

Gathering Clouds

PFAS - “Forever Chemicals”

Delanie Breuer

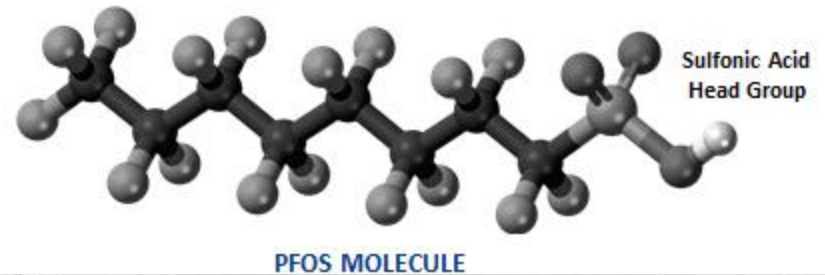
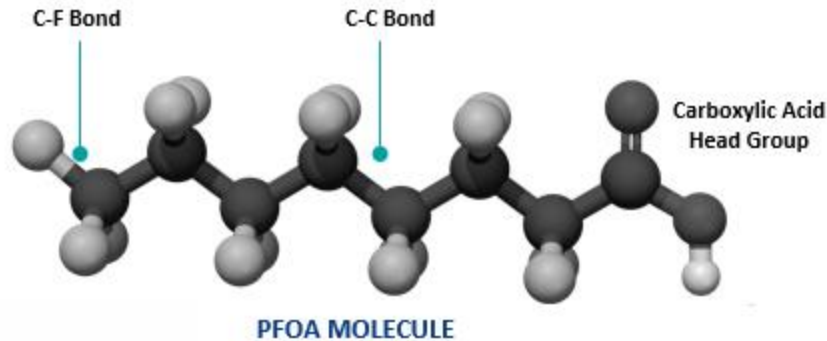
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What are PFAS?

The per-and polyfluoroalkyl substances (PFAS) are a group of chemicals used to make fluoropolymer coatings and products that resist heat, oil, stains, grease, and water. Fluoropolymer coatings can be in a variety of products. These include clothing, furniture, adhesives, food packaging, heat-resistant non-stick cooking surfaces, and the insulation of electrical wire.



What are PFAS?

Perfluoroalkyl and polyfluoroalkyl substances (PFAS) are a large group of human-made chemicals that have been used in industry and consumer products worldwide since the 1950s.

<https://dnr.wisconsin.gov/topic/PFAS>

PFAS are a group of manufactured chemicals that have been used in industry and consumer products since the 1940s because of their useful properties. There are thousands of different PFAS, some of which have been more widely used and studied than others. Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS), for example, are two of the most widely used and studied chemicals in the PFAS group. PFOA and PFOS have been replaced in the United States with other PFAS in recent years.

<https://www.epa.gov/pfas>

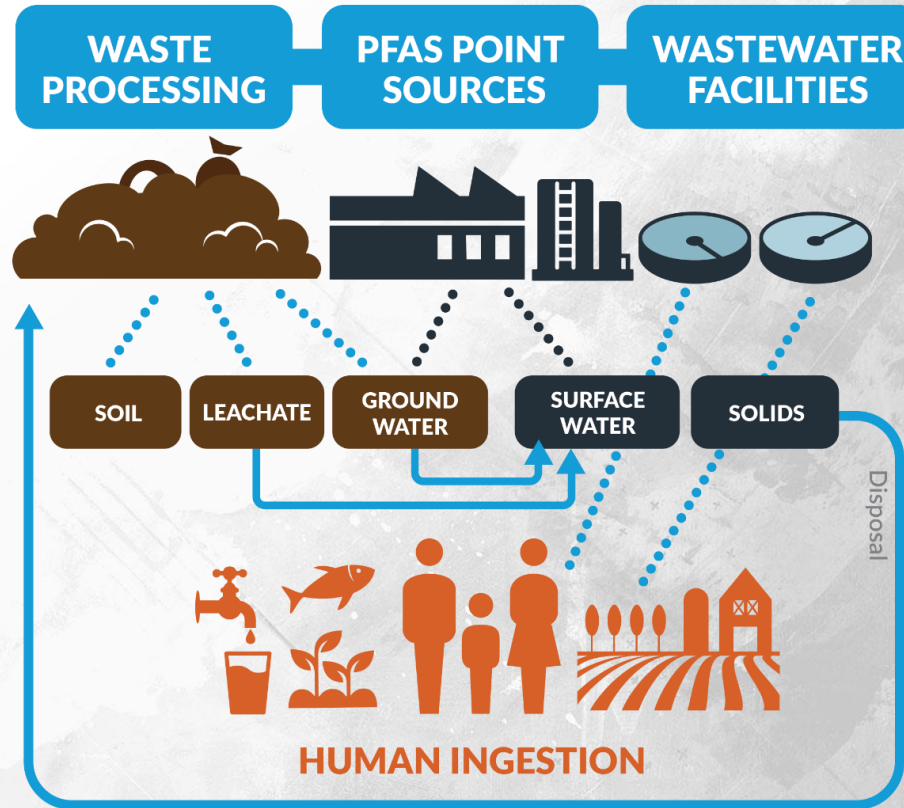
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https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Table 2-1. Discovery and manufacturing history of select PFAS

PFAS ¹	Development Time Period							
	1930s	1940s	1950s	1960s	1970s	1980s	1990s	2000s
PTFE	Invented	Non-Stick Coatings			Waterproof Fabrics			
PFOS		Initial Production	Stain & <u>Water Resistant</u> Products	Firefighting foam				U.S. Reduction of PFOS, PFOA, PFNA (and other select PFAS ²)
PFOA		Initial Production	Protective Coatings					
PFNA					Initial Production	Architectural Resins		
<u>Fluoro-</u> telomers					Initial Production	Firefighting Foams		Predominant form of firefighting foam
Dominant Process ³		Electrochemical Fluorination (ECF)						<u>Fluoro-</u> telomerization (shorter chain ECF)
Pre-Invention of Chemistry /			Initial Chemical Synthesis / Production			Commercial Products Introduced and Used		
Notes: 1. This table includes fluoropolymers, PFAAs, and fluorotelomers. PTFE (polytetrafluoroethylene) is a fluoropolymer. PFOS, PFOA, and PFNA (<u>perfluorononanoic acid</u>) are PFAAs. 2. Refer to Section 3.4. 3. The dominant manufacturing process is shown in the table; note, however, that ECF and <u>fluorotelomerization</u> have both been, and continue to be, used for the <u>production of select PFAS</u> .								
Sources: <u>Prevedouros et al. 2006</u> ; <u>Concawe 2016</u> ; <u>Chemours 2017</u> ; <u>Gore-Tex 2017</u> ; <u>US Naval Research Academy 2017</u>								

Why the Sudden Interest?



Potential Environmental Impacts

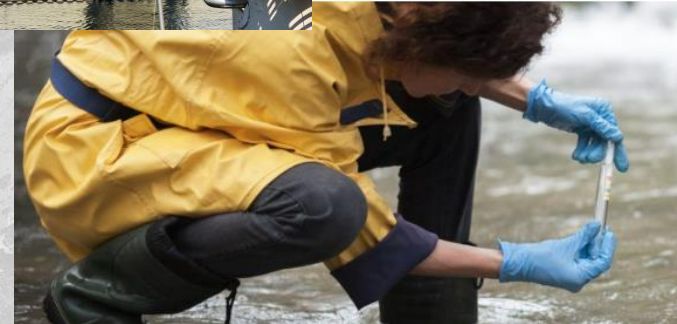
- Move freely through soil and water
- Slow to break down
- Can Bioaccumulate
- High levels and/or long-term exposure to some compounds is associated with certain health concerns



Source: WDNR



Source: EPA



Source: ATSDR

Potential Health Impacts of PFAS



Increased cholesterol levels



Decreased vaccine response in children



Changes in liver enzymes



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



Small decreases in infant birth weights



Increased risk of kidney or testicular cancer



Source: WDNR



Source: EPA



Source: ATSDR

Where did PFAS come from?



Source: Australian Dept. of Defense

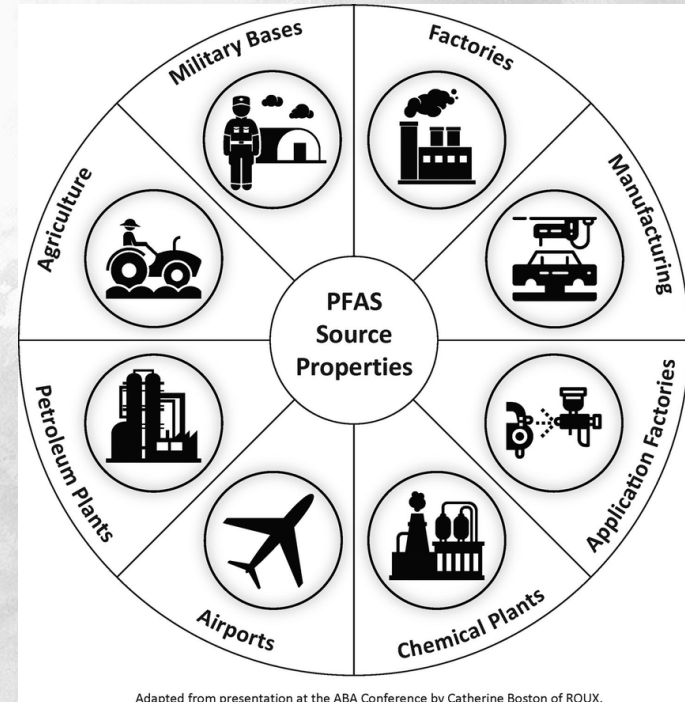


Source: Riverside Public Utilities

Major Sources of PFAS in the Environment

- AFFF
- Manufacturing
- Landfills
- Wastewater Treatment Plants

“They have been used to make nonstick cookware, water-repellent clothing, stain resistant fabrics and carpets, some cosmetics, some firefighting foams, and products that resist grease, water, and oil.” - ATSDR website



Activity Surrounding PFAS

- State Regulation
- Federal Regulation
- Litigation
- Legislation

Federal Regulation - EPA's Strategic Roadmap

EPA's PFAS Strategic Roadmap (October 2021)

- SDWA
- CERCLA
- RCRA
- TSCA
- CWA
- CAA

Federal Regulation - HALs

Previous Health Advisory Levels (HALs) for PFOA & PFAS

- Issued in 2016
- 70 ppt combined

Updated Health Advisory Levels (HALs) for 4 PFAS compounds

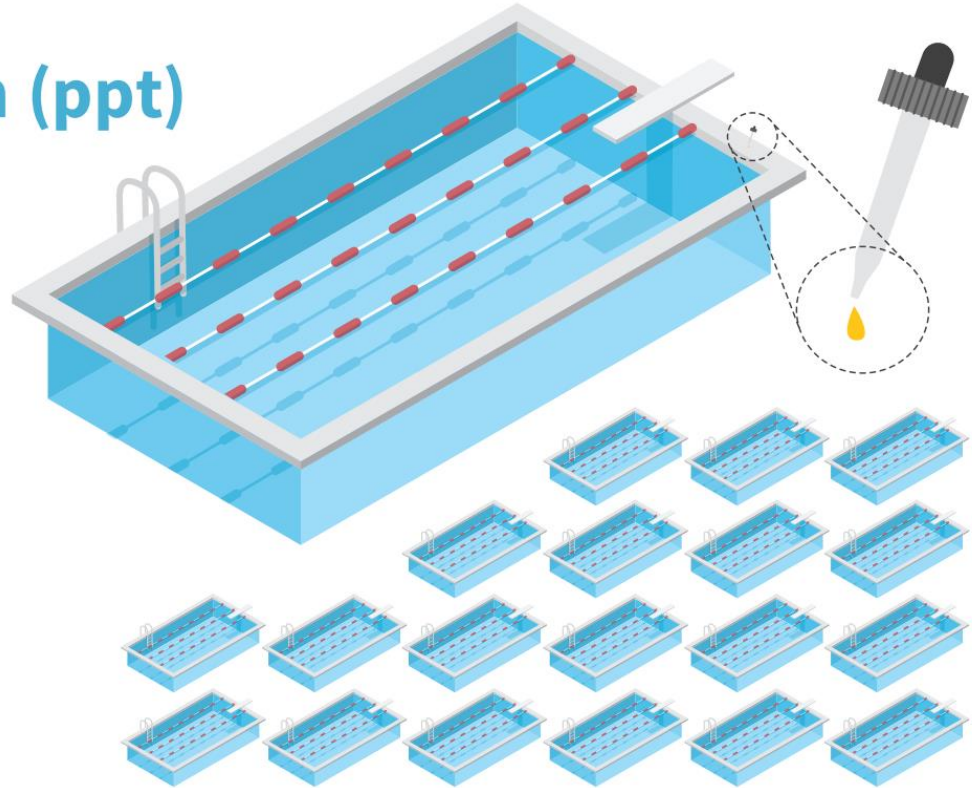
- Issued June 15, 2022
 - 0.004 ppt for PFOA,
 - 0.02 ppt for PFOS,
 - 10 ppt for GenX chemicals
 - 2,000 ppt for PFBS

Non-regulatory and reflective of EPA's assessment of the best available peer-reviewed science

1 part per trillion (ppt)

**IS EQUIVALENT TO A
SINGLE DROP OF
WATER IN**

**20 olympic-sized
swimming pools**



Source: www.Michigan.gov

“EPA’s assessment of the best available peer-reviewed science”

- Study of long-term antibody response to immunizations for diphtheria and tetanus
- Study correlated the response to the blood levels of PFAS in children and mothers
- Associational (not causation)
- Study examined 656 births in the Faroe Islands

State Regulation

Current:

- Surface Water
- Drinking Water
- Remediation Program

Proposed:

- Groundwater
- Additional Drinking and Surface Water

Anticipated:

- Air
- Solid Waste

What are PFAS?

PFAS are a group of human-made chemicals used for decades in numerous products.



Products that may contain PFAS.

What is Wisconsin Doing About It?



Additional efforts include a PFAS Action Committee (WisPAC) and a PFAS Technical Advisory Group.

Why Should I Care?

PFAS persist in the environment and the human body for long periods of time. Recent findings indicate that exposure to certain PFAS may have harmful health effects in people.



What You Can Do...

Test Your Water
dnr.wi.gov/wq/q+172



Check State Fish Advisories
dnr.wi.gov/wq/q+176



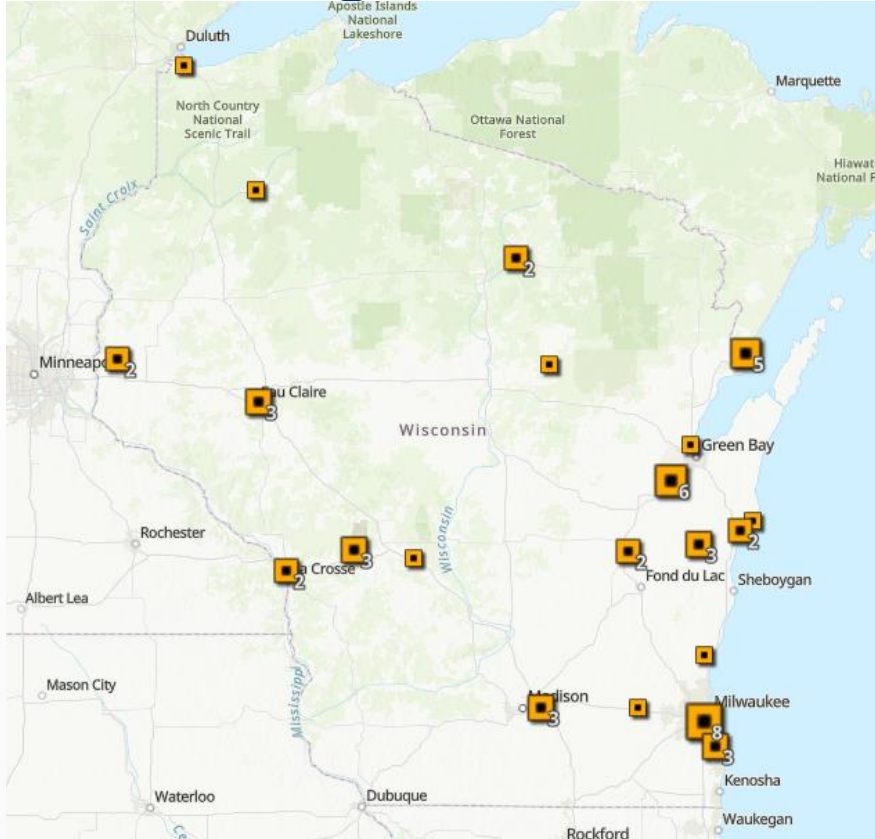
Learn More About PFAS Health Risks
dnr.wi.gov/wq/q+175



Visit dnr.wi.gov, search PFAS.

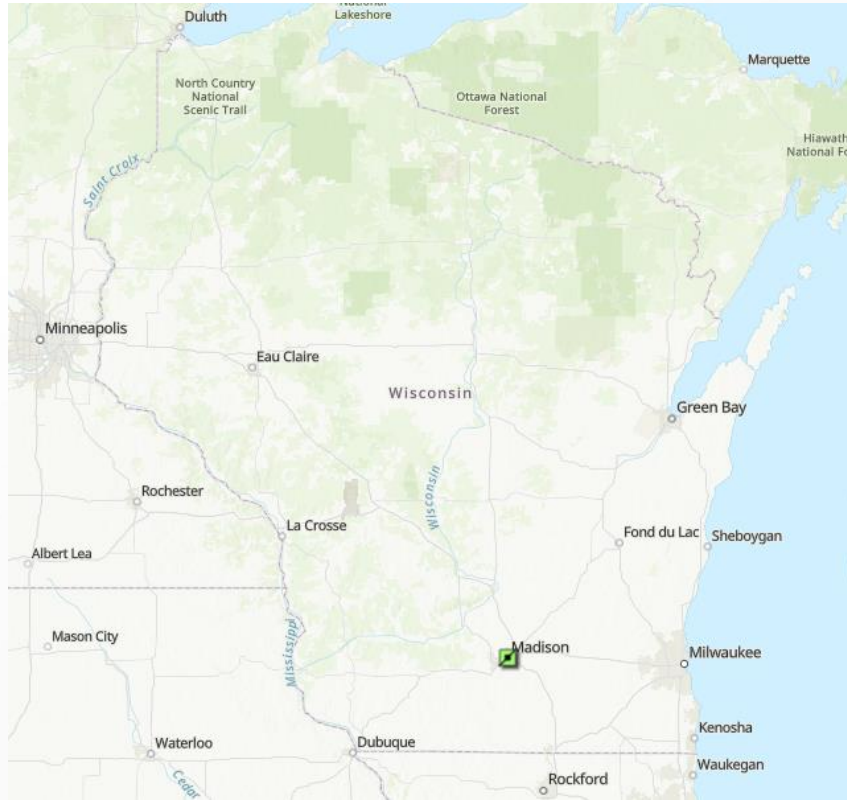


State Regulation



Open Remediation Sites

State Regulation



Closed Remediation Sites

What are states doing?

	A	B	C	D	E	F
1	PFAS State and Territory Programs					
2	June 2022					
3	State	Agency	Program Area	Topic or Focus Area	Description	PFAS-specific Legislation or Executive Order
4	Alabama (AL)	Department of Environmental Management (ADEM)	Drinking Water	Drinking water	Alabama follows USEPA's lead on drinking water standards and programs, under ADEM Admin. Code r. 335-7-2-.10, water systems conduct PFAS monitoring at all sources not previously sampled during UCMR3.	ADEM Admin. Code r. 335-7-2
5	Alabama (AL)	Department of Public Health	Fish Consumption Advisory	Fish consumption	Beginning in 2012, the Alabama Department of Public Health began issuing Fish Consumption Advisories in a number of water bodies due to elevated levels of PFOS in fish tissue.	not readily available
6	Alaska (AK)	Department of Environmental Conservation (ADEC)	Regulatory Cleanup Levels	Cleanup levels or criteria	In October 2018 DEC issued proposed regulatory cleanup levels for a number of PFAS in soil and groundwater for public comment. The comment period closed in November 2018. The proposed amendments are on hold by DEC.	none found
7	Alaska (AK)	ADEC	Spill Prevention and Response	Drinking water	2019 Revised Action Levels requiring treatment or provision of alternative water supply for private or public wells.	18 AAC 75.345(c)(5), 18 AAC 75.345(d)
8	Alaska (AK)	ADEC	Spill Prevention and Response	Cleanup levels or criteria	ADEC has established soil and groundwater cleanup levels for PFOS and PFOA	18 AAC 75.341 (soil) and 18 AAC 75.345 (groundwater and surface water) cleanup levels
					ADEC has formally designated PFOS and PFOA as "hazardous substances" under AS 46.03.826(5) and AS 46.09.900(4). Any release of PFOS and PFOA from AFFF or other sources must be reported to the State as required	

Table of current state regulations at https://pfas-1.itrcweb.org/#1_3

Practical Issues Regarding PFAS Regulation

- To Test or Not to Test?
- Permit non-compliance?
- Remediation Technology & Cost?
- Sources?

Questions?

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