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PFAS Trends: Litigation, Regulation & Analytics

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PFAS Trends: Recent Developments and the Road Ahead

- Federal & State regulatory and statutory updates
- Litigation trends
- Developments in analytical approaches

- Where are we now, and where are we going?

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The Current Regulatory Landscape

- Uncertainty surrounding ultimate compliance obligations & timelines
- Regulation is here to stay
- Soundest approach is to get ahead of the problem
  - Understand PFAS in supply chains
  - Eliminate where possible to keep access to state markets

Federal Regulatory Overview

Regulatory uncertainty ≠ deregulation

- Day 1: Administrative freeze on new rulemakings
- Areas of alignment often overlooked, even as ultimate obligations and deadlines remain unclear

2019 PFAS Action Plan (First Trump Administration)

- Evaluate MCLs for PFOA & PFOS;
- Initiate hazardous substance designation for PFOA & PFOS;
- Develop groundwater cleanup recommendations for PFOA & PFOS
- Develop toxicity values for GenX & PFBS, and assessments for others
- Establish certain PFAS SNURs under TSCA

2021 PFAS Roadmap (Biden Administration)

- Focused on more concrete action
- Proposes full lifecycle approach to managing PFAS (manufacture to disposal)
- Commits to using all enforcement authorities
- Environmental Justice concepts embedded throughout

Shutdown Effects

EPA contingency plan in effect

Rulemaking, permitting, scientific work halted

Limited exceptions:

- Emergency response
- Superfund cleanups to extent pause would threaten public health
- IT and facility security
- Misc. funded projects

Anticipate a backlog even with shutdown resolution incoming

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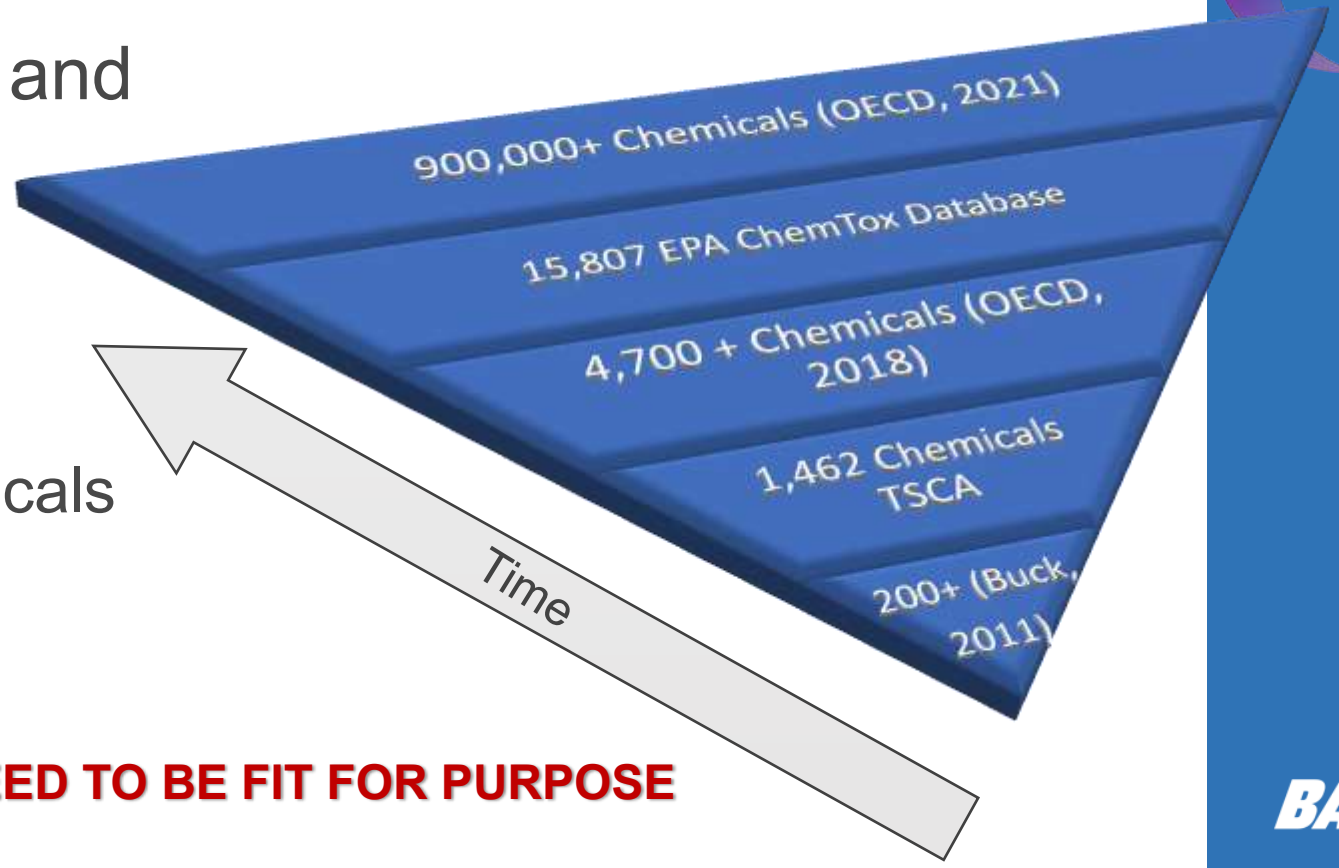
Analytical Approaches

PFAS Definitions Inconsistent and Growing

- There is no universally accepted definition
- References, definitions, and resources include:
  - Buck et al. (2011)
  - OECD (2018)
  - OECD (2021)
  - USEPA CompTox Chemicals Dashboard
  - TSCA 8a(7)



DEFINITIONS NEED TO BE FIT FOR PURPOSE

Analytical Approaches: Top Considerations

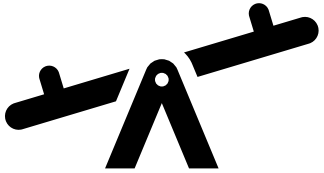
PFAS USE

Non-Essential

Essential

PFAS PROCESS

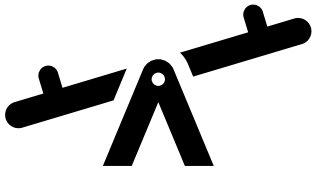
Unintentional



Intentional

PFAS-FREE DEFINITION

Specific



General

PFAS IN ENVIRONMENT

Compliance

Source Attribution

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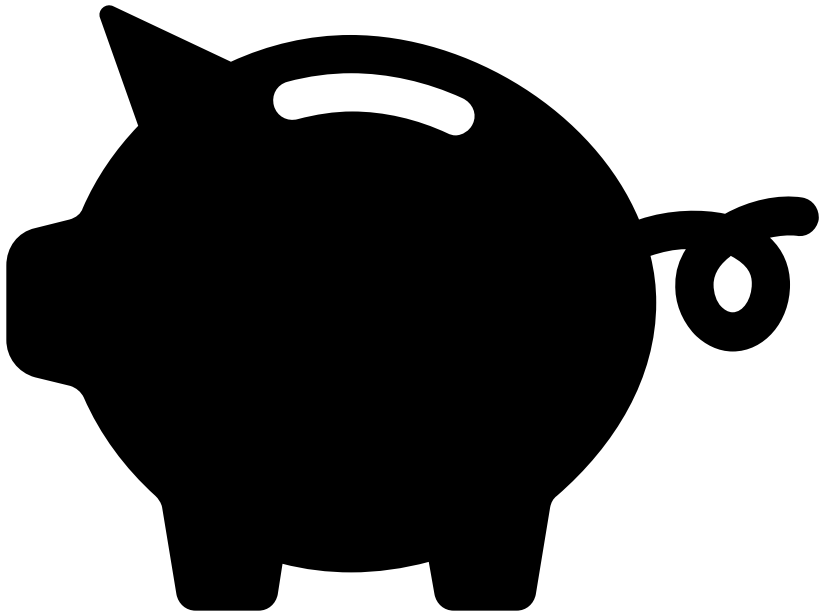
Determining Best Analytical Approach

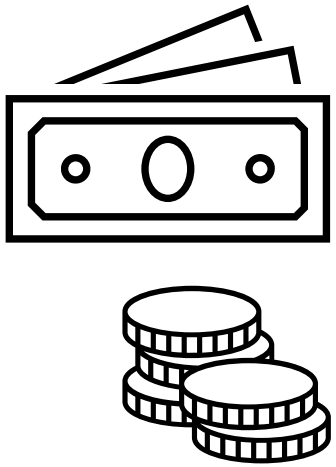
Think about it this way….

Total Fluorine (TOF, AOF)

Detection limit generally 20 ppm or higher

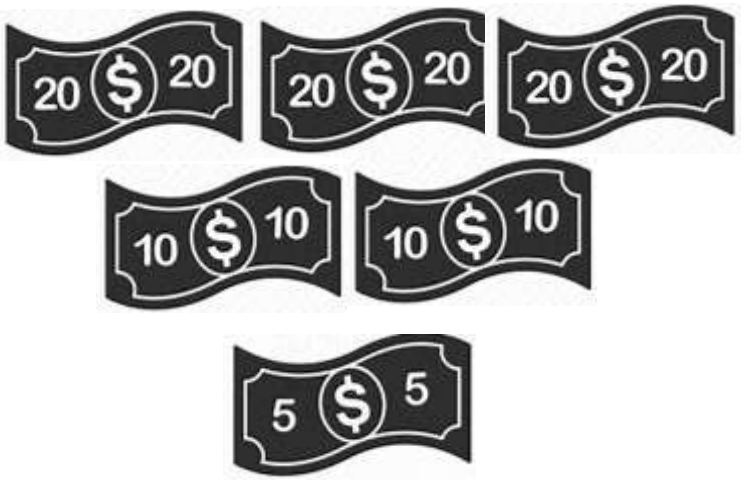


Non-target Analysis/ Suspect Screening



Target Analysis

Low detection limit (ppt- ppb)



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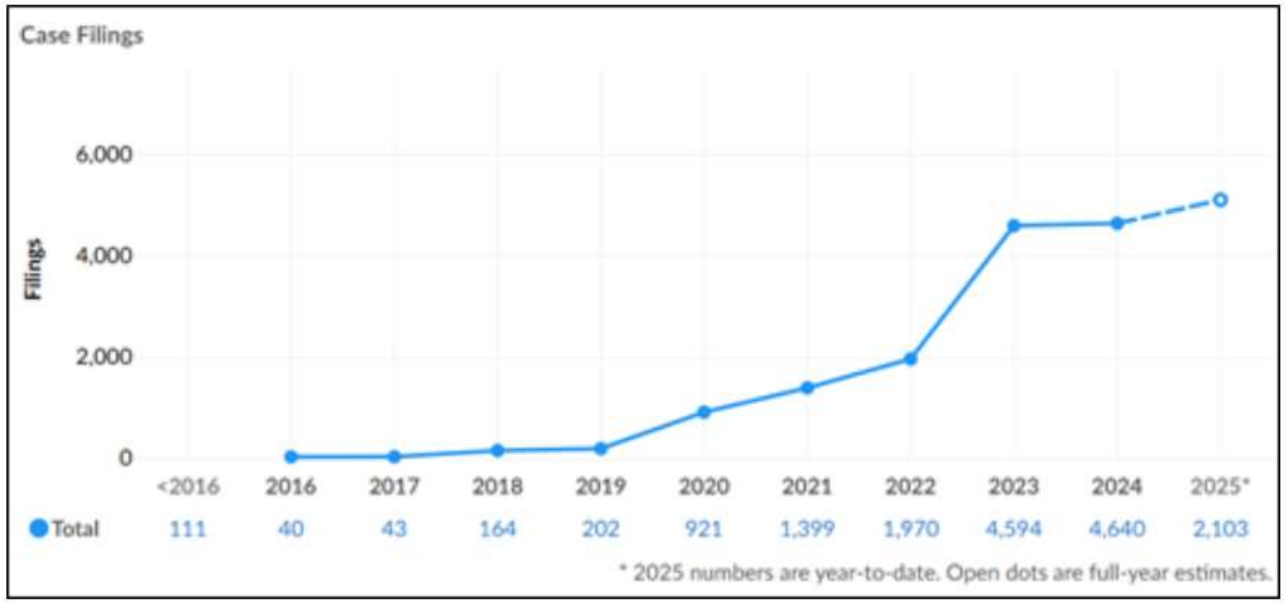
Litigation Update

PFAS Litigation – An Overview

- Filings on the rise
  - 2018: < 300 cases
  - 2024: ~4,500 cases
  - 2025: 11,000+ cases
- Regulatory environment
- Parties are evolving
- Claims are evolving

PFAS Litigation – Who is Suing

- State AGs
- Water Systems
- Landfills
- Private Property Owners
- Farmers
- Tribes
- Consumers
- Downstream Users



PFAS Litigation – Claims Evolving

AFFF MDL – 37,000+ cases and counting

Property Claims

- Nuisance
- Negligence

Personal Injury

- C(8) persists, expands

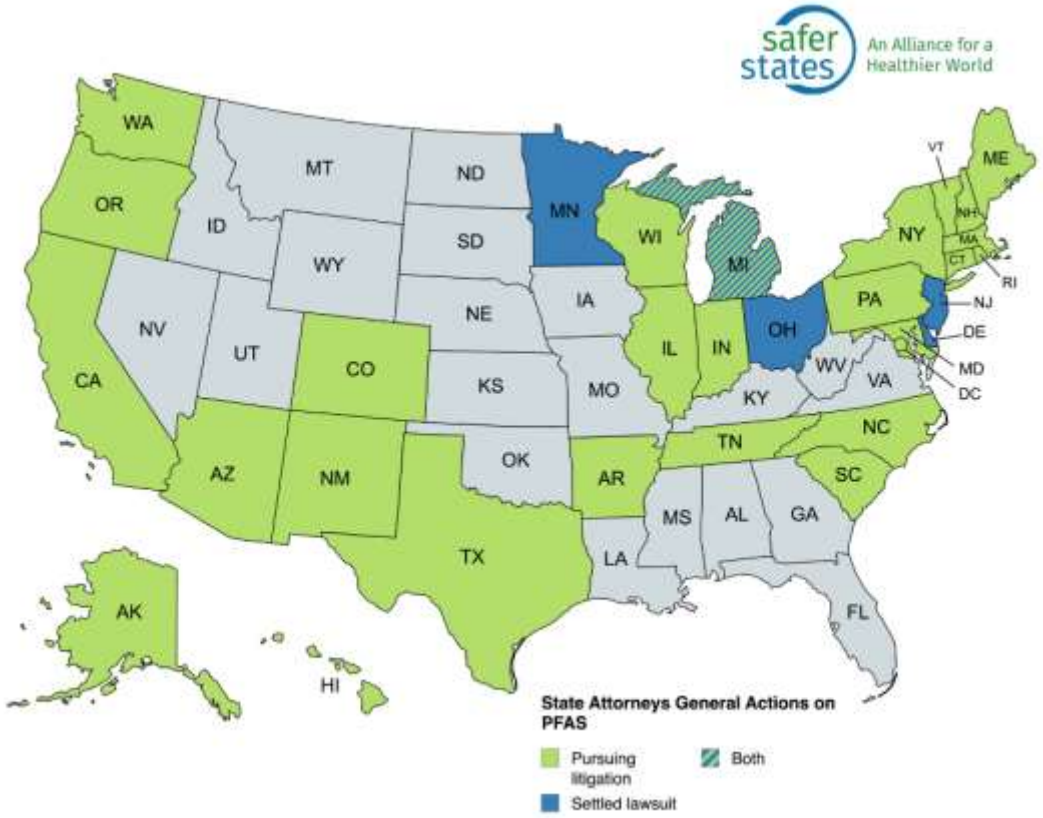
Deceptive Trade Practices

State Regulations

Federal – CERCLA

Class Actions + MDL

State Attorney General Actions



- As of 2025, 31 state attorneys general have filed PFAS-related litigation.
- Michigan more active than other states
  - 9 suits filed in Michigan; Michigan participates in 15 other instances of multistate litigation
- Causes of action vary:
  - Public nuisance
  - Products liability
  - Consumer protection suits and false advertising

Federal Regulatory Developments

Remediation & Environmental Media

- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
- Safe Drinking Water Act (SDWA)
- Resource Conservation and Recovery Act (RCRA)
- Toxic Release Inventory (TRI) under Toxic Substances Control Act (TSCA)

Supply Chains & Consumer Goods

- TSCA PFAS Reporting Rule
- No federal standards for PFAS in consumer goods
- States are filling the gaps
- Private-party solutions

Safe Drinking Water Act (SDWA) Maximum Contaminant Limits (MCLs)

April 2024: EPA announces MCLs for six PFAS as part of the National Primary Drinking Water Regulation (NPDWR).

May 2025: EPA confirmed it will keep MCLs for PFOA & PFOS

EPA plans rulemaking to reconsider MCLs for four PFAS and mixtures.
EPA plans to extend compliance deadlines for PFOA and PFOS to 2031.

- Establish a federal exemption framework
- Enhanced outreach to water systems in rural and small communities

Practical impacts for water systems and users

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Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) & Part 201

EPA listed PFOS and PFOA as hazardous substances

- EPA recently confirmed it intends to maintain this designation

"Rules of the Road" rulemaking forthcoming

- Would govern future hazardous substances rulemakings by EPA

Proposed legislation regarding "Passive receivers"

- E.g. Municipal Wastewater Treatment plants
- Landfills pushing to position themselves as passive receivers

Resource Conservation and Recovery Act (RCRA)

RCRA regulates hazardous wastes from “cradle to the grave”

In February 2024 EPA proposed to list nine PFAS as hazardous constituents under RCRA.

Would apply to TSD facilities

RCRA corrective action requires TSD facilities to investigate and remediate hazardous waste released into soil, groundwater, or surface water.

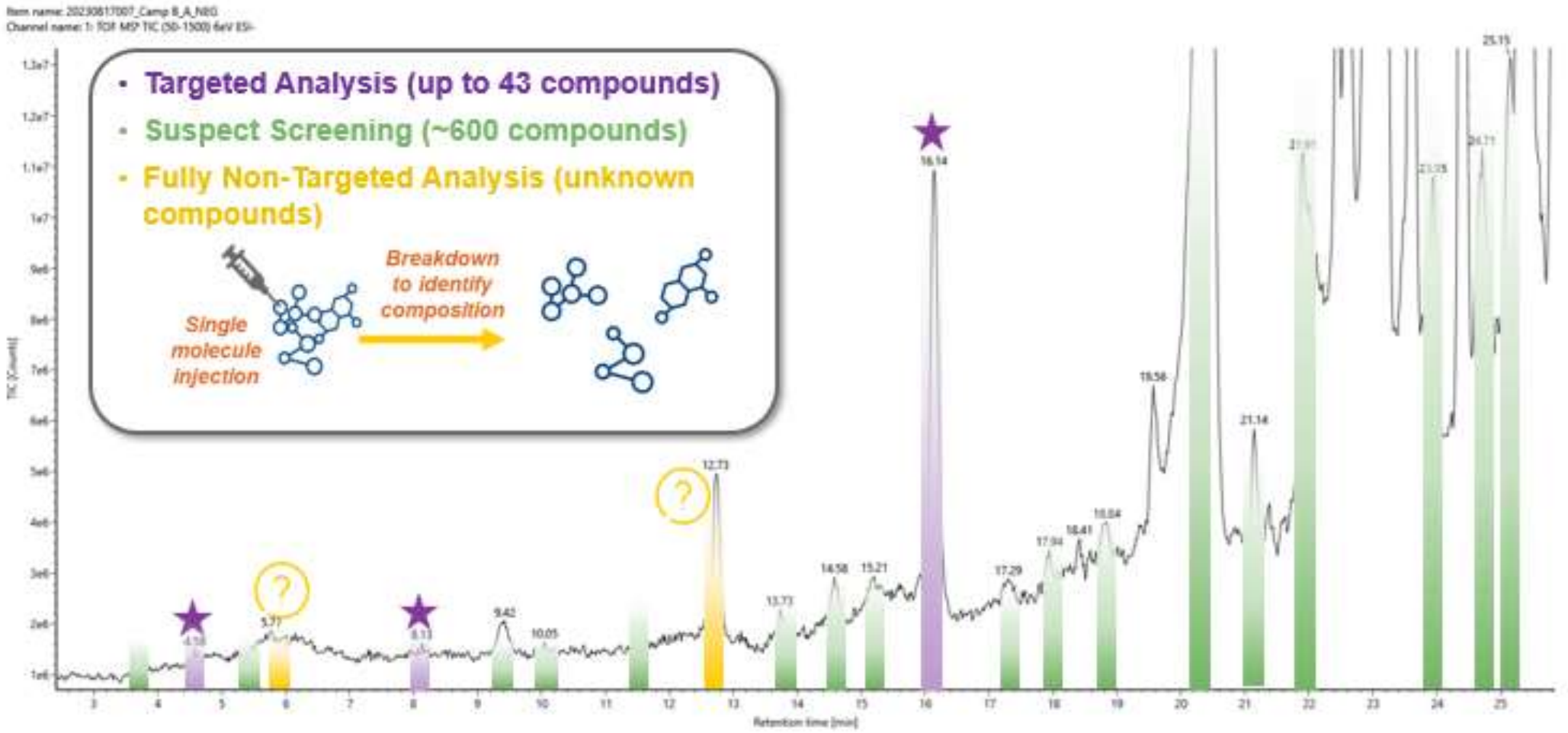
Toxics Release Inventory (TRI) Program

January 2025: EPA announces plans to add certain PFAS to the TRI guidelines.

Largely administrative change to track requirements of the 2020 NDAA.

Confirms TRI supplier-notification requires covered suppliers to notify customers receiving a mixture or other trade name product containing a TRI-listed PFAS with the first shipment of each calendar year.

Analytical Methods Comparison



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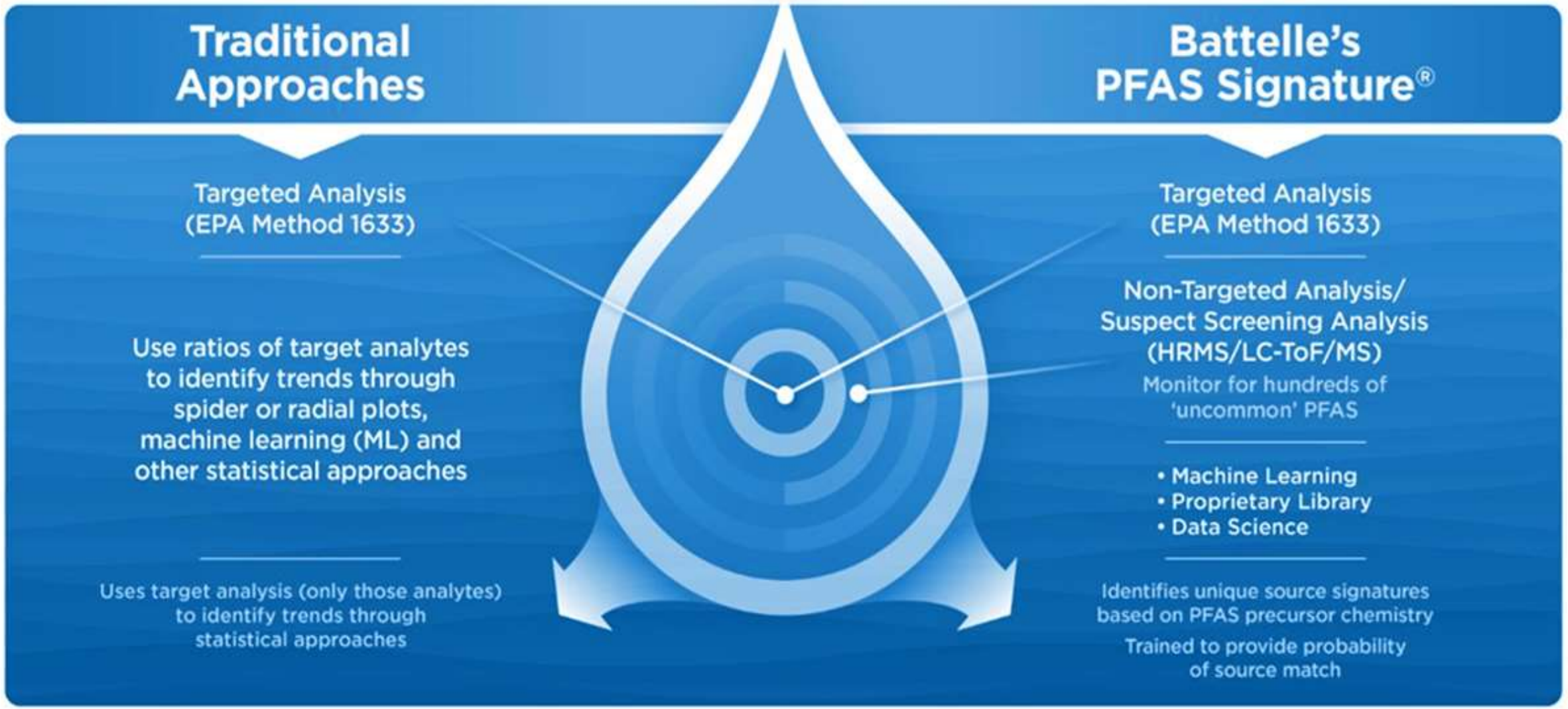
Analytical Approaches for PFAS Forensics



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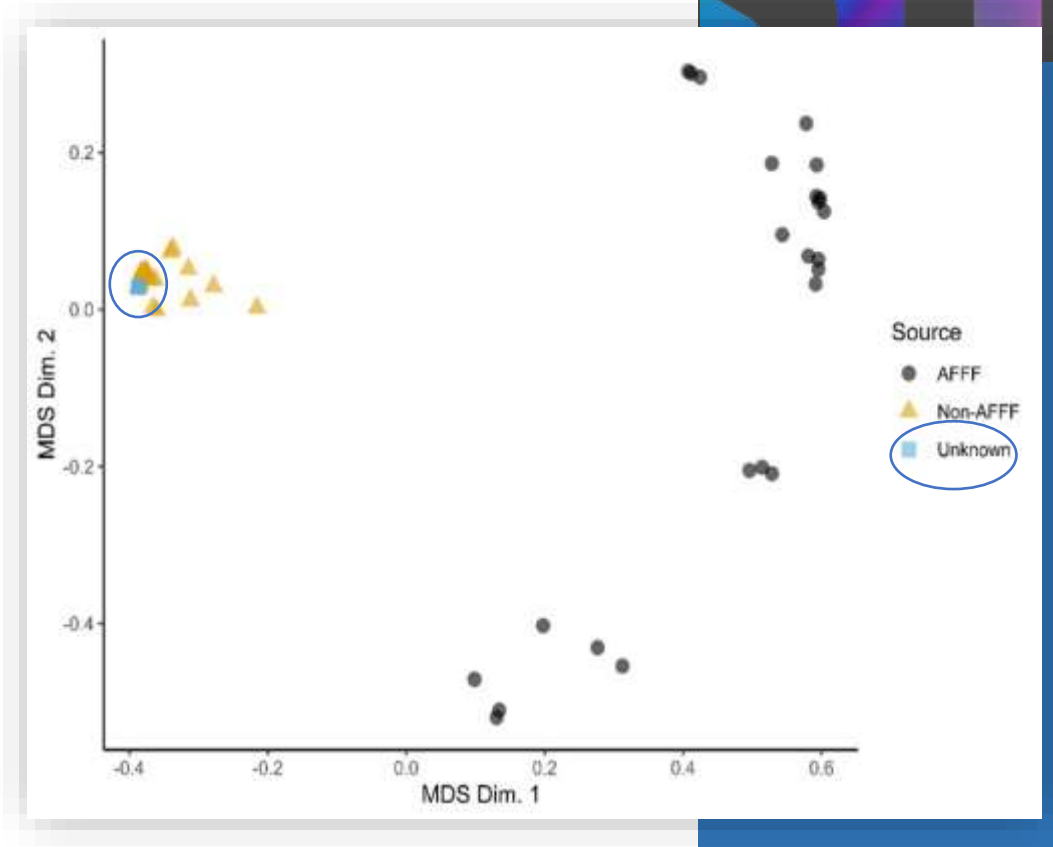
PFAS Signature: Source Discrimination Using AI

PFAS Signature®

Sample ID	Prediction Confidence from Machine Learning Algorithm Where 1.0 is Exact Agreement	
	AFFF	Non-AFFF
Sample A	0.9724	0.0276
Sample B	0.734	0.266
Sample C	0.824	0.176
Sample D	0.3434	0.6566
Sample E	0.1162	0.8838

Multiple Lines of Evidence



PFAS Signature® AI compares the signature of unknown samples with the known source library to understand unknown sample sources

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PFAS Signature: Multiple Applications

Targeted and Non-Targeted/Suspect Screening Analysis (SSA)

- Background
- Mass Balance
- Due Diligence

PFAS Signature® (including targeted, non targeted/SSA plus Machine Learning trained database)

- Source Discrimination
- On/offsite Migration and Transport
- Data Gap Investigations

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PFAS Remediation Litigation

- Emerging litigation demonstrates the breadth of potential liable parties at Facilities
- Example case: *Ryan v. Newark Group*, D. Mass (2024)
  - Cost recovery claim under Massachusetts law at composting facility
  - PRPs included paper company (paper waste), lettuce company (lettuce and soilless medium), dairy farm (cow manure); Harvard university (carbon pellets associated with construction); anaerobic digester company (digestate)
- Source separation inherently difficult but developing

Michigan Drinking Water Standards

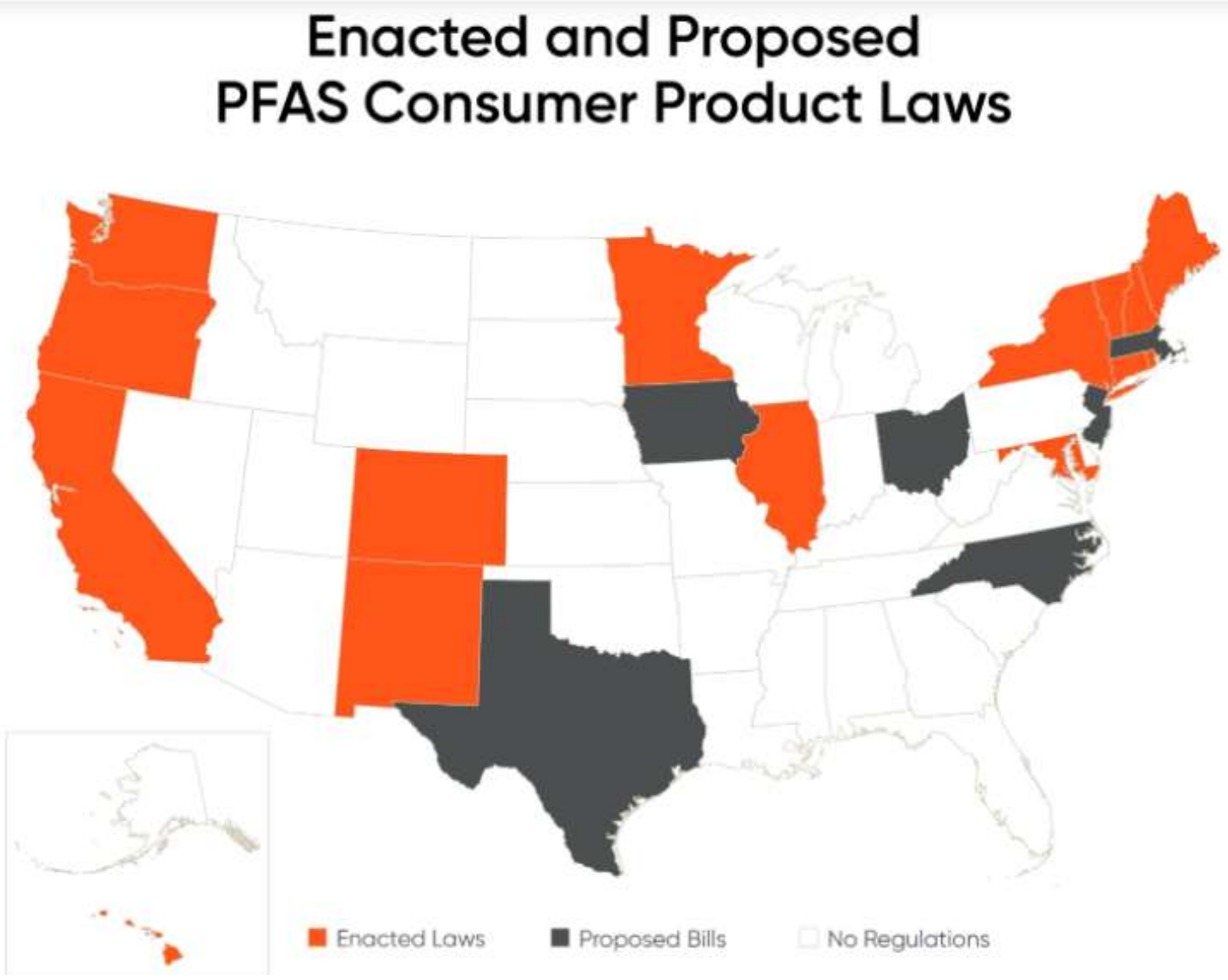
- In August 2020, EGLE promulgated new drinking-water standards (Maximum Contaminant Levels, MCLs) for seven PFAS compounds in Michigan, one of the most stringent state regulatory regimes.
  - MCLs triggers cleanup criteria under Part 201.
- 3M challenge: agency failed to comply with the Michigan APA
  - EGLE did not estimate the compliance/cleanup costs that businesses would incur—especially the downstream groundwater-cleanup costs triggered by the drinking water rule.
- Rule remains in effect as the litigation remains ongoing

Supply Chains & Consumer Goods

Toxic Substances Control Act (TSCA)

- PFAS Reporting Rule
  - Requires manufacturers to report to EPA various categories of information regarding PFAS use and effects
  - Requires businesses to report for all manufacture of PFAS since January 1, 2011
- Reporting window opens April 13, 2026 and closes October 13, 2026. Small manufacturers reporting due April 13, 2027
- November 10, 2025: Pre-publication proposed rule released
  - De minimis exemption (0.1%)
  - Imported articles exemption
  - Byproducts, impurities, and R&D exemptions
  - Clarified data to be reported

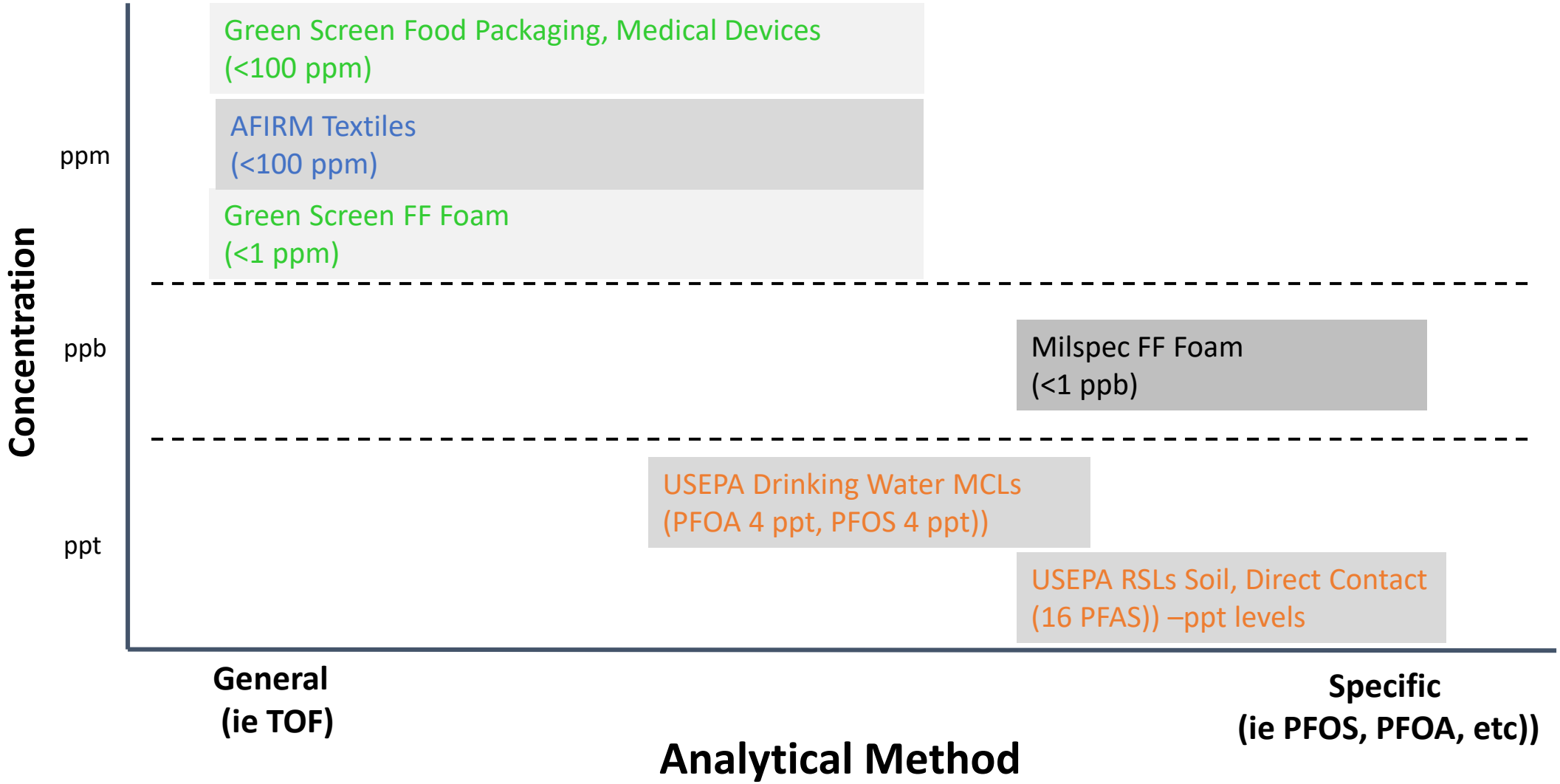
PFAS in Consumer Goods



Common Features of State-Law Prohibitions

- Hugely broad definition of PFAS
- Phased approach to prohibitions based on category of consumer goods
- Currently Unavoidable Use designations
- Trade associations are a valuable resource

Consumer Products: Analytical Basis Varies



NOTE: The target criteria and the method to achieve it substantially vary

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Consumer Products & Consumer Protection Litigation

- Novel approach by state AGs
- Great deal of state-level variance
- Theories Continue to evolve
  - *Texas v. 3M* (Texas State Court)
    - "Defendants knew . . . that PFAS pose risks to people's health and impact the environment" for approximately 50 of the 70 years in which Defendants sold their PFAS-containing products in the state, they "[n]onetheless . . . concealed these substantial risks from consumers and the State, and for decades, . . . even affirmatively claimed their products were safe.'"
  - *Lurenz v. The Coca-Cola Co. & Simply Orange Juice Co.*

PFAS Regulation: Where are we going?

Don’t expect that obligations relating to PFAS will go away under any administration

Private-party solutions gaining traction.

Supply chain management

Prohibitions on PFAS in components

Gathering information through contracting

Managing liability through contracting

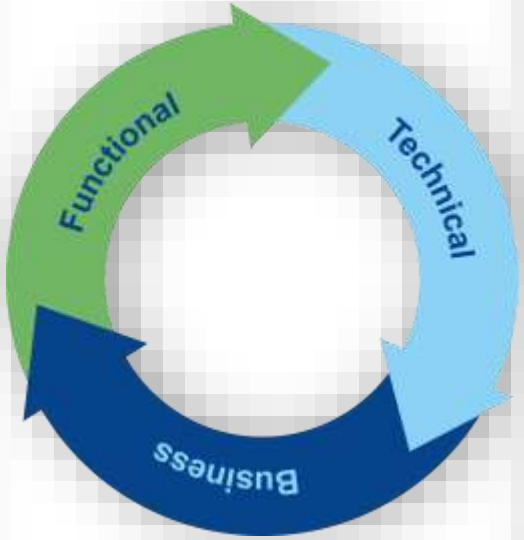
Proactive Analytical Approach
Battelle's Vulnerability Assessment

Functional

- Alternative Assessment
- Supply Chain Evaluation

Technical

- Hazard Assessment
- Lifecycle Assessment



Business

- Strategy, Risk Management

Business

- Cost/Liability Management

Understand, Plan, and Anticipate

PFAS USE	PFAS PROCESS	PFAS-FREE DEFINITION	PFAS IN ENVIRONMENT
Essential	Intentional	General	Compliance
Non-Essential	Unintentional	Specific	Source Attribution

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Thank you!

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Supplemental Slides

Battelle Laboratory Capabilities

Columbus, OH – R&D, specialized

- 500,000 ft^2 of chemistry, biology, engineering, and physics laboratories (i.e., 530 unique laboratories)

Norwell, MA – Accredited, client directed

- Customized $8-million 10,000 ft^2 facility built in 2014 for analyzing sediment, soil, air, water, and tissues

Analyte Class	Environmental						Indoor/Residential						Biological			
	Air	Water	Soil	Sediment	Animal Tissue	Animal Blood	Air	Dust	High-Fat Food	Low-Fat Food	Beverages	Surface Residue	Urine	Human Blood	Human Tissue	Breath
VOCs																
– Nonpolar	●	●					●				●					●
– Polar	●	●					●				●					●
– BTEX		●	●	●	●											
– PIANO		●	●	●	●											
Pesticides																
– OC/OPs	●	●	●	●	●		●	●	●	●	●	●	●		●	
– Pyrethroids	●	●	●	●			●	●	●	●	●	●	●			
– Triazine	●	●	●				●	●	●	●	●	●	●			
– Carbamate	●	●	●				●	●	●	●	●	●	●			
Acid Herbicides	●	●	●				●	●	●	●	●	●	●			
Energetics		●	●	●				●								
PCBs																
– Congeners	●	●	●	●	●		●	●	●	●	●	●		●	●	
– Co-Planars	●	●	●	●	●		●	●	●	●	●	●		●	●	
– Aroclors	●	●	●	●	●		●	●	●	●	●	●		●	●	
Dioxins/Furans	●	●	●	●	●		●	●	●	●	●	●		●	●	
Phthalates	●	●	●	●	●		●	●	●	●	●	●	●			
Alkyl Phenols		●														
PAHs																
– Total PAHs	●	●	●	●	●		●	●	●	●	●	●	●		●	
– PAH metabolites	●	●	●	●	●		●	●	●	●	●	●	●		●	
– PAH alkyl homologs		●	●	●	●			●								
– Biomarkers		●	●	●	●			●								
– Thio-PAH		●	●	●												
Alkane/TPH Fingerprinting		●	●	●	●											
Metals	●	●	●	●	●		●	●	●	●		●	●	●	●	
Emerging Contaminants																
– Oganotins		●	●	●	●			●	●	●	●	●	●			
– PBDE		●	●	●	●			●	●	●	●	●	●			
– Alkylphenol ethoxylates		●	●	●	●											
– Hormones/steroids		●	●	●	●								●	●	●	
– Pharmaceuticals		●	●	●	●								●	●	●	
– Disinfectants/antimicrobials		●	●	●	●											
– Personal care products		●	●	●	●											
– PFAS	●	●	●	●	●	●	●	●	●	●	●	●	●			
– 1,4-dioxane	●						●									

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Battelle PFAS Analytical Services

OUR OFFERINGS							
Holds national accreditations through DOD, DOECAP, NELAP, ELAP and several state level. Certified in AFFF.							
Method	**# of PFAS Analytes**	**Reporting Limit**	**Turnaround Time**	**Accredited**	**Matrices**	**Distinguishing Factors**	**When to chose this method**
EPA Method 1633	Up to 40	Single ppt	72 business hrs to 28 d	Yes	Solid, vapor, non-potable water, tissue	Most extensive data quality and reporting requirements. Most widely accepted method for PFAS in non- drinking water matrices	When you want the highest fidelity data suitable for independent validation; when required for use
B-15 Compliant Method	Up to 40	Single ppt	72 business hrs to 28 d	Yes	Solid, vapor, non-potable water, tissue	Predecessor method to 1633; similar approach but does not have QC and reporting requirements	When you would like 1633 data but don't have the requirement to use it
EPA Method 537.1	Up to 18	Single ppt	72 business hrs to 28 d	Yes	Drinking Water	Standard list of PFAS analytes for PFAS. Most established method	When you need to test drinking water; analyte list drives selection between 537.1 and 533
EPA Method 533	Up to 24	Single ppt	72 business hrs to 28 d	Yes	Drinking water	New method for drinking water that expand list of analytes which couldn't be accomplished by 537.1	When you need to test drinking water; analyte list drives selection between 537.1 and 533
Total Oxidizable Precursor (TOP) Assay	Up to 40	Single ppt	21 to 28 d	1633 portion	Solid, vapor, non-potable water, tissue	Standard method; recognized tool for assessing total PFAS	Drive PFAS to terminal end products
Non- targeted/ suspect screening	Up to 600	Qualitative	90 d	1633 portion	Solid, vapor, non-potable water, tissue	Commercial analytical services to expand monitoring for less common PFAS	Assess for products of incomplete combustion; mass balance studies
PFAS Signature®	Up to 600	Qualitative	120 d	1633 portion	Solid, vapor, non-potable water, tissue	First of its kind commercial analytical tool which incorporate suspect screening and machine learning	Assess PFAS background and sources; fill data gaps in conceptual site model
Modified ASTM D7359-08 Total Organic Fluorine (TOF) Extractable Organic F (EOF)	Total F	20-50 ppb	72 business hrs to 28 d	No	Solid, tissue, liquid	Robust data quality and reporting requirements. The most widely accepted method for extractable organic F in solid matrices	Assess product compliance and mass balance studies.
EPA Method 1621 Absorbable Organic F (AOF)	Total F	1-20 ppb	72 business hrs to 28 d	No	Water/aqueous	Robust data quality and reporting requirements. The most widely accepted method for adsorbable organic F in water matrices.	Nontarget organic Fluorine content and mass balance studies