PFAS - C8 compounds

PFOS - Perfluorooctane sulfonate
PFOA- Perfluorooctanoic acid

Measuring PFAS in Drinking Water:
Understanding the Science and Preparing for a Regulatory Future

PFAS History

Dupont discovers by mistake Teflon 1930's

Used in production Uranium enrichment to line pipes to prevent HF corrosion, classified by US Government as classified

1946 declassified and released into market for nonstick pans and textile protective coatings.

AFFF was commercially marketed 1970's after being developed for the Navy

What materials leach pfas chemicals

Original Scotchgard used a fluorochemical based on a C8 compound known as perfluorooctane sulfonate (PFOS)

AFFF (Aqueous Film Forming Foam) is a type of fire suppressant used to extinguish fires involving flammable liquids, like gasoline and oil, but it contains PFAS (per- and polyfluoroalkyl substances)

Personal Care & Cosmetics: Products like shampoo, dental floss, nail polish, and eye makeup may contain PFAS.

Waterproof Materials: Water-resistant clothing, rain jackets, and tents can leach these chemicals.

Wastewater & Biosolids: Industrial facilities can release PFAS into the environment, which can end up in wastewater and then in soil when treated sewage sludge (biosolids) is used as fertilizer.

PFAS Pathways into Drinking Water Systems

Fire Events that used AFFF to extinguish fire

Training exercises at most Airports used AFFF

Run off from land applied bio solids

Storm water run off

House hold sewer discharge

State vs. Federal Standards Limits

MassDEP MMCL:

The 20 ng/L limit is for the sum of six specific PFAS compounds, referred to as PFAS6.

EPA MCLs:

The EPA has also set national limits for some individual PFAS and a different Hazard Index for mixtures of others.While these are federal standards, the state's MMCL is the governing standard in Massachusetts for PFAS.

What to do if your water exceeds the limit

Notification:

If a public water system's (PWS) PFAS6 level exceeds 20 ng/L, the water supplier must notify consumers.

Sensitive Subgroups:

Consumers in sensitive subgroups (like pregnant women or those with infants) are advised to use bottled water for drinking and cooking when levels are above the standard.

Testing:

Public water supplies in Massachusetts have been required to test for PFAS6, with different sampling frequencies depending on the system's size and population served.

Comparison of Method 533 and Method 537.1

Feature	Method 533	Method 537.1
Analyte List	Measures up to 25 PFAS compounds. It is specifically optimized to detect difficult-to-analyze short-chain PFAS (carbon chain lengths of 4 to 12).	Measures up to 18 PFAS compounds. It focuses on a different group of PFAS, including legacy long-chain compounds.
Quantitation	Uses isotope dilution, a more advanced technique that improves accuracy by using labeled compounds to correct for matrix interferences during analysis.	Uses an internal standard method, which is a simpler but potentially less robust form of quantification.
Holding Times	Allows for more time between sample collection and analysis, with a 28-day holding time for both extraction and analysis.	Requires a shorter hold time, with samples needing to be extracted within 14 days of collection.
Sample Preservation	Requires the addition of ammonium acetate as a preservative.	Requires the addition of Trisma as a preservative.
Extraction Technique	Uses a weak anion exchange solid-phase extraction (SPE) cartridge, along with an elution solvent of methanol and 2% ammonium hydroxide.	Uses a polymeric (polystyrene divinylbenzene) SPE cartridge and a methanol elution solvent.

Sample Collection

1. Wear PFAS free clothing, no plastic, gortex, polypro, polar tec, etc. Natural materials with no moisture or fire retardents.
2. Wash hands and wear PFAS free gloves.
3. All transport equipment should be PFAS free, cooler, plastic bags, ice bricks, etc.
4. Use lab provided containers pre-preserved, Triza
5. Take a field blank, helps prove that hit is not self induced

PFAS Analytical Results

CAS #	REGULATED PFAS CONTAMINANTS	Synonym	Result (ng/L)	Qualifier	MCL ng/L	MDL ng/L	MRL ng/L	DF
1763-23-1	Perfluorooctane Sulfonic Acid	PFOS	1.78	J		0.629	2.00	1
335-67-1	Perfluorooctanoic Acid	PFOA	3.46			0.629	2.00	1
355-46-4	Perfluorohexane Sulfonic Acid	PFHxS	0.735	J		0.629	2.00	1
375-95-1	Perfluorononanoic Acid	PFNA	ND			0.629	2.00	1
375-85-9	Perfluorohepatanoic Acid	PFHpA	1.45	J		0.629	2.00	1
335-76-2	Perfluorodecanoic acid	PFDA	ND			0.629	2.00	1
	PFAS6(Sum of PFAS Regulated Contaminants at or above the MRL)		3.46	-	20	-	-	-

CAS #	UNREGULATED PFAS CONTAMINANTS	Synonym	Result (ng/L)	Qualifier	MCL ng/L	MDL ng/L	MRL ng/L	DF
375-73-5	Perfluorobutane sulfonic acid	PFBS	3.01			0.629	2.00	1
307-55-1	Perfluorododecanoic acid	PFDoA	ND			0.629	2.00	1
307-24-4	Perfluorohexanoic acid	PFHxA	2.76			0.629	2.00	1
376-06-7	Perfluorotetradecanoic acid	PFTA	ND			0.629	2.00	1
72629-94-8	Perfluorotridecanoic acid	PFTrDA	ND			0.629	2.00	1
2058-94-8	Perfluoroundecanoic acid	PFUnA	ND			0.629	2.00	1
2991-50-6	N-ethyl perfluorooctanesulfonamidoacetic acid	NEtFOSAA	ND			0.629	2.00	1
2355-31-9	N-methyl perfluorooctanesulfonamidoacetic acid	NMeFOSAA	ND			0.629	2.00	1
763051-92-9	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	11Cl-PF3OUdS	ND			0.629	2.00	1
756426-58-1	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid	9Cl-PF3ONS	ND			0.629	2.00	1
919005-14-4	4,8-dioxa-3H-perfluorononanoic acid	ADONA	ND			0.629	2.00	1
13252-13-6	Hexafluoropropylene oxide dimer acid	HFPO-DA	ND			0.629	2.00	1

Phil Brown - PFAS Project Lab

https://pfasproject.com/