

PFAS Environmental Regulations: Approaches, Current Impacts, & Considerations



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July 21, 2024

Key Points



Large chemical class with **COMPLEX** chemistries



Huge **VARIATION** in regulatory thresholds



EPA's actions have **WIDE-REACHING** impacts



With Litigation Increasing, Consider **Critical Uses**

What are PFASs?

“PFASs” is a broad, general, non-specific term, which should only be used when talking about all the substances included in the PFAS definition... Otherwise, it would introduce ambiguity, and factual inaccuracies and miscommunication...”

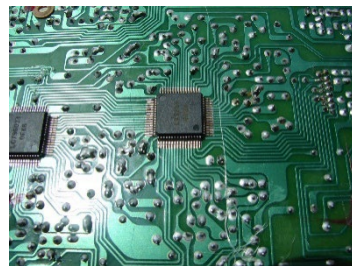
Reconciling Terminology of the Universe of Per- and Polyfluoroalkyl Substances: Recommendations and Practical Guidance



Series on Risk Management
No. 61

Where are PFASs?

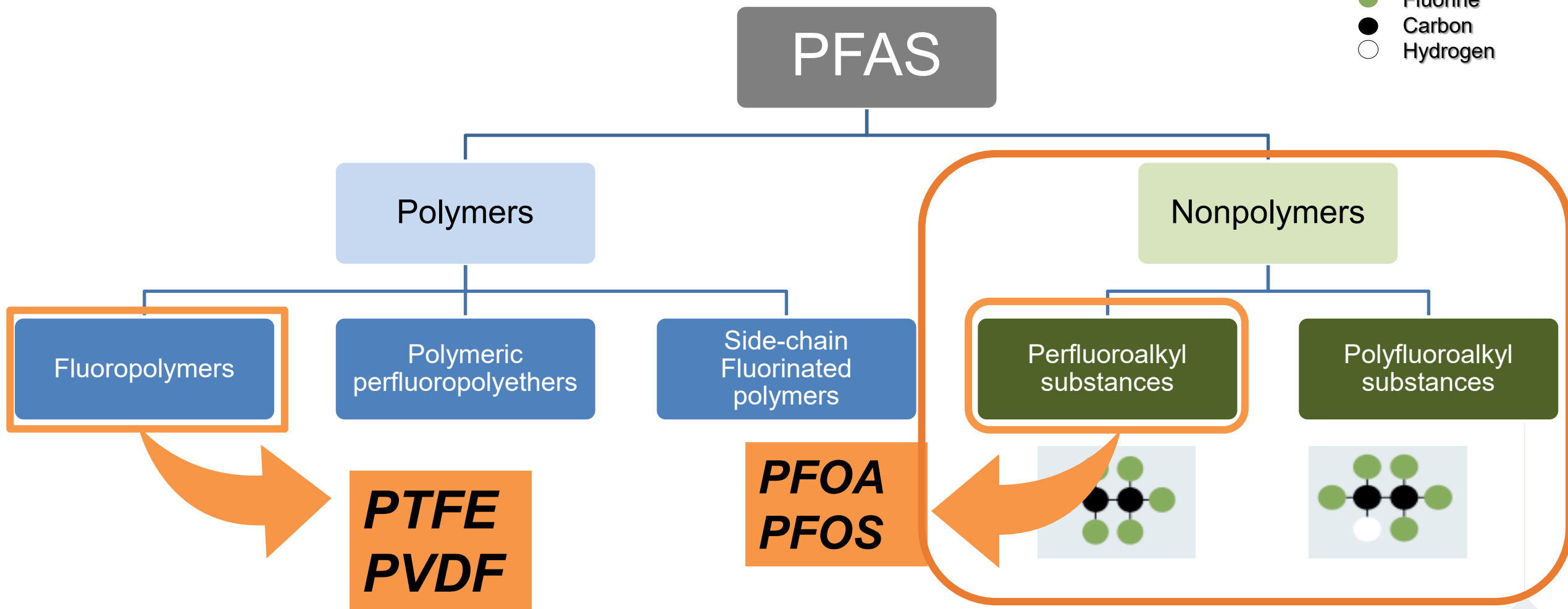
- ✓ Large class of surfactants used since 1940s
- ✓ Unique chemical & physical properties
- ✓ Extremely durable and stable
- ✓ Found in a wide range of consumer, commercial, and industrial applications



12,000 PFAS Grouped by Chemistry

All Very Different Chemistries and Uses

- Fluorine
- Carbon
- Hydrogen



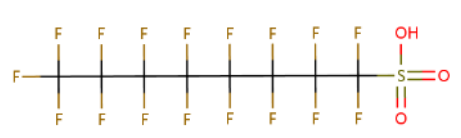
Here's the Nuance

- **Some** are environmentally persistent
- **Some** are mobile in the environment
- **Some** can bioaccumulate in humans/food chain
- **All** regulatory thresholds at **low** levels



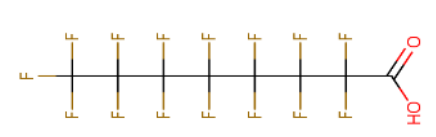
Why the Concern? PFOA and PFOS

WANTED
PFOS
PERFLUOROALKYL
SULFONIC ACID



REWARD:
>\$1 BILLION

WANTED
PFOA (C8)
PERFLUOROALKYL
CARBOXYLIC ACID



REWARD:
>\$1 BILLION

- Anthropogenic chemicals with extensive use since the 1940s
- Widespread environmental detections and in ~95% of US population serum
- Often regarded as
 - Persistent
 - Bioaccumulative and
 - Toxic
- Target of cleanup efforts and litigation throughout the country

What Now?

Energized regulatory focus on federal and (some) state levels



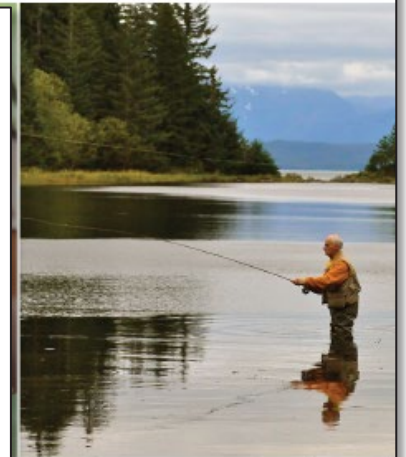
**PFAS Strategic Roadmap:
EPA's Commitments to Action
2021–2024**



**National PFAS Testing Strategy:
Identification of Candidate Per- and Poly-
fluoroalkyl Substances (PFAS) for Testing**



**The Fifth Unregulated Contaminant Monitoring Rule (UCMR 5)
Data Summary: July 2023**



Federal Regulations

- › *New National Primary Drinking Water Regulations (Maximum Contaminant Levels; MCLs)
- › CERCLA designation (PFOA & PFOS only)
- › Proposed RCRA Listing
- › TSCA Reporting Requirements



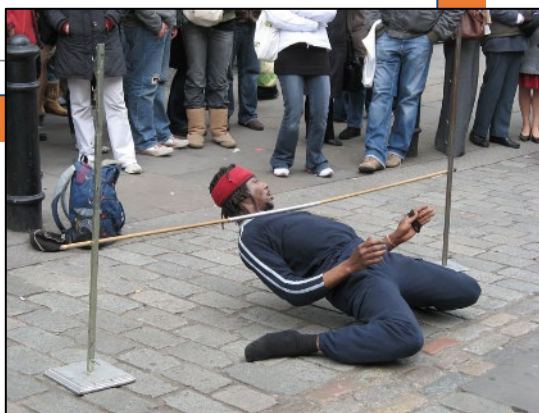
PFOA and PFOS MCLs

- ✓ Set at *lowest level we can detect*
- ✓ Practical Quantitation Limit of **4.0 ppt**
- ✓ 10 ppt for PFNA, PFHxS, GenX
- ✓ Hazard Index of 1 for PFNA, PFHxS, GenX, PFBS
- ✓ Effective 2029
- ✓ Contain NEW noncancer and **cancer** toxicity values
- ✓ **Will be used for CLEANUP and other risk-based regulations**



April 2024
EPA Document No. 815R24006

FINAL
Human Health Toxicity Assessment for Perfluorooctanoic
Acid (PFOA) and Related Salts



EPA's Proposed Toxicity Value Changes – Impacts to Environmental Cleanup Programs

› New Environmental Screening Levels (May 2024):

PFOA =



Groundwater RSL from 6 ng/L to **0.003** ng/L

Soil RSL from 19 µg/kg to **0.019** µg/kg

PFOS =



Groundwater RSL from 4 ng/L to **2** ng/L

Soil RSL from 13 µg/kg to **0.63** µg/kg





Germany – Drinking Water Ordinance

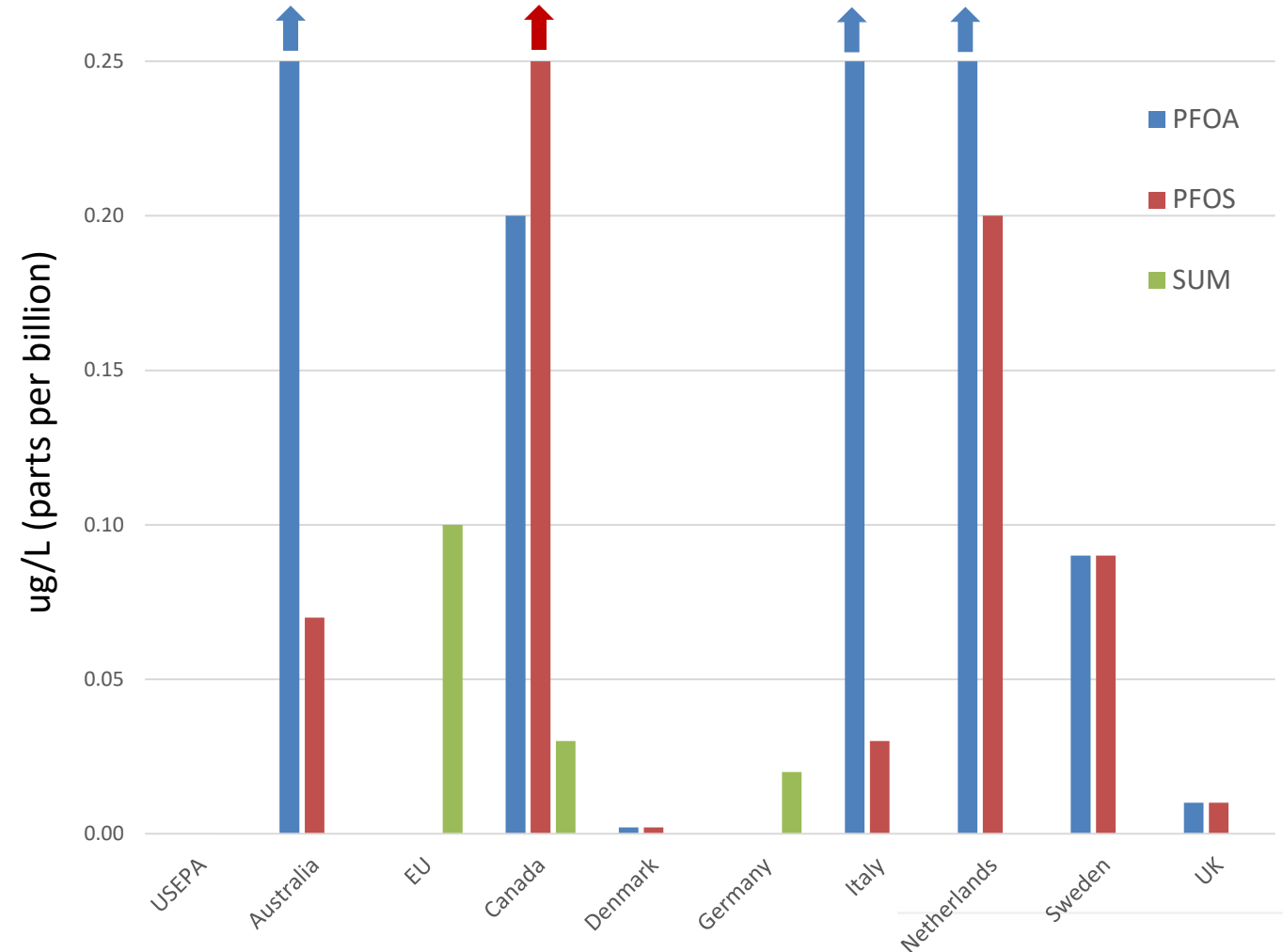
- › Proposed June 2023
- › Effective January 2026
- › Total of 20 PFAS = 100 ppt
- › Total of PFOA, PFOS, PFNA, PFHxS = 20 ppt

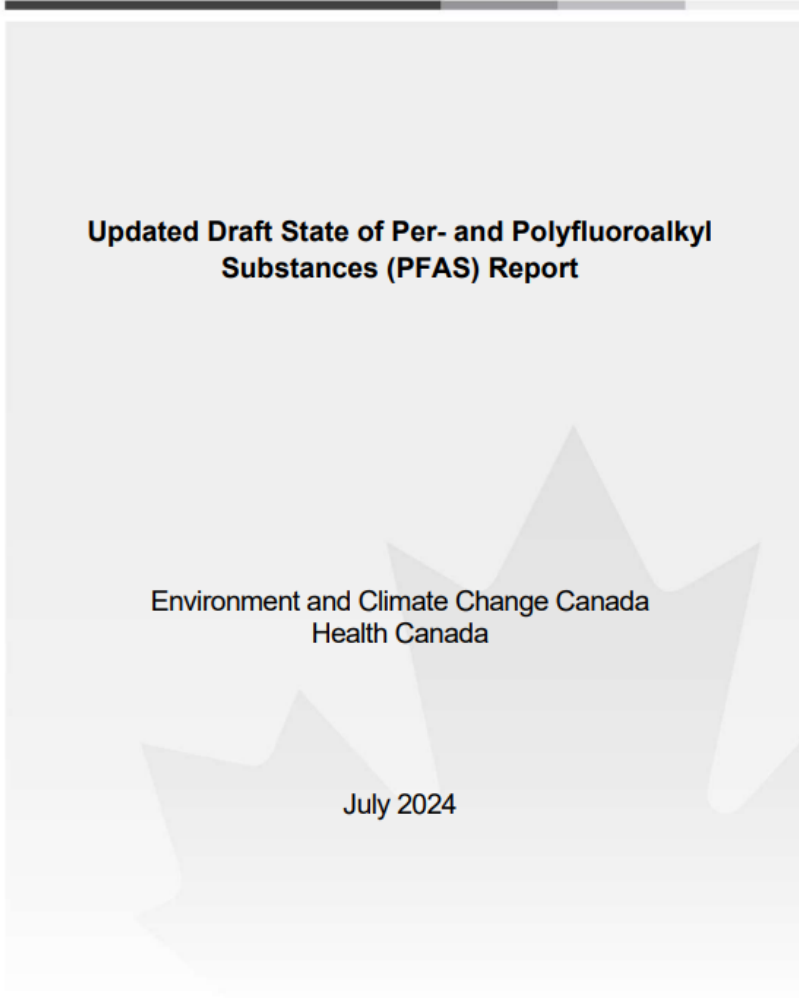
Regulatory Drinking Water Values Vary DRAMATICALLY Worldwide

International Regulatory Values

- ✓ Different science policy decisions
- ✓ Extremely different interpretations of PFOA/PFOS toxicity data

CURRENT Drinking Water or Potable Water Standards / Screening Levels (Feb 2024)





Canada – Updated Draft State of PFAS Report

- › Published July 2024
- › Excludes fluoropolymers (FPs) from PFAS grouping
- › Proposes separate FP exposure and hazard profile assessment
- › Infers combined exposures increase likelihood of detrimental impacts

Why the Inconsistency?



1. Inconsistent Science Interpretations

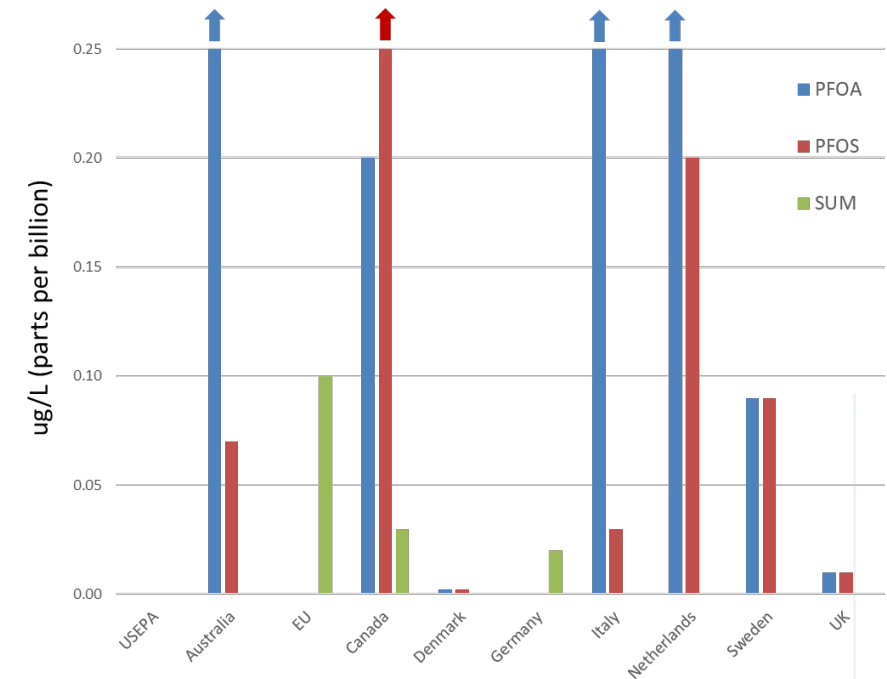
- Use of Human Data
- Use of Animal Data
- Highly Uncertain endpoints/studies

2. Regulatory Program / Policy

- Drinking Water
- Cleanup
- Screening Value v. Standard

3. Location

- Drinking Water Impacts
- Primary manufacturing
- Resources and expertise



No Broad Agreement on PFOA/PFOS Exposure & Causation Of Adverse Health Outcomes



Human studies show **associations** with...

- Effects on immune system
- Elevated cholesterol
- Decreased birth weight
- **Cancer** (“likely”)

VS.

“limited or no evidence for any causal link... and any human disease”



Australian Government
Department of Health

“The available epidemiological studies **suggest associations** ... ; however, **cause-and-effect relationships have not** been established...”

ATSDR

PFOA = “**carcinogenic to humans**”
PFOS = “**possibly carcinogenic to humans**”

“...**no evidence** for a link between exposure to PFASs and cancer risk.”

Committee on
Toxicity
UK

International Agency for Research on Cancer



Government
of Canada

Fifth Unregulated Contaminant Monitoring Rule Initial Results



HEALTH

“Forever Chemicals” Data From EPA Shows Widespread Contamination & Underestimate Of PFAS Contaminating Tap Water



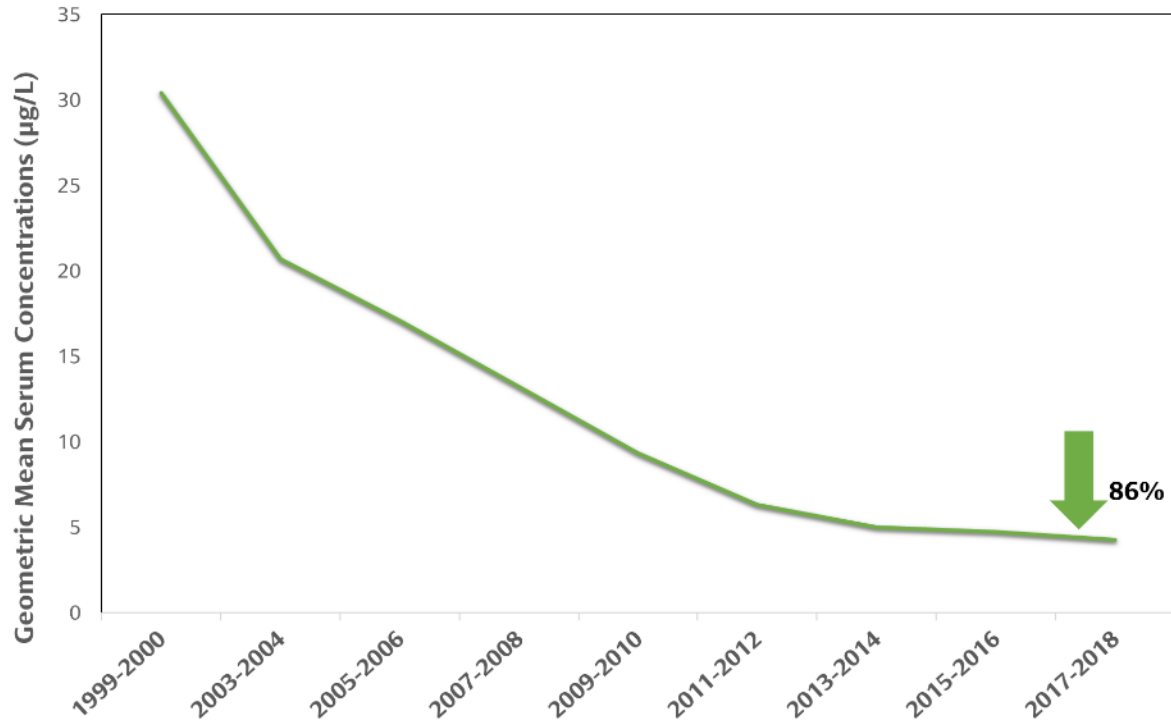
The Fifth Unregulated Contaminant Monitoring Rule (UCMR 5)
Data Summary: July 2023

THE FACTS

- › 3,720 PWS sampled
- › No detections of PFOA or PFOS in 87%

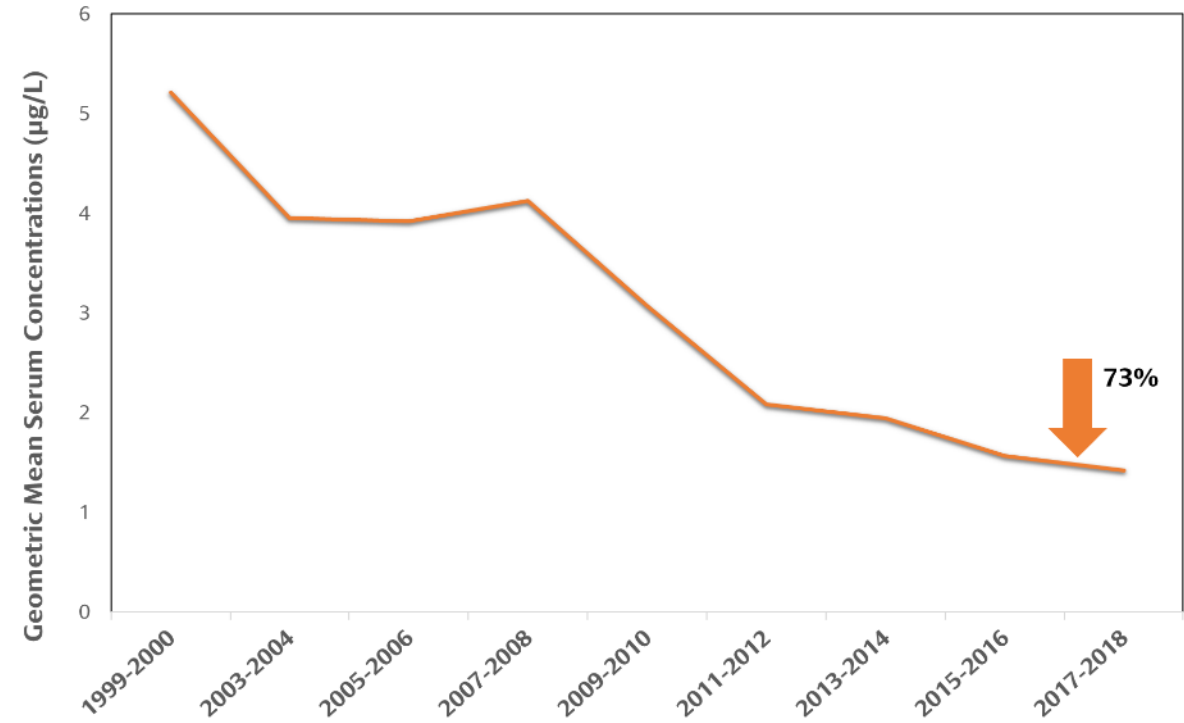
NHANES Data Shows Exposures Declined Without MCLs

PFOS Serum Concentrations for the U.S. Population (All Ages, M/F)



PFOS

PFOA Serum Concentrations for the U.S. Population (All Ages, M/F)



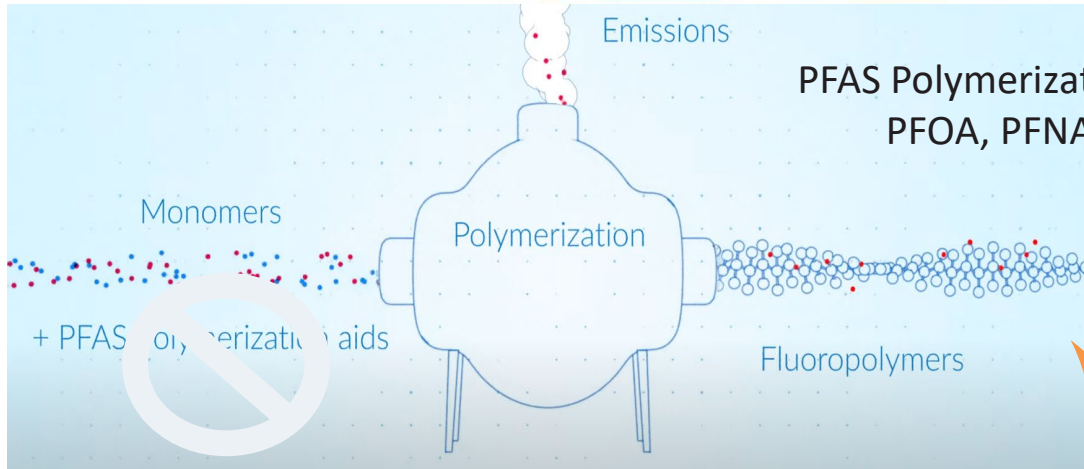
PFOA

Sources:

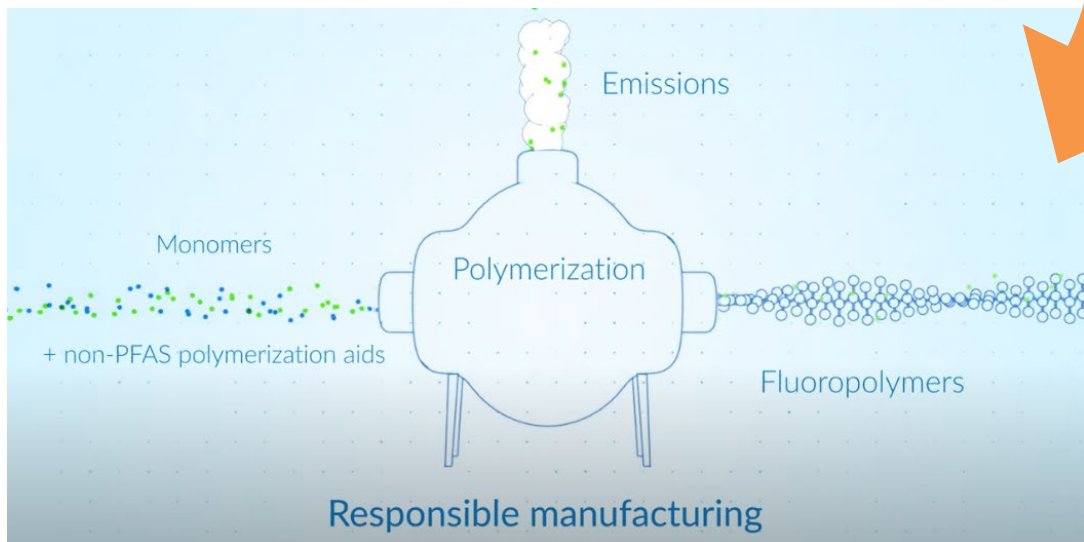
NHANES, 1999-2010. https://www.cdc.gov/exposurereport/pdf/FourthReport_UpdatedTables_Volume1_Mar2021-508.pdf

NHANES, 2011-2018. https://www.cdc.gov/exposurereport/pfas_early_release.html

Changes in Fluoropolymer Manufacturing Processes and Standards



PFAS Polymerization Aids include:
PFOA, PFNA, GenX, Etc.



- › Many fluoropolymers can now be manufactured without fluorosurfactant (Ameduri 2023) processing/polymerization aids
- › Better process controls during manufacturing (Ameduri 2023)

PFAS In Consumer Products is a HOT TOPIC

Examples, not exhaustive

REGULATORY REQUIREMENTS

› EU REACH Ban/Restriction

› States:

- bills require public reporting related to PFAS in products manufactured, sold, transported within state (e.g., Maine, Minnesota)
- bills on full PFAS bans in certain products

› USEPA TSCA reporting rules

- › Due May 2025



California

PFAS in children's products, outdoor apparel, carpets, food packaging & cookware
Prop 65 (PFOA, PFOS, PFNA)
Draft – artificial turf



Maine

Restricted in carpets, rugs, fabric treatments
PFAS Reporting Act = intentionally added – Jan. 2025



Minnesota

PFAS Reporting Requirements, Reporting starting in 2026
Ban on unnecessary uses by 2023
Ban on some residential uses

PFAS Are Used in a Wide Range of Consumer Products

Examples of Industries where PFAS are Used

Automotive/ aerospace	Nuclear industry
Biotechnology/medical	Oil & gas industry
Building and construction	Pharmaceutical industry
Chemical industry	Photographic industry
Electroplating	Production of plastic and rubber
Electronic industry	Renewable energy
Energy sector	Semiconductor industry
Food production industry	Telecommunication
Machinery and equipment	Textile production
Manufacture of metal products	Watchmaking industry
Mining	Wood industry

Use categories

Aerosol propellants	Metallic and ceramic surfaces
Antifoaming agent	Pipes, pumps, fittings and liners
Ammunition	Plastic and rubber
Coatings, paints and varnishes	Refrigerant systems
Dispersions	Resins
Fire-fighting foam	Sealants and adhesives
Flame retardants	Soldering
Lubricants and greases	Wire and cable insulation, gaskets and hoses



Critical or Essential Uses of PFAS

A use of PFAS for which use of a replacement substance is impossible or impractical (H.R. 7900- NDAA 2023)

- Pharmaceutical Products and Medical Devices (ex, cardiovascular stents)
- Infrastructure (ex, electric vehicles)
- Energy (ex, solar panels, batteries)
- Defense and Aeronautics (ex, kinetics [explosives], aviation)
- Technology (ex, semiconductors)

NSTC Report to Congress: PFAS Alternatives
Presentation on 2/15/2024 to EPA TSCA

PFAS Critical and Essential Uses

Report on Critical Per- and Polyfluoroalkyl Substance Uses

Pursuant to Section 347 of the James M. Inhofe National Defense Authorization Act for
Fiscal Year 2023 (Public Law 117-263)



August 2023

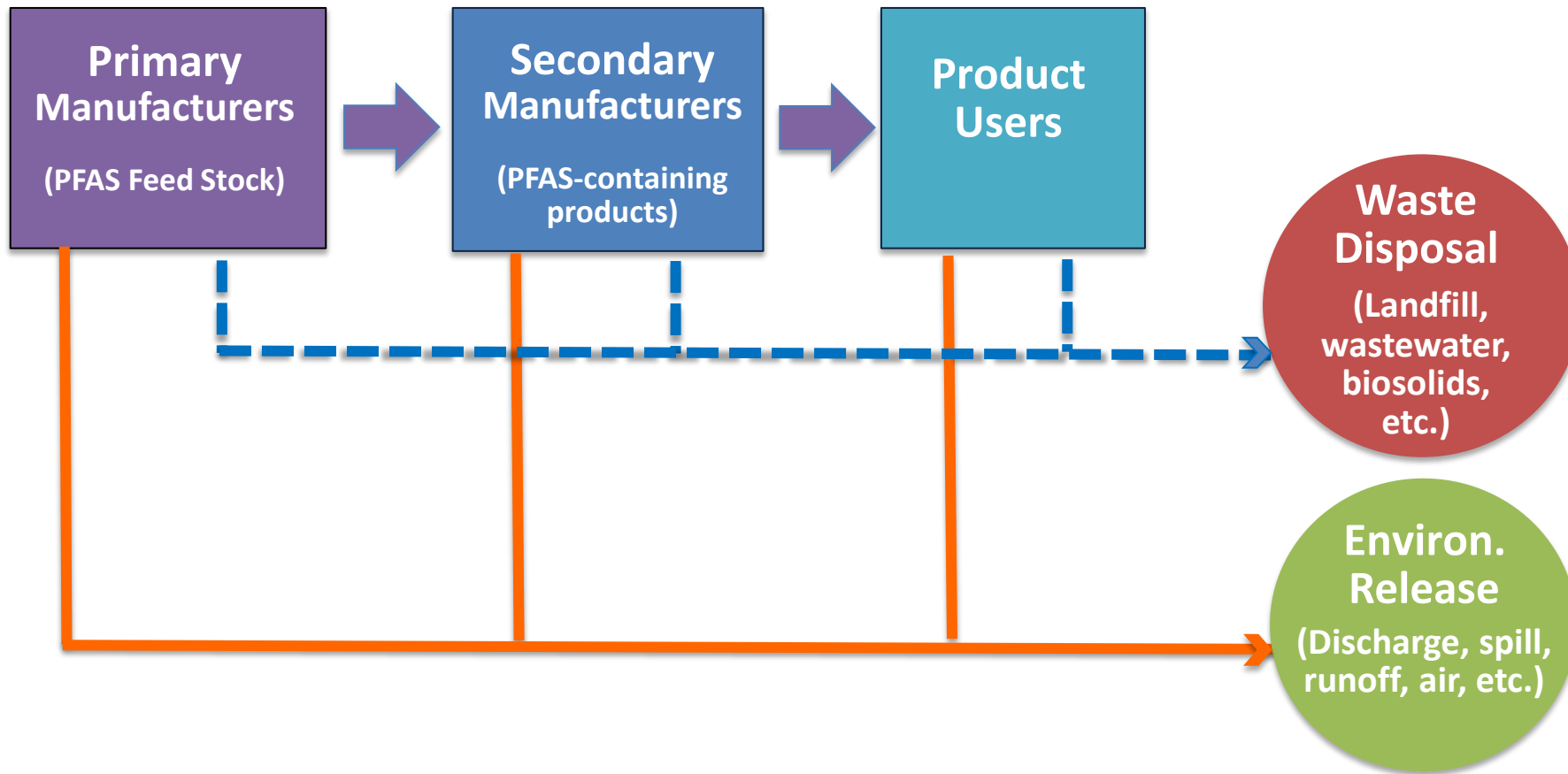
Office of the Assistant Secretary of Defense for Energy,
Installations, and Environment

Office of the Assistant Secretary of Defense for Industrial
Base Policy

“Mission critical PFAS uses provide significant benefits to the framework of U.S. critical infrastructure, and national and economic security.”

“Losing access to PFAS due to overly broad regulations or severe market contractions would greatly impact national security and DoD’s ability to fulfill its mission, and impact domestic defense industrial base manufacturing and supply.”

Potential Environmental Sources



CERCLA Liability:

- Direct manufacturers, including importers;
- Processors;
- Manufacturers of products containing PFOA and/or PFOS;
- Downstream product manufacturers and users; and
- Waste management and wastewater treatment facilities

Current PFAS Litigation Landscape



- Manufacturers, importers, suppliers, and retailers that use PFAS may be exposed to liability resulting from:
 - Individual claims
 - Federal Regulatory Agencies
 - State Government/Agencies/Attorney Generals
 - Class action/ Mass Tort
- Property Damage Claims
- Environmental/Natural Resource Damages
- Trespass/Nuisance
- Personal Injury
- Bodily Injury
- Products

[Source](#)

Litigation Landscape – Chevron Fallout



- Waters largely untested
- Opening for substantive regulatory challenges?
 - CERCLA (PFAS MCLs?)
 - CAA
 - CWA

What's Next for PFAS and Environmental Issues?

- ✓ **CERCLA/RCRA and re-opening Sites**
- ✓ **Natural Resource Damages and Ecological Risk Claims**
- ✓ **NPDES, Effluent Limitation Guidelines**
- ✓ **Property Transfer and Due Diligence**
- ✓ **Consumer Products**

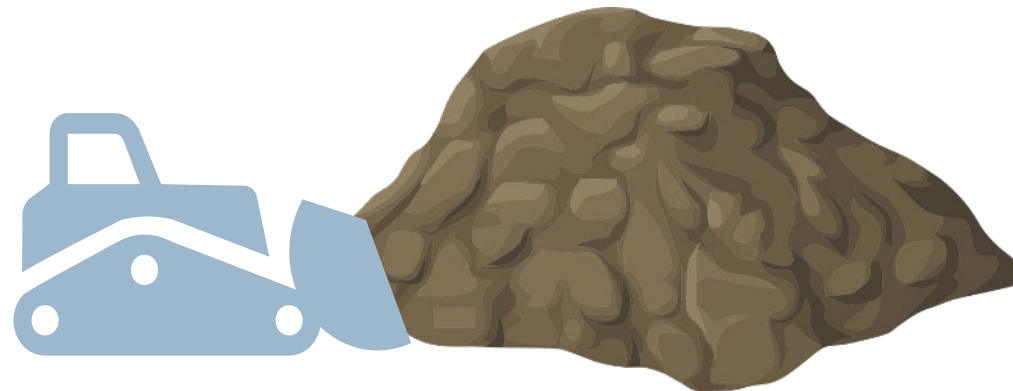


It's not just drinking water...

What about other receptors and potential liabilities?



- › Occupational exposure
- › Soil exposure and management
- › Construction debris
 - › EHS Plans
 - › Waste Management



Known issue for construction projects and/or redevelopment of AFFF sites.




Image from: <https://wollamconstruction.com/concrete/refinery-projects/>



Image from: <https://www.hdrinc.com/insights/experts-talk-optimizing-airport-construction-safety-and-phasing-plan-process-joe-grubbs>

Property Acquisitions/Transfers



CERCLA
Hazardous
Substance
Designation

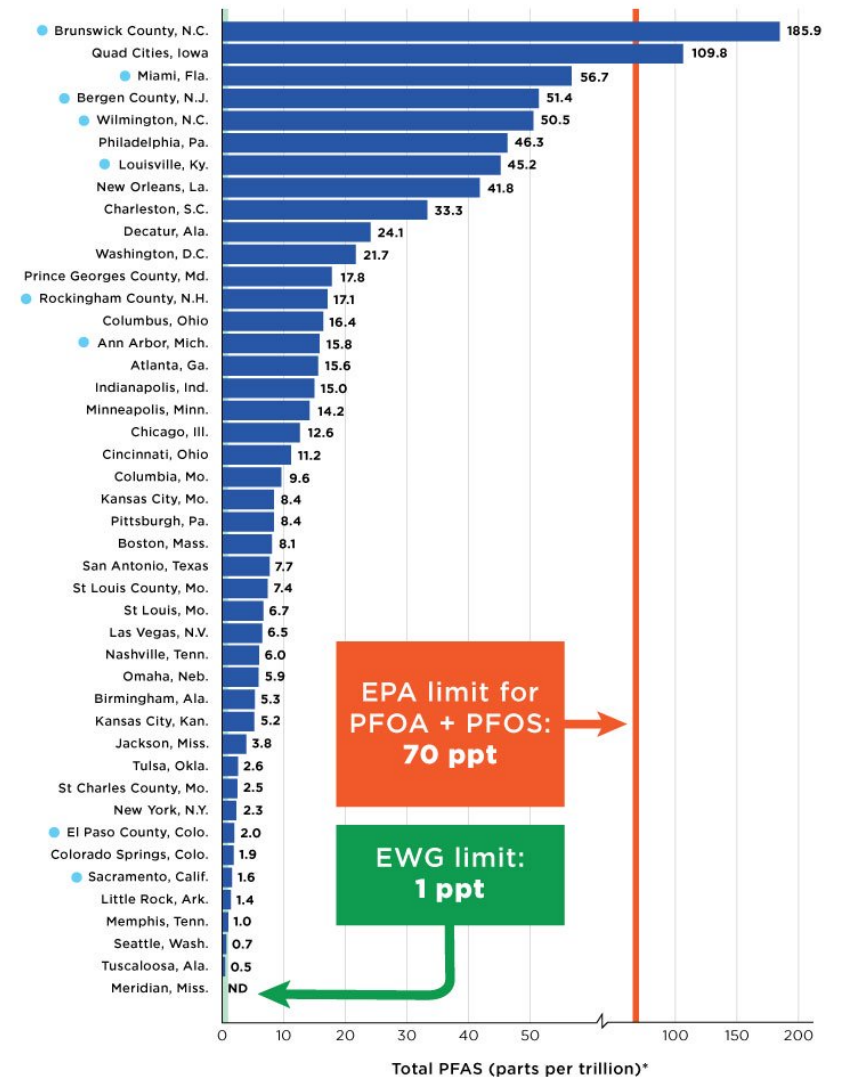
ASTM Phase I
**Recognized
Environmental
Condition**

**PFAS
RECs**

Should We Compare “Total PFAS” to SLs?

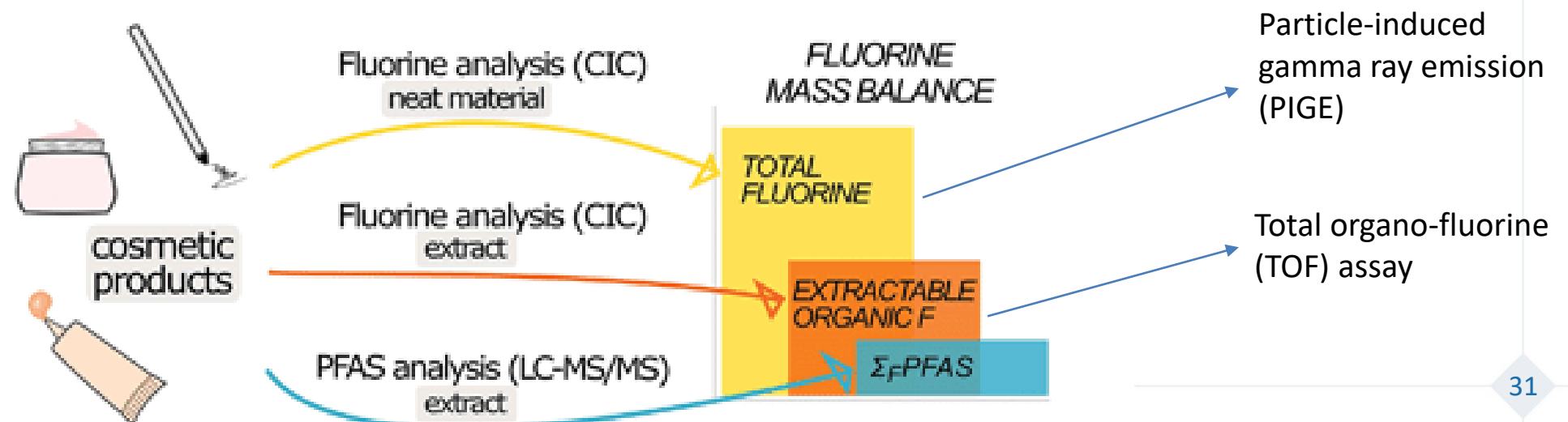
- › “Total PFAS” sometimes compared to a PFOA/PFOS reg. levels
- › Assumes equal potency
- › Scientifically unjustified
- › Recommend using USEPA Method 1633

EWG TESTS FOUND TOXIC PFAS CHEMICALS IN TAP WATER IN 31 STATES AND D.C.



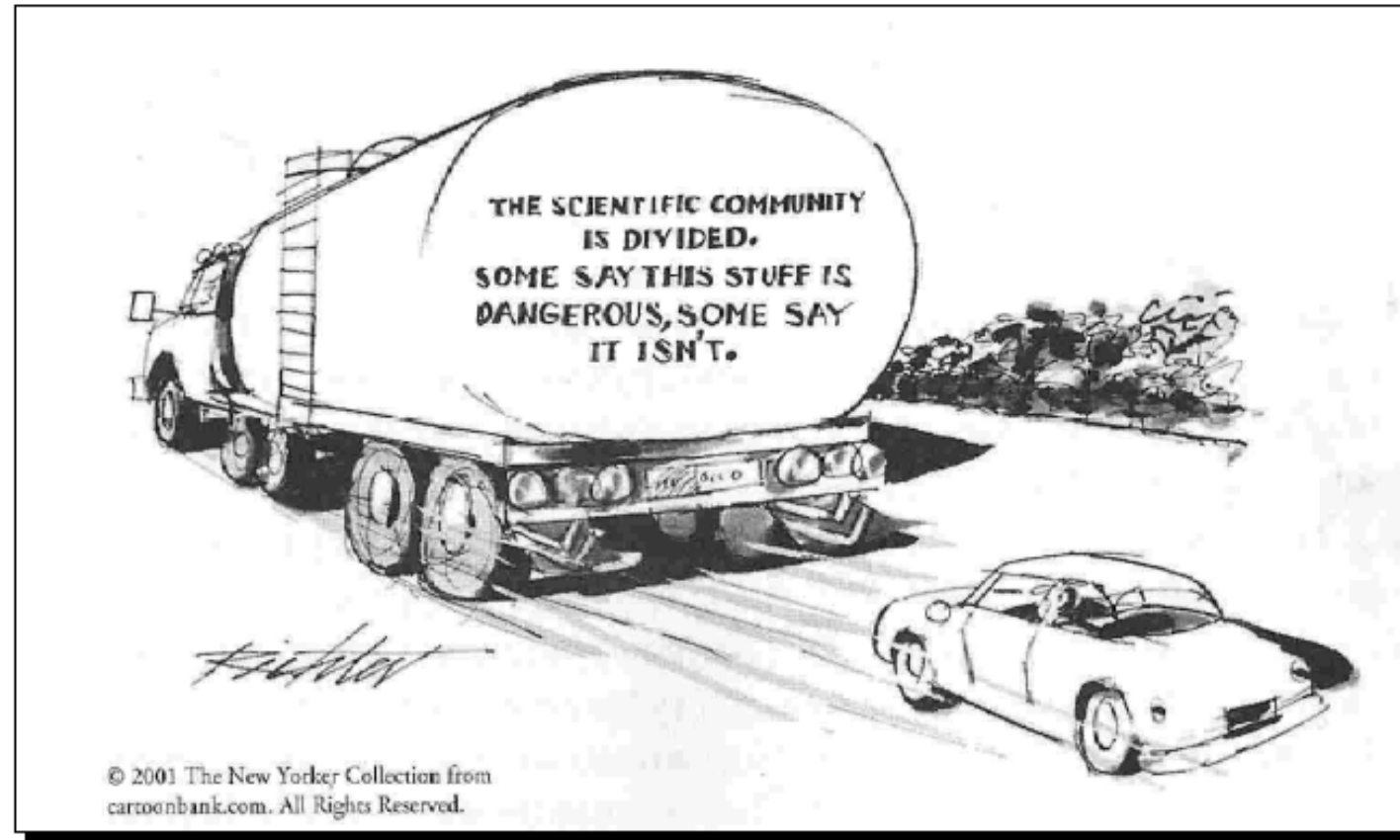
Does F Presence = PFAS Presence in a Product? It's a Good Starting Point

- › Total Fluorine = PFAS presence?
 - › Not necessarily.
 - › Useful as a **preliminary** screening method
- › **Secondary** Screening: Extractable Organic Fluorine
- › **“Final”** Screening: **USEPA Method 1633**
 - › Best method available
 - › Gives individual analyte concentrations

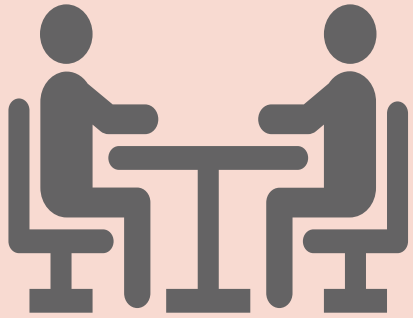


Public Communication Challenges Abound

- › What works?
 - › **Simple**, clear statements
 - › Identify **uncertainties**
 - › **Transparent** data
- › Goal: Raise awareness, reduce alarm, build trust.

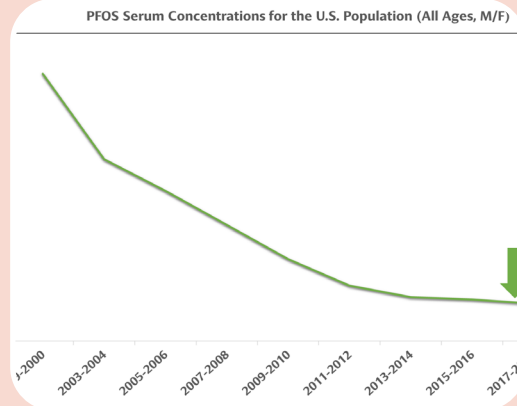


Key Takeaways



No Consensus on PFOA/PFOS Toxicity

- Public health benefits of PFAS MCLs **highly uncertain**
- Regulations, policy vary widely across countries



Exposures Are Declining

- Levels of PFOA and PFOS in the US general population have dramatically decreased
- Before MCLs



It's More Than Just PFOA/PFOS in Drinking Water

- Consumer products
- Property Redevelopment
- Litigation headwinds are shifting



Are Certain PFASs Critical/Essential?

- Not all PFASs are the same
- Analytical methods should be specific
- Goal is to balance HH/Eco with critical uses

THANK YOU



Science · Strategy · Solutions

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