



PFAS Forever Chemicals and Brownfields

What you need to know



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March 26, 2024
Pennsylvania Brownfields Conference, State College, PA

EPA PFAS Updates

2024 Pennsylvania Brownfields
Conference

March 26, 2024

Ruby Stanmyer

EPA Region 3 Water Division

What Are Per- and Polyfluoroalkyl Substances (PFAS) and Why are We Concerned?

PFAS captures a large class of synthetic chemicals.

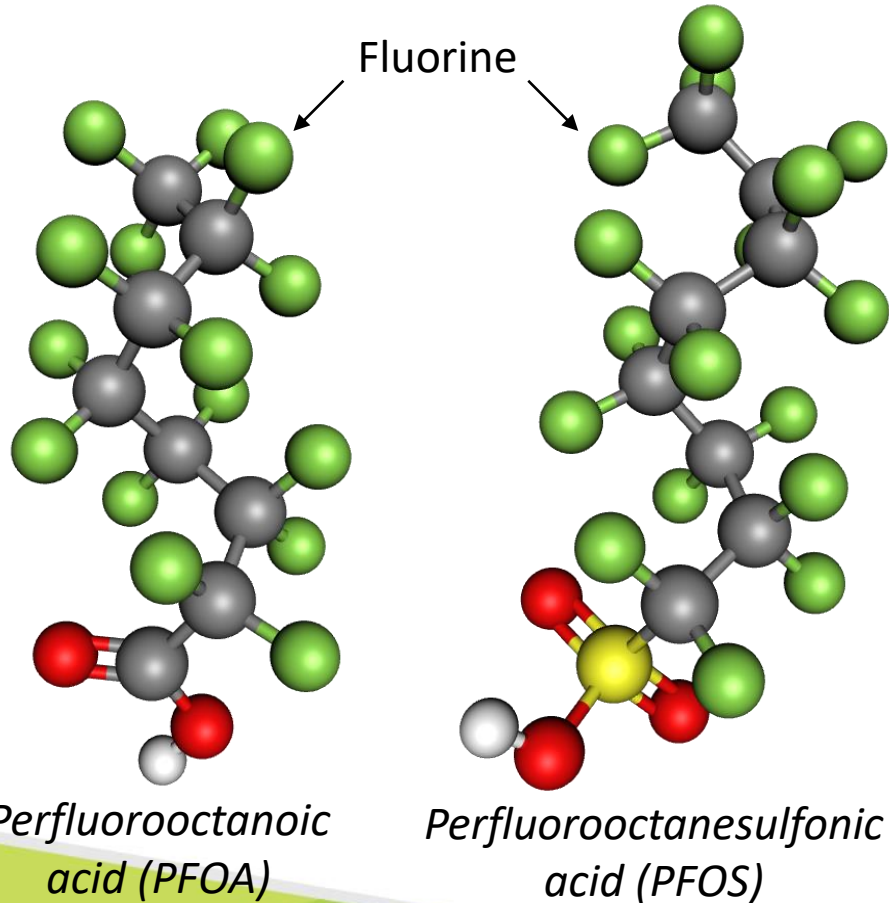
- Chains of carbon atoms surrounded by fluorine atoms.
- Wide variety of chemical structures.

Used in homes, businesses, and industry since the 1940s.

- Used by a number of industries and found in many consumer products.
- Detected in soil, water, and air samples.
- Most people have been exposed to PFAS.

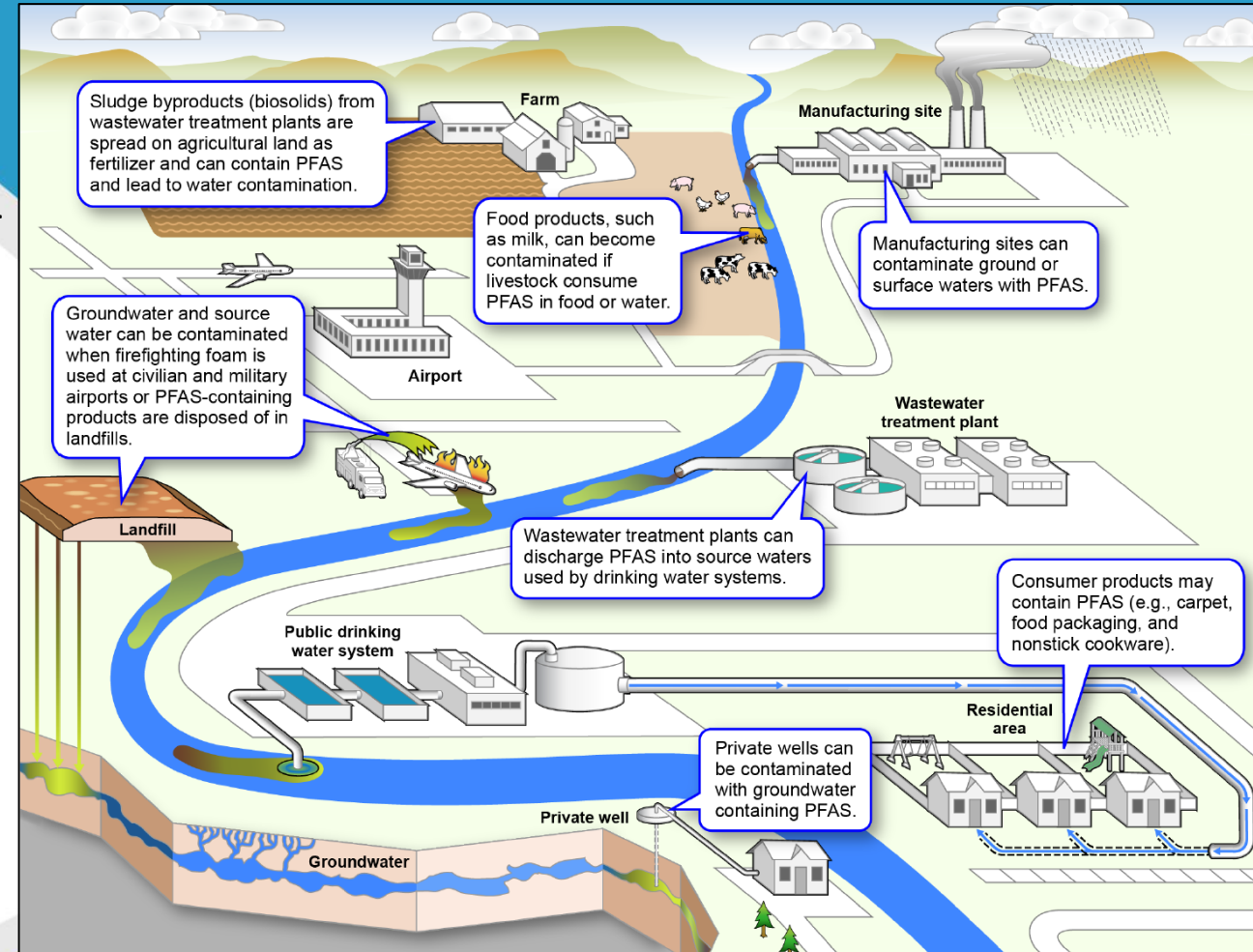
Known or suspected toxicity.

- Potential developmental, liver, immune, and thyroid effects.
- Some are relatively well understood; many others are not.
- Resist decomposition in the environment and in the human body.



EPA PFAS Roadmap

- EPA Administrator Michael Regan established the EPA Council on PFAS in April 2021.
- The Council developed the PFAS Strategic Roadmap, released in October 2021 – a bold, strategic, whole-of-EPA strategy to protect public health and the environment from PFAS.
- The PFAS Strategic Roadmap:
 - Lays out EPA’s whole-of-agency approach to tackling PFAS;
 - Sets timelines for concrete actions from 2021 to 2024;
 - Fills a critical gap in federal leadership;
 - Supports states’ ongoing efforts; and
- The second annual progress report was released in December 2023.



So, what's
happening in the
water world??



EPA's Proposed Action for the PFAS Drinking Water Rule

- EPA is proposing a National Primary Drinking Water Regulation (NPDWR) to establish legally enforceable levels, called Maximum Contaminant Levels (MCLs), for six PFAS in drinking water.
 - PFOA and PFOS as individual contaminants, and
 - PFHxS, PFNA, PFBS, and HFPO-DA (commonly referred to as GenX Chemicals) as a PFAS mixture
- EPA is also proposing health-based, non-enforceable Maximum Contaminant Level Goals (MCLGs) for these six PFAS.
 - MCLGs are the maximum level of a contaminant in drinking water where there are no known or anticipated negative health effects allowing for a margin of safety.

EPA's Proposed Action for Drinking Water

Compound	Proposed MCLG	Proposed MCL (enforceable levels)
PFOA	0 ppt*	4.0 ppt*
PFOS	0 ppt*	4.0 ppt*
PFNA		
PFHxS	1.0 (unitless)	1.0 (unitless)
PFBS	Hazard Index	Hazard Index
HFPO-DA (commonly referred to as GenX Chemicals)		

The Hazard Index is a tool used to evaluate potential health risks from exposure to chemical mixtures.

- A part per trillion is roughly equivalent to one drop in an Olympic-sized swimming pool OR a single second out of 32,000 years.
- EPA's proposal is lower than any state-directed regulation.

EPA's Proposed Action for Drinking Water

- The proposed rule would require public water systems to:
 - Monitor for these PFAS;
 - Notify the public of the levels of these PFAS; and
 - Reduce the levels of these PFAS in drinking water if they exceed the proposed standards (based on a running annual average approach)
- This action is not final and does not require any actions until after EPA considers public input and finalizes the regulation.
- EPA anticipates that if fully implemented the rule will prevent tens of thousands of serious PFAS-attributable illnesses or deaths.
- Timeline:
 - Proposal published in March 2023
 - Final rule expected sometime early 2024
 - Compliance typically expected three years after publishing
- Note: MCLs often used as cleanup and screening levels for Superfund and RCRA

Pennsylvania's State PFAS Rule

Compound	MCLG	MCL
PFOA	8 ppt*	14 ppt*
PFOS	14 ppt*	18 ppt*

- The rule applies to all public water systems in the Commonwealth.
- Requirements include initial monitoring at all systems and public notification for results and violations.
- The MCLs became effective as of January 14, 2023.
- Compliance monitoring began on January 1, 2024.
- More information:
<https://www.dep.pa.gov/Business/Water/BureauSafeDrinkingWater/DrinkingWaterMgmt/Regulations/Pages/PFAS-MCL-Rule.aspx>

Bipartisan Infrastructure Law and PFAS

The Bipartisan Infrastructure Law (BIL or IIJA) provides \$10 billion to invest in communities impacted by PFAS and other emerging contaminants.

\$4 billion	Drinking Water State Revolving Fund (DWSRF)
\$1 billion	Clean Water State Revolving Fund (CWSRF)
\$5 billion	Small or Disadvantaged Communities Drinking Water Grants (EC-SDC)

- Only states are eligible to apply for these funds from EPA
- Talk to your state SRF contacts if you are interested in accessing funds for PFAS!
 - Robert Boos rboos@pa.gov and/or Dave Henning dahenning@pa.gov
- SRF funds can be used to match an alternate funding source

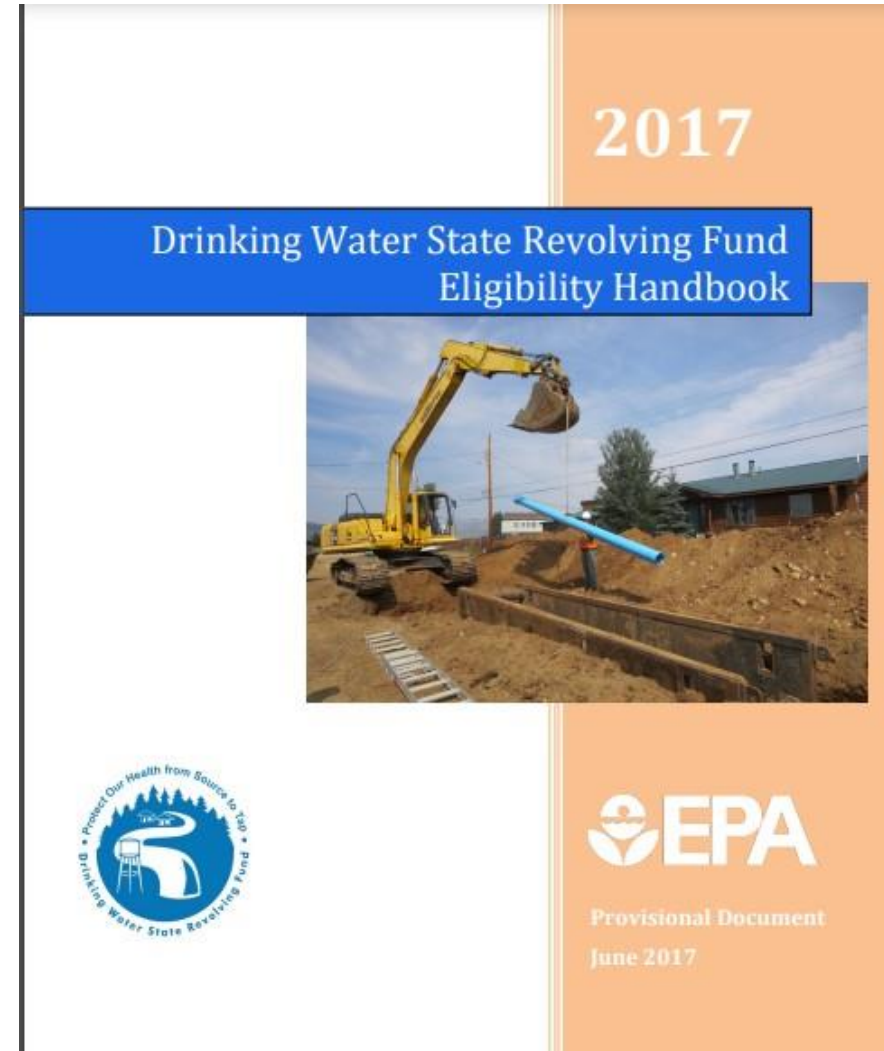
Drinking Water State Revolving Fund Eligibilities

Projects:

- Water Treatment
- Transmission and Distribution
- Lead Service Line Replacement
- Source: new or alternate
- Storage
- Consolidations/Regionalization

Borrowers:

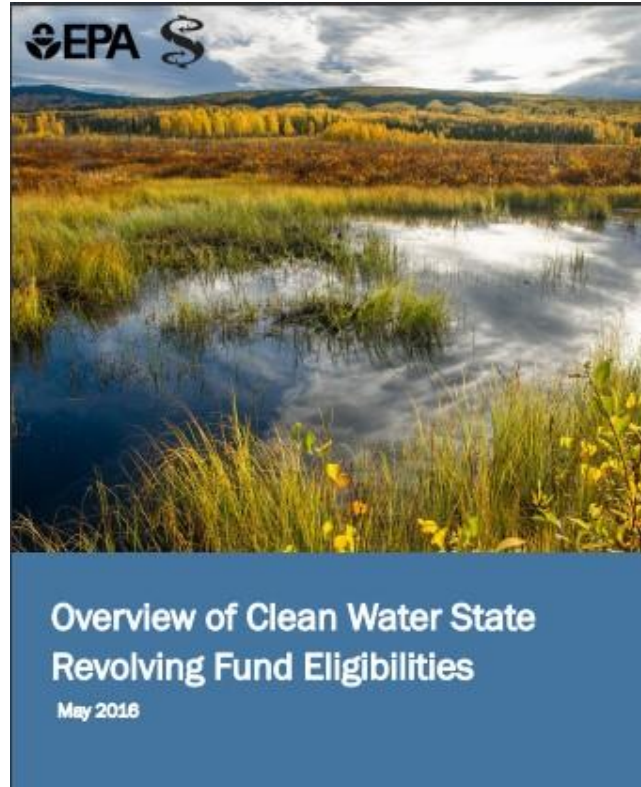
- Community (Public & Private) water system
- Non-profit non-community water system



Clean Water State Revolving Fund Eligibilities

Projects:

- Wastewater Treatment
- Combined Sewer Overflows
- Sanitary Sewer Overflows
- Collection Systems
- Stormwater Projects
- Agricultural BMPs
- Forestry BMPs
- Riparian Buffers
- Stream Restoration
- Wetlands
- Easements/Land Conservation
- WQ Protection/Restoration



Borrowers:

- Local Governments
- Utilities
- Individuals
- Conservation Districts
- Nonprofit entities
- Businesses
- Watershed groups
- Community groups



Want more
data? Do you
like maps?



Try the PFAS Analytic Tools

- EPA released the **PFAS Analytic Tools** in January 2023.
- EPA created the PFAS Analytic Tools to integrate data about PFAS reporting, testing, and occurrences in communities.
- Information includes:
 - Clean Water Act discharges from permitted sources;
 - a log of spills reported containing PFAS constituents;
 - lists of facilities historically manufacturing and importing PFAS chemical;
 - federally owned locations where PFAS is being investigated;
 - a history of transfers of PFAS waste;
 - PFAS detections in the environment (e.g., surface water and fish tissue); and
 - drinking water testing results.

PFAS Analytic Tools

Available at <https://echo.epa.gov/trends/pfas-tools>

EPA Integrated Map Drinking Water (UCMR) Drinking Water (State) Production Environmental Media Discharge

Superfund Sites Federal Sites Industry Sectors Transfers Spills Toxic Releases

Region 03

PFAS Analytic Tools Home

Scope of Drinking Water Samples for Public Water Systems (PWSs):

Most Recent Sample at PWS

All Samples at PWS

Filters:

EPA Region

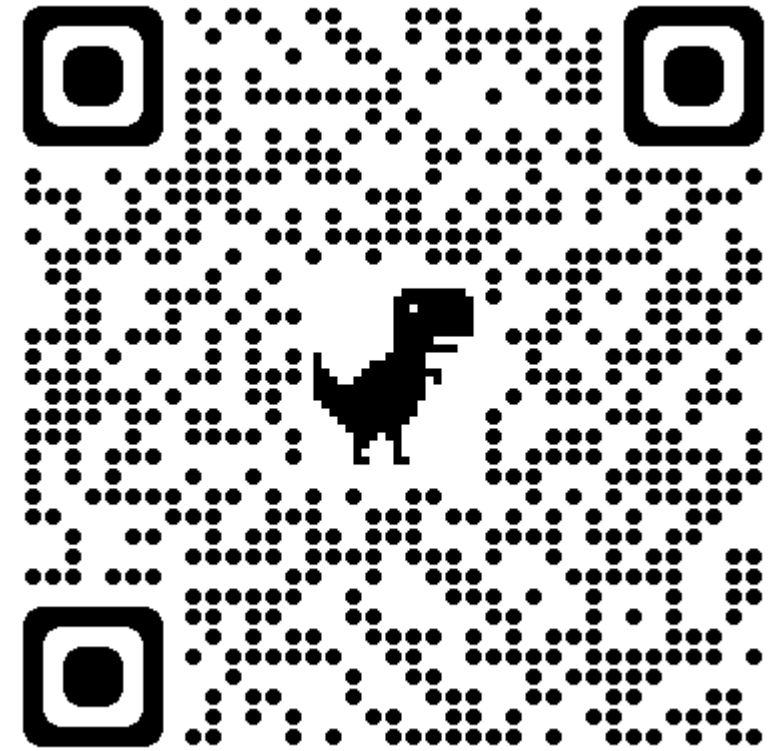
State Territory or Tribe

Include Non-Detects: No

PFAS Analytic Tools

Legend and Layers

Map showing locations across the Eastern United States (Ohio, Pennsylvania, Maryland, Delaware, Virginia, West Virginia, Kentucky, Indiana, Michigan, New York, New Jersey) with numerous data points.





Thank you!
We will be taking questions
at the end of the panel

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Analyzing the PFAS Problem

Charles A. Brown, PhD
Life Scientist

Standards and TMDL Section
USEPA Region III

PFAS Mobility Results in Broad Impacts

Economic

- Decreased real-estate value
- Testing and Clean up
- Negative Perception

Environmental

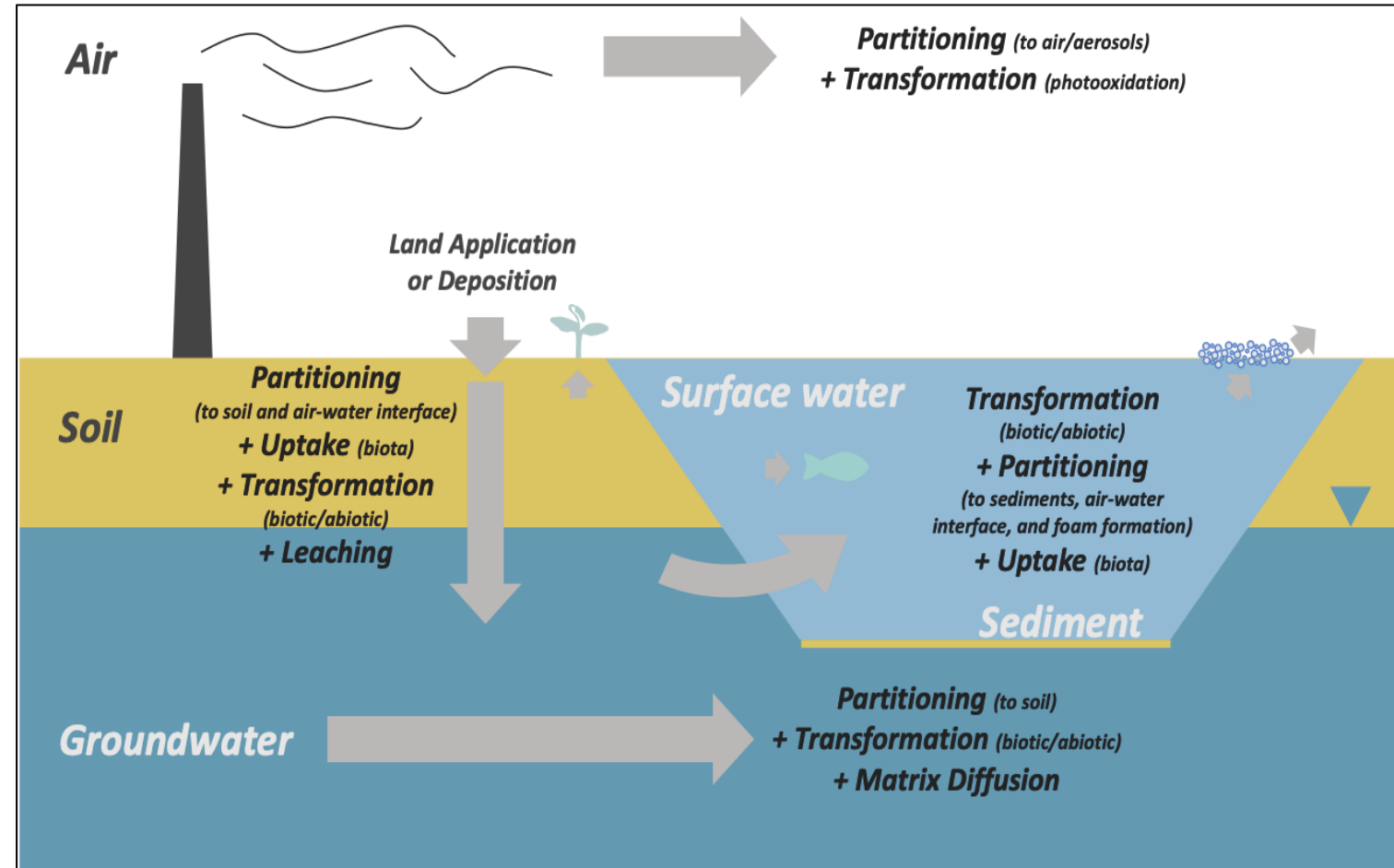
- Potential impacts on aquatic life and human health



www.asdwa.org

Environmental Behavior

- Fate and transport depends on chemical structure
- Chain length
 - Shorter – Aqueous
 - Longer – Protein
- Head group and bioaccumulation (BAF)
 - PFOA – 198.6 L/kg_(ww)
 - PFOS – 3,739 L/kg_(ww)



Obtaining Your Sample

- Sampling results must be defensible!
 - Methods should be well thought out
- Equipment used
 - PFAS-free clothing (if possible)
 - PFAS-free containers and instruments (must)
- Consider how you're sampling
 - PFAS stratification in soil and sediment
 - Minimize turbidity if surface water sampling
- Why re-invent the wheel?
 - EPA PFAS Analytic Tools
 - Other State/Agency databases



Analyzing the Problem

Non-Targeted Analysis

Targeted Analysis

Benefits

- High throughput
- No standards required
- Broad PFAS detection
- PFAS Discovery

- Low detection limits
- Quantitative
- Easier data interpretation

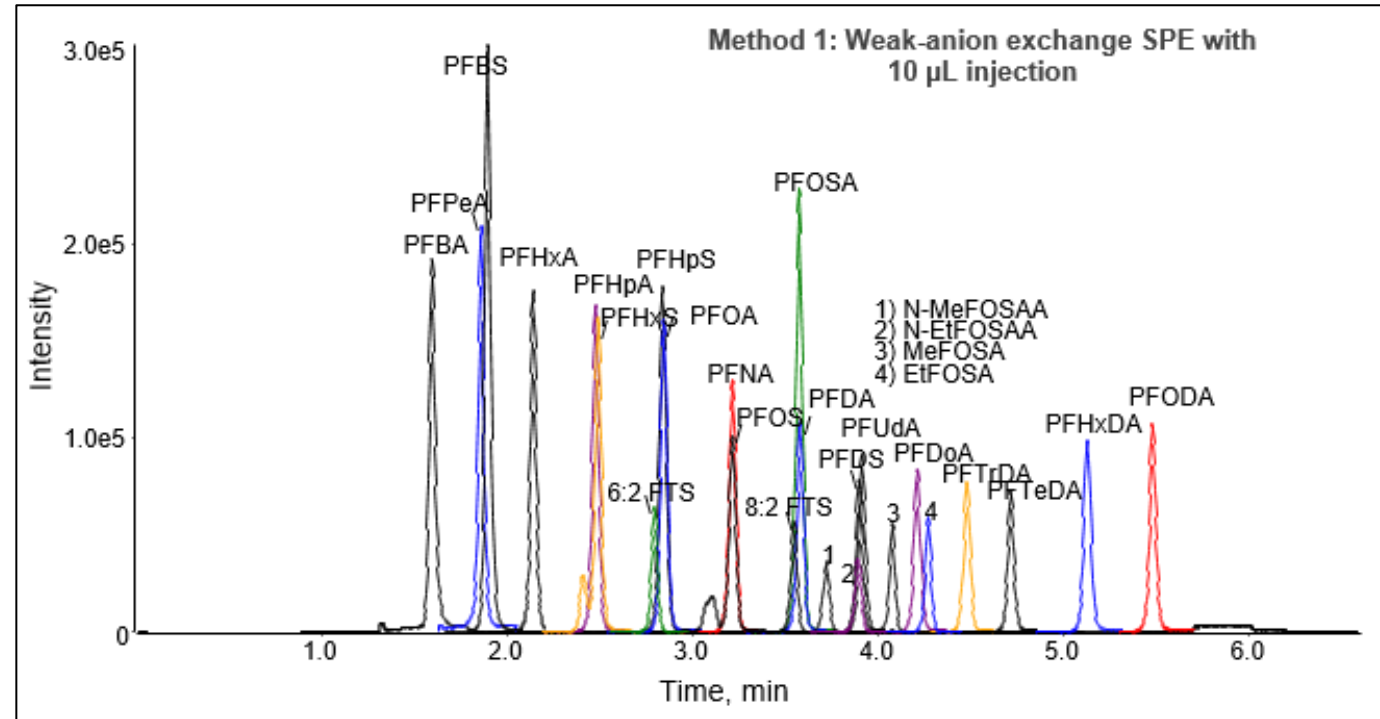
Considerations

- Potential for false positives
- Semi-quantitative
- Many unknowns
- Complex data/specialized interpretation

- Compound detection limited by availability of standards
- Limited list of compounds
- Detection accuracy limited by quality of standards

Targeted Analyses – Test Methods

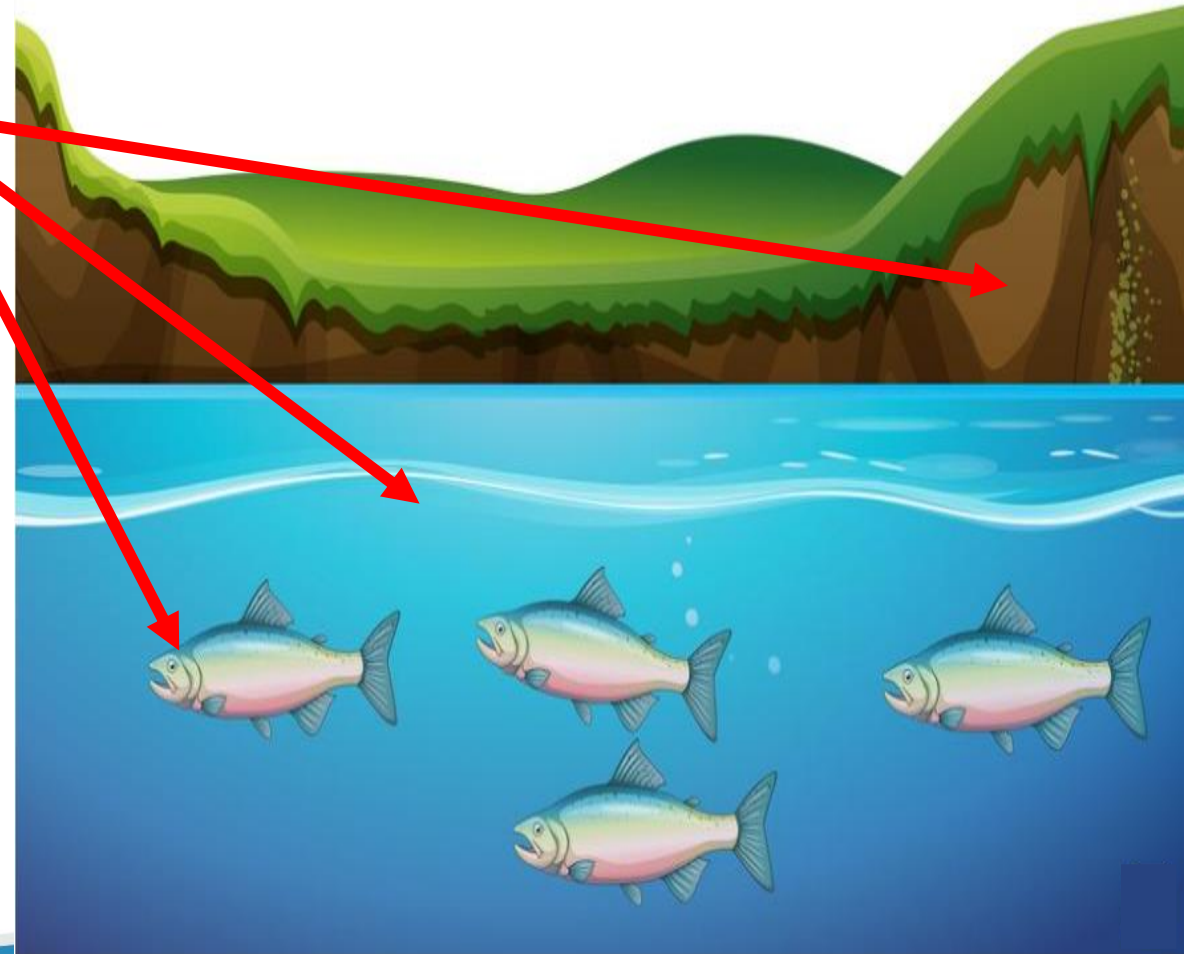
- 533 (LC-MS/MS)
 - Drinking water
 - 25 PFAS
 - Isotopic Dilution
- 537.1 (LC-MS/MS)
 - Drinking water
 - 18 PFAS
 - Modified versions exist
 - Ex: Isotope dilution
 - No longer considered an EPA method
- 8327 (LC-MS/MS)
 - Surface water/ groundwater/ wastewater
 - 24 PFAS compounds



Roberts et al. 2019. Food and Environmental – Sciex

Targeted Analysis – Method 1633

- Robust Methodology
 - Isotope dilution
 - Any Matrix: water, soil, tissue
 - 40 unique PFAS compounds
 - Recent finalization of matrices
- Considerations
 - 40 out of thousands
 - Labor intensive and time consuming
 - Sample preparation – matrix dependant
 - Analysis and data review/verification
 - Demand
 - Regulatory needs
 - Costs
 - Supplies, standards, waste disposal



Targeted Analysis – Method 1633

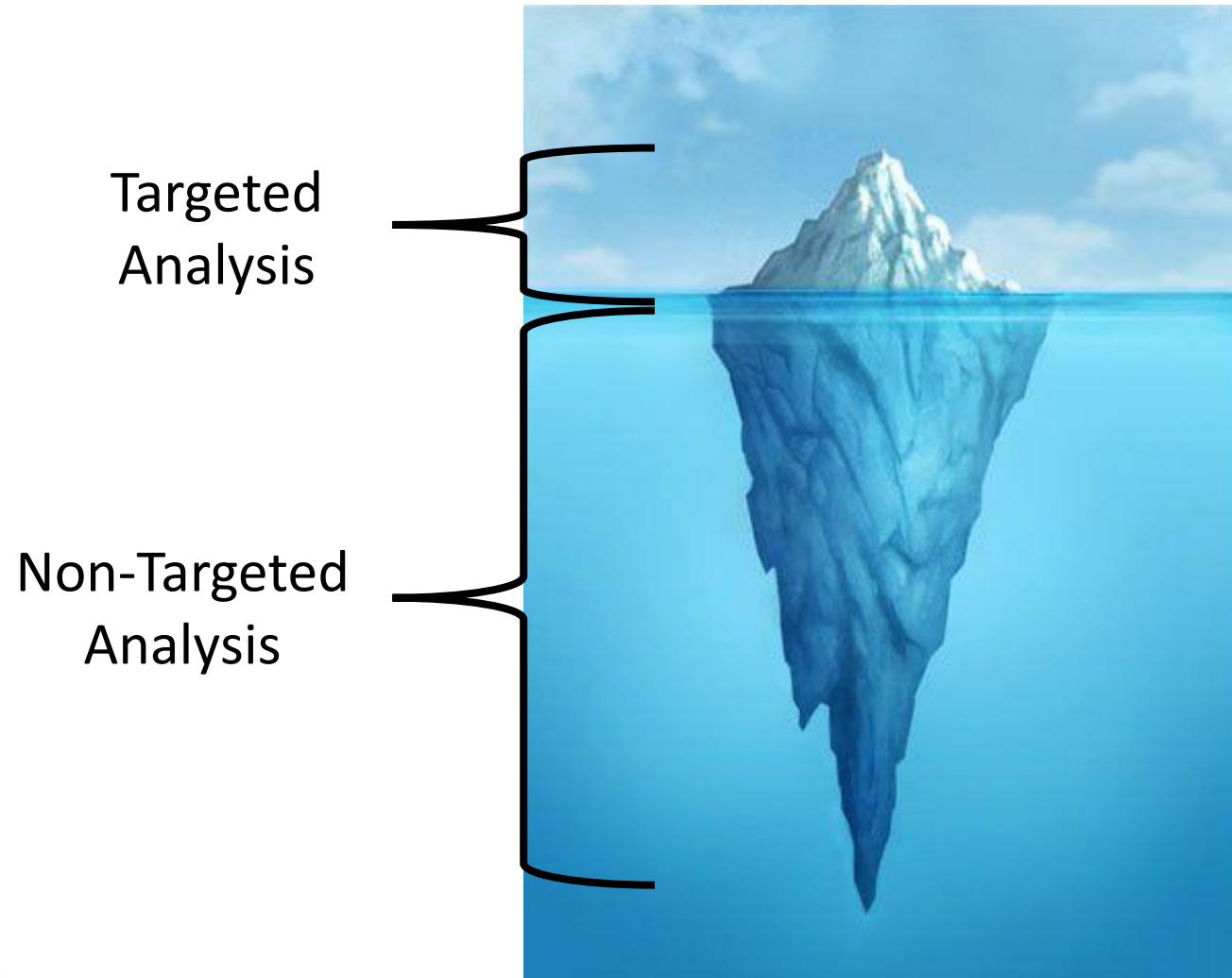
Sensitivity will vary based on:

- Analyte
- Matrix
- Individual lab

Data From EPA Multi-Lab Validation Study

Compound	Aqueous (ng/L)		Solid (ng/g)		Tissue (ng/g)	
	LOQ Range	Pooled MDL	LOQ Range	Pooled MDL	LOQ Range	Pooled MDL
PFOA	1 – 4	0.54	0.16 – 0.4	0.07	0.4 – 0.5	0.105
PFOS	1 – 4	0.63	0.16 – 0.4	0.07	0.4 – 2.0	0.145
GenX (HFPO-DA)	2 – 8	0.51	0.64 – 1.6	0.25	1.6 – 2.1	0.339

Non-Target Analysis



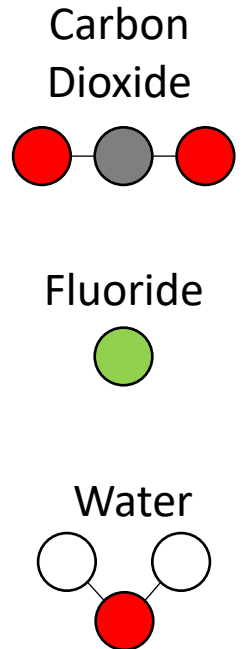
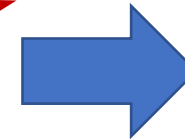
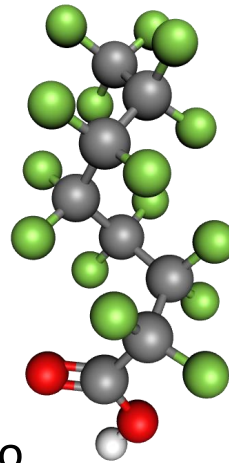
Non-Targeted Analysis - Method 1621

- Broad Screening

- Tests for thousands of PFAS at ppb ($\mu\text{g/L}$)
- Combustion Ion Chromatography
 - F is uncommon in nature
 - Reduces the PFAS to base components

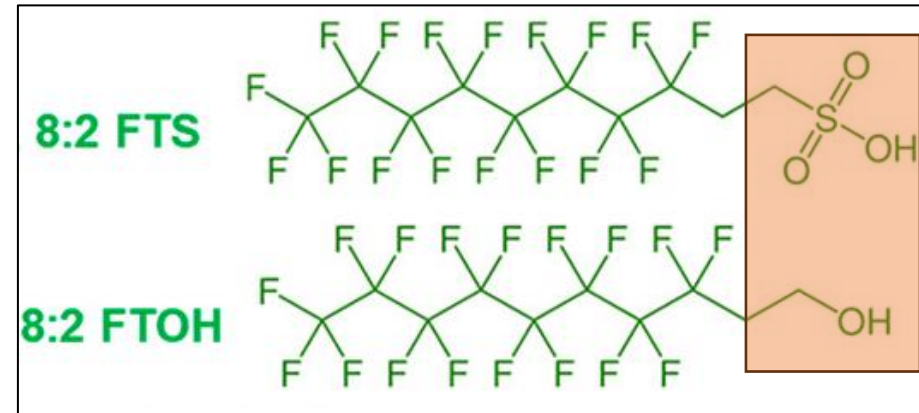
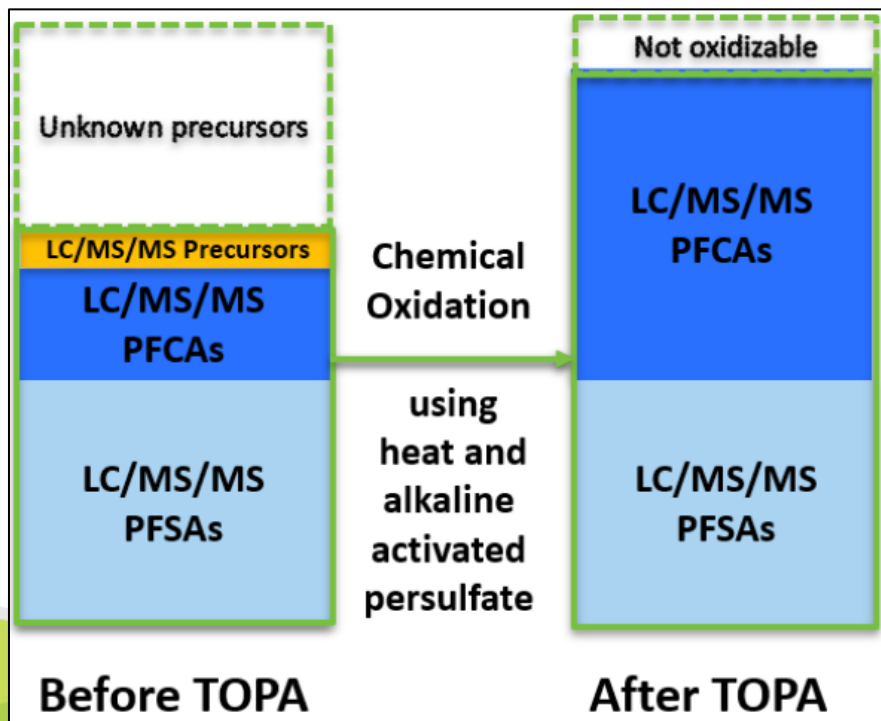
- Considerations

- Destructive
 - Cannot identify compounds
- Adsorbable Organic Fluorine
 - GAC column
 - Short chain (<4 carbons) don't stick well to GAC
 - Long chain (>8) hydrophobic can stick to other surfaces

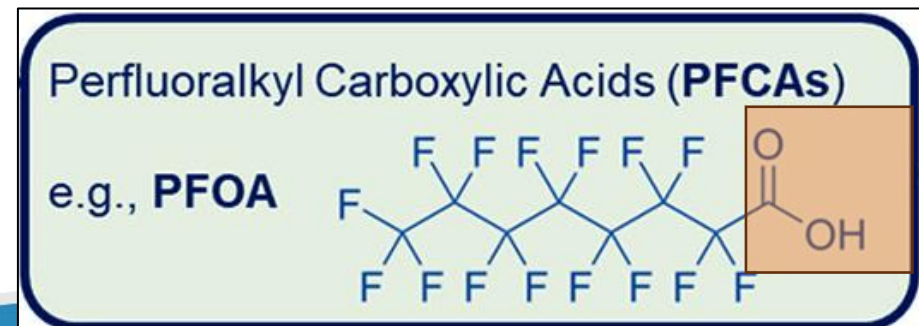


“TOP” Analyses

- Total Oxidizable Precursor (TOP Assay)
 - Oxidizes precursors into terminal forms
 - Fluorotelomer and sulfonamide PFAS broken down to carboxylates
 - Analysis ran twice
 - EPA Method being developed



Heated
Oxidation



Ateia et al. 2023, *Env. Sci. & Tech. Lett.*

Birds Eye View of EPA Methods

Method	No. of Analytes	Detection Range	Matrix Type	Pro's and Con's	Approximate Costs Per Sample (\$)
537.1	18	ng/L (ppt)	Drinking- and Surface Water	<ul style="list-style-type: none"> Not as effective with short chain PFAS 	\$ 300-420
533	25	ng/L (ppt)	Drinking- and Surface Water	<ul style="list-style-type: none"> Effective with short chain PFAS 	\$ 150-420
8327	24	ng/L (ppt)	Drinking-, Surface, Wastewater	<ul style="list-style-type: none"> Commercially established procedure Laboratory cleanup and accuracy issues Not Accepted by DoD 	\$ 350-450
1621	NA	µg/L (ppb)	Aqueous (water/blood)	<ul style="list-style-type: none"> Quick and relatively affordable* Can't ID specific PFAS and Interference from organofluorines 	\$ 500 (\$250)*
1633	40	ng/L(kg) (ppt)	Aqueous, solid, biosolid, tissue	<ul style="list-style-type: none"> Single method that tests a variety of matrices Tests for PFAS included in Methods 537.1, 533, 8327, and 8 more 	Water: \$ 350-450 Sediment: \$ 350-470 Fish tissue: \$ 350-590

ppt – parts per trillion
ppb – parts per billion

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pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION



Bureau of Environmental Cleanup & Brownfields

Pennsylvania Brownfields Conference PFAS under Act 2 March 26, 2024

Josh Shapiro, Governor

Jessica Shirley, Interim Acting Secretary

Current PFAS MSCs

2021: Soil and Groundwater MSCs for

- PFOA
- PFOS
- PFBS

2022: EPA Final Health Advisory (GW ONLY)

- Gen-X
- PFBS

2023: PA MCL (GW ONLY)

- PFOA
- PFOS

Proposed PFAS MSCs

To be published as proposed:

Soil and groundwater MSCs for:

- PFOA
- PFBA
- PFBS
- Gen-X Chemicals
- PFOS
- PFHxA
- Potassium PFBS

Limitations for PFAS

- Fate and transport modeling
 - Leaching/soil retention unknown
 - Does not degrade
- Lack of toxicity information
 - Very few published toxicity factors
 - Inhalation toxicity unknown
- Other limitations
 - Usually mixtures
 - Potentially both carcinogenic AND systemic risk
 - Analysis limitations
 - Potentially volatile

Other Programs in PADEP

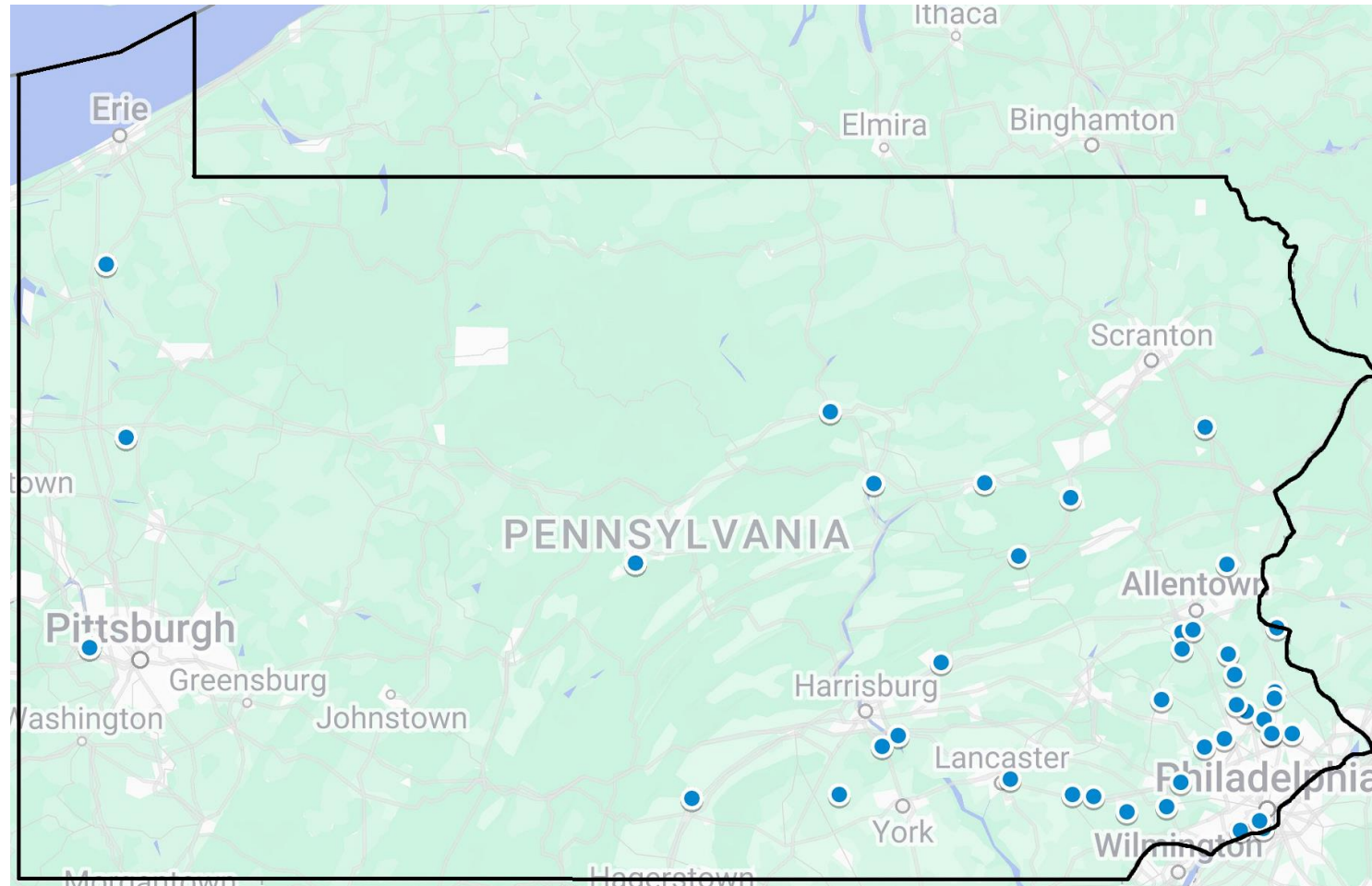
- Bureau of Clean Water
 - Beginning to require PFAS monitoring in NPDES
- Bureau of Safe Drinking Water
 - Promulgated PA MCL for PFOA and PFOS
 - Funds available for public water systems to address PFAS

Other Programs in PADEP

For more information on PA DEP actions, visit:
https://www.dep.pa.gov/Citizens/My-Water/drinking_water/PFAS/Pages/default.aspx



Current PFAS Site Locations



Currently known PFAS sites
This does not include drinking water sampling locations



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Bureau of Environmental Cleanup & Brownfields

Thank you!
**Questions to be addressed at
end of panel session**

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Where Trust and Value Meet™

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Brownfields, Due Diligence, and PFAS

2024 Pennsylvania Brownfields Conference

March 26, 2024

Mackenzie Moyer

Babst | Calland
Attorneys at Law

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Caveat

My presentation is for informational purposes only and does not constitute legal advice. If you have legal questions about your specific site, please discuss with your attorney and environmental professional.

Brownfields Process Overview

- 1) Phase I Environmental Site Assessment
 - Identify Recognized Environmental Conditions (RECs) or other potential issues
- 2) Phase II Environmental Site Assessment
 - Sample to confirm presence/absence of contamination
- 3) Site Investigation
 - More sampling to fill data gaps
- 4) Remediate the contamination
 - Based on results of Site Investigation findings and proposed reuse
- 5) Site Reuse

Land Recycling Program (Act 2) Overview

- Act 2 signed into law by former Governor Tom Ridge on May 19, 1995 as the Land Recycling and Environmental Remediation Standards Act
- 25 Pa. Code Chapter 250. Administration of Land Recycling Program
- Three remediation options
 - Background standard – concentration of contaminant present but not related to releases on site
 - Statewide health standard – Medium Specific Concentrations
 - Site specific standard – risk-based approach
- Remediation standards under Act 2 are used when site is remediated voluntarily or when remediation is required under:
 - Clean Streams Law
 - Air Pollution Control Act
 - Solid Waste Management Act
 - Infectious and Chemotherapeutic Waste Law
 - Hazardous Sites Cleanup Act
 - Storage Tank and Spill Prevention Act

Act 2 Potential Benefits/Drawbacks

- **Liability Protections**
 - Relieved of further remediation for contamination identified in final report
 - Protections from citizen suits and contribution actions
 - Applies to: current owner, future owners, any person who participated in the cleanup, developer, occupiers, successors or assigns, public utilities performing work on property
 - Potential reopeners
- **Other Benefits**
 - Structured regulatory process with PADEP guidance and oversight, risk-based standards, positive community impacts
- **Opportunities/Challenges**
 - Existing infrastructure
 - Reduced purchase price
 - Timing and cost variability

Phase I Environmental Site Assessment

- ASTM International E1527 Standard Practice for Phase I Environmental Site Assessments
- Used to meet EPA's All Appropriate Inquiries ("AAI") Standard under CERCLA, but generally accepted standard for conducting due diligence
- Updated/reissued at least every eight years: **Newest version is E1527-21** (December 2022)
 - Updated discussion of business environmental risks (which includes emerging contaminants → aka PFAS)

Phase I ESA E1527-21 – PFAS

- PFAS and other “substances not defined as CERCLA hazardous substances” are outside scope, but potential “business environmental risks”
 - Material environmental or environmentally-driven impacts on the business associated with the current/planned use of the property, not necessarily related to environmental issues required to be investigated in the Phase I
 - When defined as hazardous under state law → the user may decide to include PFAS as Non-Scope Consideration
- At the moment, all PFAS compounds are not defined as CERCLA hazardous substances. But . . .

PFOA/PFOS Proposed Hazardous Substance Designation

- September 6, 2022 – EPA proposed rule to designate PFOA and PFOS as hazardous substances under CERCLA
- April 2023 – EPA ANPR requesting input on potential future PFAS hazardous substance designations
- Spring 2024(?) – PFOA/PFOS designation final rule
- Bottom Line
 - E1527-21 currently does not require consideration of PFAS compounds
 - In the near future: PFOA and PFOS will no longer be “non-scope” under Phase I (likely followed by other PFAS compounds)

Potential Effects of Designation as Hazardous Substances

- “Downstream” Effects
 - Expanded federal response authority
 - Government and private party cost recovery
- Liability for “non-source” entities (e.g., POTWs, sewage treatment, biosolids, municipal landfills)
- EPA discretion and settlement policy: Will focus enforcement efforts on manufacturers/industries that release significant PFAS into the environment
- When will the policy be published?

Include PFAS in Your Due Diligence?

Caveat: Talk to your environmental consultant and attorney!

- Should I consider PFOA/PFOS in my due diligence?
 - Case-by-case, but including PFAS should be strongly considered
 - Consider: Under Act 2, you only obtain liability protection for constituents you address as part of your investigation/remediation

I Redeveloped a Property and have a COC!

Caveat: Talk to your attorney and environmental consultant!

- Am I liable if PFAS compounds are on my property?
 - Liability protection for constituents you address as part of your investigation/remediation. If PFAS compounds were not included, then you do not have liability protection for those compounds.
- Can PADEP reopen the site after completion?
 - Yes, for certain reasons, e.g., significantly increased level of risk at the Site or new information confirms the existence of previously unknown contamination that exceeds the remediation standards

Other Notable Items

- EPA, state agencies, and other authorities are issuing PFAS-related information requests (see e.g., West Virginia)
 - Everybody is interested in determining where PFAS are and where they came from
- Pennsylvania NPDES permits
- Pennsylvania MCLs → used as MSCs
- Environmental Indemnifications in Agreements
 - Cover unknown contamination?
 - May be a significant point of negotiation
 - Prohibit use of PFAS containing materials?



Thank you!
Mackenzie Moyer – mmoyer@babstcalland.com

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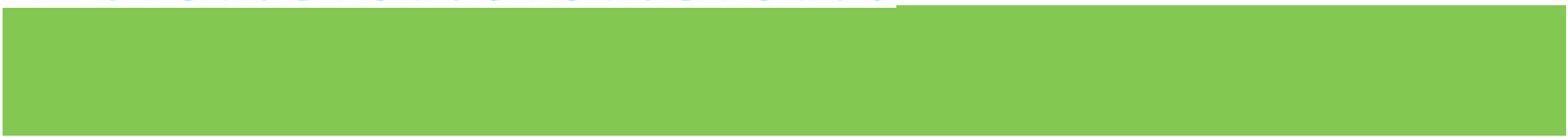
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Questions?



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- Ruby Stanmyer, Project Officer, Drinking Water, US EPA
- Dr. Charlie Brown, Standards and TMDLs, US EPA Water Division
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