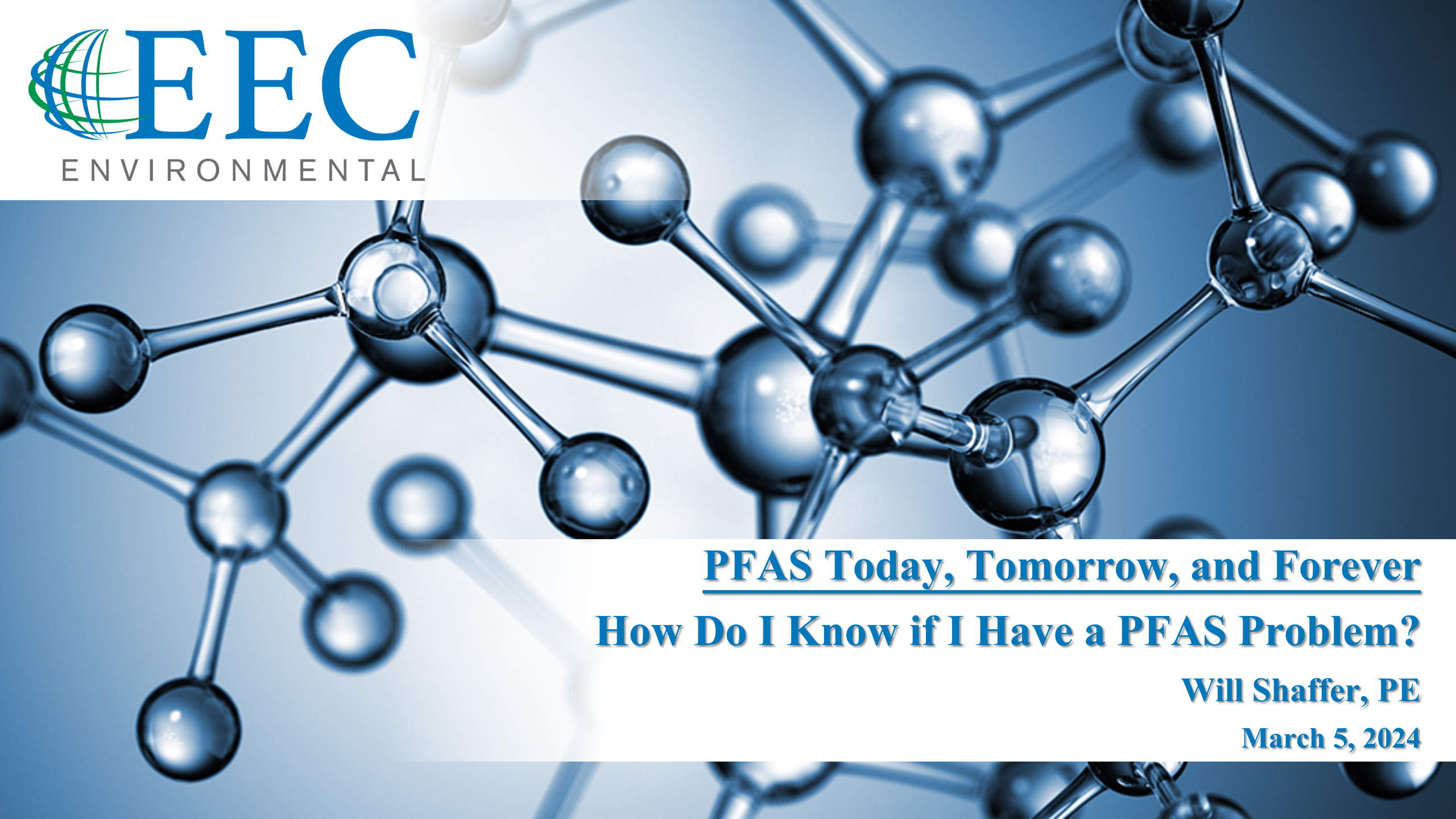


PFAS Today, Tomorrow, and Forever

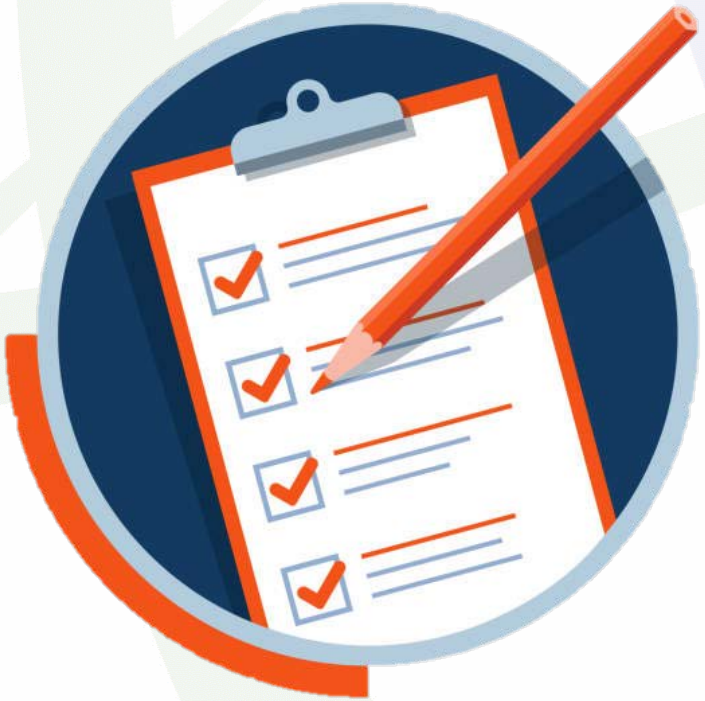
How Do I Know if I Have a PFAS Problem?

Will Shaffer, PE

March 5, 2024

Agenda

- Introduction
- Regulatory Overview
- Sampling Methods
- Characterization Efforts



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Introduction

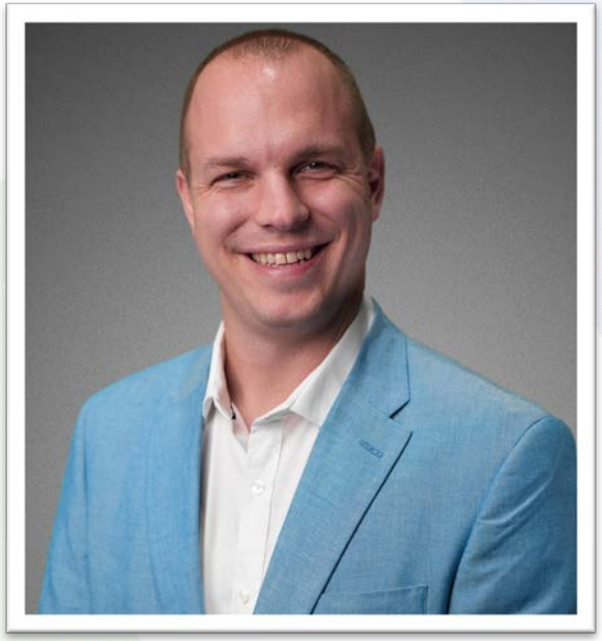
Introduction

EEC Environmental

- National environmental engineering consultant
- Chemists, engineers, geologists, hydrogeologists, regulatory and compliance specialists
- PFAS treatment experts

PFAS Services

- Site assessment and remediation
- PFAS characterization and planning
- Treatment system design
- Owner's representative consultant



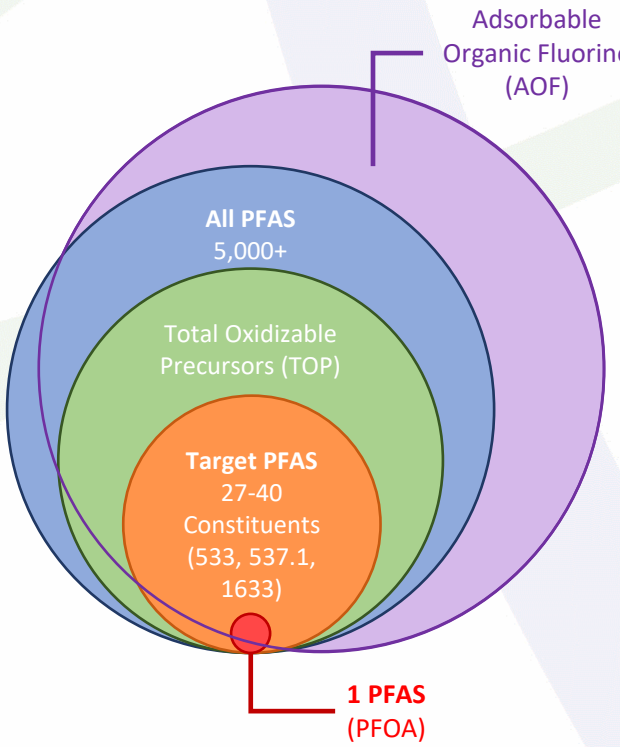
Will Shaffer, PE
Project Engineer

Webinar Series

1. **November 14, 2023** – PFAS Today, Tomorrow, and Forever
2. **February 6, 2024** - MCLs are Coming…Very Soon!
3. **March 5, 2024** - How Do I Know if I Have A PFAS Problem?
4. **April 9, 2024** – Effective Treatment of "Forever Chemicals"
5. **May 7, 2024** - ???

PFAS 101

- Broad class of manufactured chemicals used to make products that resist heat, oils, grease, stains, & water
- Teflon™ coated cookware, carpets, clothing, paper packaging for food, fire retardants, AFFF
- Over 5,000 PFAS constituents (terminal and precursors)
- Extremely stable in environment and can be found in soil, air, surface water, groundwater, wastewater plant effluent, sewage sludge and landfills **"Forever Chemicals"**



Source: Modified from BACWA

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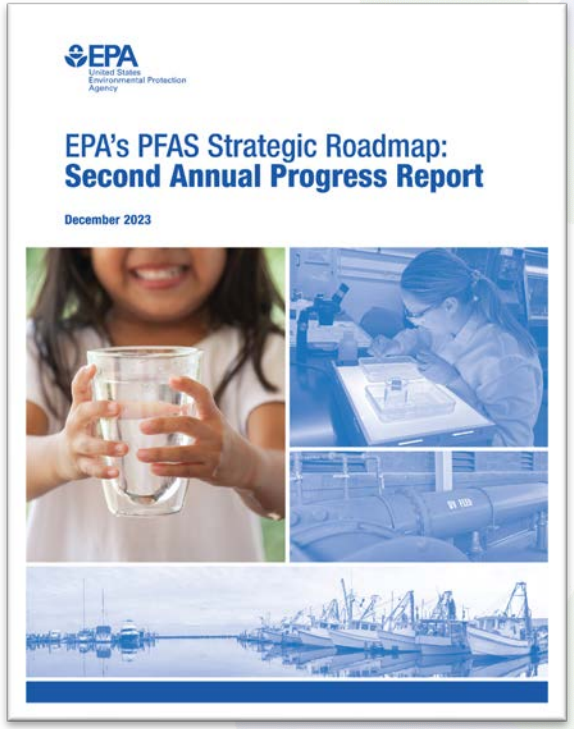
Regulatory Overview

EPA PFAS Strategic Roadmap

Research — Restrict — Remediate



- Biosolids
- Drinking Water
- Chemical Manu. and Use
- Contaminated Sites
- Wastewater
- Surface Water
- Analytical Methods
- Air

https://www.epa.gov/pfas/pfas-strategic-roadmap-epas-commitments-action-2021-2024

EPA PFAS Strategic Roadmap
Key Actions

Research — Restrict — Remediate

Fall 2021
- Nationwide monitoring (UCMR5)

March 2023
- Propose PFAS MCLs for six constituents [1]

February 2024
- Propose nine PFAS as RCRA hazardous constituents [2]

Early 2024
- **Finalize PFAS MCLs for six constituents [1]**

Early 2024
- **Finalize PFOS and PFOA (at a minimum) as hazardous substances (CERCLA) [2]**

Summer 2024
- Adopt Effluent Limitation Guidelines (ELGs) for nine industrial categories and landfills.

Winter 2024
- Finalize risk assessment for PFOA and PFOS in biosolids to determine whether regulation is appropriate

[1] PFOA, PFOS, PFNA, PFHxS, PFBS, HFPO-DA (GenX)
[2] PFOA, PFOS, PFBS, PFHxS, PFNA, GenX, PFBA, PFHxA, PFDA & precursors

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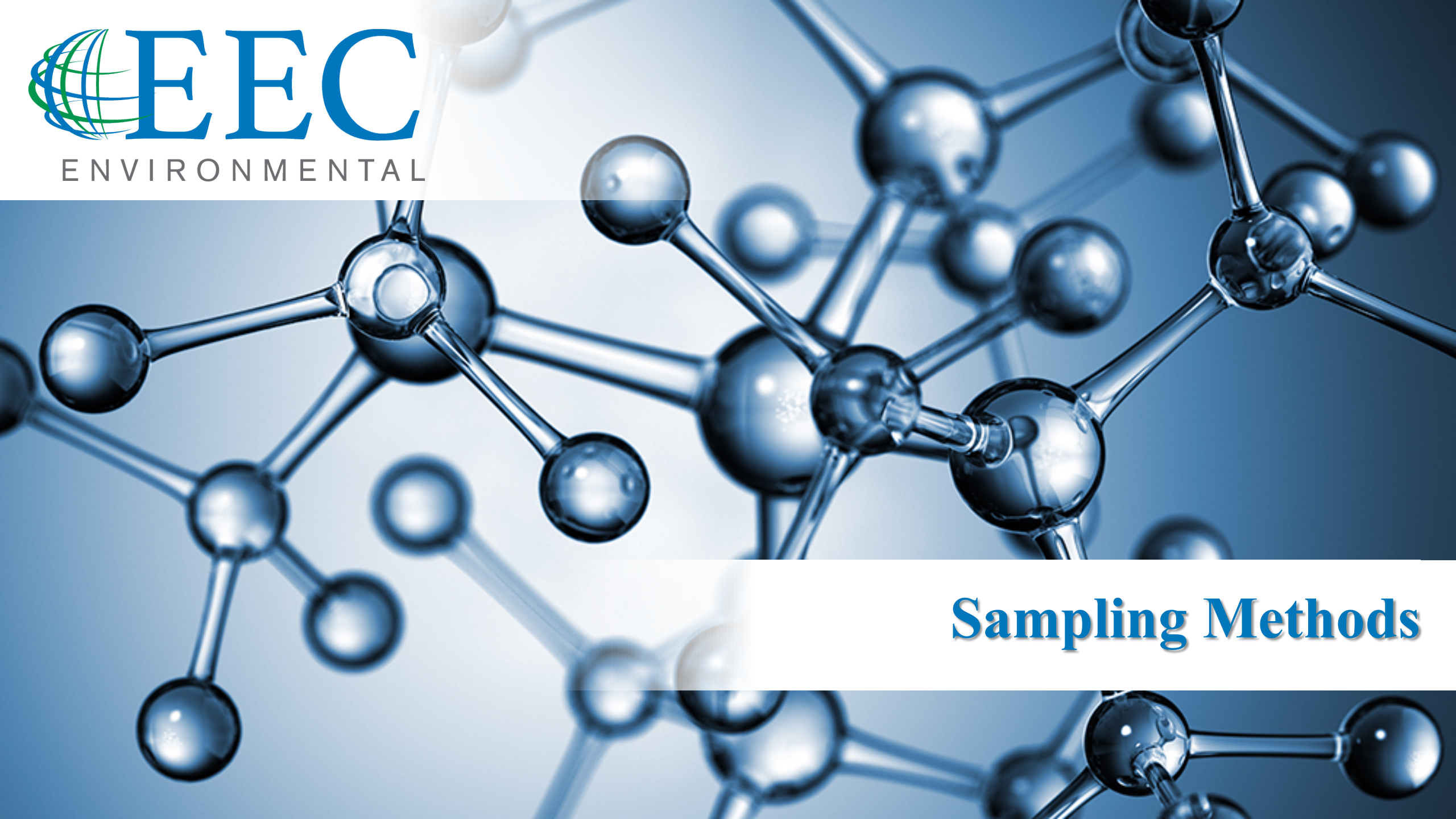

Sampling Methods

Drinking Water Analytical Methods

EPA Method 537.1

- 18 PFAS Compounds

EPA Method 533

- 25 PFAS Compounds

Both include PFOA, PFOS, GenX, PFBS, PFNA, and PFHxS

Practical Quantitation Limit (PQL) for 6 PFAS between 2 – 4 ppt

Wastewater Analytical Methods

EPA Method 1633

- 40 PFAS Compounds
- Non-drinking water matrices (wastewater, surface water, groundwater, landfill leachate, soil, sediment, biosolids, fish and shellfish tissue)

Total Oxidizable Precursors (TOP) Assay

- Non-targeted analysis
- Indirect measurement of precursors

EPA Method 1621 (AOF)

- Indicator of “total” PFAS concentration

Source: Florian Fuchs

Wastewater Analytical Methods

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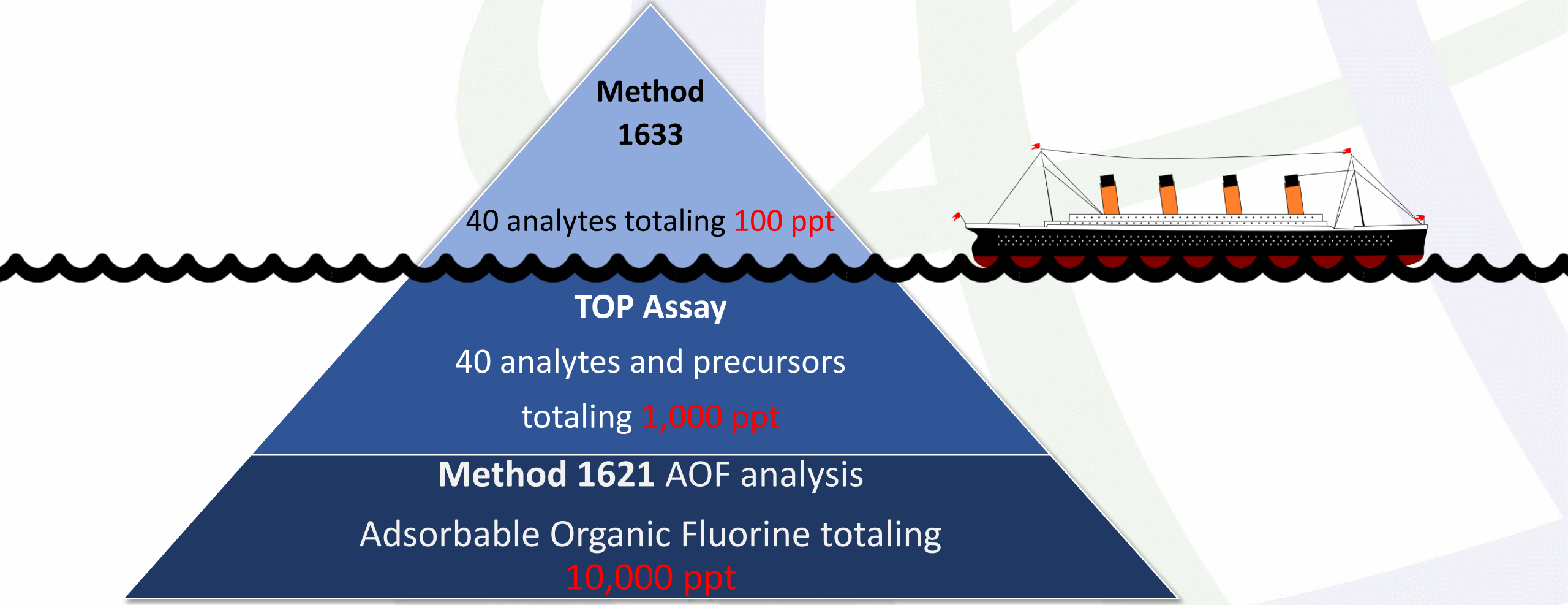

Hypothetical WWTP influent sample

Sampling Guidance

- Do's and Don'ts of sample collection
- Avoid cross-contamination
- Many states have issued guidance documents
  - Can vary depending on matrices
- Detailed work plan
  - Rely on experienced consultants and labs

https://www.epa.gov/water-research/pfas-analytical-methods-development-and-sampling-research

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Regulations	Sampling	Expertise
Regulations and methods are continuing to evolve	Analytical may only show some of the picture	Experience counts

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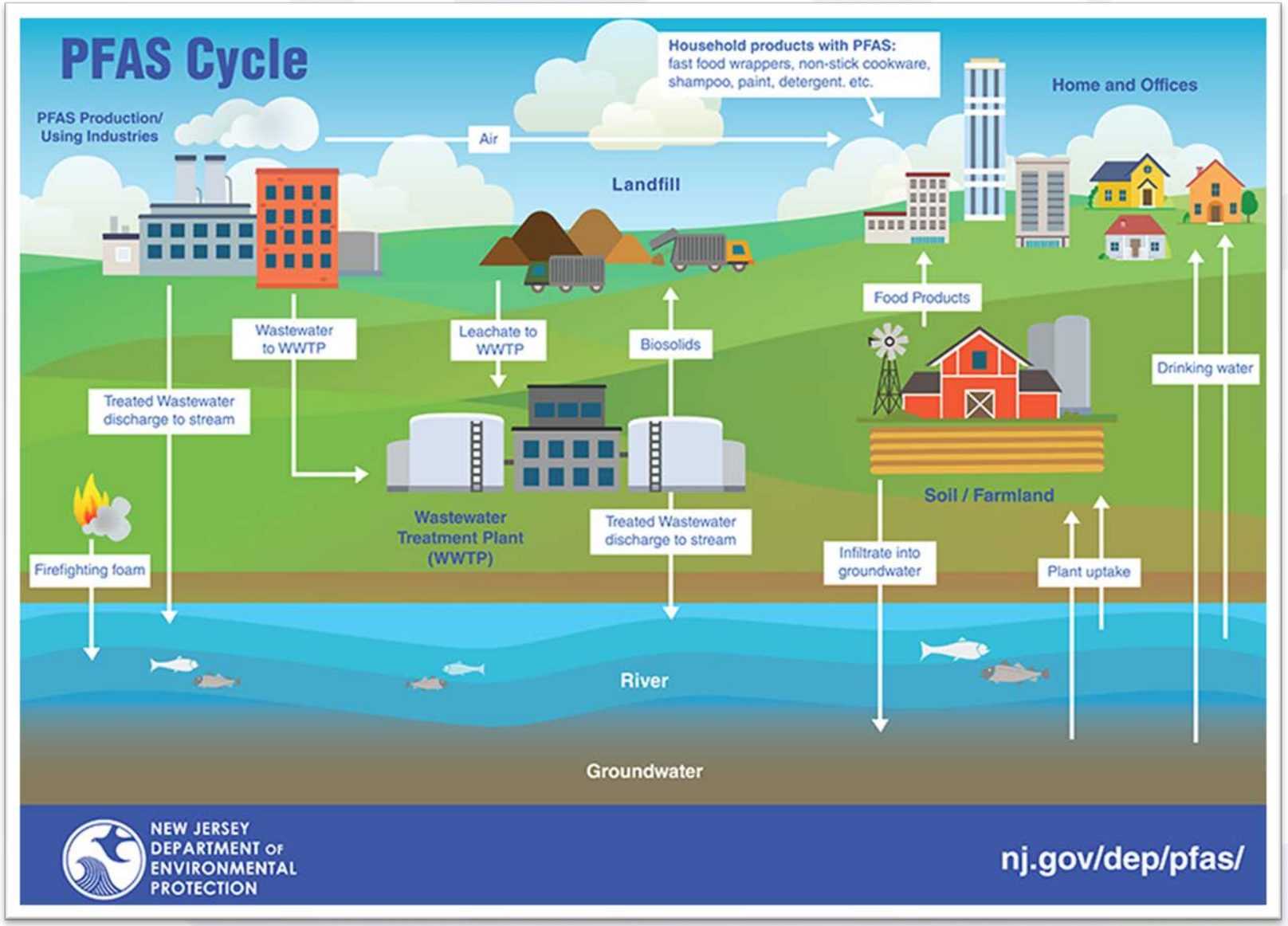
Characterization Efforts

PFAS Environmental Cycle



Why Sample?

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Regulatory Compliance (MCL, NPDES, Investigative Order)

Mitigate Risk

Sampling/ Characterize

Environmental Stewardship

Project Protection

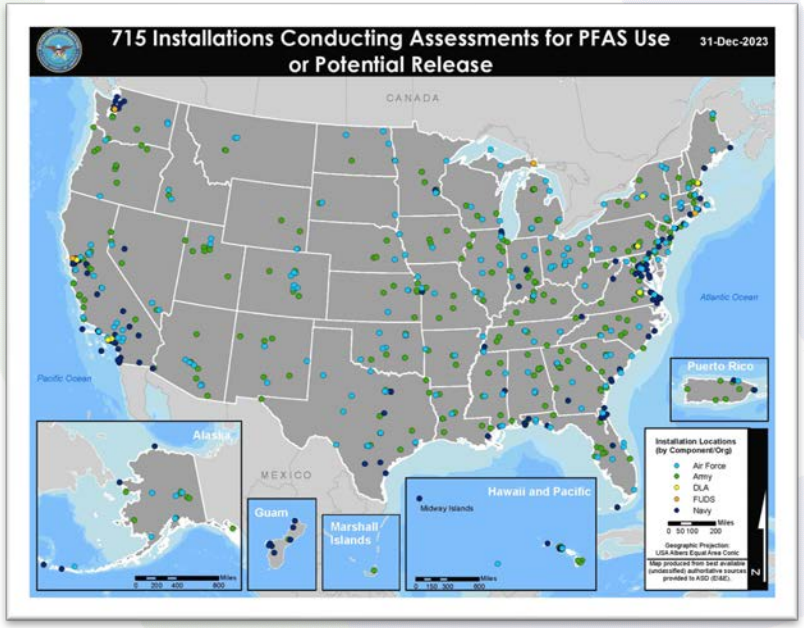
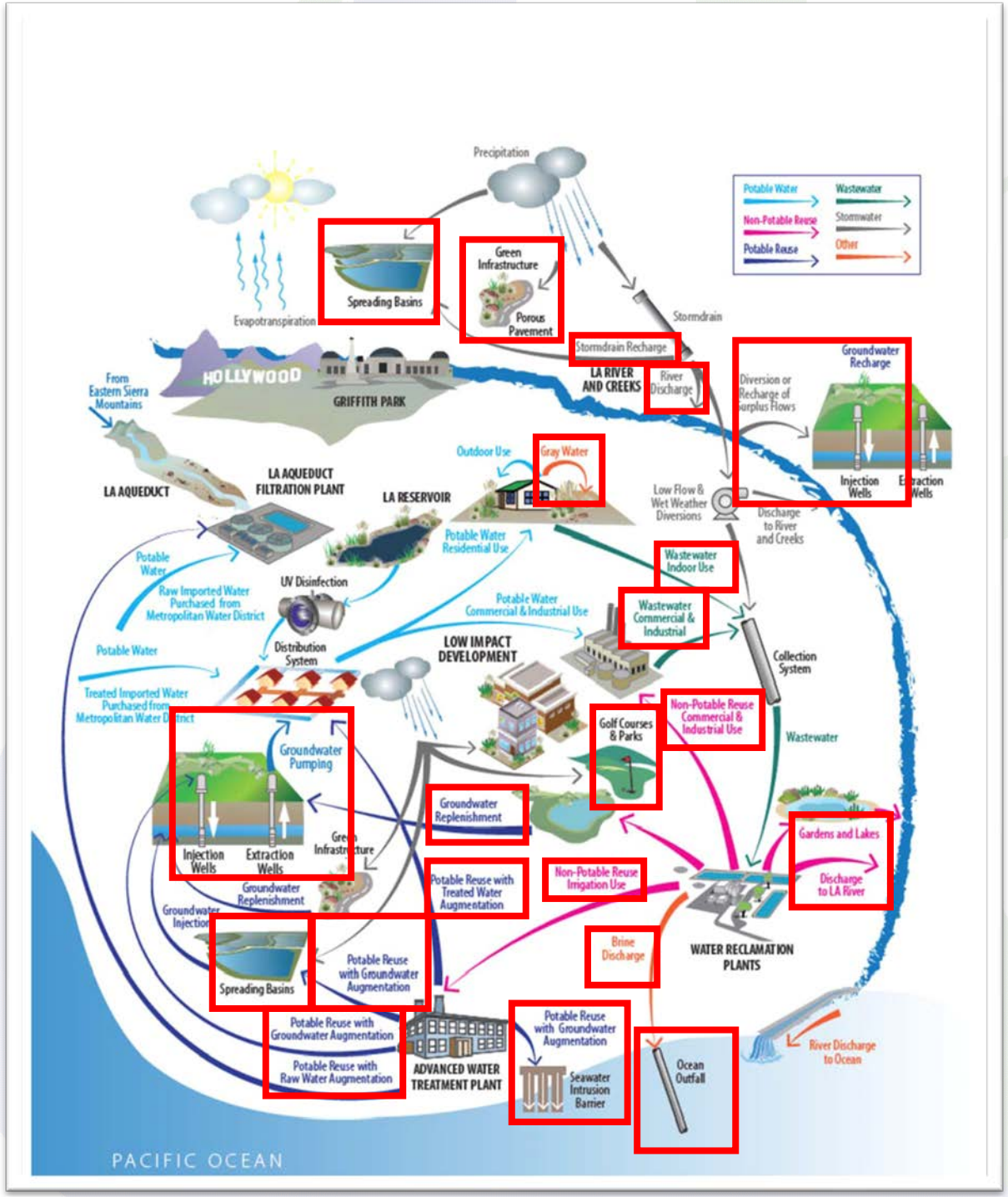


Image Sources: New York Post, DoD



Areas where PFAS impacts are unregulated, untested, or not yet well understood

Source: One Water LA

Regulatory Compliance Drivers

- Drinking Water – UCMR5, MCLs
- Future CERCLA and/or RCRA designations
- Growing widespread public knowledge/fear of PFAS
- Biosolids land application concerns (already banned in Maine)
- Recycled water quality concerns, Indirect and Direct Potable Reuse
- Pending NPDES permit standards
- Aquatic species bioaccumulation impacts
- Site investigative orders

https://pfas-1.itrcweb.org/8-basis-of-regulations/#8_2

Michigan EGLE:

A Case Study on PFAS Characterization and Source Identification

Source: The New Yorker

1. Smart Testing

EGLE IPP PFAS Initiative:

- Identify potential industrial PFAS sources (surveys, interviews, records research)
- Sample effluent of likely dischargers & WWTPs
- Require PFAS/PFOS reduction at discharge source
- Monitor industrial users and report to Water Resources Division
- **Over 574 Dischargers, 2,000+ Samples**

2. Smart Regulation

NPDES permits enforce POTW effluent limits of PFAS at drinking WQS (in most cases)

POTWs develop technically based local limits to eliminate pass-through

- Based on surface water and drinking water standards
- Assume 0% removal efficiency at POTW

Strategic local limit implementation and guidance from regulatory body leads to effective PFAS reduction and mitigation.

3. Analysis (Learning from EGLE)

88-99% Reduction in PFOA/PFOS in effluent/biosolids with source control and pretreatment

- PFOA treated alongside PFOS
- Biosolids reduction lags behind effluent

Fluctuation in PFAS concentrations occur even after source reduction implementation

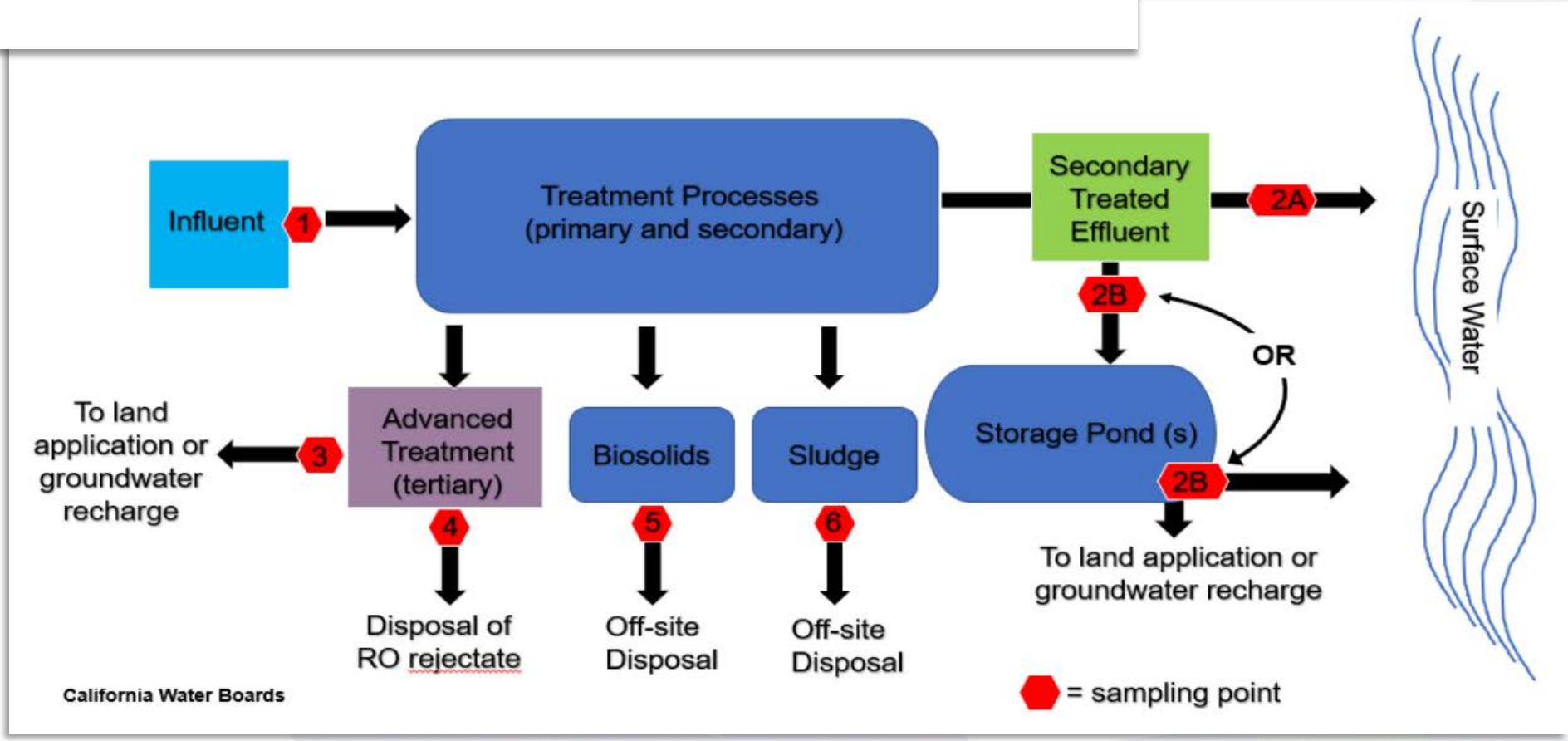
- Spent filter media, periodic dumping, spills/leaks?

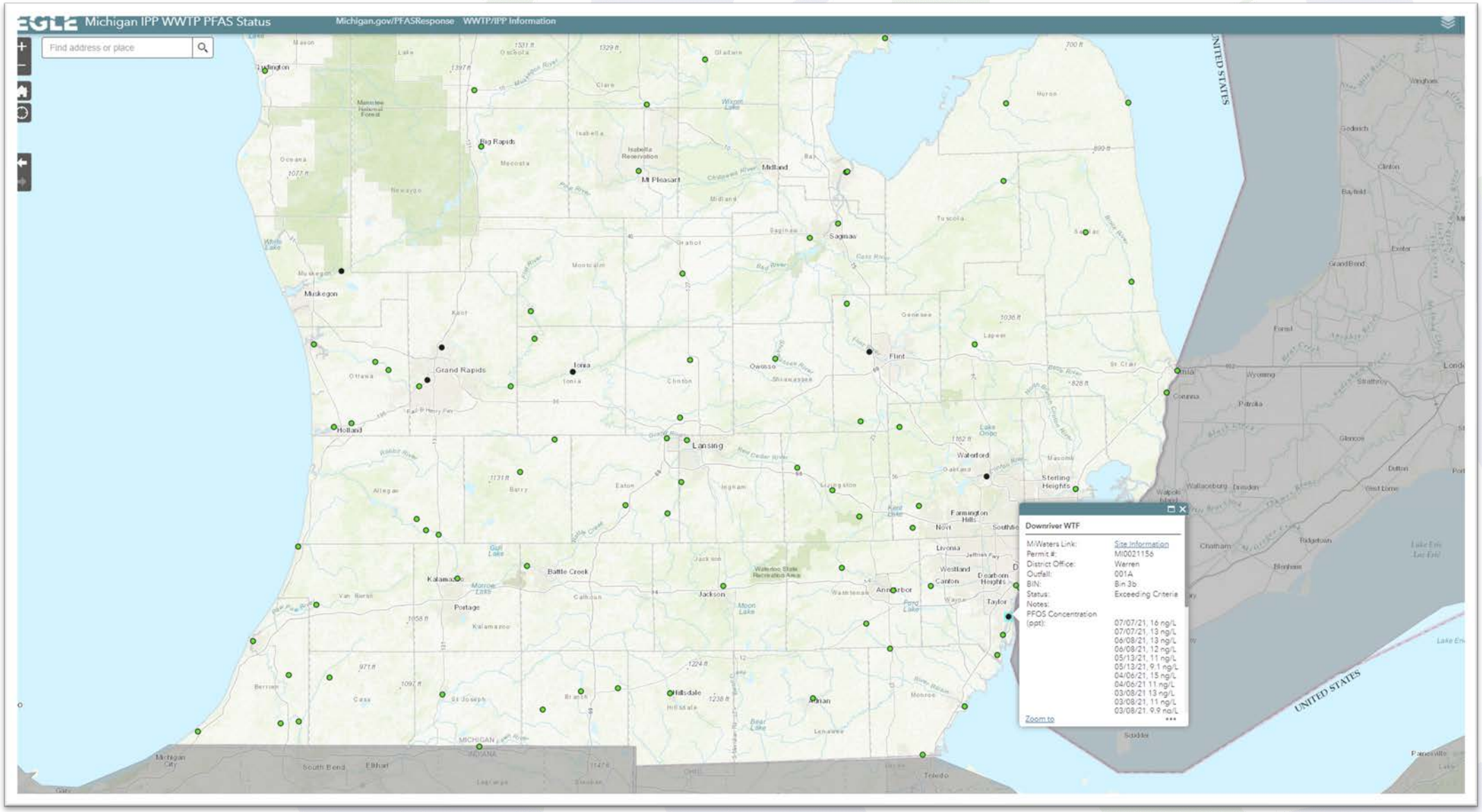
POTWs achieve significant reduction through pretreatment at a small number of discharge sources

Higher effluent vs influent concentrations suggest biodegradation of precursor PFAS

4. Monitoring

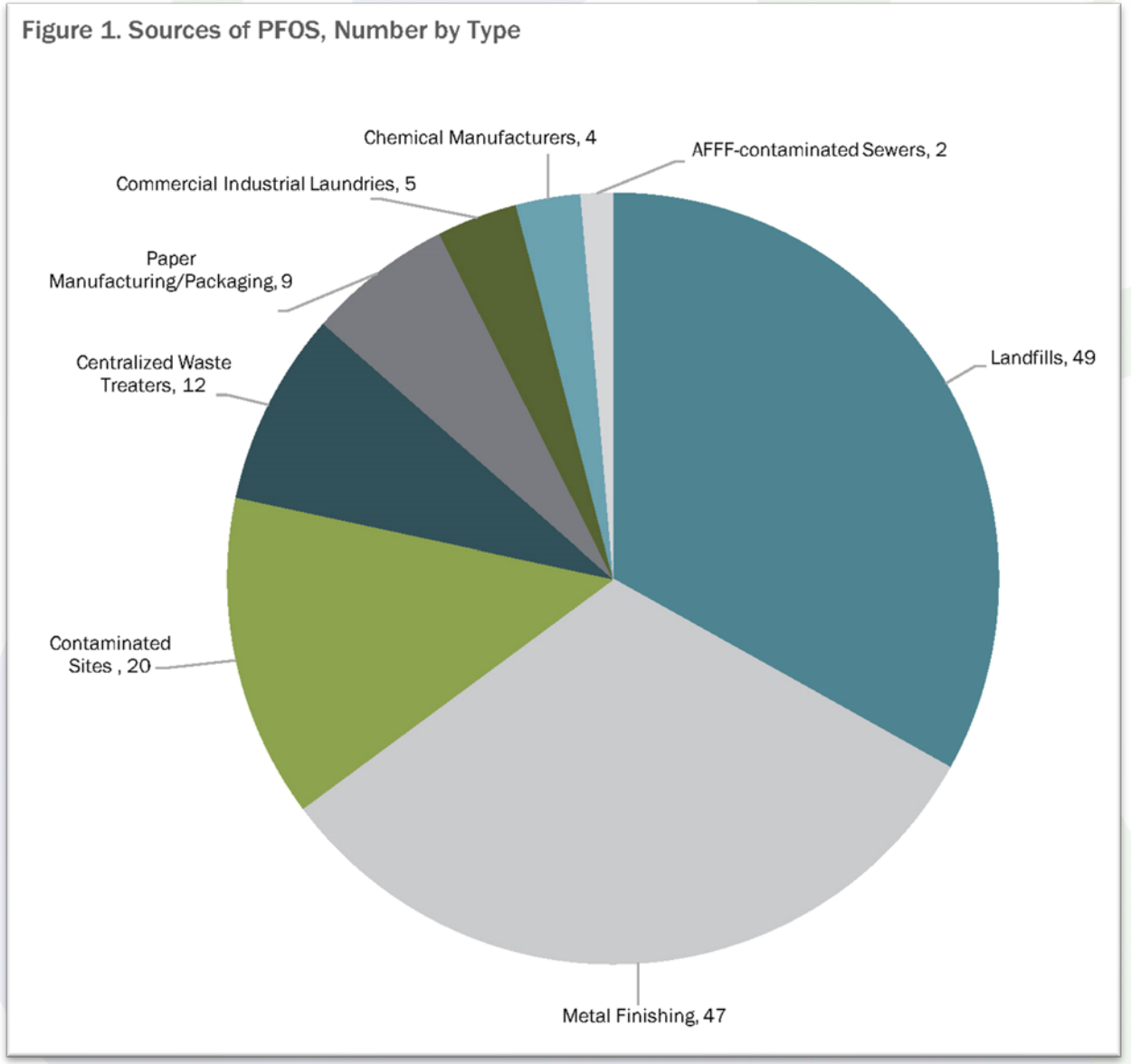
Extensive testing at every level of the water treatment cycle.
WWTP influent/various treatment stages/effluent





Source: [Michigan EGLE]

Michigan Wastewater PFAS Sources



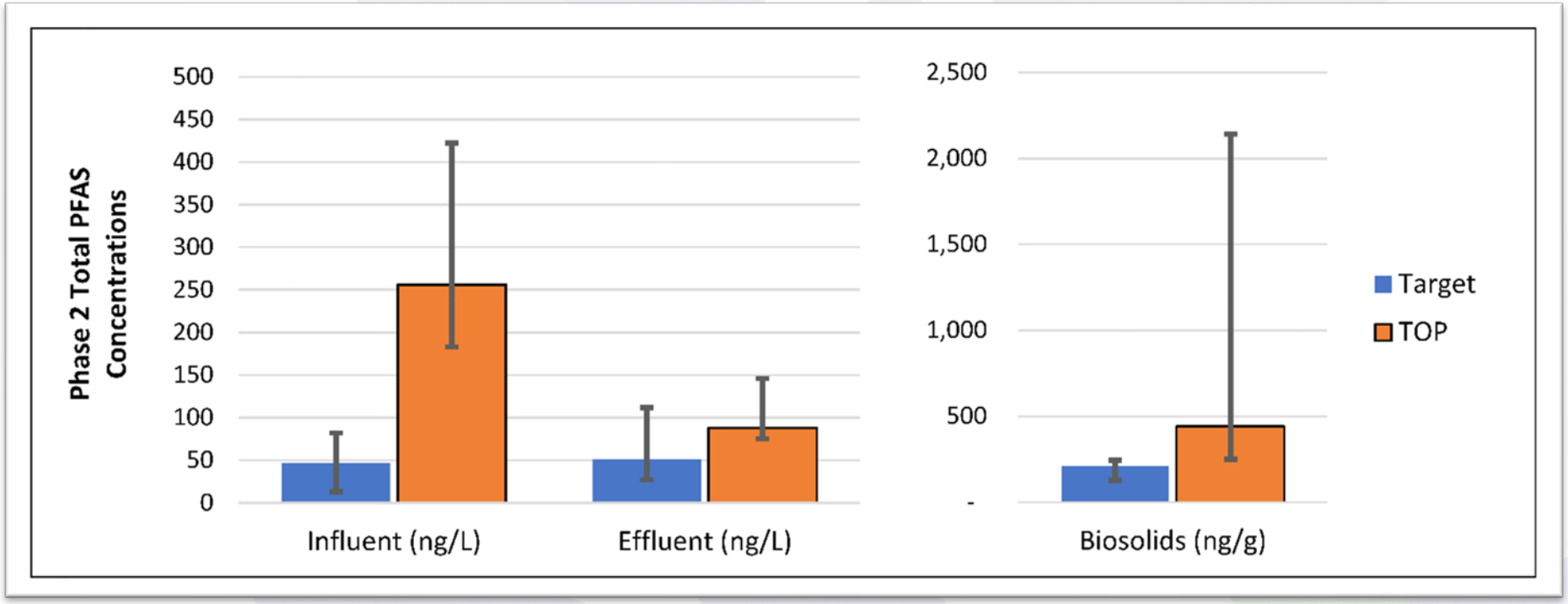
Source: Michigan EGLE

Pretreatment or POTW Treatment?

Sources: Shinonome Studio, Adobe Stock; iStock

Bay Area POTW Study Findings

Total PFAS concentrations quantified (based on TOP analysis) will often be much larger than the sum of the target PFAS compounds due to presence of PFAS precursors that are not on the target PFAS analyte list



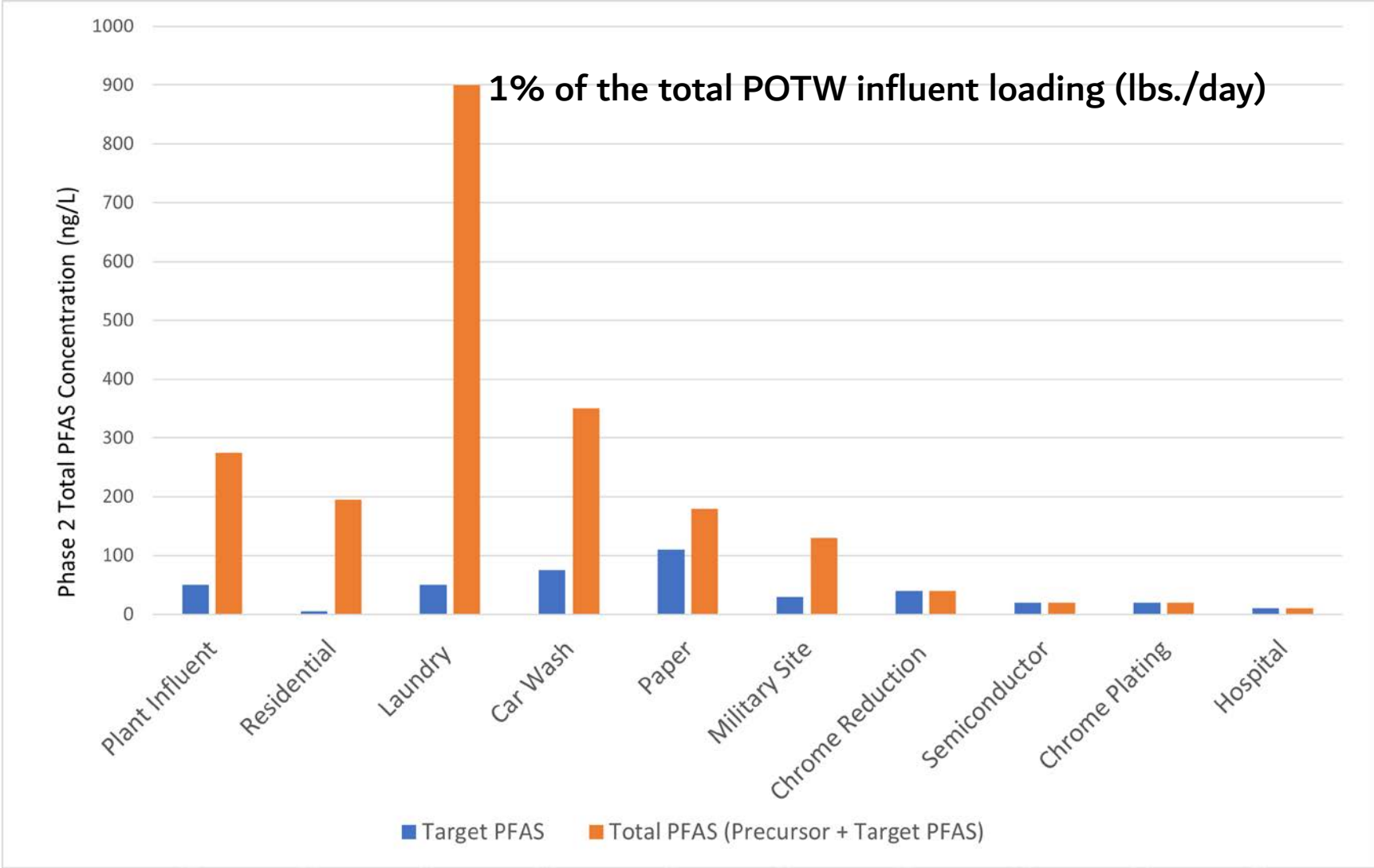
Source: BACWA/SFEI Study of PFAS in Bay Area Wastewater

Bay Area POTW Study Findings

Residential loads may be the largest source of PFAS to municipal WWTPs in the SF Bay region in sewersheds without other major PFAS industries




Bay Area POTW Study Findings



Source: Modified from [BACWA/SFEI Study of PFAS in Bay Area Wastewater]

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Sampling	Sources	Act Now?	EFCN
You don't know until you know	Source identification is critical for all systems	Wait for regulations or be proactive	Leverage your local EFCN chapter

Questions?

Speaker Contact Information

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Thank you!

Environmental Finance Center Network

EFCN environmental finance center network

Southwest EFC

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