



PFAS Analysis



The Analysis of Per- and Polyfluorinated Alkyl Substances (PFAS)

What are PFAS Compounds?

Per- and Polyfluorinated Alkyl Substances (PFAS) are a large group of manufactured compounds that are used in a wide range of industrial applications. PFAS are also the principle components in Aqueous Film Forming Foams (AFFF) firefighting products that meet military specifications.

PFAS compounds are also used to repel oil and water in textile products like clothing, carpeting and furniture, as well as in food packaging and in the manufacture of fluoropolymers used in non-stick cookware. Some of the unique chemical characteristics that make PFAS compounds attractive for use in textiles, packaging and cookware, also render them resistant to biodegradation in the environment. Therefore, PFAS compounds are persistent and have been shown to bioaccumulate in humans and wildlife. PFAS compounds have been found throughout the environment in groundwater, surface water, soil and sediment. Studies have shown detections of PFAS in air, biota and food.

Leading the Industry in PFAS Analysis

When dealing with an emerging contaminant, it is vital that you receive the highest level of accuracy and precision in the results that are reported. Utilizing industry-leading practices, Eurofins not only has dedicated laboratory space and instrumentation for PFAS analysis, but also dedicated teams who provide the highest quality results each and every time. These teams provide an unmatched level of experience, and a capacity to analyze thousands of PFAS samples per month.

PFAS methodologies and regulations are continually evolving as additional compounds are identified and states continue to expand their testing requirements for these contaminants. With our dedicated teams, Eurofins is able to offer you the flexibility to develop and adapt to the continually changing analytical needs around PFAS analysis.

Eurofins offers you:

- The ability to test a wide range of matrices for 36 PFAS compounds.
- The use of gold-standard methods including isotope dilution, as well as EPA 537.1 for drinking water analysis.
- Two laboratories dedicated to drinking water analyses that have been analyzing PFAS for over 10 years as well as additional drinking water testing capacity through our network of laboratories.
- Analysis for GenX and other perfluoroether carboxylic acids (PFECA) used as replacement compounds.
- Multiple LC/MS/MS instruments dedicated to PFAS analysis, along with a dedicated sample preparation and clean-up space minimizing the chance of cross-contamination.
- Analytical results that meet or exceed current regulatory and advisory limits.
- Multiple accreditations including DoD QSM, ISO 17025, NELAC and various state-specific programs.



Capabilities and Capacity

Eurofins is a global leader in providing innovative and high-quality environmental analytical laboratory services. Our PFAS laboratories, located in Lancaster, Pennsylvania; Denver, Colorado; South Bend, Indiana; Monrovia and Sacramento, California; and Burlington, Vermont are equipped with state-of-the-art technology and instrumentation. With thousands of employees dedicated to environmental testing, Eurofins has the capacity and financial stability to meet your project needs.

We perform PFAS analysis on a variety environmental matrices including:

- air
- drinking water
- groundwater
- wastewater
- soil
- sediment
- leachate
- tissue
- biosolids
- consumer products
- AFFF
- Emulsions and Fluoropolymer Dispersions
- Food, Feed and Agricultural Products

We use state-of-the-art LC/MS/MS instrumentation in support of trace-level reporting of PFAS contaminants as well as GC/MS/MS for the analysis of other emerging contaminants. Within our isolated PFAS laboratories, we run numerous dedicated systems over multiple shifts, giving us unmatched capacity for any project size. We have optimized our systems so that the data reported to you meets or exceeds all of the current regulatory or Health Advisory limits. We offer several analytical methods to meet state, federal and DoD criteria. The isotope dilution method can be utilized when testing potable water, non-potable water, soil/sediment, tissue and nontraditional matrices. For drinking water, we support EPA method 537, without modification. To accommodate unique project reporting requirements, data can be provided in a client specific Data Deliverable format as well as a Level II, III or IV data package.

In accordance with the EPA's September 2016 Technical Advisory and EPA method 537.1, Eurofins includes branched/linear isomers in the quantification of PFOA, PFOS, PFHxS, NETFOSAA and NMeFOSAA. While a technical grade standard of PFOA is analyzed with each initial calibration for a qualitative reference and identification, branched/linear isomers are in the calibration for PFOS, PFHxS, NETFOSAA and NMeFOSAA.

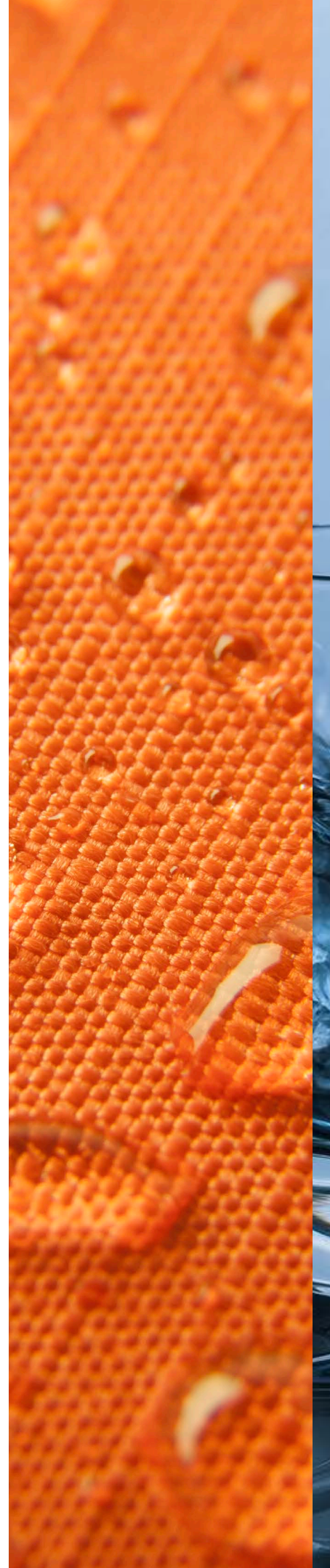
Our depth of knowledge, redundancy of systems and state-of-the-art facilities are key to our success in supporting the PFAS market. Eurofins' reinvestment in the business ensures that we continue to offer highly sensitive methods, low reporting limits and compliance with method protocols meeting regulatory guidance over the duration of the client program.

Total Oxidizable Precursors (TOP) Analysis

TOP analysis is an analytical tool to determine the hidden mass of oxidizable precursor compounds in a potentially impacted sample. Water, soil, and sediment are treated with persulfate, hydroxide and heat to create a hydroxyl radical oxidation. This process converts polyfluorinated precursors to the more recalcitrant perfluorinated forms like Perfluorocarboxylic acids (PFCA).

An initial aliquot of each sample is analyzed for the suite of PFAS compounds. Then a second portion of the sample is oxidized. When the oxidation is complete, the oxidized portion is extracted in the normal fashion for the suite of PFAS compounds and then compared to the initial analysis. Increases in the concentrations in the PFCAs indicate the presence of oxidizable precursors which constitute the hidden mass.

AFFF impacted samples analyzed by the TOP Assay have been shown to reveal an additional mass of PFAS compounds that can comprise of up to 70% of the fluorinated organics in the sample. The combination of the TOP analysis and the standard suite of PFAS compounds can give a more complete characterization of the PFAS contamination present.





Drinking Water Analysis

Eurofins has the largest potable water testing laboratory in the United States, serving water quality professionals throughout the United States and in more than 100 countries worldwide. The South Bend, Indiana water testing laboratory has been in business since 1986, is certified or approved to perform drinking water analyses in all 50 states and provides over 30 years of experience in water quality analytical services. The Monrovia, California location has been in operation since 1969 and maintains a proud and successful history providing the water and beverage industry with high-quality testing, data management and other customer-focused services. Eurofins' two drinking water laboratories serve more than 7,000 state and local municipalities as well as bottlers, engineering firms, consultants and federal agencies such as the EPA and U.S. Military. Eurofins is drinking water certified or approved in all 50 states and territories, LT2 Cryptosporidium and ISO 17025-accredited, and also certified under the NELAC Institute (TNI) national accreditation program, as well as other federal, state and private organizations to perform routine and specialized analyses. We are also approved by the U.S. EPA to perform all UCMR4 methods.

UCMR

Eurofins laboratories participated in the EPA's Third Unregulated Contaminants Monitoring Rule (UCMR3) program, which was responsible for the initial collection of PFAS data across the US. Existing national occurrence data for PFOS, PFOA and other PFAS compounds are based on results from EPA's UCMR3 program which was a national data-gathering effort of public water systems in 2013-15. The following PFAS compounds were included in the UCMR3 survey:

- Perfluorooctanesulfonic Acid (PFOS)
- Perfluorooctanoic Acid (PFOA)
- Perfluoro-n-nonanoic Acid (PFNA)
- Perfluoro-1-hexanesulfonic Acid (PFHxS)
- Perfluoroheptanoic Acid (PFHpA)
- Perfluoro-1-butanesulfonic Acid (PFBS)

Eurofins analyzed over 10,000 samples from approximately 1,800 public water system customers during the 2013-2015 UCMR3 monitoring period. Data from the UCMR3 program indicates that more than 60 public water supplies had entry point samples exceeding the Health Advisories for PFOS and/or PFOA.

Sampling Considerations

Sampling can be challenging due to the widespread use of PFAS, as many materials typically used in field and laboratory operations may contain PFAS. For example, products such as tubing, sample containers and sampling equipment that are made of polytetrafluoroethylene are often used in sampling. Since they may contain PFAS, these items should be evaluated before using for PFAS sampling. In addition, field clothing and food articles, such as water-resistant jackets or fast food wrappers, should be avoided because they also may contain PFAS that can contaminate samples. It is strongly recommended that proper field sampling and hygiene protocols are followed to ensure that testing results reflect actual PFAS levels in the analyzed samples.

Things to Avoid Using when Sampling for PFAS

- Chemical ice bags
- Non-stick and waterproof materials
- Certain sunscreens, insect repellants and other personal care products
- Aluminum foil
- Treated clothing
- Clothing laundered with fabric softener

PFAS Analytes

Compound	Acronym	CAS #
10:2-fluorotelomersulfonic acid	10:2 FTS	120226-60-0
4:2 fluorotelomersulfonic acid	4:2 FTS	757124-72-4
6:2 fluorotelomersulfonic acid	6:2 FTS	27619-97-2
8:2 fluorotelomersulfonic acid	8:2 FTS	39108-34-4
N-ethyl perfluorooctanesulfonamidoacetic acid	NEtFOSAA	2991-50-6
N-methyl perfluorooctanesulfonamidoacetic acid	NMeFOSAA	2355-31-9
Perfluoro-octanesulfonic acid	PFOS	1763-23-1
Perfluorobutanesulfonic acid	PFBS	375-73-5
Perfluorobutanoic acid	PFBA	375-22-4
Perfluorodecanesulfonic acid	PFDS	335-77-3
Perfluorodecanoic acid	PFDA	335-76-2
Perfluorododecanesulfonic acid	PFDoS	79780-39-5
Perfluorododecanoic acid	PFDoS	307-55-1
Perfluoroheptanesulfonic acid	PFHpS	375-92-8
Perfluoroheptanoic acid	PFHpA	375-85-9
Perfluorohexadecanoic acid	PFHxDA	67905-19-5
Perfluorohexanesulfonic acid	PFHxS	355-46-4
Perfluorohexanoic acid	PFHxA	307-24-4
Perfluorononanesulfonic acid	PFNS	68259-12-1
Perfluorononanoic acid	PFNA	375-95-1
Perfluorooctadecanoic acid	PFODA	16517-11-6
Perfluorooctanoic acid	PFOA	335-67-1
Perfluoropentanesulfonic acid	PFPoS	2706-91-4
Perfluoropentanoic acid	PFPeA	2706-90-3
Perfluorotetradecanoic acid	PFTeDA	376-06-7
Perfluorotridecanoic acid	PFTTrDA	72629-94-8
Perfluoroundecanoic acid	PFUnA	2058-94-8
Perfluorooctanesulfonamide	PFOSA	754-91-6
N-ethylperfluorooctane-1-sulfonamide	NEtPFOSA	4151-50-2
N-ethyl-N-perfluorooctylsulfonaminoethanol	NEtPFOSAE	1691-99-2
N-methyl-perfluorooctane-1-sulfonamide	NMePFOSA	31506-32-8
N-methylperfluorooctanesulfonamidoethanol	NMePFOSAE	24448-09-7
2,3,3,3-Tetrafluoro-2-(1,1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid	HFPODA	13252-13-6
4,8-dioxa-3H-perfluorononanoic acid	DONA	919005-14-4
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	9Cl-PF3ONS	756426-58-1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	11Cl-PF3OUdS	763051-92-9
Nafion Byproduct 1*		29311-67-9
Nafion Byproduct 2*		749836-20-2
Perfluoro(3,4,5,9-tetraoxadecanoic) acid*		39492-90-5
Perfluoro(3,5,7-trioxaoctanoic) acid*		39492-89-2
Perfluoro(3,5-dioxahexanoic) acid*		39492-88-1
Perfluoro-2-methoxyacetic acid*		674-13-5
Perfluoro-2-methoxyethoxyacetic acid		151772-58-6
Perfluoro-3-methoxypropanoic acid	PFMOPrA	377-73-1
Perfluoro-4-isopropoxybutanoic acid		801212-59-9
Perfluoro-4-methoxybutanoic acid	PFMObA	863090-89-5

*non-target analyte - semi-quantitative

Sampling Preservatives and Bottles

Matrix	Container/Preservation	Method
Potable Water	2 x 250mL WM Plastic/ Trizma	EPA 537.1
Aqueous	2 x 250mL WM Plastic/ none	537 Isotope Dilution
Aqueous (DOD)	2 x 250mL WM Plastic/ none	537 Isotope Dilution QSM 5.1 table B-15
TOP in Water (Pre-Oxidation)	3 x 250mL WM Plastic/ none	537 Isotope Dilution
TOP in Water (Post-Oxidation)	3 x 250mL WM Plastic/ none	537 Isotope Dilution
Solid	1 x 125mL WM Plastic/ none	537 Isotope Dilution
Solid (DOD)	1 x 125mL WM Plastic/ none	537 Isotope Dilution QSM 5.1 table B-15
AFFF	1 x 250mL WM Plastic/ none	537 Isotope Dilution

Eurofins provides sample collection bottles made of high-density polyethylene plastic (HDPE) and lids that are free of Teflon™ lining.

PFAS Certifications & Accreditations

Eurofins holds certification with the Department of Defense (DoD) ELAP program and state accreditations for per- and polyfluorinated chemical analysis that follow QSM Table B15 protocol. We were one of the first to have experience with EPA 537 v1.1 as we worked with EPA on the validation of the method.

	EPA 537 Potable Water (SDWA)	EPA 537.1 Potable Water (SDWA)	Non Potable (CWA)	Solid Waste (RCRA)		EPA 537 Potable Water (SDWA)	EPA 537.1 Potable Water (SDWA)	Non Potable (CWA)	Solid Waste (RCRA)
Alabama	✓	✓	✓	✓	Montana	✓	✓		
Alaska	✓		✓	✓	Nebraska	✓			
Arizona	✓	✓	✓	✓	Nevada	✓		✓	✓
Arkansas	✓	✓	✓	✓	New Hampshire	✓	✓	✓	✓
California	✓	✓	✓	✓	New Jersey	✓	✓	✓	✓
Colorado	✓	✓			New Mexico				
Connecticut	✓	✓	✓	✓	New York	✓	✓	✓	✓
Delaware	✓	✓			North Carolina	⌚		✓	✓
Florida	✓	✓	✓	✓	North Dakota	✓		✓	✓
Georgia	✓		✓	✓	Ohio		✓	✓	✓
Hawaii	✓	⌚			Oklahoma			✓	✓
Idaho					Oregon	✓	✓	✓	✓
Illinois	✓		✓	✓	Pennsylvania	✓	✓	✓	✓
Indiana					Rhode Island	✓		✓	
Iowa	✓				South Carolina	✓		✓	✓
Kansas	✓	⌚	✓	✓	South Dakota				
Kentucky	✓		✓	✓	Tennessee	✓			
Louisiana	✓	✓	✓	✓	Texas	✓	✓	✓	✓
Maine	✓	✓	✓	✓	Utah	✓	✓		
Maryland	✓	✓			Vermont	✓	✓		
Massachusetts	✓	✓	✓		Virginia	✓		✓	✓
Michigan	✓	✓	✓	✓	Washington	✓		✓	✓
Minnesota	✓	✓	✓	✓	West Virginia	✓		✓	✓
Mississippi	✓	✓			Wisconsin			✓	✓
Missouri	✓	✓			Wyoming	✓	✓		

✓ Certifications or Accreditations Held

⌚ Accreditation in Process

✓ Able to Complete Work

Contact Eurofins for specific state PFAS program details



Eurofins Locations for PFAS Analysis

Eurofins Eaton Analytical Monrovia, CA and South Bend, IN

- PFAS in drinking water - reporting 39 quantitative plus six semi-quantitative compounds
- Largest drinking water lab in the country
- Backup capacity between two labs to accommodate project schedules
- NELAP / ISO 17025 accredited

Eurofins Lancaster Laboratories Environmental Lancaster, PA

- PFAS in drinking water, groundwater, wastewater, soil, sediment, tissue, biosolids, AFFF, milk, food and vegetation and consumer products
- DoD / NELAP / ISO 17025 accredited
- TOP Analysis
- Isotope Dilution

Eurofins TestAmerica West Sacramento, CA; Denver, CO; Burlington, VT; Knoxville, TN

- PFAS in drinking water, groundwater, wastewater, soil, sediment, tissue, biosolids, AFFF, consumer products and air
- DoD / NELAP / ISO 17025 accredited
- TOP Analysis
- Isotope Dilution



www.EurofinsUS.com/PFAS