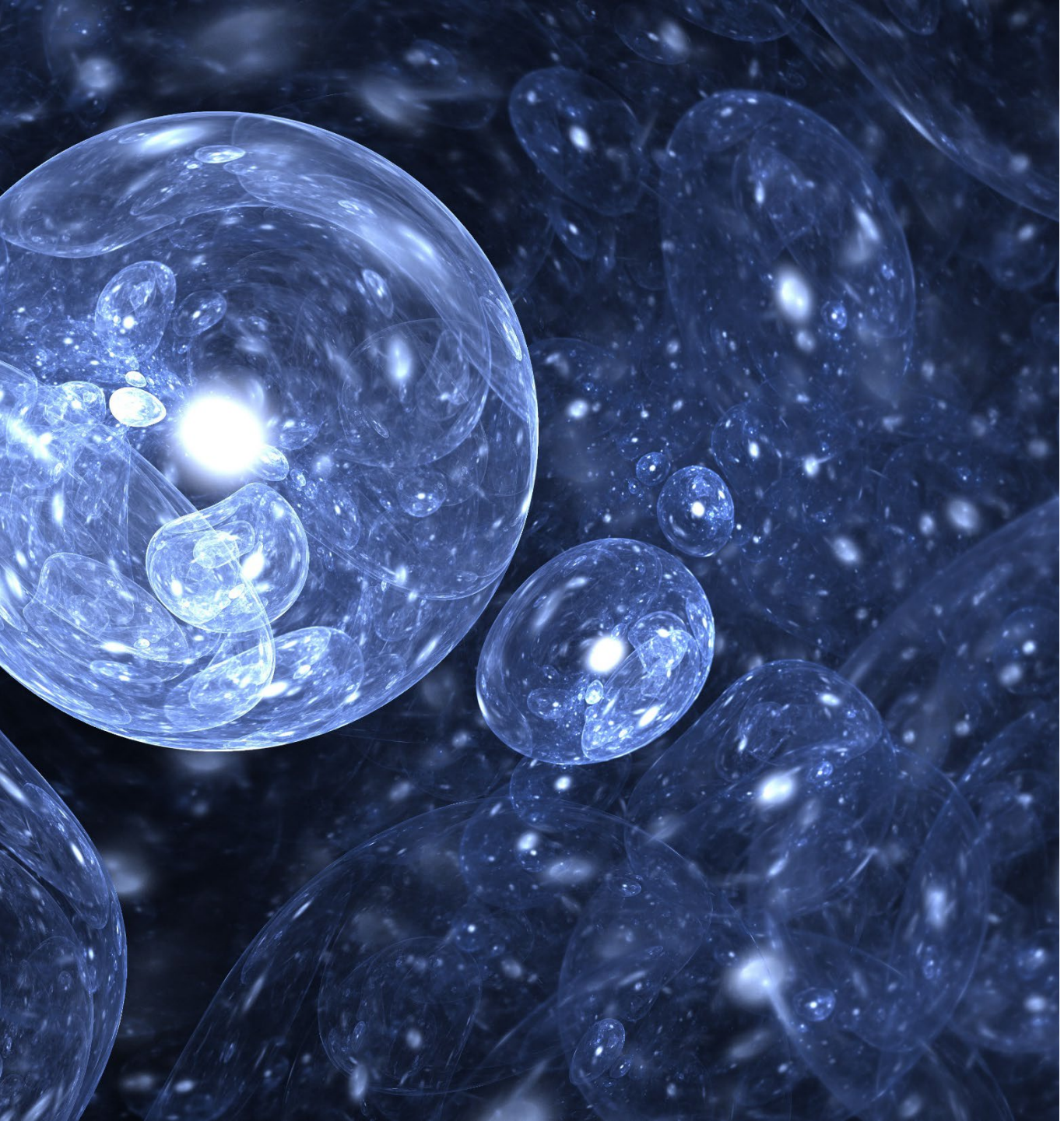
Welcome Participants

Your lines have been muted to ensure our presenters are not distracted by background noise

Attendees are encouraged to participate by using the chat/Q&A via the chat box function – select “All Panelists and Attendees” or only “All Panelists”

A link to the recording of this session & slides will be provided in our follow-up email sent next week



ERM Webinar Series: Fast Fluorinated Facts

PFAS in the News

27 September 2022

The business of sustainability

ERM

SAFETY MOMENT

Multitasking can elevate stress and trigger displayed fear and sadness reactions which can erode the emotional culture of a workspace

HOW TO MANAGE THE URGE TO MULTITASK

- Turn off your email notifications and respond to emails thoughtfully during a designated period
- Turn off your phone when you are not using it
- Make a prioritized to do list
- Allow yourself time to finish a task before starting a new one
- Take back control of your calendar

Speakers

Mark Lafranconi, PhD, DABT
Principal Toxicologist
Cincinnati, OH

ERM

Sara Meyer
Principal Consultant
Holland, MI

ERM

Nadine Weinberg
Partner
Boston, MA

ERM

Jeff McDonough, M.S., P.E.
Technical Director
Denver, CO

ERM

AGENDA

01 Health Advisories for PFOS/PFOS/PFAS Toxicology

02 NASEM Guidance on PFAS Exposure, Testing & Clinical Follow-up

03 Review of Ambient Water Quality Criteria for PFOA and PFOS

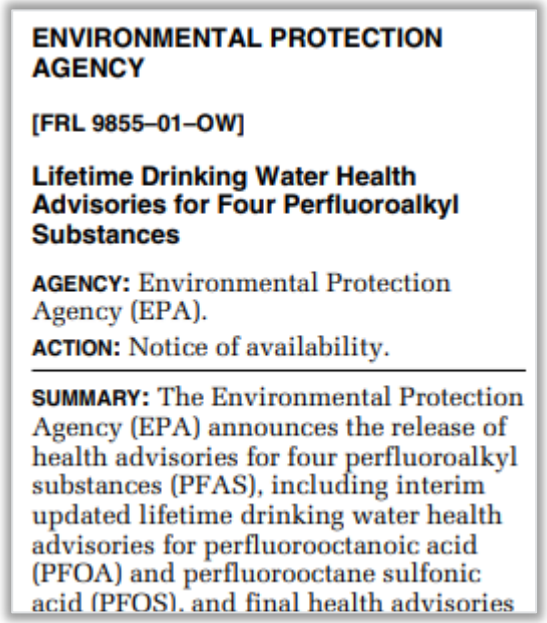
04 PFOA/PFOS as CERCLA Hazardous Substances

05 Remediation Oxidation Issue

HEALTH ADVISORIES FOR PFOS/PFOS/PFAS TOXICOLOGY

MARK LAFRANCONI, ERM

EPA Health Advisories on Four PFAS Molecules



ENVIRONMENTAL PROTECTION AGENCY

[FRL 9855–01–OW]

Lifetime Drinking Water Health Advisories for Four Perfluoroalkyl Substances

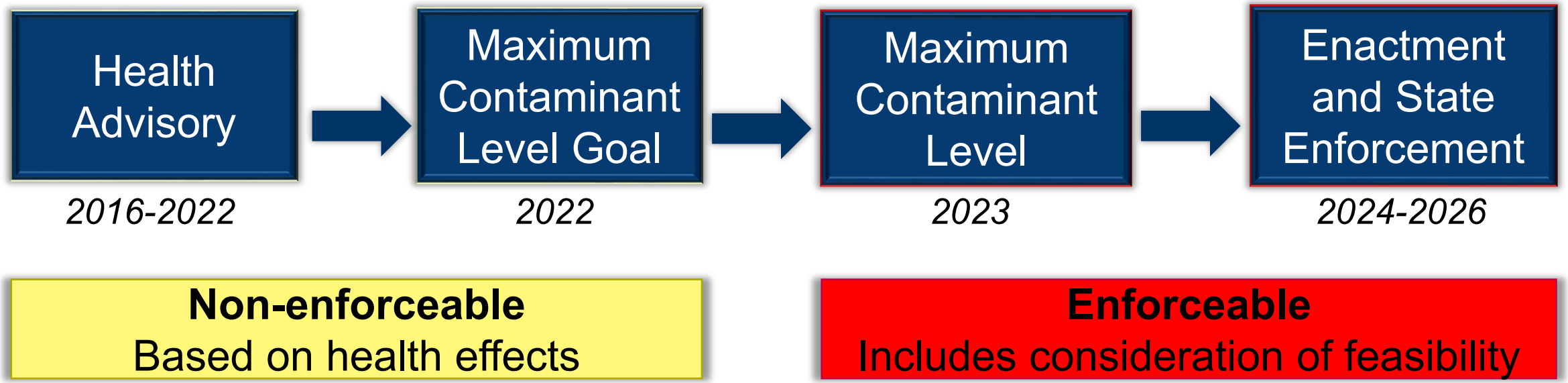
AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice of availability.

SUMMARY: The Environmental Protection Agency (EPA) announces the release of health advisories for four perfluoroalkyl substances (PFAS), including interim updated lifetime drinking water health advisories for perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS), and final health advisories

PFAS	HA (ppt)	Minimum Reporting Level (ppt)	Basis
PFOA	0.004 (Interim)	4	Epidemiological study on vaccine response in children - Faroe Islands *Original HA was 70 ppt based on reduced rat and mouse pup weights*
PFOS	0.02 (Interim)	4	
PFBS	2,000	5	Thyroid effects in mice
GenX	10	3	Liver lesions in female mice

Anticipated National Drinking Water Standard

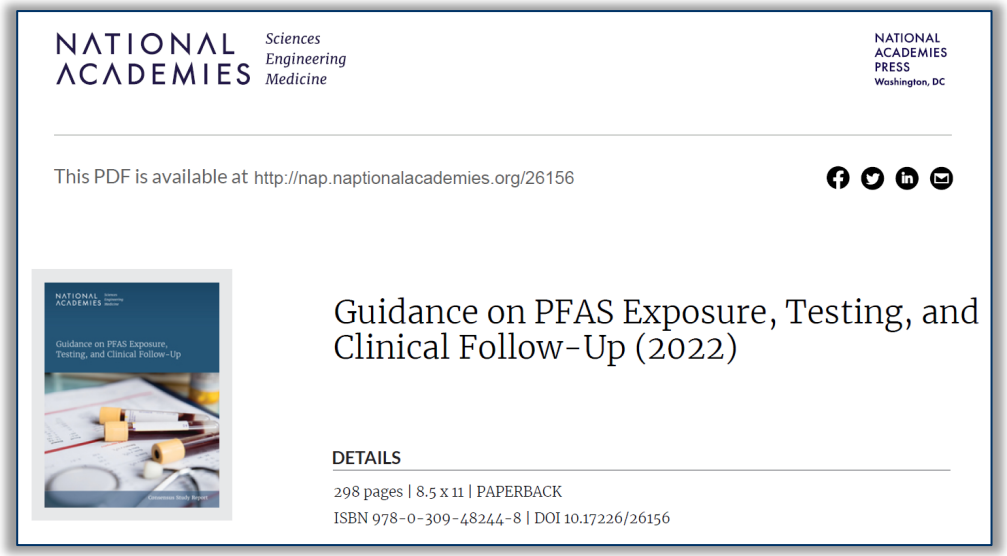


https://www.epa.gov/sdwa/and-polyfluoroalkyl-substances-pfas

NASEM GUIDANCE ON PFAS EXPOSURE, TESTING & CLINICAL FOLLOW-UP

MARK LAFRANCONI, ERM

National Academies of Sciences Report on PFAS Exposure and Clinical Follow-up


NATIONAL ACADEMIES Sciences Engineering Medicine

NATIONAL ACADEMIES PRESS Washington, DC

This PDF is available at http://nap.naptionalacademies.org/26156

Guidance on PFAS Exposure, Testing, and Clinical Follow-Up (2022)

DETAILS

298 pages | 8.5 x 11 | PAPERBACK

ISBN 978-0-309-48244-8 | DOI 10.17226/26156

Evaluate literature
Determine clinically relevant health effects

Evaluate approaches for reducing exposure
Determine effective approaches to reduce exposure

Correlate blood levels and Health Effects
Determine blood ranges for decision making

Assess available standards of care
Determine patient follow-up

Clinical Recommendations

Sufficient evidence of association

- Decreased antibody response (in adults and children),
- Dyslipidemia (altered lipid metabolism in adults and children),
- Decreased infant and fetal growth, and
- Increased risk of kidney cancer (in adults)

< 2 ng/mL	2 – 20 ng/mL	≥ 20 ng/mL
Provide usual standard of care	▪ Encourage PFAS exposure reduction ▪ Dyslipidemia with lipid panel ▪ Hypertensive disorders during pregnancy and fetal monitoring during prenatal visits	▪ Encourage PFAS exposure reduction ▪ Dyslipidemia with lipid panel ▪ Kidney, breast, testicular cancer ▪ Thyroid function ▪ Ulcerative colitis

REVIEW OF AMBIENT WATER QUALITY CRITERIA FOR PFOA AND PFOS

SARA MEYER, ERM

Aquatic Life Ambient Water Quality Criteria: PFOA & PFOS

Draft Recommended Freshwater Aquatic Life AWQC 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	49 mg/L	0.094 mg/L	1.11	6.10	0.125
PFOS	3.0 mg/L	0.0084 mg/L	0.937	6.75	2.91
Duration	1-hour average	4-day average	Instantaneous		
Frequency	Not to be exceeded more than once in 3 years on average		Not to be exceeded more than once in 10 years on average		

1= Criterion Maximum Concentration; 2 = Criterion Chronic Concentration; 3 = Wet weight

Draft Acute Water Column Benchmark for Aquatic Life in Estuarine/Marine Waters

- PFOA: 7.0 mg/L; one hour average, not to be exceeded more than once in 3 years on average
- PFOS: 0.55 mg/L; one hour average, not to be exceeded more than once in 3 years on average

*Scheduled to be final Fall 2024 per USEPA Strategic Roadmap
(public comment period closed July 2022)

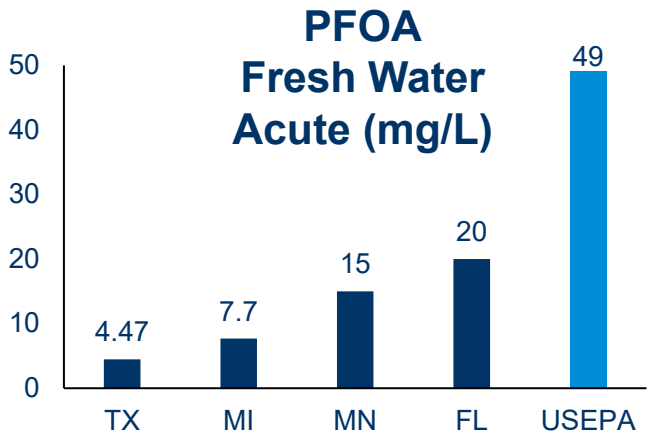
Aquatic Life Ambient Water Quality Criteria: PFOA & PFOS

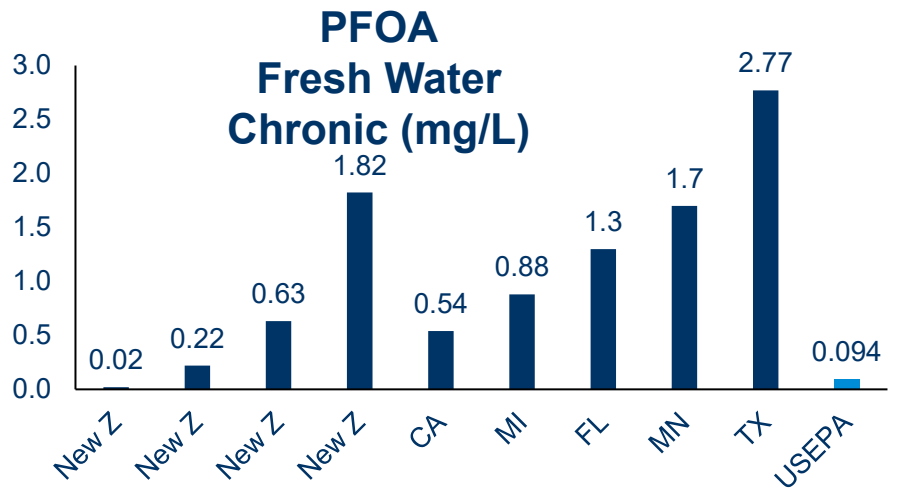
WHY DOES IT MATTER

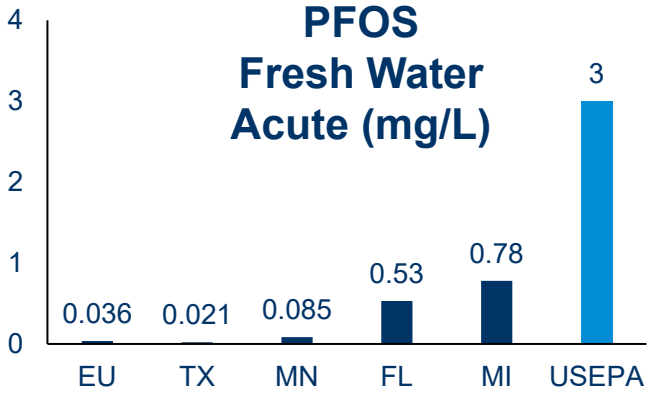
These criteria could drive changes in State-issued NPDES Permits (Wastewater & Stormwater) including:

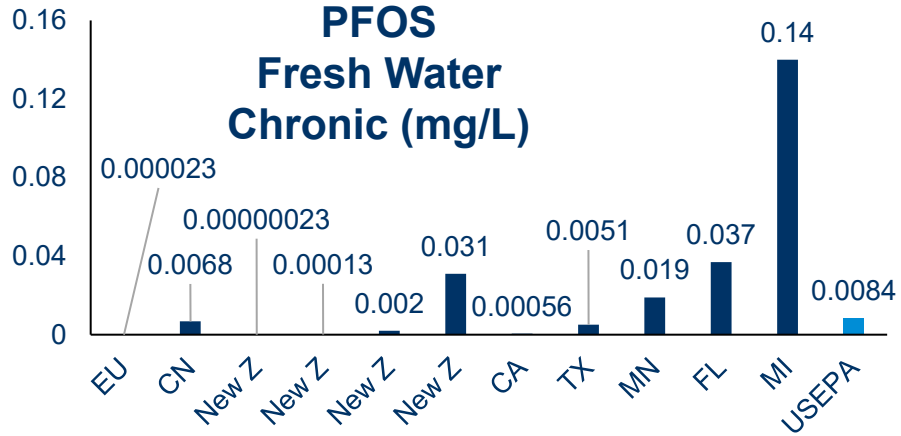
- Routine monitoring for PFOA/PFOS
- Identification of BMPs* to minimize PFOA/PFOS in discharge
- Requirement for technological improvements to reduce PFOA/PFOS
- Antidegradation assessments

*Best Management Practices









PFOA/PFOS in wastewater or stormwater discharge presents significant challenges to **identify** & **control** the source.

States may set criteria and limits lower than USEPA values.

PFOA/PFOS AS CERCLA HAZARDOUS SUBSTANCES

NADINE WEINBERG, ERM

CERCLA Listing of PFOA and PFOS

What is EPA Doing?

- EPA lists PFOA, PFOS including salts & structural isomers as hazardous substances under CERCLA
- Requires reporting any release above one (1) pound in a 24-hour period
- Allows EPA to conduct response actions without establishing an imminent and substantial danger
- EPA can recover costs from potentially responsible parties

Why Did EPA Propose Listing?

- Exposure to PFOA, PFOS may present a significant danger to human health and the environment including effects to immune system, cardiovascular system and liver
- PFOA, PFOS may persist for long periods of time once released
- PFOA, PFOS are widely detected in surface and groundwaters

CERCLA Listing of PFOA and PFOS

Direct Effects

- Reporting & notification of releases above RQ (1 lb.)
  - *Modern foams*: ~150,000 gallons
  - *Older foams*: ~12 gallons
- Requires DOT to regulate as hazardous materials
- Provides additional response and enforcement actions to Federal and state regulatory agencies
- Private parties conducting cleanups can recover costs from PRPs

Indirect Effects

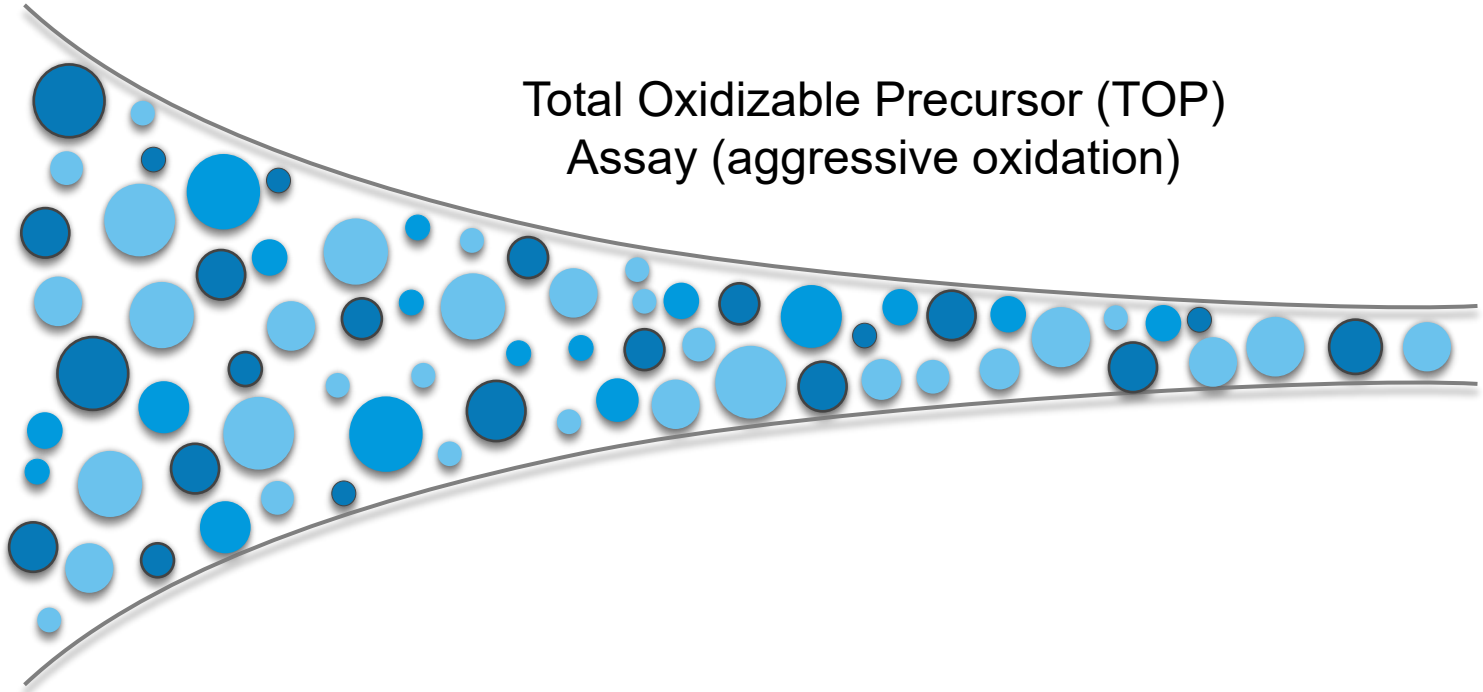
- Likely to trigger investigation at existing and closed sites including through 5-year reviews
- May lead to reopening sites for additional investigation including new groundwater wells and additional rounds of sampling
- May require changes to existing remediation approach
- May result in identifying new sites
- May create additional challenges for IDW disposal

REMEDIATION OXIDATION ISSUE

JEFF MCDONOUGH, ERM

In Situ Chemical Oxidation (ISCO) may Transform "Precursors" into Detectable PFCAs

Potential for many thousands of per- and polyfluoroalkyl* substances



Total Oxidizable Precursor (TOP) Assay (aggressive oxidation)

~40 individual PFAS quantified by commercially available methods

TOP Assay: aggressive, radical-based chemical oxidation converts **polyfluoroalkyl** compounds into detectable **perfluoroalkyl carboxylic acids** (PFCAs; e.g., PFOA)

TOP Assay typically results in 10% to 30% increases in detectable PFCAs (can vary depending on historical source of PFAS)

**Polyfluoroalkyl* compounds sometimes referred to as "precursors"*

Houtz and Sedlak 2012

Potential Ramifications if ISCO is a Presumptive Technology

Why it MATTERS

- Planned/historical ISCO may trigger a regulatory request for PFAS sampling with or without (w/o) TOP assay w/o evidence of PFAS use/release at the Site (e.g., historically similar to metals sampling ahead of ISCO)
- If PFAS are known/suspected to be present, ISCO may inadvertently transform polyfluoroalkyl compounds into regulated or detectable PFAS

Historical ISCO w/o known PFAS

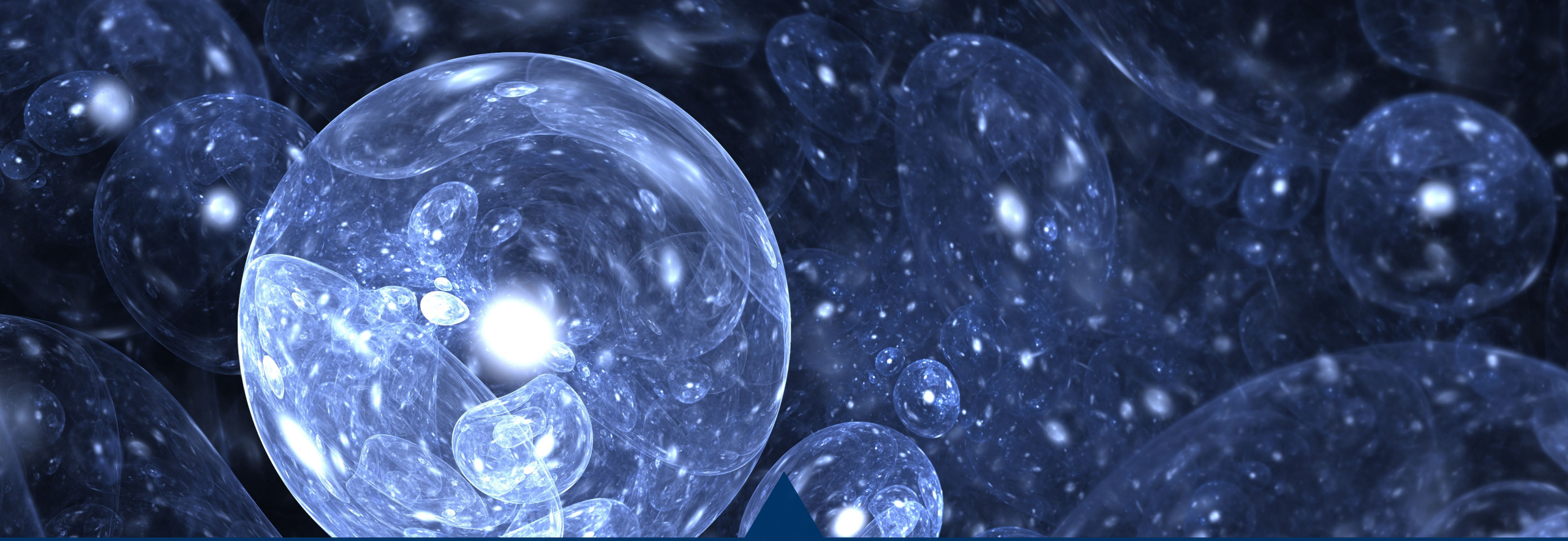
- Did not "create" a PFAS problem
- May accelerate polyfluoroalkyl transformation to detectable PFCAs
- Consider PFAS-specific sampling at property boundaries (no TOP assay)

Planned ISCO no known/suspected PFAS

- Push back on sampling request
- Typically, polyfluoroalkyl compounds are associated with LNAPL/DNAPL source zones where ISCO may not be best suited

Planned ISCO with known/suspected PFAS

- May accelerate polyfluoroalkyl transformation to detectable PFCAs (McGuire et al., 2014)
- Consider pre-ISCO sampling (w/o TOP assay)
- Type of ISCO & location matters



Thank you

Mark Lafranconi
Principal Consultant, ERM
Mark.Lafranconi@erm.com

Sara Meyer
Principal Consultant, ERM
Sara.Meyer@erm.com

Nadine Weinberg
Partner, ERM
Nadine.Weinberg@erm.com

Jeff McDonough
Technical Director, ERM
Jeff.McDonough@erm.com

ERM