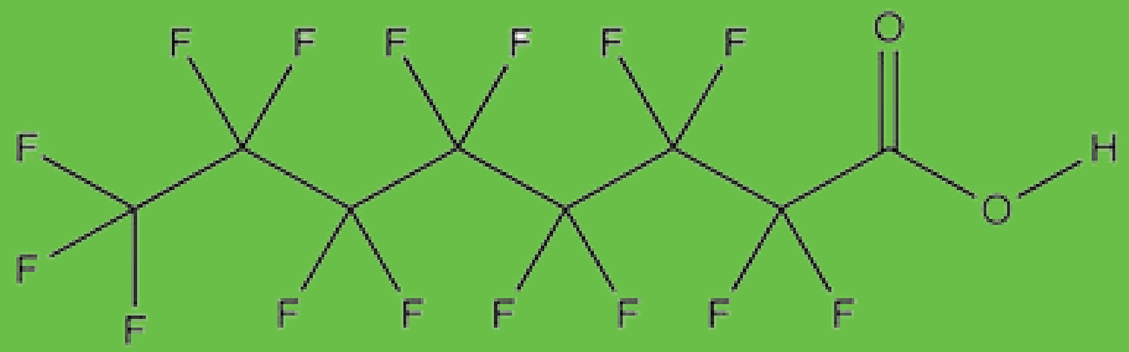
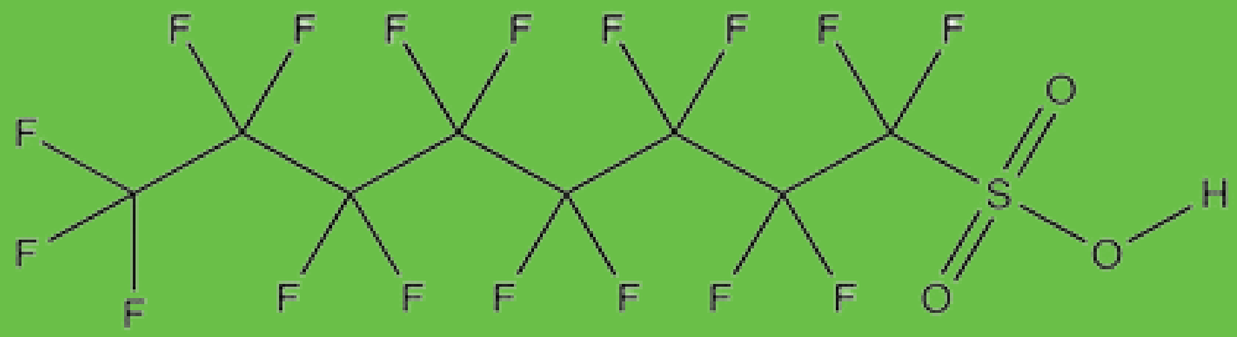
PFAS/ PFOA Potential Implications Where are We?

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)



PFOA



PFOS

forever chemicals that persist in the environment

Where are they found?

Products are treated with PFAS to imbue heat, stain, grease and water repellency properties to a wide variety of consumer products, including clothing, makeup, furniture, adhesives, food packaging and serving containers, non-stick cooking surfaces and personal care products. In the environment, PFAS are highly mobile and can bioaccumulate in flora and fauna.

A quick chemistry lesson

- Thousands of individual PFAS
- C-F bond is very strong and difficult to break - very stable
- PFAS differ based on:
  - Carbon-chain length
  - # of fluorinated carbon atoms
  - inclusion of functional groups (carboxylates, sulfonates, phosphates, amines)
  - per vs poly fluorinated carbon chains
- Long chain PFAS with non-fluorinated carbon's are easier to remove and partition, but are also subject to degradation into shorter chain compounds that are more stable
- Why we see many treatment plants with higher effluent concentration than influent concentration

And then what happens to them?

Products at the end of their useful life are discarded, typically in landfills, where breakdown causes PFAS to detach and become mobile. Mobilized PFAS, are carried by landfill liquids and landfill gas.

Where else do they go?

A large portion of PFAs are washed down the drain (pots, makeup, cleaning products, etc.) and accumulate in biosolids generated in the treatment of sanitary wastewater. Facilities that accept biosolids or sewage sludge are also likely introducing PFAS from these sources.

And then….

Through these various mechanisms PFAS then enter the environment and move downstream where other facilities pull them into their plants via groundwater or surface intakes.

Who is responsible for them if you pull them in from the environment?

Will net limits be allowed? How much is in your intake?

We have been hearing about PFAs for years, so where are we?

DRAFT WQ & DW Standards - Still Not Final

2016 - Set limits at 70 ppt for PFOA and PFOS combined in drinking water

2022 - Drafted revisions to 0.004 ppt for PFOA and 0.2 ppt for PFOS in drinking water

2023 – Drafted revisions to 4 ppt for both PFOA and PFOS in drinking water plus a Hazard Index of 1 for PFNA, PFBS and PFHxS.

Table 1—Draft Recommended Freshwater Aquatic Life Water Quality Criteria for PFOA and PFOS

Criteria component	Acute water column (CMC) [1]	Chronic water column (CCC) [2]	Invertebrate whole-body (mg/kg ww[3])	Fish whole-body (mg/kg ww)	Fish muscle (mg/kg ww)
PFOA Magnitude	49 mg/L	0.094 mg/L	1.11	6.10	0.125
PFOS Magnitude	3.0 mg/L	0.0084 mg/L	0.937	6.75	2.91
Duration	1-hour average	4-day average	Instantaneous.[4]		
Frequency	Not to be exceeded more than once in three years, on average	Not to be exceeded more than once in three years, on average	Not to be exceeded more than once in ten years, on average.		

So what are they doing?

1

Initial Nationwide Monitoring Data on 29 PFAS in Drinking Water Systems

2

Intel is that 308 Information Requests will be going out in 2024 to nations 200-300 largest POTWs to begin monitoring

3

Issuing Guidance to States on what they should consider doing

But wait there is more…

4

Adding PFAS as a National Enforcement and Compliance Initiative

5

Final Rule to Enhance PFAS Toxics Release Inventory Reporting

6

Requiring Toxics Release Inventory Reporting for Seven Additional PFAS

TEST METHODS FINALIZED IN JANUARY 2024

- Final EPA Method 1633, a method to test for 40 PFAS in wastewater, surface water, groundwater, soil, biosolids, sediment, landfill leachate, and fish tissue.
- Final EPA Method 1621, which can broadly screen for the presence of chemical substances that contain carbon-fluorine bonds, including PFAS, in wastewater.
- Other Test Method (OTM)-50, which measures 30 volatile fluorinated compounds in air.

Testing

Current technology can reliably quantify < 100 PFAS

Technology	Environmental media	Advantages	Limitations
Targeted methods	Water (potable and non-potable), solids, soil, air, leachate	Sensitive - can detect some PFAS down to 0.1 parts per trillion (ppt) EPA methods exist for this technology.	Method can only detect specific PFAS targeted for analysis and for which a standard is available.
Non-targeted methods	Water (potable and non-potable), solids, soil, air, leachate	Can screen for PFAS broadly, discover new PFAS without need for analytical standards.	Cannot measure amount of newly discovered PFAS without analytical standard. No EPA methods exist.
Total fluorine methods	Most methods designed for detection in water (potable and non-potable), some applied to soil	Can quantify PFAS at high concentrations (~1,000 ppt) that would be unquantifiable by other methods.	Total fluorine methods are not standardized or multilaboratory-validated as EPA methods. Most are not widely available and some are more costly.

Source: GAO analysis of agency documents. | GAO-22-105088

EPA 1663

SAMPLING CHALLENGES REMAIN

High risk of contamination

Extremely challenging to prevent contamination at such low reporting levels

Requires highly trained sampling technicians

Recommendations for Applicable Industrial Direct Dischargers to Monitor for PFAs issued to states in late 2022:

Industry categories known or suspected to discharge PFAS include:

organic chemicals, plastics & synthetic fibers (OCPSF);
metal finishing; electroplating; electric and electronic components;
landfills; pulp, paper & paperboard;
leather tanning & finishing; plastics molding & forming;
textile mills; paint formulating, airports; CWTs
and anyone else that has the reasonable potential to have PFAs.

EPA recommends that monitoring include each of the 40 PFAS parameters detectable by method 1633 and be conducted at least quarterly to ensure that there are adequate data to assess the presence and concentration of PFAS in discharges

EPA notes that no permit may be issued to the owner or operator of a facility unless the owner or operator submits a complete permit application in accordance with applicable regulations, and applicants must provide any additional information that the permitting authority may reasonably require to assess the discharges of the facility (40 CFR 122.21(e), (g)(13)). The applicant may be required to submit additional information under CWA Section 308 or under a similar provision of state law.

RCRA Implications:

On February 8, 2024, EPA proposed changes to the Resource Conservation and Recovery Act regulations by adding nine particular per- and polyfluoroalkyl compounds, their salts, and their structural isomers, to its list of hazardous constituents in Title 40 of the Code of Federal Regulations Part 261 Appendix VIII. These nine PFAS are:

- Perfluorooctanoic acid.
- Perfluorooctanesulfonic acid
- Perfluorobutanesulfonic acid.
- Hexafluoropropylene oxide-dimer acid.
- Perfluorononanoic acid.
- Perfluorohexanesulfonic acid.
- Perfluorodecanoic acid.
- Perfluorohexanoic acid.
- Perfluorobutanoic acid.

RCRA Implications:

EPA also issued a draft Hazardous Waste Corrective Action Rule ammending the definition of hazardous waste as it applies to RCRA corrective action addressing releases from the solid waste management units of permitted treatment, storage and disposal facilities, or TSDFs. If finalized, the rule would clarify that the statutory definition of hazardous waste applies to corrective action for releases from solid waste management units.

The proposed rule provides clear regulatory authority to require RCRA-permitted facilities to conduct corrective action not only for substances listed and identified as RCRA hazardous waste and hazardous constituents, but also for any substance meeting the statutory definition of hazardous waste.

RCRA Implications:

EPA identified 56 industries most likely to be affected by the PFAS Hazardous Constituent Rule, including waste management and remediation services, chemical manufacturing, petroleum and coal products manufacturing, and fabricated metal product manufacturing.

The five industries cover over 54% of the 1,740 potentially affected facilities that the EPA identified in its rulemaking. These industries and facilities would also be affected by the Hazardous Waste Corrective Action Rule.

Facilities that would not be affected by the RCRA corrective action requirements include solid waste disposal facilities — such as municipal waste or construction and demolition landfills — and publicly owned treatment works facilities, unless those facilities were also operating as hazardous waste TSDFs.

Hazardous waste generators that are not subject to the RCRA permitting requirements would not be affected by the proposed rules.

RCRA Implications:

If the PFAS Hazardous Constituent Rule is finalized and the nine PFAS are listed as hazardous constituents, the EPA would have to determine only that the PFAS can pose a substantial hazard before designating them as hazardous wastes.

In the PFAS Hazardous Constituent Rule, the EPA noted that "listing these PFAS as RCRA hazardous constituents does not make them, or the wastes containing them, RCRA hazardous wastes." However, this ignores the potentially broader implications of the proposed rules.

The EPA continues to evaluate available data before deciding to add PFAS compounds to the RCRA hazardous waste list. This, combined with the broadened definition in the Hazardous Waste Corrective Action Rule, signals the EPA is proceeding down this path. Listing any of the nine PFAS compounds as hazardous wastes would open the door to other statutory requirements. For example, RCRA cradle-to-grave requirements and the cleanup authorities under CERCLA would apply to PFAS.

Other Areas for Concern

CERCLA RQ

1lb/day

Solids

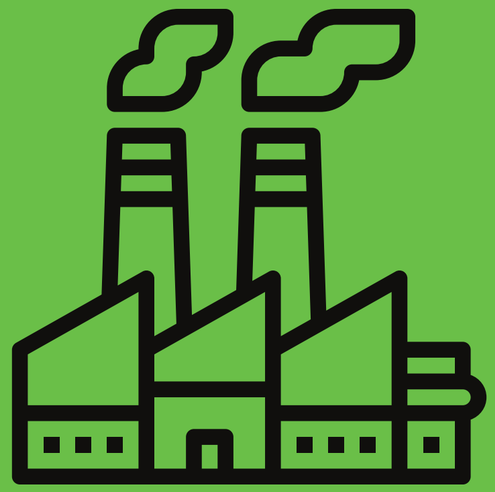
Remediate Soils

Receiving Stream Clean Up

Pre-cursors

Intake Water

Potential Industrial Sources



Where are they coming from?

Where does your make up water come from?

Do you use PFAS containing compounds (i.e. on the list for updates)

Any legacy contamination on the site?

Valves, bearings and other large grease fitted junctions?

Ever fought any fires on-site in the past?

the Treatment Process

Conventional Treatment (activated sludge) generally does not remove or destroy PFAS

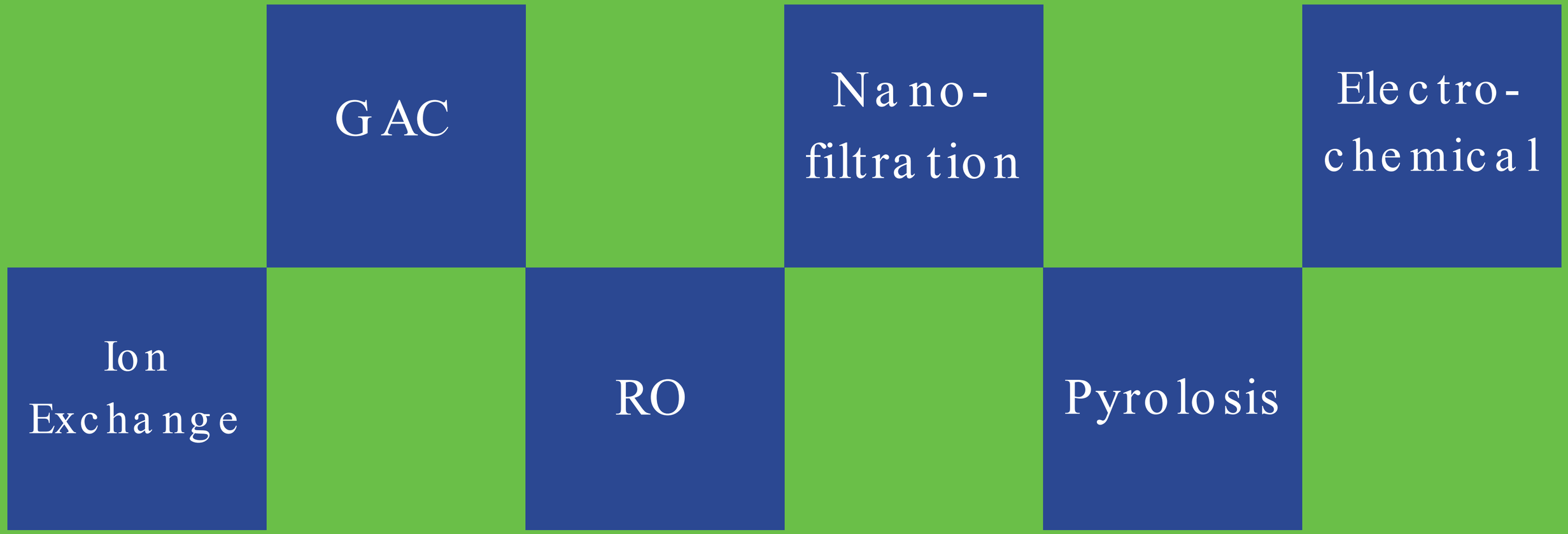
Precursors (alkyl acids, sulfonamides, alcohols, sulfonates) exist at levels that when degraded in the treatment plant result in higher effluent concentrations of measured PFAS

Longer retention and higher temperatures enhance transformation

Monitoring of precursors and longer chain PFAS throughout the process is necessary to understand fully the complexity of effluent concentrations

Treatment and Remediation

Treatment and remediation require specific techniques, most of which do not destroy PFAs, simply create another waste stream that requires management.



Challenges to broad based regulation:

1

Avoid incentivizing product sourcing from outside the United and drive up prices for American industry and consumers = further supply chain issues.

2

Some flouropolymers are necessary to advance 5G technologies, to advance production of Li-ion batteries for electric vehicles, hydrogen fuel cells, and a host of renewable energy generation technologies

3

Responsibility of industry and regulated community to participate in rule making

SO WHAT DO YOU NEED TO BE DOING?

Watching the CFR

Sampling

Participate in Industry Groups

Doing some calcs

Inventory Users

Educate your public

Making comments

Quantify Ambient Levels

Ask Questions

PROVIDENCE

Thank You!

Shout out to Carol Martinson who I work with (we typically do this presentation together) for helping with development!