



**MINNESOTA POLLUTION  
CONTROL AGENCY**

Per- and polyfluoroalkyl substances (PFAS) and plastics

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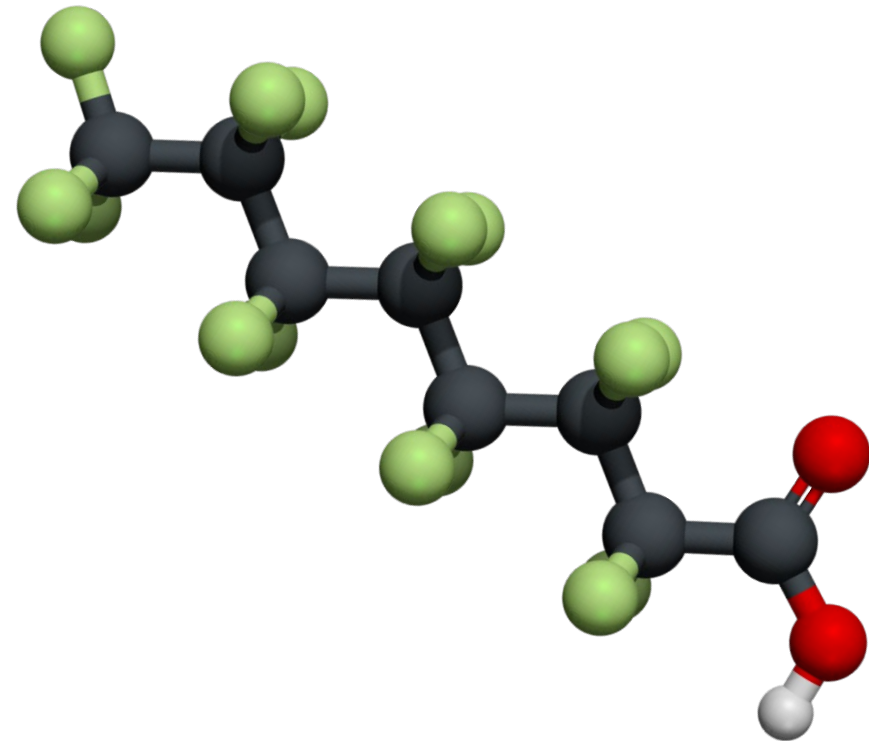
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- What PFAS are and why they're a problem
- Human health and environmental impacts
- PFAS and plastics
- What you can do

# What are PFAS?

## Per- and polyfluoroalkyl substances

- "Forever chemicals"
- Chains of carbon-fluorine bonds
- Diverse class of compounds
- Useful traits



# The problem with PFAS chemicals

Small amounts  
may be harmful.



Some build up in  
people over time.



All are difficult  
to remove and  
destroy.



# Where do PFAS come from?



# Minnesota's PFAS journey



Disposal Sites



Drinking Water

- PFOA and PFOS – reported in disposal sites
- Discovered in nearby drinking water



- Further investigation found PFAS throughout Minnesota



- Thousands of PFAS studies published
- Health-based guidance evolves to reflect new science



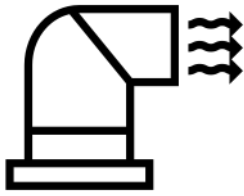
Wastewater



Solid Waste



Fish and wildlife



Air

- Legacy and emerging PFAS found at concentrations of concern in multiple places around Minnesota

# Human health effects and exposure routes



## Health effects:

Immune suppression, developmental effects, reproductive effects

## Exposure routes:

Drinking water, fish consumption, other food consumption, breastmilk or formula, air, dust inhalation, dermal?

**Which PFAS you're exposed to depends on how you're exposed**

# Environmental impacts

## Limited understanding of

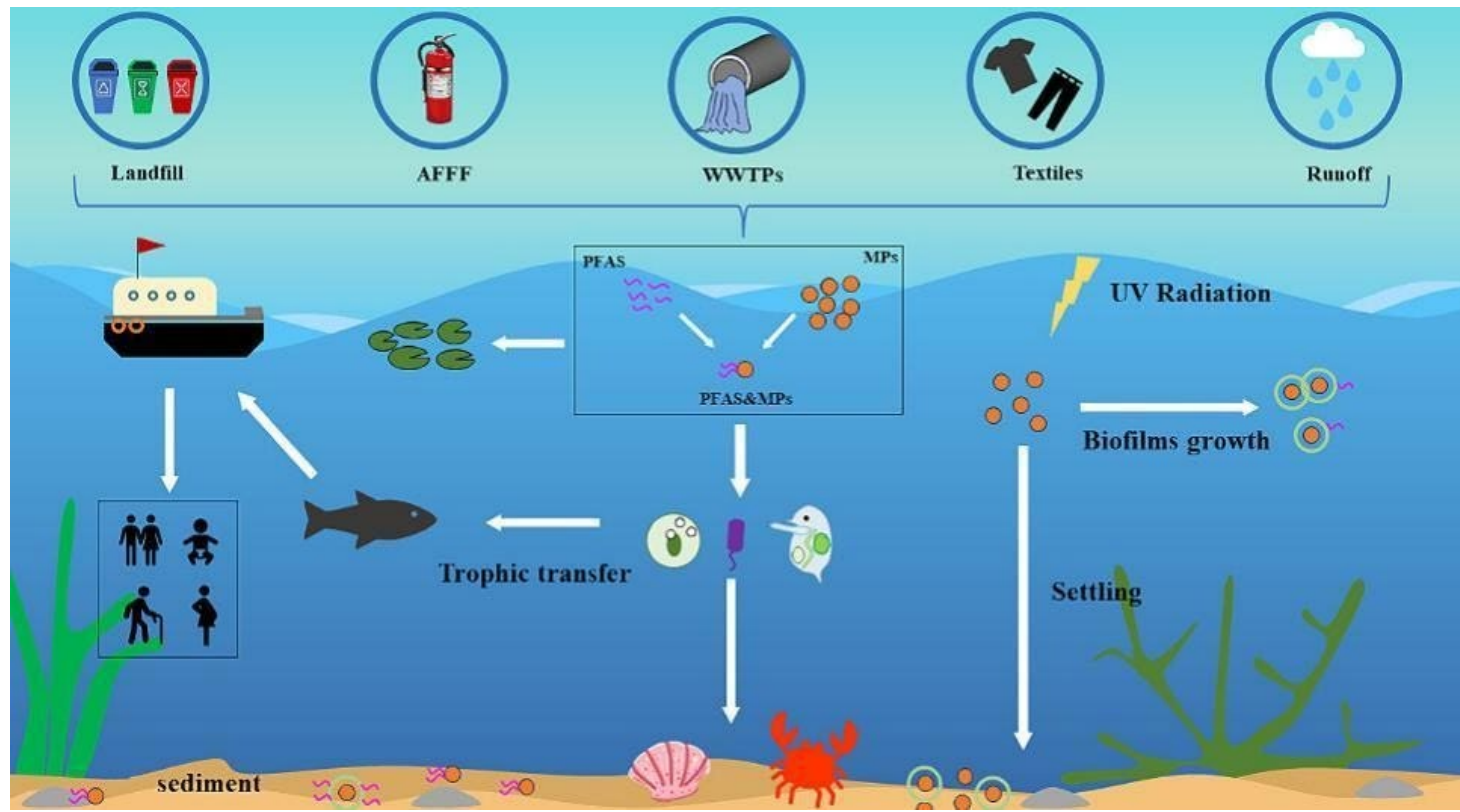
- fate and transport
- toxicity in non-human creatures, plants
- If or how PFAS accumulate in food webs

We do know that **PFAS** are **ubiquitous**





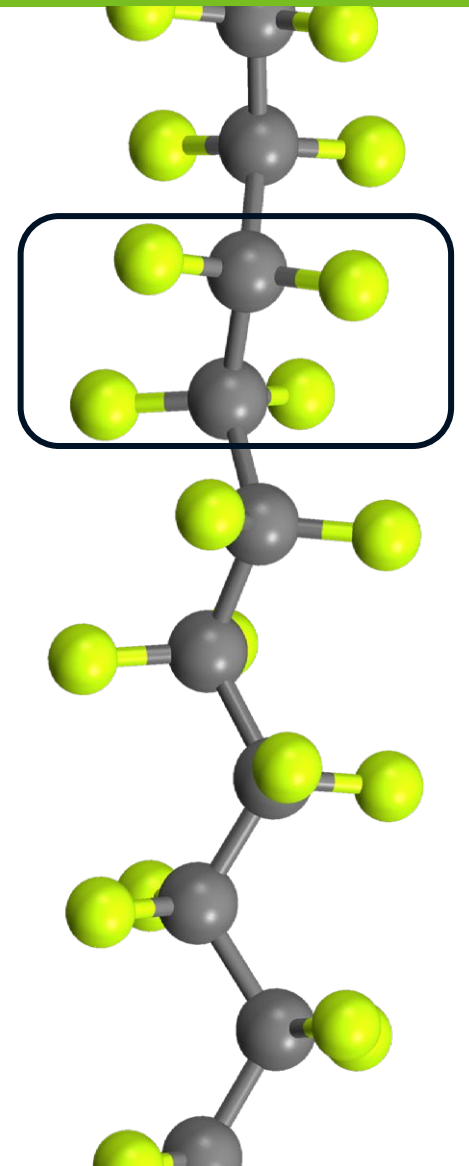
# PFAS and plastics



- Micro- and nanoplastics
- Fluorinated high-density polyethylene (HDPE)
- Fluoropolymers
- Other?

# Fluoropolymers

- PFAS polymers comprised of repeating, smaller molecules (monomers)
- Broadly assumed to be inert – like polytetrafluoroethylene (PTFE)
  - Production of fluoropolymers often includes other PFAS
  - Degradation of product after useful life
  - Releases of other PFAS during use?



# What you can do

- Reduce personal/family exposure
  - Use “PFAS-free” (labeled) cookware, other products
  - Know where your drinking water is coming from
  - Avoid single-use plastics when possible
- Tell your friends! (Family, coworkers...)

# What you can do (cont'd)

- Support ordinances, legislation that prohibit selling products with intentionally-added PFAS (like HB1295)
  - Amara's Law (Minnesota Statutes 116.943)
  - Prohibitions on use of PFAS in firefighting foams, food packaging, pesticides
- Encourage state to investigate and reduce PFAS sources in waste stream
  - Landfills/leachate
  - Wastewater discharges (especially industrial facilities)
  - Land application

# Prohibitions on PFAS in products

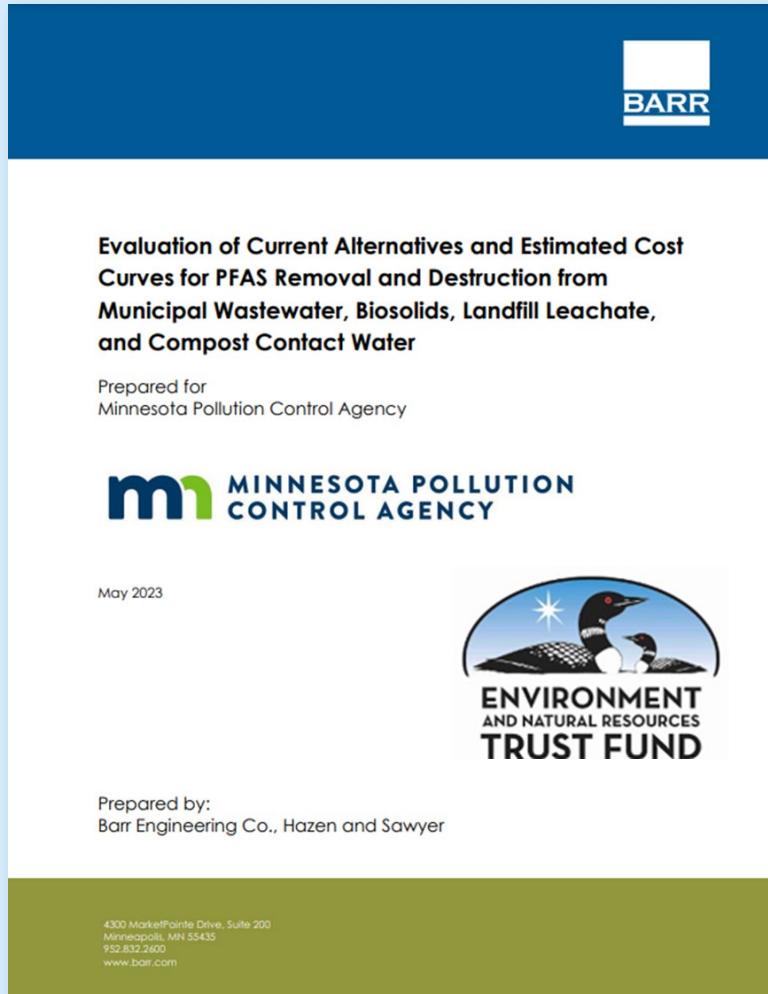


## Amara's Law

July 1, 2020	January 1, 2024	January 1, 2025	January 1, 2026	January 1, 2032
Firefighting foam for testing or training	Food packaging and other uses of firefighting foam (with exceptions)	11 consumer product categories	PFAS reporting requirements begin	PFAS in nearly all other consumer product categories*
		*unless use of PFAS is determined "currently unavoidable"		

Minnesota Department of Agriculture is working on implementing a prohibition on PFAS intentionally added to pesticides and some other agricultural products on the same timeline as Amara's Law.

# The economic case for prevention



**Cost to buy PFAS**  
to make consumer  
products

**\$50 - \$1000**  
per pound

**Cost to remove  
and destroy PFAS**  
from municipal  
wastewater

**\$2.7 million -  
\$18 million**  
per pound

# Questions?

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