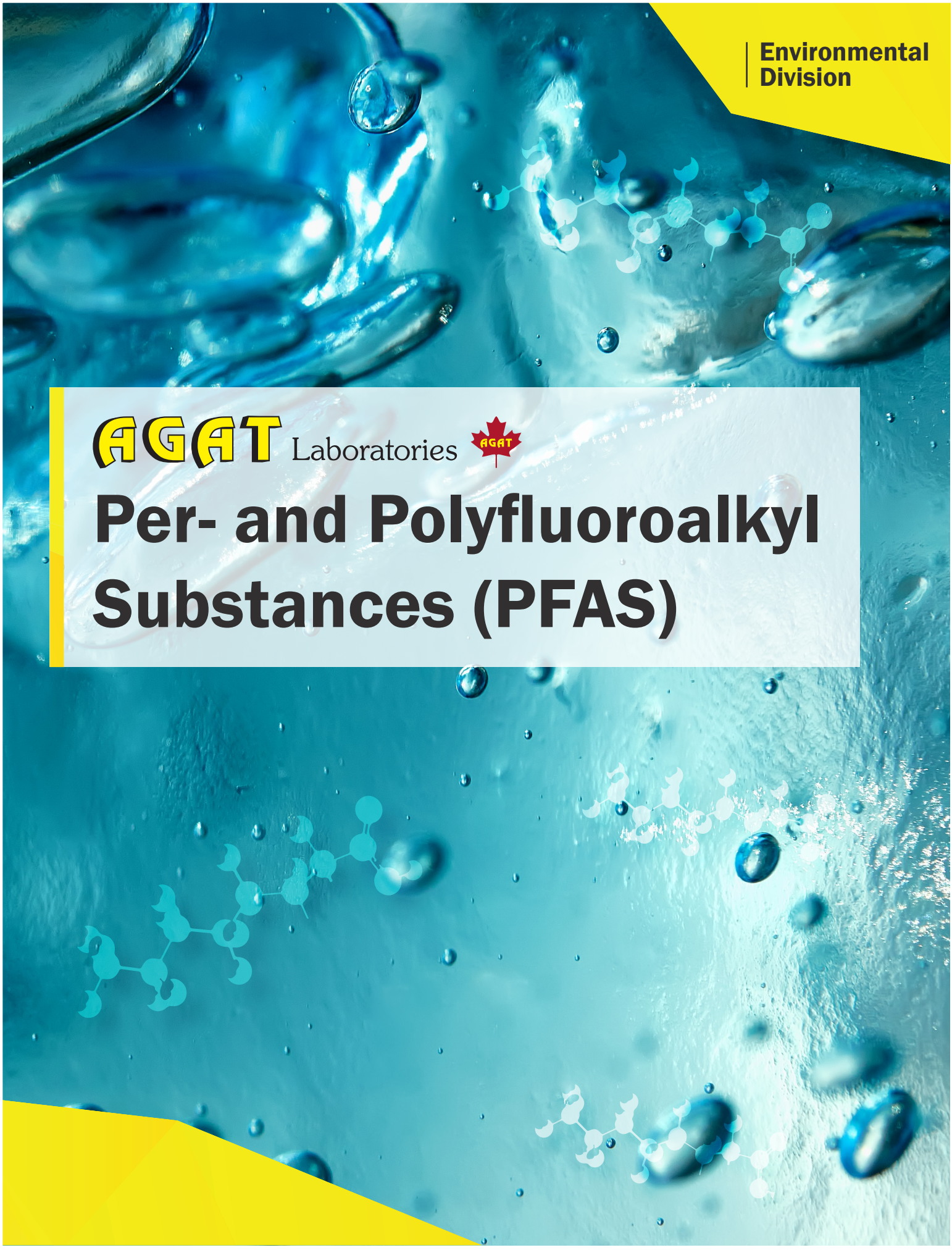
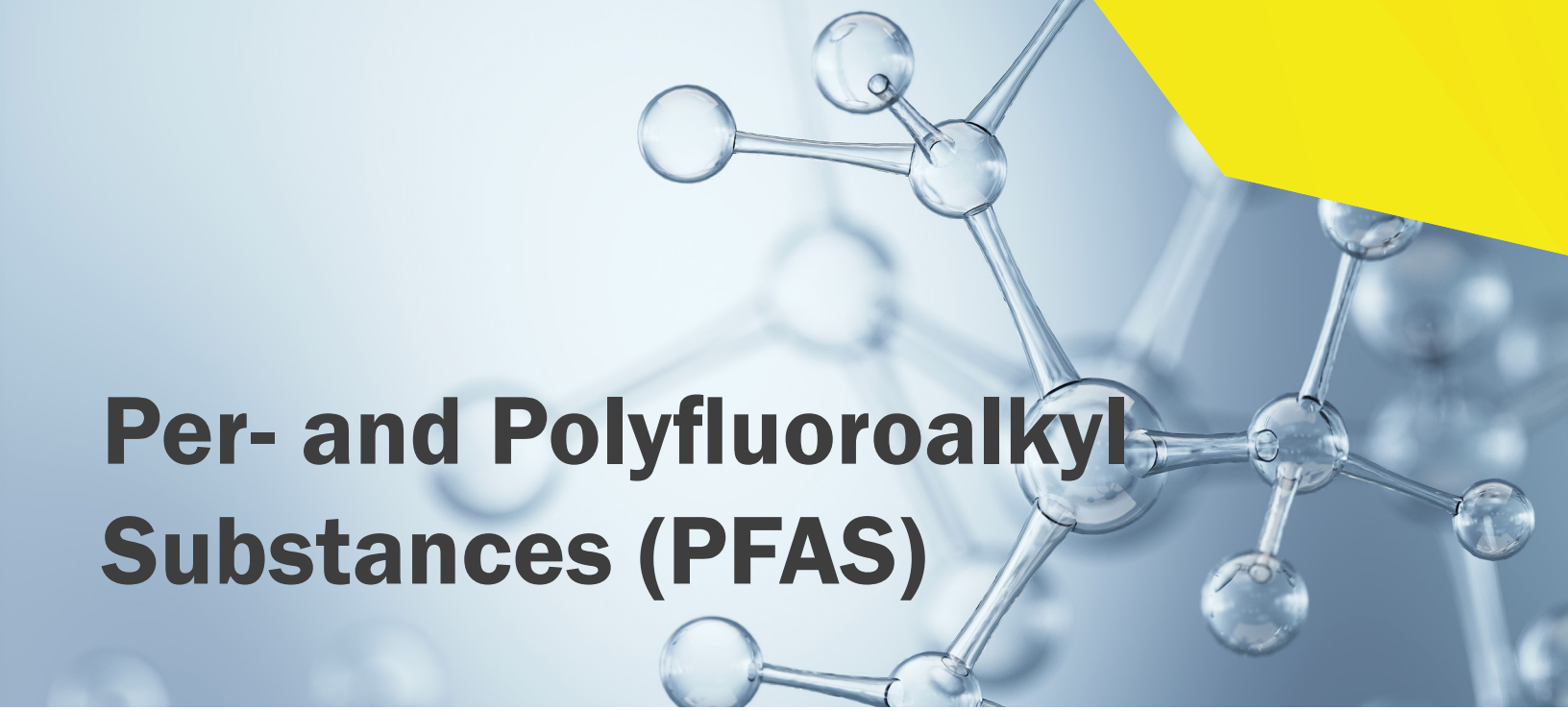


Environmental Division

AGAT Laboratories

Per- and Polyfluoroalkyl Substances (PFAS)



Per- and Polyfluoroalkyl Substances (PFAS)

PFAS in the Environment

Per- and polyfluoroalkyl substances (PFAS) have many industrial and commercial applications due to their ability to repel oil and water, reduce friction, and their resistance to high temperatures. Non-stick coatings, textile applications and firefighting foams represent some of the most common uses of PFAS. Because of their widespread use since the manufacturing of these chemicals began in the 1940s, PFAS is now found in the blood of people and animals all over the world.

Manufacturing and use of PFAS has resulted in their presence in the environment. The health effects of Perfluorooctyl Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA) have been widely studied and are associated with several adverse health effects. They are very persistent in the environment and are bioaccumulative.

PFAS releases into the environment from sources such as the use for firefighting foams at airports, military sites and major industrial facilities such as refineries. These all have important firefighting training activities and, in some cases, application during fire events. After usage PFAS migrate to soil, groundwater, surface water, drinking water, and eventually landfill leachate and wastewater.

Key Industries supported with PFAS analysis include:

- Firefighters & First Responders
- Government Agencies
- Airports
- Energy, Oil, & Gas
- Wastewater Infrastructure
- Manufacturers

Why AGAT Stands Out in PFAS Testing

Leading Turnaround Times

Team of Technical Experts

Critical Lab Capacity

Coast to Coast Coverage

Analytical Method

In light of ongoing regulatory evaluations in various countries, AGAT has opted to align with established guidelines, particularly those published by the US Environmental Protection Agency, which encompasses several robust methods for PFAS analysis. This approach ensures that our PFAS testing protocols remain in harmony with widely recognized standards, promoting consistency and reliability in our analytical services. The most recent methods are EPA 533 for drinking water and EPA 1633 for other matrices. AGAT Laboratories offers PFAS analysis complying with EPA 533 and EPA 1633 and cover all compounds in those methods.

Accreditation

AGAT Laboratories is accredited by the Standards Council of Canada for the LC-MS/MS analysis of compounds listed in the table on the following page in water and soil samples with a scope expansion planned for 2024 to enhance service for International clientele.

Reporting Packages

AGAT offers both a standard list of PFAS and an extended list of PFAS compounds. The standard list, based on legacy PFAS, can be used to meet regulatory criteria and includes the most widely studied PFAS, in particular PFOA and PFOS. The extended list includes many additional precursors and new generation PFAS capable of degrading in the environment to form PFOS and other PFAS. It can be used as a tool to determine what precursors are present and if they will form PFOS and other PFAS.

AGAT Laboratories offer several different lists to accommodate specific project requirements.

Compound List/Capabilities

	Abbreviation	Water (ng/L)	Solid (ng/g)
Perfluorobutanoic acid	PFBA	1.0	0.5
Perfluoropentanoic acid	PFPeA	1.0	0.2
Perfluorohexanoic acid	PFHxA	1.0	0.1
Perfluoroheptanoic acid	PFHpA	1.0	0.1
Perfluorooctanoic acid	PFOA	1.0	0.1
Perfluorononanoic acid	PFNA	1.0	0.1
Perfluorodecanoic acid	PFDA	1.0	0.1
Perfluoroundecanoic acid	PFUnA	1.0	0.1
Perfluorododecanoic acid	PFDoA	1.0	0.1
Perfluorotridecanoic acid	PFTrDA	1.0	0.1
Perfluorotetradecanoic acid	PFTeDA	1.0	0.1
Perfluorobutanesulfonic acid	PFBS	1.0	0.1
Perfluoropentansulfonic acid	PFPeS	1.0	0.1
Perfluorohexanesulfonic acid	PFHxS	1.0	0.1
Perfluoroheptanesulfonic acid	PFHpS	1.0	0.1
Perfluorooctanesulfonic acid	PFOS	1.0	0.1
Perfluorononanesulfonic acid	PFNS	1.0	0.1
Perfluorodecanesulfonic acid	PFDS	1.0	0.1
Perfluorododecanesulfonic acid	PFDoS	1.0	0.1
4:2 Fluorotelomer sulfonic acid	4:2-FTS	1.0	0.2
6:2 Fluorotelomer sulfonic acid	6:2-FTS)	3.0	0.1
8:2 Fluorotelomer sulfonic acid	8:2-FTS	2.0	1.0
Perfluorooctanesulfonamide	PFOSA	1.0	0.1
N-methyl perfluorooctanesulfonamide	NMeFOSA	1.0	0.1
N-ethyl perfluorooctanesulfonamide	NEtFOSA	1.0	0.1
N-methyl perfluorooctanesulfonamidoac.	NMeFOSAA	1.0	0.1
N-ethyl perfluorooctanesulfonamidoac.	NEtFOSAA	1.0	0.1
N-methyl perfluorooctanesulfonamidoeth.	NMeFOSE	3.0	1.0
N-ethyl perfluorooctanesulfonamidoeth.	NEtFOSE	4.0	1.0
Hexafluoropropylene oxide dimer acid	HFPO-DA	1.0	0.2
4,8-Dioxa-3H-perfluorononanoic acid	ADONA	1.0	0.1
F-53B Major	9Cl-PF3ONS	1.0	0.1
F-53B Minor	11-Cl-PF3OUdS	1.0	0.1
3:3 Fluorotelomer carboxylic acid	3:3FTCA	2.0	1.0
5:3 Fluorotelomer carboxylic acid	5:3FTCA	6.0	1.0
7:3 Fluorotelomer carboxylic acid	7:3FTCA	6.0	1.0
Perfluoro(2-ethoxyethane)sulfonic acid	PFEESA	1.0	0.1
Perfluoro-3-methoxypropanoic acid	PFMPA	1.0	0.1
Perfluoro-4-methoxybutanoic acid	PFMBA	1.0	0.1
Nonafluoro-3,6-dioxaheptanoic acid	NFDHA	3.0	1.0
2H-perfluoro-octenoic acid	FHUEA	2.0	0.1
2H-perfluoro-decanoic acid	FOUEA	2.0	0.1
2H-Perfluoro-dodecanoic acid	FDUEA	1.0	0.2

Field Sampling

Given the ubiquitous nature of PFAS, the material and procedure normally used for environmental sampling may cause cross-contamination when collecting samples. It is important to plan sample collection ahead as well as ways to minimize the potential for cross-contamination.

Sampling Considerations

- Avoid clothing treated with water-resistant, waterproof and/or stain-treated clothing. (i.e. Gore-Tex, Tyvek). Waterproof clothing made with polyurethane, PVC, rubber or neoprene is recommended.
- Polypropylene (PP), silicone, stainless steel, nylon, acetate, cotton materials and equipment parts can be used during sampling.
- Samples should not be in contact with glass or low-density polyethylene (LDPE).
- Clothing with natural fibers is preferred.
- Clothing should be well laundered, not new, and free of laundry soaps and fabric softeners. Water rinse is recommended before dryer.
- Waterproof notebooks and pads are NOT permitted on site. Also, non-gel pens or markers are not recommended.
- Powderless nitrile gloves should be used in abundance and changed in EVERY step including but not limited to decontamination, manipulation, sampling, blank sampling, etc.
- Avoid any cosmetics, moisturizers, fragrances, and creams. Sunscreens and insect repellent must be applied outside of the sampling area when necessary preferably at least half an hour before sampling. Hands have to be washed well after application of sunscreens and insect repellents.
- Avoid packaged food in sampling area.

Sampling Supplies

- Request all containers, equipment rinses from the laboratory.
- It is recommended to have prepared a field blank, a trip blank, an equipment blank, and enough containers for duplicate samples for your field program.
- High-density polyethylene (HDPE) sampling bottles and jars with Teflon-free lids must be used.
- PFAS free water is available through AGAT.
- Do not use chemical ice packs.

Please note that this is not an exhaustive list of all sampling guidelines, but focuses on key areas of consideration. For more information please contact your designated AGAT representative or **info@agatlabs.com.**

Sample Containers and Holding Times (all containers should be free of Teflon-lined lids)

Matrix	Container	Container Volume	Storage	Holding Time
Drinking Water	HDPE* bottle	500 mL**	4°C	28 days
Wastewater	HDPE bottle	500 mL	4°C	28 days
Groundwater	HDPE bottle	500 mL	4°C	28 days
Surface Water	HDPE bottle	500 mL	4°C	28 days
Sludge	HDPE jar	250 mL	4°C	28 days
Soil	HDPE jar	250 mL	4°C	28 days
Sediment	HDPE jar	250 mL	4°C	28 days

***HDPE:** High-density polyethylene. Sampling material must be provided by the laboratory in order to ensure the absence of PFAS.
** Contains 1 g/L ammounium acetate.

AGAT Laboratories

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of laboratory services.