/kg wet
Perfluoroheptanoic acid (PFHpA)	ND	0.43	µg/kg wet
Perfluorooctanoic acid (PFOA)	ND	0.43	µg/kg wet
Perfluorooctanesulfonic acid (PFOS)	ND	0.43	µg/kg wet
Perfluorononanoic acid (PFNA)	ND	0.43	µg/kg wet

LCS (B365359-BS1)

Prepared: 02/08/24 Analyzed: 02/13/24

Perfluorobutanoic acid (PFBA)	1.80	0.42	µg/kg wet	2.10	85.5	71-135
Perfluorobutanesulfonic acid (PFBS)	1.53	0.42	µg/kg wet	1.86	82.3	72-128
Perfluoropentanoic acid (PFPeA)	1.86	0.42	µg/kg wet	2.10	88.6	69-132
Perfluorohexanoic acid (PFHxA)	1.89	0.42	µg/kg wet	2.10	89.9	70-132
11Cl-PF3OUdS (F53B Major)	1.65	0.42	µg/kg wet	1.98	83.4	40.1-127
9Cl-PF3ONS (F53B Minor)	1.40	0.42	µg/kg wet	1.96	71.4	42.3-128
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	1.64	0.42	µg/kg wet	1.98	82.7	50-150
Hexafluoropropylene oxide dimer acid (HFPO-DA)	1.91	0.42	µg/kg wet	2.10	90.9	36.8-134
8:2 Fluorotelomersulfonic acid (8:2FTS A)	1.74	0.42	µg/kg wet	2.02	86.3	65-137
Perfluorodecanoic acid (PFDA)	1.89	0.42	µg/kg wet	2.10	89.7	69-133
Perfluorododecanoic acid (PFDoA)	1.76	0.42	µg/kg wet	2.10	83.6	69-135
Perfluoro(2-ethoxyethane)sulfonic acid (PFEEESA)	1.74	0.42	µg/kg wet	1.87	92.8	42.2-136

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 B365359 - SOP 466-PFAAS
LCS (B365359-BS1)

Prepared: 02/08/24 Analyzed: 02/13/24

Perfluoroheptanesulfonic acid (PFHpS)	1.48	0.42	µg/kg wet	2.01		73.6	70-132			
N-EtFOSAA (NEtFOSAA)	1.95	0.42	µg/kg wet	2.10		92.9	61-139			
N-MeFOSAA (NMeFOSAA)	2.14	0.42	µg/kg wet	2.10		102	63-144			
Perfluorotetradecanoic acid (PFTA)	1.56	0.42	µg/kg wet	2.10		74.3	69-133			
Perfluorotridecanoic acid (PFTTrDA)	1.87	0.42	µg/kg wet	2.10		88.9	66-139			
4:2 Fluorotelomersulfonic acid (4:2FTS A)	1.78	0.42	µg/kg wet	1.97		90.3	62-145			
Perfluorodecanesulfonic acid (PFDS)	1.56	0.42	µg/kg wet	2.03		76.8	59-134			
Perfluorooctanesulfonamide (FOSA)	1.89	0.42	µg/kg wet	2.10		89.7	67-137			
Perfluorononanesulfonic acid (PFNS)	1.56	0.42	µg/kg wet	2.02		77.4	69-125			
Perfluoro-1-hexanesulfonamide (FHxSA)	1.59	0.42	µg/kg wet	2.10		75.8	34.4-146			
Perfluoro-1-butanefulfonamide (FBSA)	1.73	0.42	µg/kg wet	2.10		82.1	41.3-135			
Perfluorohexanesulfonic acid (PFHxS)	1.65	0.42	µg/kg wet	1.93		85.7	67-130			
Perfluoro-4-oxapentanoic acid (PFMPA)	1.82	0.42	µg/kg wet	2.10		86.5	38.9-139			
Perfluoro-5-oxahexanoic acid (PFMBA)	1.84	0.42	µg/kg wet	2.10		87.4	40.3-140			
6:2 Fluorotelomersulfonic acid (6:2FTS A)	1.86	0.42	µg/kg wet	2.00		93.1	64-140			
Perfluoropentanesulfonic acid (PFPeS)	1.72	0.42	µg/kg wet	1.98		87.1	73-123			
Perfluoroundecanoic acid (PFUnA)	1.61	0.42	µg/kg wet	2.10		76.5	64-136			
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	1.90	0.42	µg/kg wet	2.10		90.2	41.8-145			
Perfluoroheptanoic acid (PFHpA)	1.61	0.42	µg/kg wet	2.10		76.8	71-131			
Perfluorooctanoic acid (PFOA)	1.68	0.42	µg/kg wet	2.10		79.9	69-133			
Perfluorooctanesulfonic acid (PFOS)	1.52	0.42	µg/kg wet	1.94		78.4	68-136			
Perfluorononanoic acid (PFNA)	1.77	0.42	µg/kg wet	2.10		84.2	72-129			

Matrix Spike (B365359-MS1)
Source: 24B0532-01

Prepared: 02/08/24 Analyzed: 02/13/24

Perfluorobutanoic acid (PFBA)	7.62	1.2	µg/kg dry	5.82	2.20	93.0	71-135			
Perfluorobutanesulfonic acid (PFBS)	4.68	1.2	µg/kg dry	5.15	ND	91.0	72-128			
Perfluoropentanoic acid (PFPeA)	8.95	1.2	µg/kg dry	5.82	ND	154 *	69-132			MS-12
Perfluorohexanoic acid (PFHxA)	15.9	1.2	µg/kg dry	5.82	10.9	85.8	70-132			
11Cl-PF3OUdS (F53B Major)	5.51	1.2	µg/kg dry	5.49	ND	101	55.9-127			
9Cl-PF3ONS (F53B Minor)	4.70	1.2	µg/kg dry	5.43	ND	86.6	65.8-121			
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	4.91	1.2	µg/kg dry	5.49	ND	89.4	50-150			
Hexafluoropropylene oxide dimer acid (HFPO-DA)	6.25	1.2	µg/kg dry	5.82	ND	107	43.9-138			
8:2 Fluorotelomersulfonic acid (8:2FTS A)	5.09	1.2	µg/kg dry	5.59	ND	91.0	65-137			
Perfluorodecanoic acid (PFDA)	6.39	1.2	µg/kg dry	5.82	0.809	95.8	69-133			
Perfluorododecanoic acid (PFDoA)	5.50	1.2	µg/kg dry	5.82	ND	94.4	69-135			
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	5.20	1.2	µg/kg dry	5.18	ND	100	65.5-133			
Perfluoroheptanesulfonic acid (PFHpS)	4.88	1.2	µg/kg dry	5.57	ND	87.7	70-132			
N-EtFOSAA (NEtFOSAA)	6.48	1.2	µg/kg dry	5.82	ND	111	61-139			
N-MeFOSAA (NMeFOSAA)	6.35	1.2	µg/kg dry	5.82	ND	109	63-144			
Perfluorotetradecanoic acid (PFTA)	4.82	1.2	µg/kg dry	5.82	ND	82.7	69-133			
Perfluorotridecanoic acid (PFTTrDA)	4.64	1.2	µg/kg dry	5.82	ND	79.7	66-139			
4:2 Fluorotelomersulfonic acid (4:2FTS A)	5.28	1.2	µg/kg dry	5.45	ND	96.8	62-145			
Perfluorodecanesulfonic acid (PFDS)	5.11	1.2	µg/kg dry	5.61	ND	91.0	59-134			
Perfluorooctanesulfonamide (FOSA)	5.87	1.2	µg/kg dry	5.82	ND	101	67-137			
Perfluorononanesulfonic acid (PFNS)	5.07	1.2	µg/kg dry	5.59	ND	90.7	69-125			
Perfluoro-1-hexanesulfonamide (FHxSA)	4.70	1.2	µg/kg dry	5.82	ND	80.7	43.7-166			
Perfluoro-1-butanefulfonamide (FBSA)	5.03	1.2	µg/kg dry	5.82	ND	86.4	59.6-139			
Perfluorohexanesulfonic acid (PFHxS)	5.00	1.2	µg/kg dry	5.33	ND	93.7	67-130			
Perfluoro-4-oxapentanoic acid (PFMPA)	6.36	1.2	µg/kg dry	5.82	ND	109	63.5-137			
Perfluoro-5-oxahexanoic acid (PFMBA)	5.61	1.2	µg/kg dry	5.82	ND	96.3	64.7-135			

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 B365359 - SOP 466-PFAAS

Matrix Spike (B365359-MS1)		Source: 24B0532-01		Prepared: 02/08/24 Analyzed: 02/13/24						
6:2 Fluorotelomersulfonic acid (6:2FTS A)	6.14	1.2	µg/kg dry	5.53	ND	111	64-140			
Perfluoropentanesulfonic acid (PFPeS)	5.17	1.2	µg/kg dry	5.47	ND	94.4	73-123			
Perfluoroundecanoic acid (PFUnA)	5.50	1.2	µg/kg dry	5.82	ND	94.5	64-136			
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	5.50	1.2	µg/kg dry	5.82	ND	94.5	59.8-147			
Perfluoroheptanoic acid (PFHpA)	5.46	1.2	µg/kg dry	5.82	ND	93.8	71-131			
Perfluorooctanoic acid (PFOA)	6.55	1.2	µg/kg dry	5.82	1.50	86.7	69-133			
Perfluorooctanesulfonic acid (PFOS)	5.68	1.2	µg/kg dry	5.38	ND	106	68-136			
Perfluorononanoic acid (PFNA)	6.09	1.2	µg/kg dry	5.82	ND	105	72-129			

Matrix Spike Dup (B365359-MSD1)		Source: 24B0532-01		Prepared: 02/08/24 Analyzed: 02/13/24						
Perfluorobutanoic acid (PFBA)	6.93	1.2	µg/kg dry	5.85	2.20	80.7	71-135	9.50	30	
Perfluorobutanesulfonic acid (PFBS)	4.92	1.2	µg/kg dry	5.17	ND	95.0	72-128	4.89	30	
Perfluoropentanoic acid (PFPeA)	8.93	1.2	µg/kg dry	5.85	ND	153	* 69-132	0.222	30	MS-12
Perfluorohexanoic acid (PFHxA)	14.1	1.2	µg/kg dry	5.85	10.9	54.8	* 70-132	11.9	30	MS-22
11Cl-PF3OUdS (F53B Major)	5.21	1.2	µg/kg dry	5.51	ND	94.6	55.9-127	5.58	30	
9Cl-PF3ONS (F53B Minor)	4.52	1.2	µg/kg dry	5.46	ND	82.9	65.8-121	3.85	30	
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	4.76	1.2	µg/kg dry	5.51	ND	86.2	50-150	3.12	30	
Hexafluoropropylene oxide dimer acid (HFPO-DA)	6.24	1.2	µg/kg dry	5.85	ND	107	43.9-138	0.0446	30	
8:2 Fluorotelomersulfonic acid (8:2FTS A)	5.46	1.2	µg/kg dry	5.62	ND	97.2	65-137	7.15	30	
Perfluorodecanoic acid (PFDA)	6.08	1.2	µg/kg dry	5.85	0.809	90.1	69-133	4.88	30	
Perfluorododecanoic acid (PFDoA)	5.45	1.2	µg/kg dry	5.85	ND	93.1	69-135	0.875	30	
Perfluoro(2-ethoxyethane)sulfonic acid (PFEEA)	5.43	1.2	µg/kg dry	5.21	ND	104	65.5-133	4.49	30	
Perfluoroheptanesulfonic acid (PFHpS)	4.94	1.2	µg/kg dry	5.60	ND	88.3	70-132	1.25	30	
N-EtFOSAA (NEtFOSAA)	7.07	1.2	µg/kg dry	5.85	ND	121	61-139	8.71	30	
N-MeFOSAA (NMeFOSAA)	6.20	1.2	µg/kg dry	5.85	ND	106	63-144	2.43	30	
Perfluorotetradecanoic acid (PFTA)	4.89	1.2	µg/kg dry	5.85	ND	83.5	69-133	1.46	30	
Perfluorotridecanoic acid (PFTrDA)	4.71	1.2	µg/kg dry	5.85	ND	80.5	66-139	1.52	30	
4:2 Fluorotelomersulfonic acid (4:2FTS A)	5.62	1.2	µg/kg dry	5.48	ND	103	62-145	6.29	30	
Perfluorodecanesulfonic acid (PFDS)	5.31	1.2	µg/kg dry	5.64	ND	94.0	59-134	3.77	30	
Perfluorooctanesulfonamide (FOSA)	6.06	1.2	µg/kg dry	5.85	ND	104	67-137	3.28	30	
Perfluorononanesulfonic acid (PFNS)	4.98	1.2	µg/kg dry	5.62	ND	88.6	69-125	1.79	30	
Perfluoro-1-hexanesulfonamide (FHxSA)	5.12	1.2	µg/kg dry	5.85	ND	87.4	43.7-166	8.47	30	
Perfluoro-1-butanedisulfonamide (FBSA)	5.31	1.2	µg/kg dry	5.85	ND	90.8	59.6-139	5.53	30	
Perfluorohexanesulfonic acid (PFHxS)	5.31	1.2	µg/kg dry	5.36	ND	99.1	67-130	6.08	30	
Perfluoro-4-oxapentanoic acid (PFMPA)	6.36	1.2	µg/kg dry	5.85	ND	109	63.5-137	0.0203	30	
Perfluoro-5-oxahexanoic acid (PFMBA)	6.01	1.2	µg/kg dry	5.85	ND	103	64.7-135	6.99	30	
6:2 Fluorotelomersulfonic acid (6:2FTS A)	6.33	1.2	µg/kg dry	5.56	ND	114	64-140	3.02	30	
Perfluoropentanesulfonic acid (PFPeS)	5.44	1.2	µg/kg dry	5.50	ND	98.8	73-123	5.03	30	
Perfluoroundecanoic acid (PFUnA)	5.30	1.2	µg/kg dry	5.85	ND	90.6	64-136	3.73	30	
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	5.85	1.2	µg/kg dry	5.85	ND	99.9	59.8-147	6.14	30	
Perfluoroheptanoic acid (PFHpA)	5.23	1.2	µg/kg dry	5.85	ND	89.4	71-131	4.31	30	
Perfluorooctanoic acid (PFOA)	6.69	1.2	µg/kg dry	5.85	1.50	88.7	69-133	2.20	30	
Perfluorooctanesulfonic acid (PFOS)	5.29	1.2	µg/kg dry	5.41	ND	97.8	68-136	7.12	30	
Perfluorononanoic acid (PFNA)	5.95	1.2	µg/kg dry	5.85	ND	102	72-129	2.36	30	

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 B365559 - SOP 454-PFAAS
Blank (B365559-BLK1)

Prepared: 02/13/24 Analyzed: 02/14/24

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 (PFEEESA)	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
Perfluoropentanesulfonic 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 (B365559-BS1)

Prepared: 02/13/24 Analyzed: 02/14/24

Perfluorobutanoic acid (PFBA)	8.43	1.8	ng/L	9.06	93.0	73-129
Perfluorobutanesulfonic acid (PFBS)	7.01	1.8	ng/L	8.02	87.4	72-130
Perfluoropentanoic acid (PFPeA)	8.71	1.8	ng/L	9.06	96.2	72-129
Perfluorohexanoic acid (PFHxA)	8.67	1.8	ng/L	9.06	95.7	72-129
11Cl-PF3OUdS (F53B Major)	9.14	1.8	ng/L	8.53	107	43.3-138
9Cl-PF3ONS (F53B Minor)	7.32	1.8	ng/L	8.44	86.7	52-140
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	8.22	1.8	ng/L	8.53	96.4	53.7-152
Hexafluoropropylene oxide dimer acid (HFPO-DA)	9.79	1.8	ng/L	9.06	108	42.1-145
8:2 Fluorotelomersulfonic acid (8:2FTS A)	7.73	1.8	ng/L	8.70	88.9	67-138
Perfluorodecanoic acid (PFDA)	8.76	1.8	ng/L	9.06	96.7	71-129
Perfluorododecanoic acid (PFDoA)	7.84	1.8	ng/L	9.06	86.6	72-134
Perfluoro(2-ethoxyethane)sulfonic acid (PFEEESA)	8.97	1.8	ng/L	8.06	111	52.7-147

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 B365559 - SOP 454-PFAAS
LCS (B365559-BS1)

Prepared: 02/13/24 Analyzed: 02/14/24

Perfluoroheptanesulfonic acid (PFHpS)	7.51	1.8	ng/L	8.65		86.8	69-134			
N-EtFOSAA (NEtFOSAA)	9.35	1.8	ng/L	9.06		103	61-135			
N-MeFOSAA (NMeFOSAA)	10.3	1.8	ng/L	9.06		113	65-136			
Perfluorotetradecanoic acid (PFTA)	7.32	1.8	ng/L	9.06		80.8	71-132			
Perfluorotridecanoic acid (PFTTrDA)	8.48	1.8	ng/L	9.06		93.6	65-144			
4:2 Fluorotelomersulfonic acid (4:2FTS A)	8.29	1.8	ng/L	8.47		97.9	63-143			
Perfluorodecanesulfonic acid (PFDS)	7.48	1.8	ng/L	8.74		85.6	53-142			
Perfluorooctanesulfonamide (FOSA)	8.94	1.8	ng/L	9.06		98.6	67-137			
Perfluorononanesulfonic acid (PFNS)	7.38	1.8	ng/L	8.70		84.9	69-127			
Perfluoro-1-hexanesulfonamide (FHxSA)	7.30	1.8	ng/L	9.06		80.6	50-150			
Perfluoro-1-butanefulfonamide (FBSA)	7.27	1.8	ng/L	9.06		80.3	50-150			
Perfluorohexanesulfonic acid (PFHxS)	7.87	1.8	ng/L	8.29		94.9	68-131			
Perfluoro-4-oxapentanoic acid (PFMPA)	8.61	1.8	ng/L	9.06		95.0	53.8-150			
Perfluoro-5-oxahexanoic acid (PFMBA)	8.95	1.8	ng/L	9.06		98.8	54.5-152			
6:2 Fluorotelomersulfonic acid (6:2FTS A)	8.62	1.8	ng/L	8.61		100	64-140			
Perfluoropentanesulfonic acid (PFPeS)	8.03	1.8	ng/L	8.52		94.3	71-127			
Perfluoroundecanoic acid (PFUnA)	7.83	1.8	ng/L	9.06		86.4	69-133			
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	7.99	1.8	ng/L	9.06		88.2	50.5-159			
Perfluoroheptanoic acid (PFHpA)	7.59	1.8	ng/L	9.06		83.8	72-130			
Perfluorooctanoic acid (PFOA)	7.95	1.8	ng/L	9.06		87.8	71-133			
Perfluorooctanesulfonic acid (PFOS)	7.85	1.8	ng/L	8.38		93.7	65-140			
Perfluorononanoic acid (PFNA)	8.45	1.8	ng/L	9.06		93.2	69-130			

LCS Dup (B365559-BSD1)

Prepared: 02/13/24 Analyzed: 02/14/24

Perfluorobutanoic acid (PFBA)	8.72	1.9	ng/L	9.36		93.2	73-129	3.44	30	
Perfluorobutanesulfonic acid (PFBS)	7.33	1.9	ng/L	8.28		88.5	72-130	4.50	30	
Perfluoropentanoic acid (PFPeA)	9.29	1.9	ng/L	9.36		99.2	72-129	6.41	30	
Perfluorohexanoic acid (PFHxA)	9.26	1.9	ng/L	9.36		98.9	72-129	6.60	30	
11Cl-PF3OUdS (F53B Major)	9.19	1.9	ng/L	8.82		104	43.3-138	0.545	30	
9Cl-PF3ONS (F53B Minor)	7.55	1.9	ng/L	8.72		86.6	52-140	3.07	30	
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	8.51	1.9	ng/L	8.82		96.5	53.7-152	3.43	30	
Hexafluoropropylene oxide dimer acid (HFPO-DA)	10.1	1.9	ng/L	9.36		108	42.1-145	2.82	30	
8:2 Fluorotelomersulfonic acid (8:2FTS A)	8.02	1.9	ng/L	8.99		89.3	67-138	3.70	30	
Perfluorodecanoic acid (PFDA)	9.28	1.9	ng/L	9.36		99.1	71-129	5.69	30	
Perfluorododecanoic acid (PFDoA)	9.05	1.9	ng/L	9.36		96.6	72-134	14.3	30	
Perfluoro(2-ethoxyethane)sulfonic acid (PFEEA)	9.60	1.9	ng/L	8.33		115	52.7-147	6.78	30	
Perfluoroheptanesulfonic acid (PFHpS)	7.97	1.9	ng/L	8.94		89.1	69-134	5.94	30	
N-EtFOSAA (NEtFOSAA)	10.5	1.9	ng/L	9.36		112	61-135	11.2	30	
N-MeFOSAA (NMeFOSAA)	11.1	1.9	ng/L	9.36		119	65-136	7.79	30	
Perfluorotetradecanoic acid (PFTA)	7.94	1.9	ng/L	9.36		84.8	71-132	8.07	30	
Perfluorotridecanoic acid (PFTTrDA)	8.91	1.9	ng/L	9.36		95.2	65-144	4.87	30	
4:2 Fluorotelomersulfonic acid (4:2FTS A)	8.35	1.9	ng/L	8.75		95.4	63-143	0.682	30	
Perfluorodecanesulfonic acid (PFDS)	7.96	1.9	ng/L	9.03		88.2	53-142	6.22	30	
Perfluorooctanesulfonamide (FOSA)	9.23	1.9	ng/L	9.36		98.6	67-137	3.22	30	
Perfluorononanesulfonic acid (PFNS)	7.58	1.9	ng/L	8.99		84.4	69-127	2.63	30	
Perfluoro-1-hexanesulfonamide (FHxSA)	7.97	1.9	ng/L	9.36		85.1	50-150	8.70	30	
Perfluoro-1-butanefulfonamide (FBSA)	8.21	1.9	ng/L	9.36		87.8	50-150	12.2	30	
Perfluorohexanesulfonic acid (PFHxS)	8.11	1.9	ng/L	8.56		94.7	68-131	3.06	30	
Perfluoro-4-oxapentanoic acid (PFMPA)	9.09	1.9	ng/L	9.36		97.1	53.8-150	5.46	30	
Perfluoro-5-oxahexanoic acid (PFMBA)	9.43	1.9	ng/L	9.36		101	54.5-152	5.27	30	

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 B365559 - SOP 454-PFAAS
LCS Dup (B365559-BSD1)

Prepared: 02/13/24 Analyzed: 02/14/24

6:2 Fluorotelomersulfonic acid (6:2FTS A)	8.95	1.9	ng/L	8.89		101	64-140	3.67	30	
Perfluoropentanesulfonic acid (PFPeS)	8.27	1.9	ng/L	8.80		93.9	71-127	2.92	30	
Perfluoroundecanoic acid (PFUnA)	8.82	1.9	ng/L	9.36		94.3	69-133	11.9	30	
Nonafluoro-3,6-dioxahexanoic acid (NFDHA)	8.83	1.9	ng/L	9.36		94.3	50.5-159	9.96	30	
Perfluoroheptanoic acid (PFHpA)	7.72	1.9	ng/L	9.36		82.4	72-130	1.65	30	
Perfluorooctanoic acid (PFOA)	9.24	1.9	ng/L	9.36		98.7	71-133	15.0	30	
Perfluorooctanesulfonic acid (PFOS)	7.85	1.9	ng/L	8.66		90.7	65-140	0.0279	30	
Perfluorononanoic acid (PFNA)	8.73	1.9	ng/L	9.36		93.3	69-130	3.33	30	

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.
MS-12	Matrix spike recovery and matrix spike duplicate recovery outside of control limits. Possibility of sample matrix effects that lead to a high bias for reported result or non-homogeneous sample aliquots cannot be eliminated.
MS-22	Either matrix spike or MS duplicate is outside of control limits, but the other is within limits. RPD between the two MS/MSD 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-18	Re-analysis confirmed Extracted Internal Standard failure due to matrix effects.
PF-20	Quantifying ion signal to noise ratio is <10. Detection is suspect.
S-29	Extracted Internal Standard is outside of control limits.

INTERNAL STANDARD AREA AND RT SUMMARY
SOP-466 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Framingham (24B0532-01) Lab File ID: 24B0532-01.d Analyzed: 02/13/24 15:23									
M8FOSA	711386.4	3.686733	991,192.00	3.686733	72	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	420016.8	2.304767	385,875.00	2.29655	109	50 - 150	0.0082	+/-0.50	
M2PFTA	1883897	4.036417	2,689,617.00	4.044517	70	50 - 150	-0.0081	+/-0.50	
M2-8:2FTS	470976.7	3.509267	267,977.00	3.50925	176	50 - 150	0.0000	+/-0.50	*
MPFBA	752722.6	0.82605	1,178,352.00	0.8177333	64	50 - 150	0.0083	+/-0.50	
M3HFPO-DA	244680.5	2.604383	333,780.00	2.604383	73	50 - 150	0.0000	+/-0.50	
M6PFDA	1469486	3.509767	1,796,499.00	3.50975	82	50 - 150	0.0000	+/-0.50	
M3PFBS	377976.5	1.680517	475,526.00	1.6805	79	50 - 150	0.0000	+/-0.50	
M7PFUnA	1776072	3.6602	2,131,064.00	3.660183	83	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	509491.8	3.152067	284,071.00	3.160033	179	50 - 150	-0.0080	+/-0.50	*
M5PFPeA	808546.4	1.499767	1,059,518.00	1.499767	76	50 - 150	0.0000	+/-0.50	
M5PFHxA	1572857	2.389433	1,970,798.00	2.389433	80	50 - 150	0.0000	+/-0.50	
M3PFHxS	281737.3	2.93475	371,360.00	2.93475	76	50 - 150	0.0000	+/-0.50	
M4PFHpA	1740804	2.903017	2,280,089.00	2.903	76	50 - 150	0.0000	+/-0.50	
M8PFOA	1789561	3.16855	2,296,815.00	3.16855	78	50 - 150	0.0000	+/-0.50	
M8PFOS	234072.6	3.35045	306,380.00	3.35045	76	50 - 150	0.0000	+/-0.50	
M9PFNA	1479281	3.351433	1,724,903.00	3.351417	86	50 - 150	0.0000	+/-0.50	
MPFDoA	1647348	3.795217	2,335,946.00	3.803233	71	50 - 150	-0.0080	+/-0.50	
D5-NEtFOSAA	550811.9	3.667667	593,742.00	3.66765	93	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	636128.8	3.588083	641,092.00	3.588083	99	50 - 150	0.0000	+/-0.50	

INTERNAL STANDARD AREA AND RT SUMMARY
SOP-466 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Manchester (24B0532-02) Lab File ID: 24B0532-02.d Analyzed: 02/13/24 15:30									
M8FOSA	844893.4	3.686733	991,192.00	3.686733	85	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	318285	2.304767	385,875.00	2.29655	82	50 - 150	0.0082	+/-0.50	
M2PFTA	2567682	4.044533	2,689,617.00	4.044517	95	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	325144.1	3.517217	267,977.00	3.50925	121	50 - 150	0.0080	+/-0.50	
MPFBA	838423.8	0.82605	1,178,352.00	0.8177333	71	50 - 150	0.0083	+/-0.50	
M3HFPO-DA	327427.7	2.604383	333,780.00	2.604383	98	50 - 150	0.0000	+/-0.50	
M6PFDA	1721133	3.509767	1,796,499.00	3.50975	96	50 - 150	0.0000	+/-0.50	
M3PFBS	400650.7	1.680517	475,526.00	1.6805	84	50 - 150	0.0000	+/-0.50	
M7PFUnA	2085024	3.660183	2,131,064.00	3.660183	98	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	415283.5	3.16005	284,071.00	3.160033	146	50 - 150	0.0000	+/-0.50	
M5PFPeA	851917.4	1.499767	1,059,518.00	1.499767	80	50 - 150	0.0000	+/-0.50	
M5PFHxA	1658673	2.389433	1,970,798.00	2.389433	84	50 - 150	0.0000	+/-0.50	
M3PFHxS	313755.6	2.93475	371,360.00	2.93475	84	50 - 150	0.0000	+/-0.50	
M4PFHpA	1858650	2.903017	2,280,089.00	2.903	82	50 - 150	0.0000	+/-0.50	
M8PFOA	2079932	3.16855	2,296,815.00	3.16855	91	50 - 150	0.0000	+/-0.50	
M8PFOS	273824.4	3.35045	306,380.00	3.35045	89	50 - 150	0.0000	+/-0.50	
M9PFNA	1635473	3.351433	1,724,903.00	3.351417	95	50 - 150	0.0000	+/-0.50	
MPFDoA	2025638	3.80325	2,335,946.00	3.803233	87	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	609692.5	3.667667	593,742.00	3.66765	103	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	697042	3.588083	641,092.00	3.588083	109	50 - 150	0.0000	+/-0.50	

INTERNAL STANDARD AREA AND RT SUMMARY
SOP-466 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Groton (24B0532-03)		Lab File ID: 24B0532-03.d				Analyzed: 02/13/24 15:37			
M8FOSA	772938.6	3.686733	991,192.00	3.686733	78	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	287439.3	2.304767	385,875.00	2.29655	74	50 - 150	0.0082	+/-0.50	
M2PFTA	2140617	4.036417	2,689,617.00	4.044517	80	50 - 150	-0.0081	+/-0.50	
M2-8:2FTS	276674.7	3.509267	267,977.00	3.50925	103	50 - 150	0.0000	+/-0.50	
MPFBA	725010.6	0.82605	1,178,352.00	0.8177333	62	50 - 150	0.0083	+/-0.50	
M3HFPO-DA	245861	2.604383	333,780.00	2.604383	74	50 - 150	0.0000	+/-0.50	
M6PFDA	1533118	3.509767	1,796,499.00	3.50975	85	50 - 150	0.0000	+/-0.50	
M3PFBS	362436.8	1.680517	475,526.00	1.6805	76	50 - 150	0.0000	+/-0.50	
M7PFUnA	1870266	3.6602	2,131,064.00	3.660183	88	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	412594.3	3.16005	284,071.00	3.160033	145	50 - 150	0.0000	+/-0.50	
M5PFPeA	767417.5	1.499767	1,059,518.00	1.499767	72	50 - 150	0.0000	+/-0.50	
M5PFHxA	1484112	2.389433	1,970,798.00	2.389433	75	50 - 150	0.0000	+/-0.50	
M3PFHxS	280588.5	2.93475	371,360.00	2.93475	76	50 - 150	0.0000	+/-0.50	
M4PFHpA	1741511	2.903017	2,280,089.00	2.903	76	50 - 150	0.0000	+/-0.50	
M8PFOA	1824504	3.16855	2,296,815.00	3.16855	79	50 - 150	0.0000	+/-0.50	
M8PFOS	237569.9	3.35045	306,380.00	3.35045	78	50 - 150	0.0000	+/-0.50	
M9PFNA	1456343	3.351433	1,724,903.00	3.351417	84	50 - 150	0.0000	+/-0.50	
MPFDoA	1802486	3.80325	2,335,946.00	3.803233	77	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	537016.3	3.667667	593,742.00	3.66765	90	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	598399.6	3.588083	641,092.00	3.588083	93	50 - 150	0.0000	+/-0.50	

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
Water Blank (24B0532-04)		Lab File ID: 24B0532-04.d				Analyzed: 02/14/24 16:40			
M8FOSA	830644.2	3.68675	907,420.00	3.686733	92	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	341302.9	2.28835	423,586.00	2.312983	81	50 - 150	-0.0246	+/-0.50	
M2PFTA	2653568	4.036417	2,920,346.00	4.044533	91	50 - 150	-0.0081	+/-0.50	
M2-8:2FTS	272605.2	3.509267	265,222.00	3.517217	103	50 - 150	-0.0080	+/-0.50	
MPFBA	1159206	0.8177333	1,155,982.00	0.82605	100	50 - 150	-0.0083	+/-0.50	
M3HFPO-DA	279484.1	2.59625	307,843.00	2.612517	91	50 - 150	-0.0163	+/-0.50	
M6PFDA	1830782	3.509767	1,787,992.00	3.517717	102	50 - 150	-0.0080	+/-0.50	
M3PFBS	444658.9	1.67225	445,090.00	1.688767	100	50 - 150	-0.0165	+/-0.50	
M7PFUnA	2223236	3.6522	2,149,923.00	3.668183	103	50 - 150	-0.0160	+/-0.50	
M2-6:2FTS	516344.4	3.152067	322,167.00	3.16005	160	50 - 150	-0.0080	+/-0.50	*
M5PFPeA	1015404	1.491483	1,041,998.00	1.50805	97	50 - 150	-0.0166	+/-0.50	
M5PFHxA	2004910	2.38125	1,946,688.00	2.397617	103	50 - 150	-0.0164	+/-0.50	
M3PFHxS	339635.1	2.9267	327,370.00	2.94295	104	50 - 150	-0.0163	+/-0.50	
M4PFHpA	2230973	2.903017	2,317,552.00	2.911667	96	50 - 150	-0.0086	+/-0.50	
M8PFOA	2394950	3.160567	2,311,292.00	3.16855	104	50 - 150	-0.0080	+/-0.50	
M8PFOS	280094.3	3.35045	279,092.00	3.358583	100	50 - 150	-0.0081	+/-0.50	
M9PFNA	1861097	3.351433	1,768,490.00	3.359567	105	50 - 150	-0.0081	+/-0.50	
MPFDoA	2151010	3.795217	2,223,628.00	3.80325	97	50 - 150	-0.0080	+/-0.50	
D5-NEtFOSAA	563182.5	3.659667	611,017.00	3.67565	92	50 - 150	-0.0160	+/-0.50	
D3-NMeFOSAA	644424.2	3.5801	704,598.00	3.596083	91	50 - 150	-0.0160	+/-0.50	

INTERNAL STANDARD AREA AND RT SUMMARY
SOP-466 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Blank (B365359-BLK1)			Lab File ID: B365359-BLK1.d			Analyzed: 02/13/24 14:47			
M8FOSA	768152.1	3.686733	991,192.00	3.686733	77	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	318488.7	2.304767	385,875.00	2.29655	83	50 - 150	0.0082	+/-0.50	
M2PFTA	2212533	4.044517	2,689,617.00	4.044517	82	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	220668.6	3.50925	267,977.00	3.50925	82	50 - 150	0.0000	+/-0.50	
MPFBA	965939.1	0.82605	1,178,352.00	0.8177333	82	50 - 150	0.0083	+/-0.50	
M3HFPO-DA	275043.7	2.604383	333,780.00	2.604383	82	50 - 150	0.0000	+/-0.50	
M6PFDA	1508504	3.50975	1,796,499.00	3.50975	84	50 - 150	0.0000	+/-0.50	
M3PFBS	398938.5	1.6805	475,526.00	1.6805	84	50 - 150	0.0000	+/-0.50	
M7PFUnA	1861164	3.660183	2,131,064.00	3.660183	87	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	377378.4	3.15205	284,071.00	3.160033	133	50 - 150	-0.0080	+/-0.50	
M5PFPeA	865211.5	1.499767	1,059,518.00	1.499767	82	50 - 150	0.0000	+/-0.50	
M5PFHxA	1668693	2.389433	1,970,798.00	2.389433	85	50 - 150	0.0000	+/-0.50	
M3PFHxS	296793.8	2.93475	371,360.00	2.93475	80	50 - 150	0.0000	+/-0.50	
M4PFHpA	1864817	2.903	2,280,089.00	2.903	82	50 - 150	0.0000	+/-0.50	
M8PFOA	1979474	3.16855	2,296,815.00	3.16855	86	50 - 150	0.0000	+/-0.50	
M8PFOS	266087.8	3.35045	306,380.00	3.35045	87	50 - 150	0.0000	+/-0.50	
M9PFNA	1543675	3.351417	1,724,903.00	3.351417	89	50 - 150	0.0000	+/-0.50	
MPFDoA	1938135	3.803233	2,335,946.00	3.803233	83	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	485824.7	3.66765	593,742.00	3.66765	82	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	528683.1	3.588083	641,092.00	3.588083	82	50 - 150	0.0000	+/-0.50	

INTERNAL STANDARD AREA AND RT SUMMARY
SOP-466 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
LCS (B365359-BS1)		Lab File ID: B365359-BS1.d				Analyzed: 02/13/24 14:39			
M8FOSA	971600.4	3.686733	991,192.00	3.686733	98	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	386388.7	2.304767	385,875.00	2.29655	100	50 - 150	0.0082	+/-0.50	
M2PFTA	2724267	4.044517	2,689,617.00	4.044517	101	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	238732.7	3.517217	267,977.00	3.50925	89	50 - 150	0.0080	+/-0.50	
MPFBA	1177954	0.82605	1,178,352.00	0.8177333	100	50 - 150	0.0083	+/-0.50	
M3HFPO-DA	353376.6	2.604383	333,780.00	2.604383	106	50 - 150	0.0000	+/-0.50	
M6PFDA	1730108	3.50975	1,796,499.00	3.50975	96	50 - 150	0.0000	+/-0.50	
M3PFBS	477689.9	1.6805	475,526.00	1.6805	100	50 - 150	0.0000	+/-0.50	
M7PFUnA	2190894	3.660183	2,131,064.00	3.660183	103	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	443484.6	3.15205	284,071.00	3.160033	156	50 - 150	-0.0080	+/-0.50	*
M5PFPeA	1050171	1.499767	1,059,518.00	1.499767	99	50 - 150	0.0000	+/-0.50	
M5PFHxA	1981637	2.389433	1,970,798.00	2.389433	101	50 - 150	0.0000	+/-0.50	
M3PFHxS	366880.7	2.93475	371,360.00	2.93475	99	50 - 150	0.0000	+/-0.50	
M4PFHpA	2244154	2.903	2,280,089.00	2.903	98	50 - 150	0.0000	+/-0.50	
M8PFOA	2446742	3.16855	2,296,815.00	3.16855	107	50 - 150	0.0000	+/-0.50	
M8PFOS	321806.1	3.35045	306,380.00	3.35045	105	50 - 150	0.0000	+/-0.50	
M9PFNA	1744424	3.351417	1,724,903.00	3.351417	101	50 - 150	0.0000	+/-0.50	
MPFDoA	2271201	3.803233	2,335,946.00	3.803233	97	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	544567.3	3.66765	593,742.00	3.66765	92	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	651913.8	3.588083	641,092.00	3.588083	102	50 - 150	0.0000	+/-0.50	

INTERNAL STANDARD AREA AND RT SUMMARY
SOP-466 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Matrix Spike (B365359-MS1) Lab File ID: B365359-MS1.d Analyzed: 02/13/24 14:54									
M8FOSA	704772.1	3.686733	991,192.00	3.686733	71	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	447590.8	2.304767	385,875.00	2.29655	116	50 - 150	0.0082	+/-0.50	
M2PFTA	1980023	4.036417	2,689,617.00	4.044517	74	50 - 150	-0.0081	+/-0.50	
M2-8:2FTS	463323.9	3.509267	267,977.00	3.50925	173	50 - 150	0.0000	+/-0.50	*
MPFBA	769912.6	0.82605	1,178,352.00	0.8177333	65	50 - 150	0.0083	+/-0.50	
M3HFPO-DA	227883	2.604383	333,780.00	2.604383	68	50 - 150	0.0000	+/-0.50	
M6PFDA	1495162	3.509767	1,796,499.00	3.50975	83	50 - 150	0.0000	+/-0.50	
M3PFBS	386589.8	1.6805	475,526.00	1.6805	81	50 - 150	0.0000	+/-0.50	
M7PFUnA	1733398	3.660183	2,131,064.00	3.660183	81	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	506756.2	3.152067	284,071.00	3.160033	178	50 - 150	-0.0080	+/-0.50	*
M5PFPeA	831524.9	1.499767	1,059,518.00	1.499767	78	50 - 150	0.0000	+/-0.50	
M5PFHxA	1626614	2.389433	1,970,798.00	2.389433	83	50 - 150	0.0000	+/-0.50	
M3PFHxS	296388.3	2.93475	371,360.00	2.93475	80	50 - 150	0.0000	+/-0.50	
M4PFHpA	1783267	2.903017	2,280,089.00	2.903	78	50 - 150	0.0000	+/-0.50	
M8PFOA	1853830	3.16855	2,296,815.00	3.16855	81	50 - 150	0.0000	+/-0.50	
M8PFOS	225626.1	3.35045	306,380.00	3.35045	74	50 - 150	0.0000	+/-0.50	
M9PFNA	1379481	3.351433	1,724,903.00	3.351417	80	50 - 150	0.0000	+/-0.50	
MPFDoA	1573503	3.7952	2,335,946.00	3.803233	67	50 - 150	-0.0080	+/-0.50	
D5-NEtFOSAA	561239.5	3.667667	593,742.00	3.66765	95	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	613434.2	3.588083	641,092.00	3.588083	96	50 - 150	0.0000	+/-0.50	

INTERNAL STANDARD AREA AND RT SUMMARY
SOP-466 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Matrix Spike Dup (B365359-MSD1)			Lab File ID: B365359-MSD1.d			Analyzed: 02/13/24 15:01			
M8FOSA	759252.3	3.686733	991,192.00	3.686733	77	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	479792.8	2.304767	385,875.00	2.29655	124	50 - 150	0.0082	+/-0.50	
M2PFTA	2224664	4.036417	2,689,617.00	4.044517	83	50 - 150	-0.0081	+/-0.50	
M2-8:2FTS	519464.4	3.509267	267,977.00	3.50925	194	50 - 150	0.0000	+/-0.50	*
MPFBA	871948.1	0.82605	1,178,352.00	0.8177333	74	50 - 150	0.0083	+/-0.50	
M3HFPO-DA	264768.6	2.604383	333,780.00	2.604383	79	50 - 150	0.0000	+/-0.50	
M6PFDA	1675707	3.509767	1,796,499.00	3.50975	93	50 - 150	0.0000	+/-0.50	
M3PFBS	432489	1.680517	475,526.00	1.6805	91	50 - 150	0.0000	+/-0.50	
M7PFUnA	1973361	3.6602	2,131,064.00	3.660183	93	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	554001.2	3.152067	284,071.00	3.160033	195	50 - 150	-0.0080	+/-0.50	*
M5PFPeA	911441.7	1.499767	1,059,518.00	1.499767	86	50 - 150	0.0000	+/-0.50	
M5PFHxA	1798093	2.389433	1,970,798.00	2.389433	91	50 - 150	0.0000	+/-0.50	
M3PFHxS	325796.1	2.93475	371,360.00	2.93475	88	50 - 150	0.0000	+/-0.50	
M4PFHpA	2049910	2.903017	2,280,089.00	2.903	90	50 - 150	0.0000	+/-0.50	
M8PFOA	2035495	3.16855	2,296,815.00	3.16855	89	50 - 150	0.0000	+/-0.50	
M8PFOS	266160.3	3.35045	306,380.00	3.35045	87	50 - 150	0.0000	+/-0.50	
M9PFNA	1659770	3.351433	1,724,903.00	3.351417	96	50 - 150	0.0000	+/-0.50	
MPFDoA	1808639	3.795217	2,335,946.00	3.803233	77	50 - 150	-0.0080	+/-0.50	
D5-NEtFOSAA	619323.4	3.667667	593,742.00	3.66765	104	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	701203.1	3.588083	641,092.00	3.588083	109	50 - 150	0.0000	+/-0.50	

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 (B365559-BLK1)			Lab File ID: B365559-BLK1.d			Analyzed: 02/14/24 16:32			
M8FOSA	799862.3	3.68675	907,420.00	3.686733	88	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	337736.4	2.29655	423,586.00	2.312983	80	50 - 150	-0.0164	+/-0.50	
M2PFTA	2385512	4.036433	2,920,346.00	4.044533	82	50 - 150	-0.0081	+/-0.50	
M2-8:2FTS	251445.6	3.509267	265,222.00	3.517217	95	50 - 150	-0.0080	+/-0.50	
MPFBA	1084566	0.82605	1,155,982.00	0.82605	94	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	278357.2	2.59625	307,843.00	2.612517	90	50 - 150	-0.0163	+/-0.50	
M6PFDA	1798356	3.509767	1,787,992.00	3.517717	101	50 - 150	-0.0080	+/-0.50	
M3PFBS	438426.8	1.67225	445,090.00	1.688767	99	50 - 150	-0.0165	+/-0.50	
M7PFUnA	1983387	3.6602	2,149,923.00	3.668183	92	50 - 150	-0.0080	+/-0.50	
M2-6:2FTS	404141.1	3.152067	322,167.00	3.16005	125	50 - 150	-0.0080	+/-0.50	
M5PFPeA	989870.3	1.499767	1,041,998.00	1.50805	95	50 - 150	-0.0083	+/-0.50	
M5PFHxA	1921227	2.38125	1,946,688.00	2.397617	99	50 - 150	-0.0164	+/-0.50	
M3PFHxS	344676.8	2.934767	327,370.00	2.94295	105	50 - 150	-0.0082	+/-0.50	
M4PFHpA	2278450	2.903017	2,317,552.00	2.911667	98	50 - 150	-0.0086	+/-0.50	
M8PFOA	2424956	3.160567	2,311,292.00	3.16855	105	50 - 150	-0.0080	+/-0.50	
M8PFOS	272136.4	3.35045	279,092.00	3.358583	98	50 - 150	-0.0081	+/-0.50	
M9PFNA	1802797	3.351433	1,768,490.00	3.359567	102	50 - 150	-0.0081	+/-0.50	
MPFDoA	1899208	3.795217	2,223,628.00	3.80325	85	50 - 150	-0.0080	+/-0.50	
D5-NEtFOSAA	499443.3	3.667667	611,017.00	3.67565	82	50 - 150	-0.0080	+/-0.50	
D3-NMeFOSAA	604115.3	3.5881	704,598.00	3.596083	86	50 - 150	-0.0080	+/-0.50	

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 (B365559-BS1)			Lab File ID: B365559-BS1.d			Analyzed: 02/14/24 16:18			
M8FOSA	819120	3.68675	907,420.00	3.686733	90	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	351459.8	2.304767	423,586.00	2.312983	83	50 - 150	-0.0082	+/-0.50	
M2PFTA	2967134	4.044533	2,920,346.00	4.044533	102	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	290701.5	3.517233	265,222.00	3.517217	110	50 - 150	0.0000	+/-0.50	
MPFBA	1090741	0.82605	1,155,982.00	0.82605	94	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	301930.1	2.604383	307,843.00	2.612517	98	50 - 150	-0.0081	+/-0.50	
M6PFDA	1912740	3.509767	1,787,992.00	3.517717	107	50 - 150	-0.0080	+/-0.50	
M3PFBS	472295.1	1.688767	445,090.00	1.688767	106	50 - 150	0.0000	+/-0.50	
M7PFUnA	2296620	3.6602	2,149,923.00	3.668183	107	50 - 150	-0.0080	+/-0.50	
M2-6:2FTS	428725.7	3.16005	322,167.00	3.16005	133	50 - 150	0.0000	+/-0.50	
M5PFPeA	1035370	1.50805	1,041,998.00	1.50805	99	50 - 150	0.0000	+/-0.50	
M5PFHxA	2079309	2.397617	1,946,688.00	2.397617	107	50 - 150	0.0000	+/-0.50	
M3PFHxS	360296.5	2.934767	327,370.00	2.94295	110	50 - 150	-0.0082	+/-0.50	
M4PFHpA	2376359	2.911683	2,317,552.00	2.911667	103	50 - 150	0.0000	+/-0.50	
M8PFOA	2479321	3.16855	2,311,292.00	3.16855	107	50 - 150	0.0000	+/-0.50	
M8PFOS	300948.3	3.35045	279,092.00	3.358583	108	50 - 150	-0.0081	+/-0.50	
M9PFNA	1929539	3.351433	1,768,490.00	3.359567	109	50 - 150	-0.0081	+/-0.50	
MPFDoA	2363074	3.80325	2,223,628.00	3.80325	106	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	582637.4	3.667667	611,017.00	3.67565	95	50 - 150	-0.0080	+/-0.50	
D3-NMeFOSAA	664987	3.5881	704,598.00	3.596083	94	50 - 150	-0.0080	+/-0.50	

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 (B365559-BSD1)			Lab File ID: B365559-BSD1.d			Analyzed: 02/14/24 16:25			
M8FOSA	813277.3	3.68675	907,420.00	3.686733	90	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	348470.8	2.29655	423,586.00	2.312983	82	50 - 150	-0.0164	+/-0.50	
M2PFTA	2603751	4.036433	2,920,346.00	4.044533	89	50 - 150	-0.0081	+/-0.50	
M2-8:2FTS	267471.4	3.509267	265,222.00	3.517217	101	50 - 150	-0.0080	+/-0.50	
MPFBA	1068435	0.8177333	1,155,982.00	0.82605	92	50 - 150	-0.0083	+/-0.50	
M3HFPO-DA	282697.3	2.596267	307,843.00	2.612517	92	50 - 150	-0.0162	+/-0.50	
M6PFDA	1726414	3.509767	1,787,992.00	3.517717	97	50 - 150	-0.0080	+/-0.50	
M3PFBS	439074.9	1.67225	445,090.00	1.688767	99	50 - 150	-0.0165	+/-0.50	
M7PFUnA	1980045	3.6602	2,149,923.00	3.668183	92	50 - 150	-0.0080	+/-0.50	
M2-6:2FTS	365639.6	3.152067	322,167.00	3.16005	113	50 - 150	-0.0080	+/-0.50	
M5PFPeA	983332.6	1.499767	1,041,998.00	1.50805	94	50 - 150	-0.0083	+/-0.50	
M5PFHxA	1939013	2.38125	1,946,688.00	2.397617	100	50 - 150	-0.0164	+/-0.50	
M3PFHxS	346599.6	2.934767	327,370.00	2.94295	106	50 - 150	-0.0082	+/-0.50	
M4PFHpA	2264850	2.903017	2,317,552.00	2.911667	98	50 - 150	-0.0086	+/-0.50	
M8PFOA	2272082	3.16855	2,311,292.00	3.16855	98	50 - 150	0.0000	+/-0.50	
M8PFOS	281417.3	3.35045	279,092.00	3.358583	101	50 - 150	-0.0081	+/-0.50	
M9PFNA	1804684	3.351433	1,768,490.00	3.359567	102	50 - 150	-0.0081	+/-0.50	
MPFDaA	1964200	3.795217	2,223,628.00	3.80325	88	50 - 150	-0.0080	+/-0.50	
D5-NEtFOSAA	518109	3.667667	611,017.00	3.67565	85	50 - 150	-0.0080	+/-0.50	
D3-NMeFOSAA	611007.7	3.588083	704,598.00	3.596083	87	50 - 150	-0.0080	+/-0.50	

CERTIFICATIONS
Certified Analyses included in this Report

Analyte	Certifications
<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
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
<i>SOP-466 PFAS in Soil</i>	
Perfluorobutanoic acid (PFBA)	NH-P,PA,NY
Perfluorobutanesulfonic acid (PFBS)	NH-P,PA
Perfluoropentanoic acid (PFPeA)	NH-P,PA,NY
Perfluorohexanoic acid (PFHxA)	NH-P,PA,NY
11Cl-PF3OUdS (F53B Major)	NH-P,PA
9Cl-PF3ONS (F53B Minor)	NH-P,PA
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	NH-P,PA
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NH-P,PA
8:2 Fluorotelomersulfonic acid (8:2FTS A)	NH-P,PA,NY
Perfluorodecanoic acid (PFDA)	NH-P,PA,NY
Perfluorododecanoic acid (PFDoA)	NH-P,PA,NY

CERTIFICATIONS
Certified Analyses included in this Report

Analyte	Certifications
<i>SOP-466 PFAS in Soil</i>	
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	NH-P,PA
Perfluoroheptanesulfonic acid (PFHpS)	NH-P,PA
N-EtFOSAA (NEtFOSAA)	NH-P,PA,NY
N-MeFOSAA (NMeFOSAA)	NH-P,PA
Perfluorotetradecanoic acid (PFTA)	NH-P,PA,NY
Perfluorotridecanoic acid (PFTrDA)	NH-P,PA,NY
4:2 Fluorotelomersulfonic acid (4:2FTS A)	NH-P,PA
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-butanesulfonamide (FBSA)	NH-P,PA
Perfluorohexanesulfonic acid (PFHxS)	NH-P,PA
Perfluoro-4-oxapentanoic acid (PFMPA)	NH-P,PA
Perfluoro-5-oxahexanoic acid (PFMBA)	NH-P,PA
6:2 Fluorotelomersulfonic acid (6:2FTS A)	NH-P,PA
Perfluoropentanesulfonic acid (PFPeS)	NH-P,PA
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
NY	New York State Department of Health	10899 NELAP	04/1/2024
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2024
PA	Commonwealth of Pennsylvania DEP	68-05812	06/30/2024

2430532

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Doc # 381 Rev 5_07/13/2021

39 Spruce Street
East Longmeadow, MA 01028

CHAIN OF CUSTODY RECORD

ANALYSIS REQUESTED

Page ____ of ____



Phone: 413-525-2332
Fax: 413-525-6405

Access CQC's and Support Requests

Company Name: Biology East (unlabeled)
Address: 2 N. Hyde Rd., Manchester, MA 01032
Phone: (617) 833-5435
Project Name: Compost operation

Project Location:
Project Number:
Project Manager: Syed Dong
Pace Quote Name/Number:
Invoice Recipient: Syed Dong
Sampled By: Syed Dong (S.D.)

Place Work Order	Client Sample ID / Description	Beginning Date/Time	Ending Date/Time
1	Framingham	2/5	
2	Manchester	2/5	
3	Groton	2/5	

Requested Turnaround Time
7-Day ☐ 10-Day ☐ Due Date:
PFAS 10-Day (std) ☒ Rush-Approval Required
1-Day ☐ 3-Day ☐ 4-Day ☐
2-Day ☐
Date 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 ☐

PFAS Isotope

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:

Relinquished by: (signature)	Date/Time: <u>2/5/24</u>
Received by: (signature)	Date/Time: <u>2-5-24</u>
Relinquished by: (signature)	Date/Time: <u>2-5-24</u>
Received by: (signature)	Date/Time: <u>2/5/24 17:30</u>
Relinquished by: (signature)	Date/Time: <u>2/5/24 17:30</u>
Received by: (signature)	Date/Time: <u>2/5/24 17:30</u>
Relinquished by: (signature)	Date/Time: <u>2/5/24 17:30</u>
Received by: (signature)	Date/Time: <u>2/5/24 17:30</u>

Detection Limit Requirements
MA ☐ MA MCP Required
MCP Certification Form Required
CT ☐ CT RCP Required
RCP Certification Form Required
Other: ☐ MA State DW Required
PWSID #
Project Entity
Government ☐ Municipality ☐ WRTA ☐ Other ☐
Federal ☐ 21 J ☐ School ☐ Chromatogram ☐
City ☐ Brownfield ☐ MBTA ☐ AIHA-LAP, LLC ☐

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.

Lab Comments:

No instructions



ANALYSIS REQUESTED

Reverted Turnaround Time

FACE ANALYTICAL
PHONE: 415-525-2352
FAX: 415-525-6405

[illegible]

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.

Lab Comments: No instructions

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

Log In Back-Sheet

Client Black Earth Compost
 Project Compost Operations
 MCP/RCP Required MA
 Deliverable Package Requirement MA
 Location MA
 PWSID# (When Applicable) MA
 Arrival Method:
 Courier ☒ Fed Ex ☐ Walk In ☐ Other ☐
 Received By / Date / Time MEM 2/5/24/130
 Back-Sheet By / Date / Time LA 2/5/24/1402
 Temperature Method gun #6
 Temp ✓ < 6° C Actual Temperature 2.0
 Rush Samples: Yes ☒ No ☐ Notify
 Short Hold: Yes ☒ No ☐ Notify

Notes regarding Samples/COC outside of SOP:

Wutor Blin Sample received
not on COC.

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	☒	☐
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:	<u>N/A</u>	☐

Additional Container Notes

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

