

PFAS Forever Chemicals – Regulations, Litigation, New Technologies

*Per- & polyfluorinated alkyl
substances*





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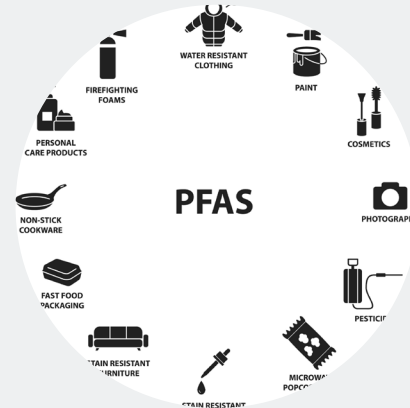
Program objective

As a result of this program, you will:



Understand ...

- ... what PFAS and associated chemicals are, and why they are useful in commercial and consumer applications;
- ... the various regulatory and litigation-related activities that have evolved in response to the health and environmental risks of PFAS



Identify ...

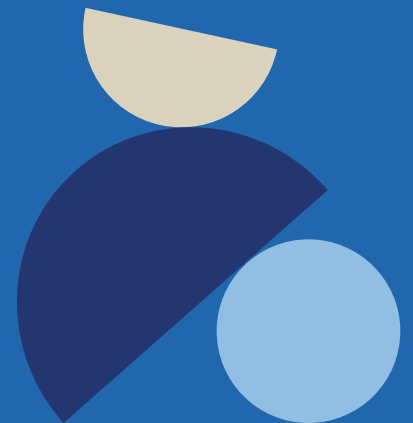
- ... the broad range of uses and applications for PFAS;
- ... specific liability exposures associated with PFAS



Learn ...

- ... how different insurance policies may or may not respond to claims associated with PFAS-related damage;
- ... risk management strategies companies can use to manage PFAS-related liability exposure, including claims brought by workers, customers, and environmental stakeholders

I. What are PFAS?

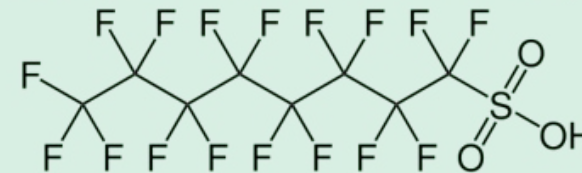


What are PFAS (aka “forever chemicals”)?

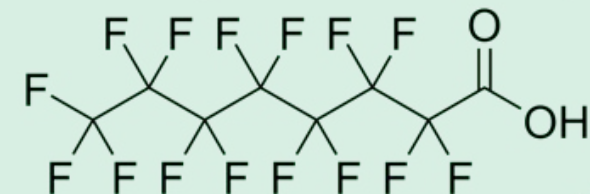
- PFAS is a term used to describe a family of man-made chemicals, including PFOA, PFOS (also known C8) and brand name GenX (also known C6). PFAS chemicals have been manufactured since the 1940s.
- “Forever chemicals” is used because they are chemically stable and extremely difficult to break down in the environment for hundreds and possibly thousands of years.
- These compounds are also known to accumulate and persist in the body (bioaccumulate) and could potentially cause health problems.
- The EPA has catalogued 4,700 + chemicals / compounds containing PFAS.

PFAS

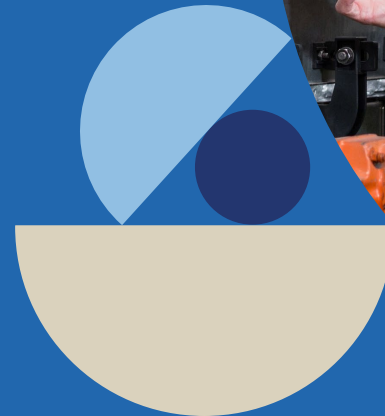
PFOS (Perfluorooctanesulfonic acid)



PFOA (Perfluorooctanoic acid)



II. Where are PFAS found?



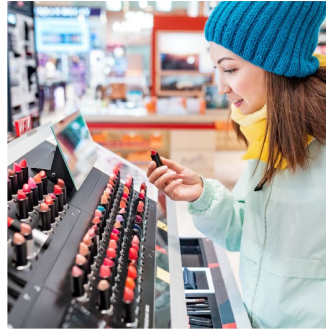
Where can you find PFAS?

A “forever” family of chemicals

Properties:

- May be both water and oil resistant
- Forms dense, stable, impermeable films on surfaces
- Stable in both chemical and high temperature environments
- Reduces surface tension in oil and water making other chemicals more efficient
- UV resistant
- Reduces friction, lubricates

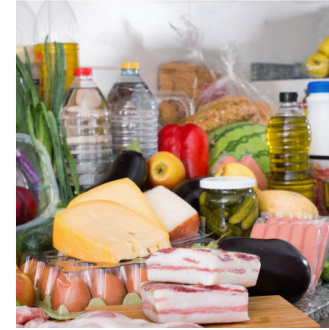
Cosmetics



Nonstick cookware



Food packaging



Car seats



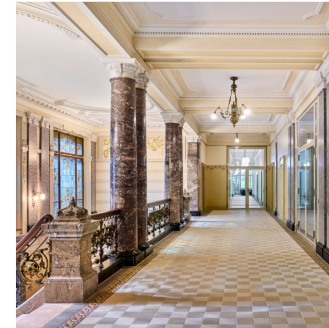
Clothing



Cleaning products



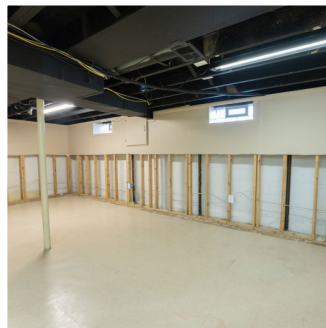
Carpets



Furnishings



Flooring adhesives



Outdoor gear



Firefighting foam



Solar panels



What are some possible pathways to exposure?

Most U.S. water supplies contaminated with PFAS¹

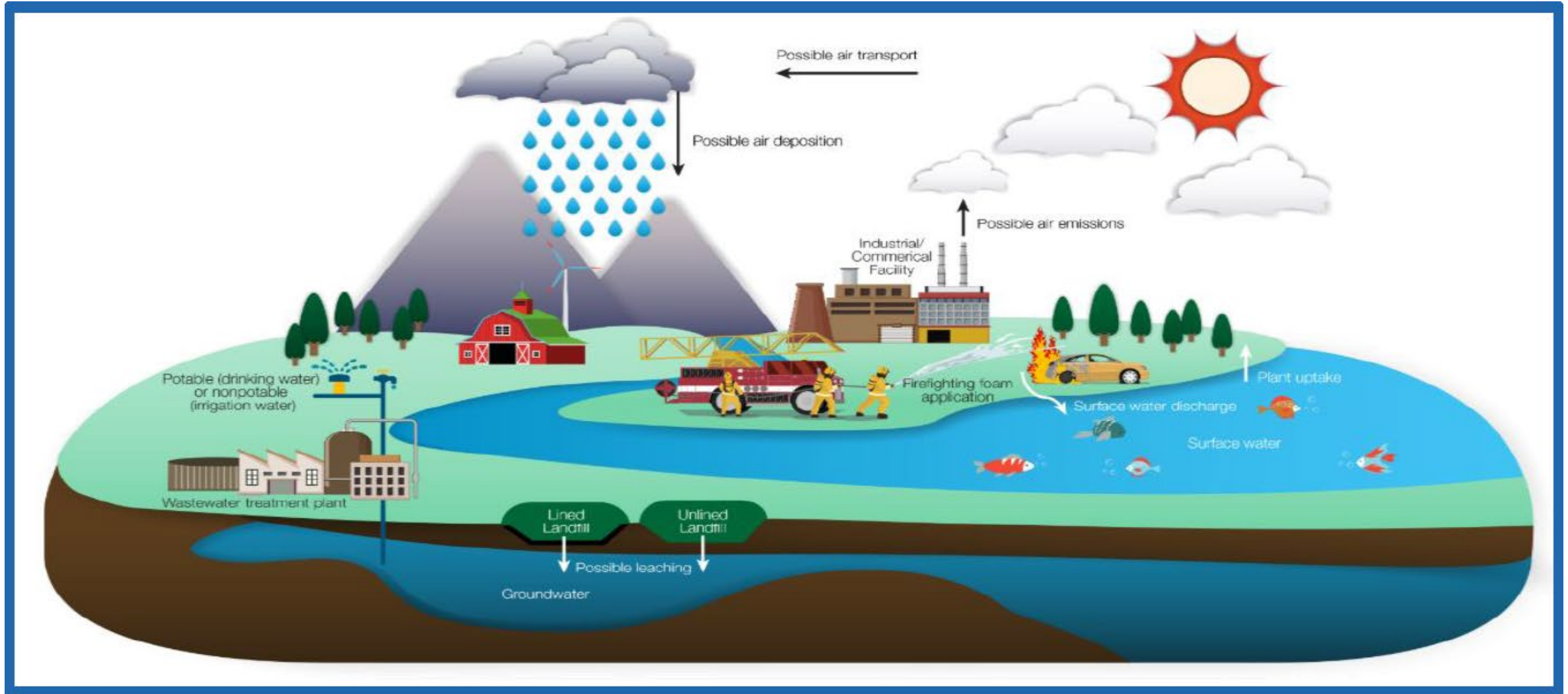


Image source: <https://www.ghd.com/en/perspectives/solving-the-pfas-puzzle.aspx>, accessed September 20, 2023.

¹<https://www.scientificamerican.com/article/forever-chemicals-are-widespread-in-u-s-drinking-water/>, accessed September 20, 2023.

<https://www.epa.gov/ground-water-and-drinking-water/drinking-water-health-advisories-pfoa-and-pfos>, accessed September 20, 2023.

II. Potential health effects



A brief history of PFAS health affects

1930/40s

- Polytetrafluorethylene (PTFE) fluorocarbon polymer accidentally invented.
- PFAS is made commercially available.

1950s

- Mice study reveals that PFAS builds up in blood.
- Stanford University study finds that PFAS binds to proteins in human blood.

1960s

Multiple studies show PFAS toxicity in humans and animals.

1980s

Female workers are reassigned after animal studies show PFAS damages the eyes of the developing fetus.

1990s

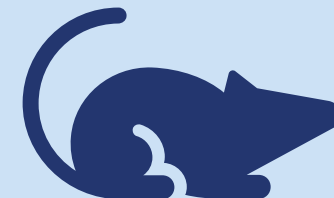
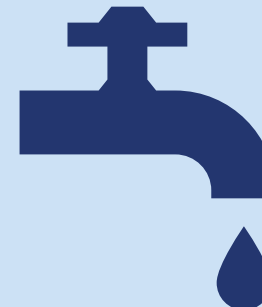
- Study finds elevated cancer rates among workers.
- Scientist finds male PFOA workers more likely to die from prostate cancer.
- Scientist describes PFOS as “the most insidious pollutant since PCB.”

2000s

- Animal study finds liver damage from PFOS exposure.
- C8 Science Panel carried out exposure and health studies to determine the potential effects of exposure to the releases of PFOA (or C8).

2020s+

2/21/2023 - Keck School of Medicine study finds “forever chemicals” disrupt key biological processes.



What are possible health effects?

There is evidence that exposure to PFAS can lead to adverse health outcomes in some humans.

If humans, or animals, ingest PFAS (by eating or drinking food or water that contain PFAS), the PFAS are absorbed and can accumulate in the body.

PFAS stay in the human body for long periods of time.

As people are exposed to PFAS from different sources over time, the level of PFAS in their bodies may increase to the point where they suffer from adverse health effects.

Increased cholesterol levels



Changes in liver enzymes



Decreased vaccine response in children



Increased risk of high blood pressure or pre-eclampsia in pregnant women



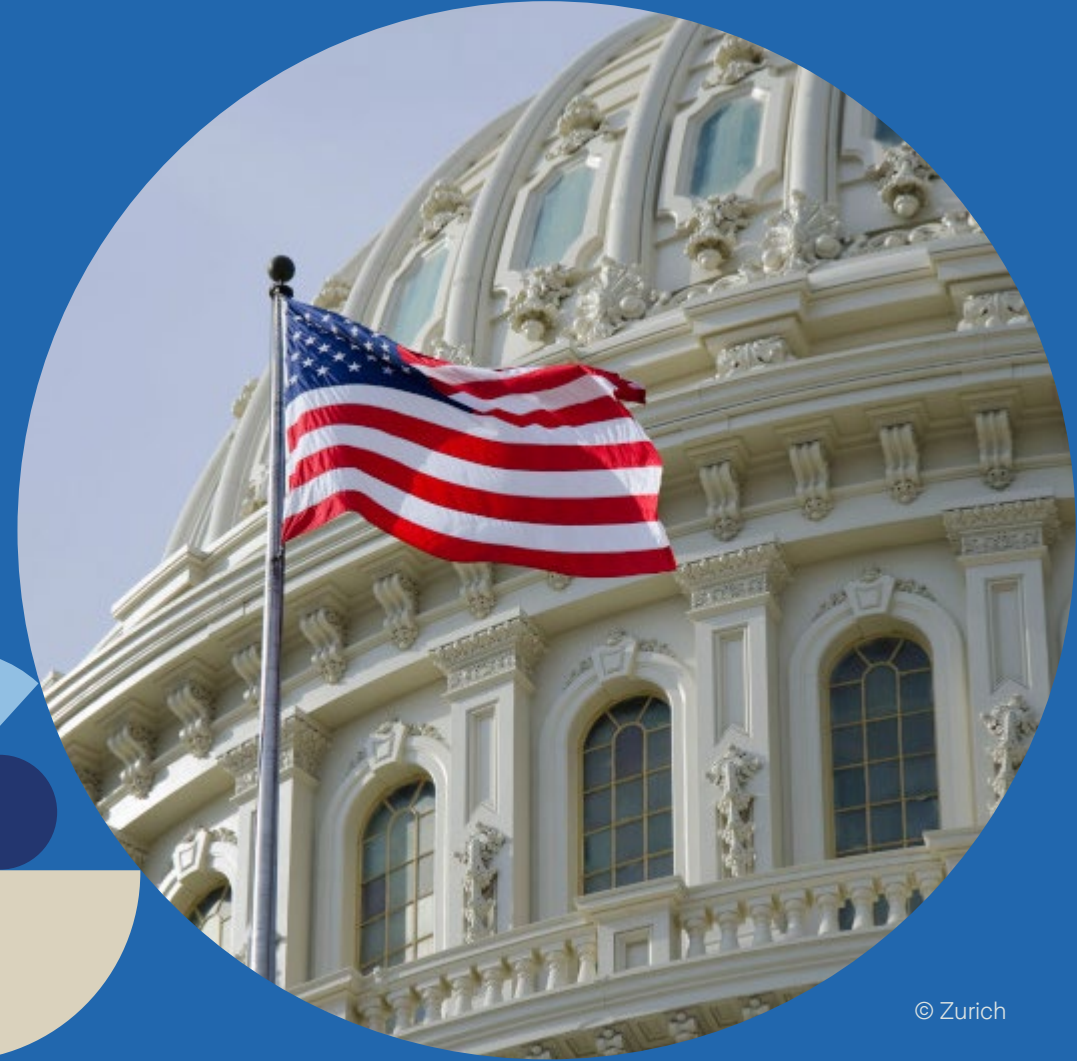
Increased risk of breast, kidney, and other forms of cancer



Lower infant birth weights



III. Regulatory and litigation responses



EPA – Proposed PFAS National Primary Drinking Water Regulation

March 14, 2023, EPA announced

National Primary Drinking Water Regulation (NPDWR) to establish legally enforceable levels, called Maximum Contaminant Levels (MCLs), for six PFAS in drinking water. The EPA is setting limits for PFOA and PFOS at levels at which they can be reliably measured.

Compound acronym	Chemical name	Proposed MCLG	Proposed MCL (enforceable levels)
PFOA	perfluorooctanoic acid	Zero	4.0 ppt*
PFOS	perfluorooctane sulfonic acid	Zero	4.0 ppt*
PFNA	perfluorononanoic acid	1.0 (unitless) Hazard Index	1.0 (unitless) Hazard Index
PFHxS	perfluorohexane sulfonic acid		
PFBS	perfluorobutane sulfonic acid		
HFPO-DA (commonly referred to as GenX Chemicals)	hexafluoropropylene oxide dimer acid		

*4.0 ppt = parts per trillion (also expressed as ng/L)



What does 1 part per trillion mean?

- One part per million is equal to ONE drop of water from an eyedropper into 10 gallons of water
- One part per billion is equal to adding ONE drop of water to a 10,000-gallon swimming pool
- One part per trillion is equal to adding ONE drop of water to a 10,000,000-gallon swimming pool
- One part per trillion also equals 1 second in about 31,710 years



<https://www.sthelensoregon.gov/dwff/page/understanding-parts-million>



EPA – Toxic Substances Control Act (TSCA)

The Toxic Substances Control Act (TSCA) Chemical Substance Inventory contains all existing chemical substances

- manufactured,
- processed, or
- imported

in the United States that do not qualify for an exemption or exclusion under TSCA.



EPA – TSCA grants EPA the authority to regulate and require:

- Pre-manufacture notification for "new chemical substances" before manufacture.
- Testing of chemicals by manufacturers, importers, and processors.
- Issue Significant New Use Rules (SNURs), for identified "significant new use."
- Maintain the TSCA Inventory, which contains more than 83,000 chemicals.
- Require those importing or exporting chemicals to comply with certification reporting and/or other requirements.
- Reporting and record-keeping by persons who manufacture, import, process, and/or distribute chemical substances in commerce.
- Require, under Section 8(e), that any person who manufactures (including imports), processes, or distributes in commerce a chemical substance or mixture and who obtains the information that reasonably supports the conclusion that such substance or mixture presents a substantial risk of injury to health or the environment to **immediately inform EPA**, except where EPA has been adequately informed of such information.



Year	Drinking Water Maximum contaminant levels (MCLs)	Fire fighting foam	PFAS Cleanup and Remediation	Packaging and Consumer Products
2018			WA	WA
2019	CA, VT	GA, NH, NY, WI	AK, VT	ME, MN, NY
2020	NH, VA	CA, CO, IN, MD, MI, NY, WA	CO, CT, FL	MD
2021	CA, DE, ME, NH	AK, CT, OH	WA	ME, NY, VT
2022	AK, AR, CO, CT, IL, IA, KY, MA, MI	CO, HI, ME	CA, FL, ME, MA, MI, MN, NH, SC, VA, WA	CA, CO, HI, MD, RI
2023	MN, NJ, NM, NY, NC, OH, RI, WV			
2024				
2025				

Federal Actions EPA – PFAS Strategic Roadmap

Timeline 2021 through 2024

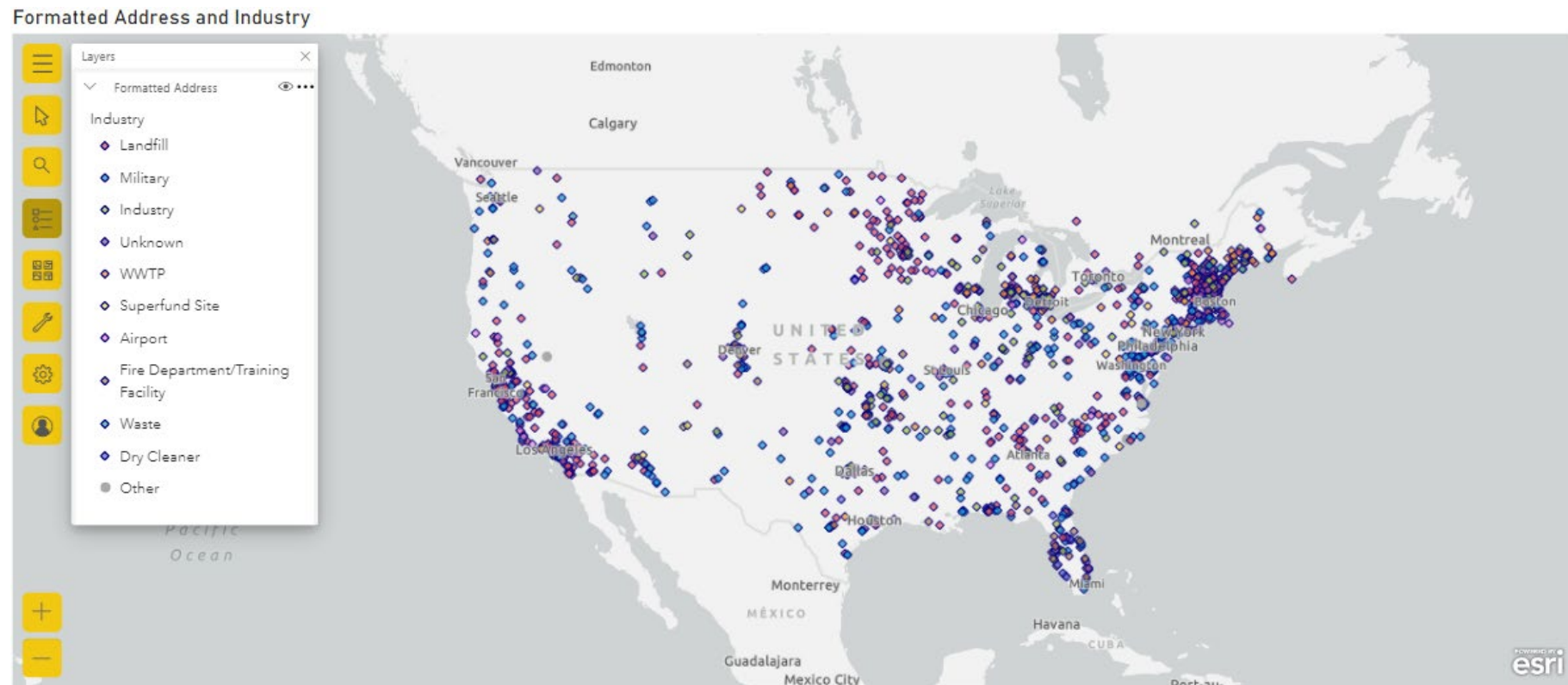


<https://www.epa.gov/system/files/documents/2021-10/pfas-natl-test-strategy.pdf>

<https://www.epa.gov/pfas/pfas-strategic-roadmap-epas-commitments-action-2021-2024>, accessed September 2023..

EPA reveals 120,000 sites in the U.S. where people may be exposed to toxic 'forever' chemicals

- Data from the EPA showed the most affected areas are in Colorado, Oklahoma, and California.
- The chemicals called PFAs, can be linked to cancer, other health problems, and developmental issues.



<https://www.epw.senate.gov/public/index.cfm/superfund-sites-identified-by-epa-to-have-pfas-contamination>

<https://www.theguardian.com/environment/2021/oct/17/us-epa-pfas-forever-chemicals-sites-data>, accessed September 20, 2023.

<https://www.epa.gov/newsreleases/broad-coalition-advocates-community-leaders-and-officials-praise-epas-new-roadmap-pfas>, accessed September 20, 2023.

<https://www.epw.senate.gov/public/index.cfm/superfund-sites-identified-by-epa-to-have-pfas-contamination>, accessed September 20, 2023.

On **October 18, 2021**, EPA

Administrator Michael S. Regan

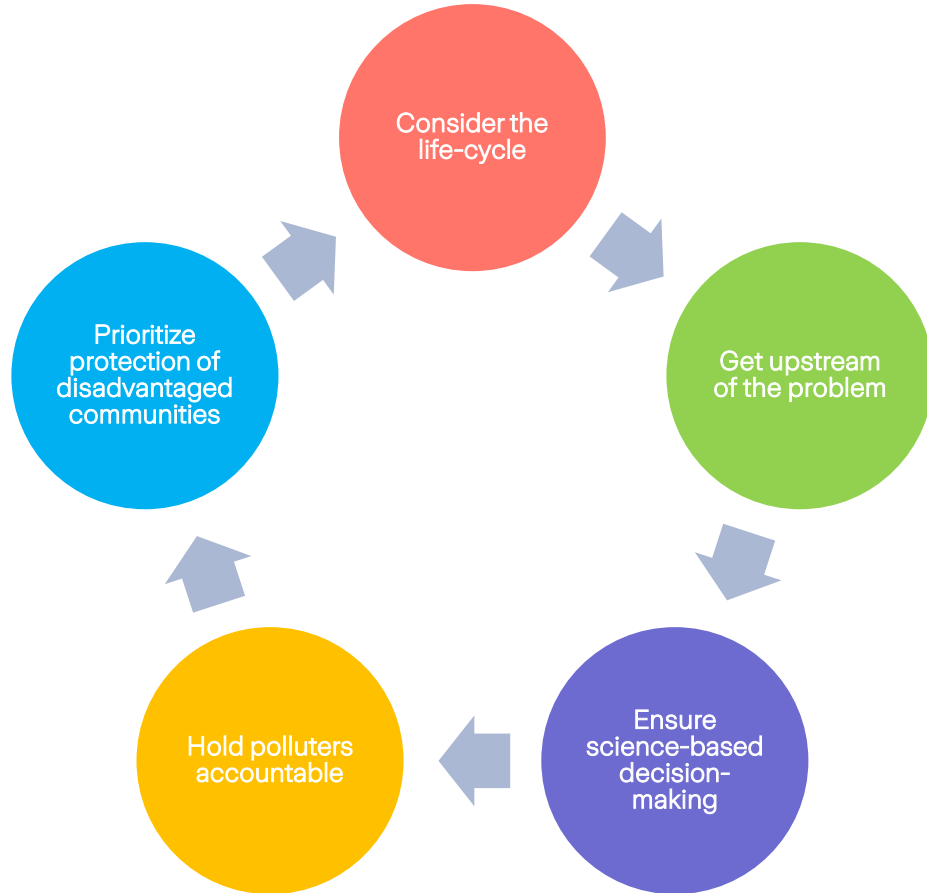
announced the agency's PFAS

Strategic Roadmap

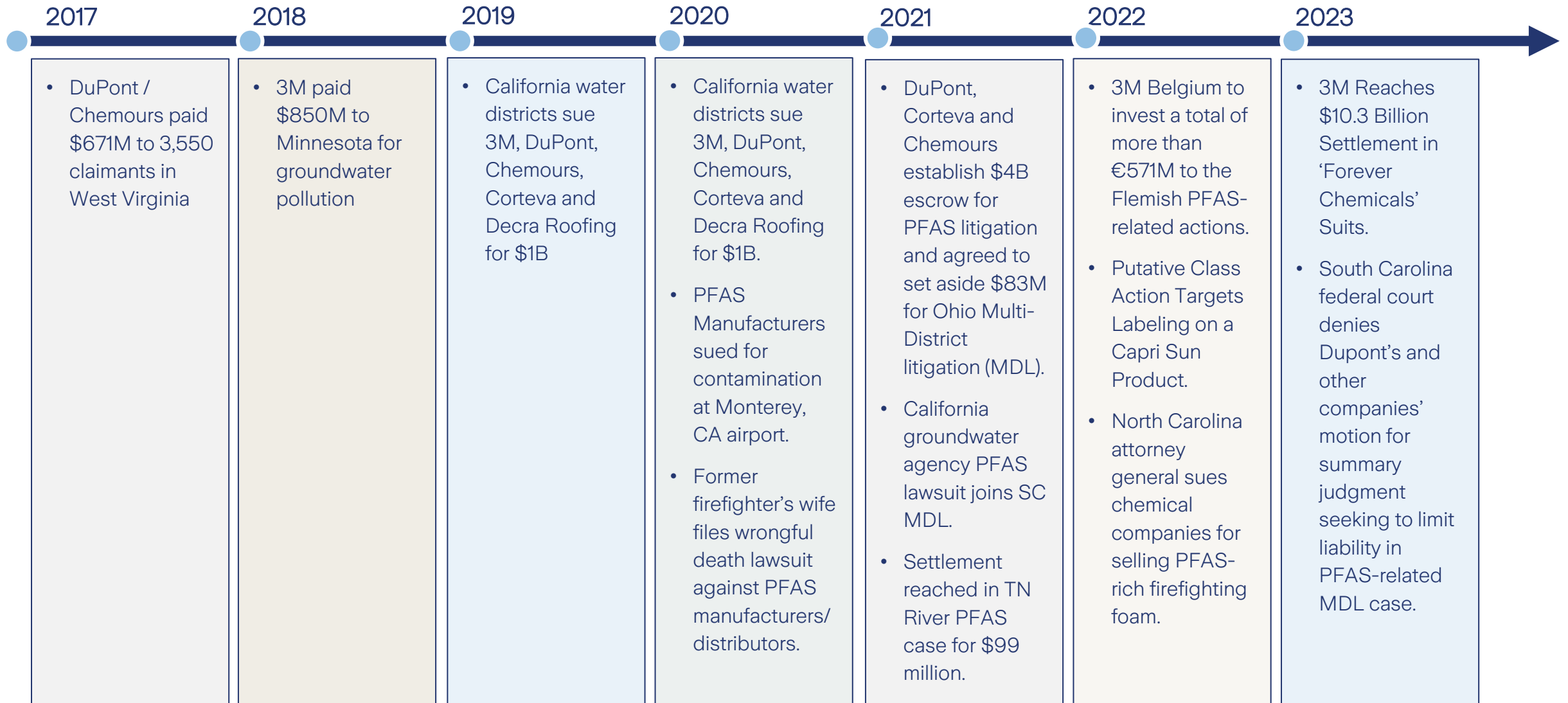
— laying out a whole-of-agency
approach to addressing PFAS.

EPA's integrated approach to PFAS is focused on three central directives:

- 1. Research** - Invest in research, development, and innovation to increase understanding of PFAS exposures and toxicities, human health and ecological effects, and effective interventions that incorporate the best available science.
- 2. Restrict** - Pursue a comprehensive approach to proactively prevent PFAS from entering air, land and water at levels that can adversely impact human health and the environment.
- 3. Remediate** - Broaden and accelerate the cleanup of PFAS contamination to protect human health and ecological systems.



- 1. Consider the lifecycle of PFAS** EPA will account for the full lifecycle of PFAS, their unique properties, the ubiquity of their uses, and the multiple pathways for exposure.
- 2. Get upstream of the problem** EPA will bring deeper focus to preventing PFAS from entering the environment in the first place—a foundational step to reducing the exposure and potential risks of future PFAS contamination.
- 3. Ensure science-based decision-making** EPA will invest in scientific research to fill gaps in understanding of PFAS, to identify which additional PFAS may pose human health and ecological risks at which exposure levels, and to develop methods to test, measure, remove, and destroy them.
- 4. Hold polluters accountable** EPA will seek to hold polluters and other responsible parties accountable for their actions and for PFAS remediation efforts.
- 5. Prioritize protection of disadvantaged communities** When taking action on PFAS, EPA will ensure that disadvantaged communities have equitable access to solutions.

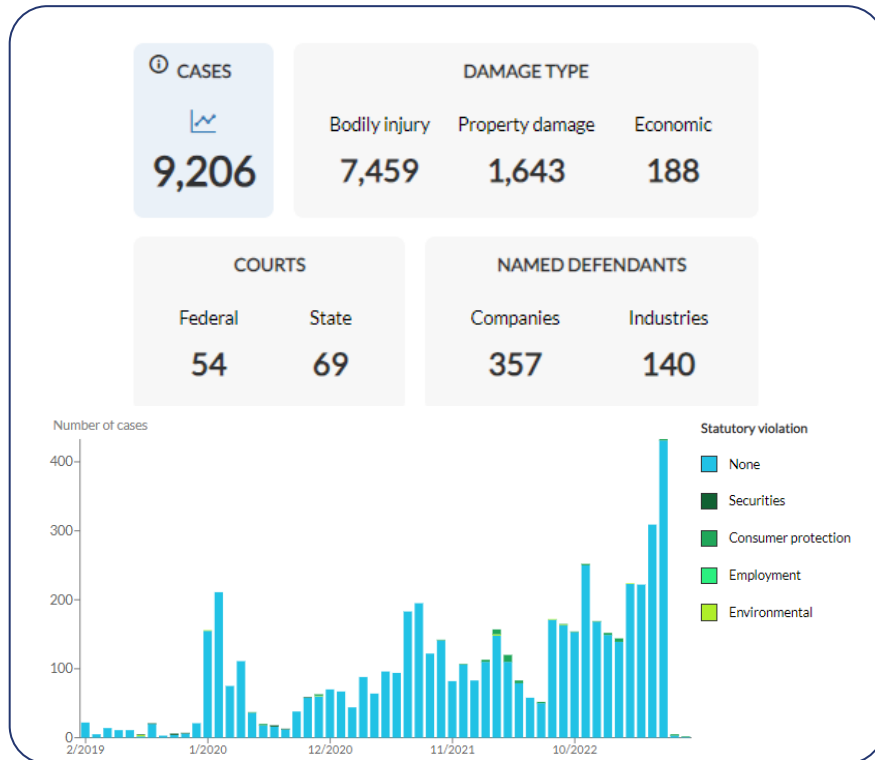


V. Potential areas of liability



Current Litigation

Litigation tracker from Praedicat



Litigation provides a snapshot of the complexity of this issue:

- Of the 357 companies named, 70% are named in 3 or fewer cases.
- 140 industries are implicated.
- Cases are spread across the country with 123 courts involved.

Litigation continues to accelerate with additional companies, industries and venues expanding

Plaintiff Type	Case Count	Causes of Action
Business	69	Water Authorities: Clean up of ground and surface water
Consumer (incl NGO)	4,843	Health effects due to PTFE in cooking and PFAS in drinking water
Public Entities	645	Municipalities: Public Property Damage to ground & surface water
Workers	3,649	Exposure to aqueous film forming foam (AFFF) commonly called firefighting foam

Where could liability lie?

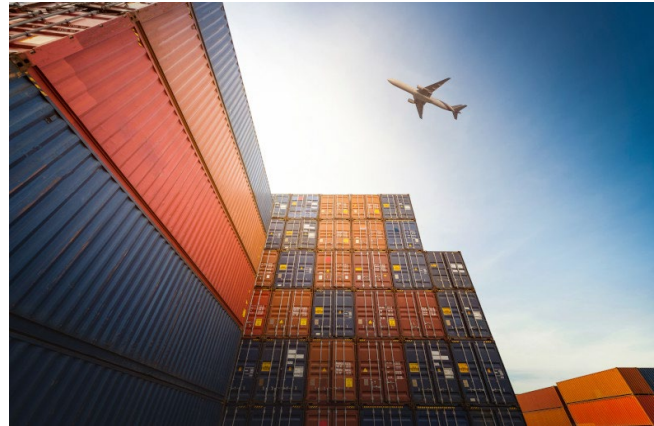
Manufacturers, importers, distributors and retailers of PFAS and PFAS-containing products could be in-scope

Liability exposed

- PFAS manufacturers
- Users of PFAS
- Importers of PFAS and PFAS-treated products where manufacturer has no U.S. assets
- Distributors and retailers of PFAS and PFAS-treated products
- Water districts based on state/federal Maximum Concentration Levels (MCL)

Workplace Exposure Claims

- Potential Workers' Comp /Employer Liability claims stemming from PFAS exposure



VI. What insurance coverages might be impacted



What insurance coverages might be impacted



- Workers' Compensation
- Product Recall
- Commercial General Liability
- Environmental Remediation
- Directors and Officers

VII. Proactive risk management strategies



What should companies consider doing now?

Conduct a self-assessment of potential PFAS exposures

- Worker exposures:
 - Manufacturing processes (including storage, handling, packaging, or application)
 - Testing, maintenance, or discharge of firefighting foam systems
- Consumer exposures
 - What products are water resistant, oil resistant, surface treated?
 - What processes, coatings or chemicals used to achieve the above benefits?
- Use of materials containing PFAS
 - Conduct a review of all chemicals for PFAS content
 - PFAS represents a new waste stream for companies to track according to US EPA roadmap
 - Spills, disposal of PFAS and PFAS-containing materials

Minimize exposures by engineering out or removing chemicals from products or processes containing PFAS

- Ensure the processes adopted do no further harm (don't replace one harmful chemical for another)

**Coordinate activities with legal counsel,
including conducting the assessment and
treatment of assessment results**

Conduct a review of all chemicals for PFAS content

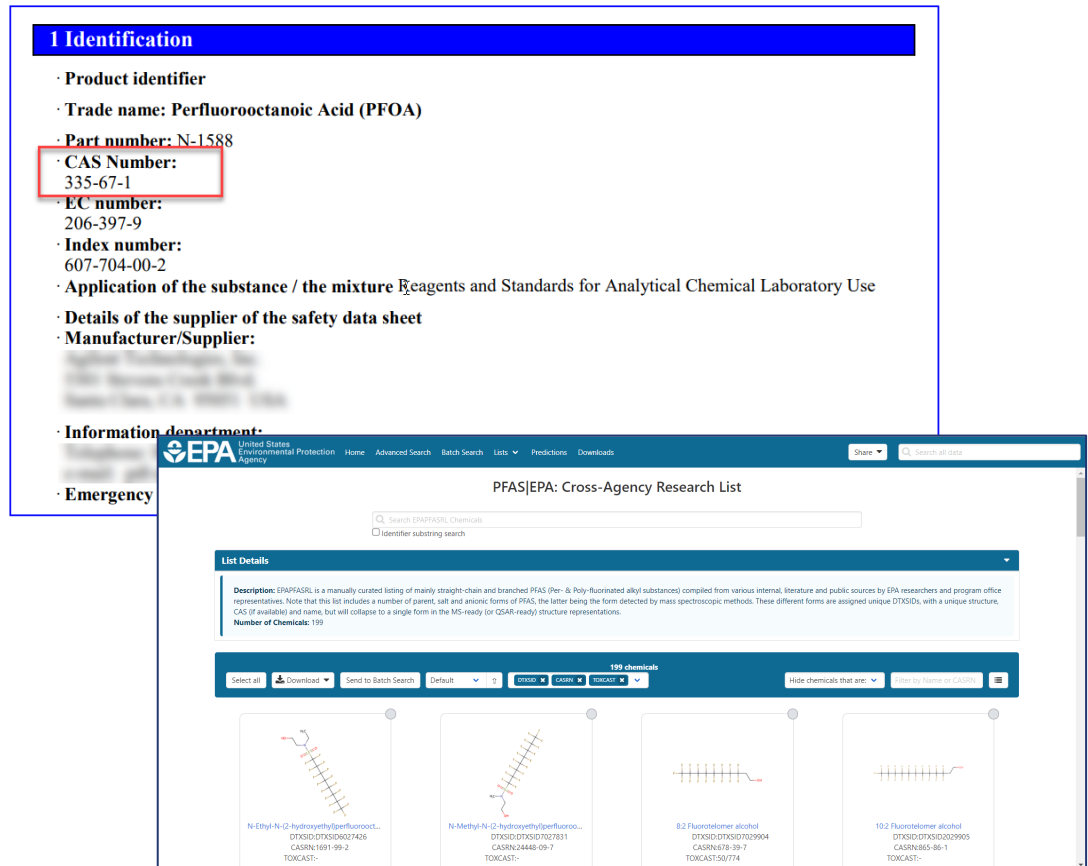
Safety Data Sheet acc. to OSHA HCS

Printing date 03/23/2019

Version Number 2

Reviewed on 03/23/2019

- Review Safety Data Sheet (SDS) for each chemical used
 - Look for Chemical Abstract System (CAS) number for each component
- Look up each CAS number at: https://comptox.epa.gov/dashboard/chemical_lists/EPAP_FASRL
- Document results



The image shows two overlapping screenshots. The top one is a Safety Data Sheet for Perfluorooctanoic Acid (PFOA). The bottom one is the EPA PFAS FASRL website interface.

Safety Data Sheet (SDS) for Perfluorooctanoic Acid (PFOA):

- Product identifier
- Trade name: Perfluorooctanoic Acid (PFOA)
- Part number: N-1588
- CAS Number: 335-67-1** (highlighted with a red box)
- EC number: 206-397-9
- Index number: 607-704-00-2
- Application of the substance / the mixture: Reagents and Standards for Analytical Chemical Laboratory Use
- Details of the supplier of the safety data sheet
- Manufacturer/Supplier:
- Information department:
- Emergency:

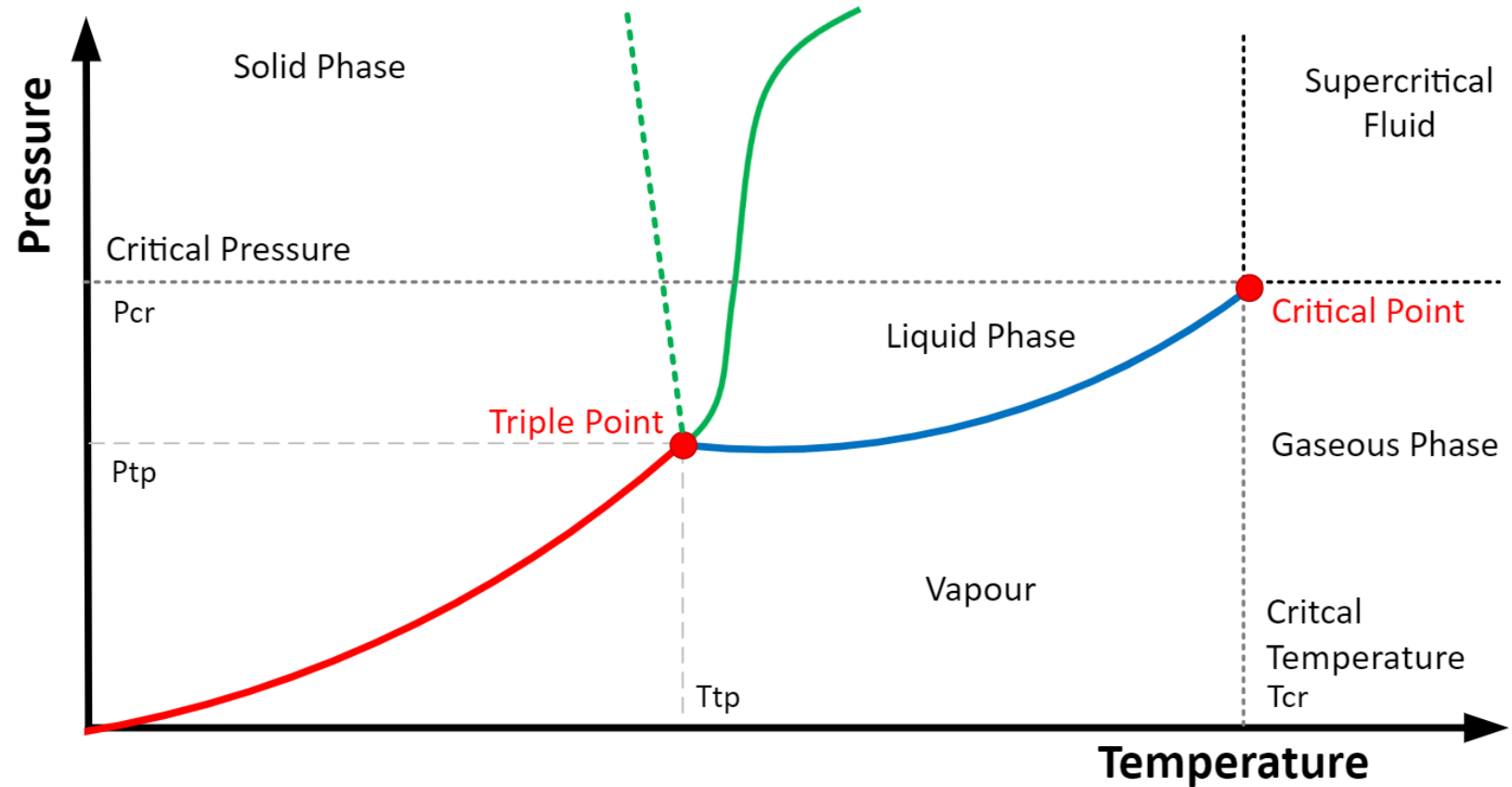
EPA PFAS FASRL Website:

- Search: EPAP/FASRL Chemicals
- Identifier: substructure search
- List Details: Description: EPAP/FASRL is a manually curated listing of mainly straight-chain and branched PFAS (Per- & Poly-fluorinated alkyl substances) compiled from various internal, literature and public sources by EPA researchers and program office representatives. Note that this list includes a number of parent, salt and anionic forms of PFAS, the latter being the form detected by mass spectroscopic methods. These different forms are assigned unique DTXSIDs, with a unique structure. CAS (if available) and name, but will collapse to a single form in the MS-ready (or QSAR-ready) structure representations.
- Number of Chemicals: 199
- 199 chemicals
- Buttons: Select all, Download, Send to Batch Search, Default, Order, CAS#, Structure
- Chemical list items:

Chemical Name	DTXSID	CASRN	TOXCAS#
N-Ethyl-N-(2-hydroxyethyl)perfluorooctanoic acid	DTXSID:DTXSID0627426	CASRN:1691-99-2	TOXCAS#:-
N-Methyl-N-(2-hydroxyethyl)perfluorooctanoic acid	DTXSID:DTXSID7027831	CASRN:24448-09-7	TOXCAS#:-
8:2 Fluorotelomer alcohol	DTXSID:DTXSID7029904	CASRN:878-39-7	TOXCAS#774
10:2 Fluorotelomer alcohol	DTXSID:DTXSID0209905	CASRN:885-86-1	TOXCAS#:-

Supercritical Reactor

- Triple Point – manipulate the phase of matter through temperature and pressure
- Critical Point – The point at which it is impossible to distinguish between a liquid and gas as their density is equal
- Supercritical water has been used to dispose of WMD's, nerve gas, etc.
- University of Washington injected PFAS into water in a supercritical phase of matter



“This kind of reactor is not going to be helpful in removing PFAS chemicals already pervading our natural environment, but... could be useful in destroying chemicals that are considered waste products at manufacturing sites...”

Key takeaways from this presentation

PFAS “Forever” chemicals



Persistent



**Accumulates in the
body**



**Litigation/regulations
are evolving**



**Consider conducting a
self-assessment**

Remediation is difficult, expensive, and inefficient as PFAS is **persistent in the environment**

- Does not readily breakdown
- Spreads quickly, soaking into soil

Accumulates in the body – Indicated health harms include immune suppression, damage to kidneys/liver and some cancers

PFAS **litigation and government regulations** are evolving

Consider **conducting a self-assessment** of possible exposures

Questions?

Disclaimer:

The information in this training was compiled from sources believed to be reliable for informational purposes only. All sample policies and procedures herein should serve as a guideline, which you can use to create your own policies and procedures. We trust that you will customize these samples to reflect your own operations and believe that these samples may serve as a helpful platform for this endeavor. Any and all information contained herein is not intended to constitute legal advice and accordingly, you should consult with your own attorneys when developing programs and policies. We do not guarantee the accuracy of this information or any results and further assume no liability in connection with this training and sample policies and procedures, including any information, methods or safety suggestions contained herein. Moreover, Zurich reminds you that this cannot be assumed to contain every acceptable safety and compliance procedure or that additional procedures might not be appropriate under the circumstances. The subject matter of this publication is not tied to any specific insurance product nor will adopting these policies and procedures ensure coverage under any insurance policy.

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