New Environmental Mandates: 
PFAS – Drinking Water & 
CERCLA Regulations

91st Annual Meeting of The United States Conference of Mayors 
June 3, 2023
PFAS have been widely used since the 1940s.
PFAS Strategic Roadmap: EPA’s Commitments to Action 2021-2024

[Link: epa.gov/pfas]

**PRINCIPLES**
- Consider PFAS lifecycle
- Get upstream of the problem
- Hold polluters accountable
- Science-based decision-making
- Prioritize protection of disadvantaged communities

**GOALS**
- **Research** with best available science
- **Restrict** introduction to avoid adverse impacts to human health & environment
- **Remediate** to accelerate cleanup of contamination to protect human health & ecological systems
THE US EPA LIFETIME DRINKING WATER HEALTH ADVISORIES FOR PFOS AND PFOA ARE OFTEN LOWER THAN THEIR RESPECTIVE LEVELS IN RAINWATER AND THE DANISH DRINKING WATER LIMIT VALUE FOR Σ4 PFAS IS ALSO OFTEN LOWER THAN THE LEVEL OF Σ4 PFAS IN RAINWATER.

THE EUROPEAN UNION (EU) ENVIRONMENTAL QUALITY STANDARD (EQS) FOR PFOS FOR FRESHWATERS IS OFTEN LOWER THAN LEVELS IN RAINWATER.

THE CYCLING OF PFAAs IN THE WORLD’S HYDROSHERE MEANS THAT LEVELS OF PFAAs IN RAINWATER WILL BE PRACTICALLY IRREVERSIBLE.

Outside the Safe Operating Space of a New Planetary Boundary for Per- and Polyfluoroalkyl Substances (PFAS)

Ian T. Cousins,* Jana H. Johansson, Matthew E. Salter, Bo Sha, and Martin Scheringer

<table>
<thead>
<tr>
<th>PFAS</th>
<th>USEPA Lifetime Health Advisories*</th>
<th>Tibetan Rain</th>
<th>Antarctic Rain</th>
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<tbody>
<tr>
<td>PFOA</td>
<td>0.004</td>
<td>0.055</td>
<td>0.22</td>
</tr>
<tr>
<td>PFOS</td>
<td>0.020</td>
<td>0.005</td>
<td>0.106</td>
</tr>
</tbody>
</table>

* Proposed 6/21/22; Scheduled to be final 9/3/24
Proposed Lifetime Health Advisory Levels (6/21/22)

PFOA & PFOS = 0.004 ppt = 4 ppq

If you were 31.8 million years old, 1 part per quadrillion (ppq) or a picogram per liter is equivalent to a blink.

Proposed National Primary Drinking Water Regulation
(comment period expired 5/30/23)

PFOA & PFOS = 4 ppt

1 part per trillion (ppt)
IS EQUIVALENT TO A SINGLE DROP OF WATER IN
20 olympic-sized swimming pools

CERCLA Designation – Advanced Notice of Public Rulemaking

• PFOA and PFOS already proposed (Sep. 2022)

• Scope
  1) 7 additional PFAS
  2) Their precursors (including PFOA and PFOS), and
  3) Groups of PFAS

• Comments due June 12

“We believe that CERCLA gives us that enforcement discretion. I want to be clear that the water utilities and our farmers and agriculture are not the target, but the target is those who are putting this pollution into our air and our water.”

EPA Administrator Regan

“We've never amended CERCLA to exempt potentially responsible parties from specific contaminants before, and now is not the time to start.”

Christine Santillana, EarthJustice
PFAS Human Health Risk
What Are the Potential Community Impacts to Low Levels?

Janet Anderson, PhD, DABT
Principal Toxicologist

June 3, 2023
US Conference of Mayors
Human health risks associated with low levels of PFAS in drinking water are HIGHLY UNCERTAIN.

EPA’s Proposed Drinking Water Regulations are EXTREMELY COSTLY and have WIDE REACHING impacts.

Gen. population exposures to PFOA/PFOS have DRAMATICALLY DECREASED in the last two decades.
EPA’s Proposed PFAS Standards for Drinking Water (MCLs)

**WHAT**

- MCLs for PFOA and PFOS at 4 ppt each
  - Based on analytical method quantitation limits (“PQL”)
- MCL of a Hazard Index of 1.0 for PFBS, PFHxS, GenX, PFNA
- Compliance = Running annual average

**SCHEDULE**

- Public comments due May 30th
- Finalization by end of 2023
- Initial monitoring to start within 3 yrs to establish baseline
- Compliance based on quarterly monitoring, with option for 1x or 2x every 3 yrs, if below 1/3 of the MCL

**Rule Trigger Levels (1/3 Proposed MCLs)**
- PFOA and PFOS = 1.3 ppt
- Hazard Index PFAS = 0.33

Hazard Index = \(\frac{[\text{GenX}_{\text{water}}]}{[10 \text{ ppt}]} + \frac{[\text{PFBS}_{\text{water}}]}{[2000 \text{ ppt}]} + \frac{[\text{PFNA}_{\text{water}}]}{[10 \text{ ppt}]} + \frac{[\text{PFHxS}_{\text{water}}]}{[9.0 \text{ ppt}]}\)
EPA must justify MCLs based on:

› **Adverse** health effects
› Occurrence in drinking water at **frequency** and **levels of concern**
› “Meaningful” public health benefit
No Consensus Opinion on Association Between PFOA/PFOS Exposure & Causation Of Adverse Health Outcomes

Human studies show associations with...

- Effects on immune system
- Elevated cholesterol
- Decreased birth weight
- Cancer

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

- limited or no evidence of human disease
- lack of clinical significance
- may be explained by reverse causation or confounding

“The available epidemiological studies suggest associations between perfluoroalkyl exposure and several health outcomes; however, cause-and-effect relationships have not been established…“
“Data on the association between PFOA exposure and kidney cancer are limited but suggest a positive association between exposure and increased risk of kidney cancer.”

For PFOS, there is suggestive evidence of carcinogenic potential in humans.

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

Due to the potential adverse health effects ... following higher level exposure... a guidance value **is warranted**

**HOWEVER...**

- the **uncertainties** ... are too significant to derive a health-based value with confidence

**A pragmatic solution** proposed:

- Provisional drinking water guidance values of
  - 100 ppt for PFOA
  - 100 ppt for PFOS
  - 500 ppt for total PFAS
It’s Not Just Public Drinking Water...
Other Applications of EPA’s Risk-Based Values

- CERCLA and RCRA remediation programs
- Discharge limits/stormwater/wastewater
- Property redevelopment/transfer/liability
- Fish Advisories
- Other federal agencies? FDA? USDA? CDC?
PFAS Baseline Human Health Conceptual Site Model

Contaminant Source → Environmental Media → Exposure Routes

PFAS release

Groundwater
Surface water/Sediment
Soil
Plants and Wildlife
Ingestion
EPA’s Exposure Assumption

Default
“Relative Source
Contribution”

EPA Toxicity Value = Threshold daily intake exposure level (mg/kg-day)

Other Sources 80%

Water 20%

KEY POINT:
Most of our exposure comes from NON-drinking water sources?

"...exposure to the PFAS at the levels measured ... are not likely to be a health concern..."
Good News! Exposures Are Declining Even Without MCLs

Sources:
DRINKING WATER REGULATIONS FOR PFAS

CHRIS MOODY, PE
REGULATORY TECHNICAL MANAGER
AWWA GOVERNMENT AFFAIRS
ADDRESSING PFAS IN DRINKING WATER SUPPLIES

- 1,300 – 9,000 PFAS
- 29 PFAS using EPA 533 & 537.1
- PFHxS, PFNA, PFBS, GenX
- PFOA, PFOS, PFHxS, PFNA, PFBS, GenX

CCL
- Draft CCL
- Final CCL
- Draft UCMR
- Final UCMR
- UCMR Monitoring Results

Regulatory Determinations
- Preliminary Regulatory Determinations
- Final Regulatory Determinations

Rule
- Proposed Rule (NPDWR)
- Final Rule (NPDWR)

Review
- Six-Year Review of Existing NPDWRs

Public Review and Comment
Research Needs Assessment

No further action if decision is to not regulate
May develop health advisory
### Proposed Standards

<table>
<thead>
<tr>
<th>Compound</th>
<th>Health Effect</th>
<th>MCLG</th>
<th>MCL</th>
<th>Best Available Treatment</th>
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<tbody>
<tr>
<td>PFOA</td>
<td>Cancer</td>
<td>0 ppt</td>
<td>4.0 ppt</td>
<td>Granular Activated Carbon</td>
</tr>
<tr>
<td>PFOS</td>
<td>Cancer</td>
<td>0 ppt</td>
<td>4.0 ppt</td>
<td>Ion Exchange Resin</td>
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<tr>
<td>PFHxS</td>
<td>Thyroid Effects</td>
<td></td>
<td></td>
<td>Nanofiltration</td>
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<tr>
<td>PFNA</td>
<td>Developmental Effects</td>
<td></td>
<td>Hazard Index 1.0</td>
<td>Reverse Osmosis</td>
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<tr>
<td>GenX</td>
<td>Liver Effects</td>
<td></td>
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<tr>
<td>PFBS</td>
<td>Thyroid Effects</td>
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</table>

EPA Proposed a standard for PFHxS, PFNA, GenX, and PFBS at the same time as the preliminary determination.
KEY CONCERNS

✓ Health effects rely on inconsistent conclusions of toxicological data
✓ Hazard index lacks a basis in science and agency guidance
✓ Underlying occurrence, cost, and benefit analysis is flawed
✓ EPA’s proposal for additional PFAS moves ahead of SDWA authority
✓ Implementation will not be feasible – timeline, costs
✓ Determination that benefits justify costs relies on poor analyses
✓ Household affordability challenges will be significant
IMPLEMENTATION CHALLENGES

- Workforce Limitations
- Laboratory Demands
- Supply Chain Strains
- Compliance Costs
- Timeline
AWWA Estimates & Case Studies 300% Higher than EPA Estimates
WHY IS THE COST ANALYSIS THIS IMPORTANT?

- Transparency on Impacts
- Justification of the Rule’s Merits
- Affordability
- Identifying Public Health Priorities
DO THE BENEFITS JUSTIFY THE COSTS?

Proposed Option:
- 4 ppt PFOA, 4 ppt PFOS
- HI=1 (PFNA, PFHxS, HFPO-DA, PFBS)

Option 1a:
- 4 ppt PFOA & 4 ppt PFOS

Option 1b: 5 ppt PFOA & 5 ppt PFOS

Option 1c: 10 ppt PFOA & 10 ppt PFOS
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## HOUSEHOLD AFFORDABILITY

<table>
<thead>
<tr>
<th>PWS Size Category</th>
<th>Population Range</th>
<th>Average Service Population</th>
<th>Approximate Range of Costs per Household</th>
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<tbody>
<tr>
<td>1</td>
<td>25 to 100</td>
<td>59</td>
<td>$3570 - $3570</td>
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<tr>
<td>2</td>
<td>101-500</td>
<td>245</td>
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<td>3</td>
<td>501-1,100</td>
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<td>4</td>
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<td>5</td>
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<td>8</td>
<td>100,001-1,000,000</td>
<td>204,194</td>
<td>$65 - $70</td>
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<tr>
<td>9</td>
<td>&gt;1,000,000</td>
<td>1,700,000</td>
<td>$115 - $120</td>
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</table>

EPA's Affordable “Expenditure Margin ranges from $753 - $877
FUTURE UNKNOWNS

- CERCLA Hazardous Liability
- Future Health Assessments
- Clean Water Act Requirements
- Next Steps for SDWA
- Lead and Copper Rule Improvements Rulemaking
- Economy
Practical Implications of the Proposed PFAS Regulation

U.S. Conference of Mayors
91st Annual Meeting

Chad Seidel, Ph.D., P.E.
Corona Environmental Consulting, LLC
Timeline for PFAS MCL Implementation

- **Initial Monitoring Period**
  - 2024: UCMR 5 Monitoring
  - 2025-2026: Implementation of Mitigation (e.g., Planning, Design, Piloting, Permitting, Procurement, Construction)

- **Final Rule**

- **Potential Extension for Capital Improvements** (At Discretion of Primacy Agency)

- **These Schedules Overlap**
Planning for Impacted Communities

- **Non Treatment**
  - Take sources offline
  - Blending

- **Treatment**
  - Granular Activated Carbon (GAC)
  - Ion Exchange (IX)
  - Reverse Osmosis (RO)

- Lots of other peripheral details...
  - Operational feasibility
  - Waste stream disposal
  - Timeframe for implementation
  - Fiscal constraints for capital and operating expenses
GAC & IX Equipment Examples
Design, Permitting, Procurement, Construction, Operation

• Depends on several factors:
  • Project size
  • Equipment availability
  • Funding procedure
  • Project delivery approach

- Design-Bid-Build
- Pre-procurement of Equipment
- Design-Build
Impacted Community Response & Planning

- Implement risk communications with customers
- Monitor for PFAS if not performed yet including UCMR 5
- Pursue litigation cost recovery if impacted
- Evaluate treatment and non-treatment alternatives to meet the new regulations if results are greater than draft MCLs
- Consider time required to plan, pilot, design, permit, procure, and construct PFAS treatment
- Expect future PFAS regulations to come with UCMR 5 results
Safe Drinking Water Act

“meaningful opportunity for health risk reduction”
What’s the concern?

Unknown, unregulated risk

Unidentified DBPs, chemicals, microbes, PFAS

Known, unregulated risk

PFAS, chlorate, CCL contaminants, nitrosamines

Known, regulated risk

Chemical: Arsenic, Nitrate, TTHMs, etc.

Microbial: Cryptosporidium, Giardia, etc.
What's the concern?

- Infrastructure failure
- Workforce limitations
- Natural disasters
  - Drought
  - Wildfires
  - Flooding

Not having water...
What’s the Priority?

- Limited funding and competing priorities
- Prioritizing risks to be efficient with our limited funding and achieve the greatest health benefit