



August 29, 2019

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Wisconsin State Speaker's Task Force on Water Quality Public Hearing

Marinette, WI

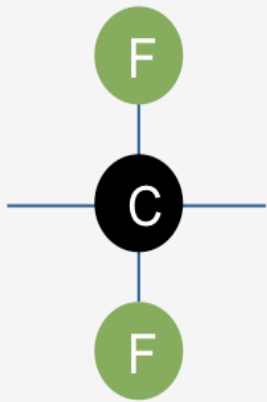
PFAS Overview

Per- and Polyfluoroalkyl
Substances



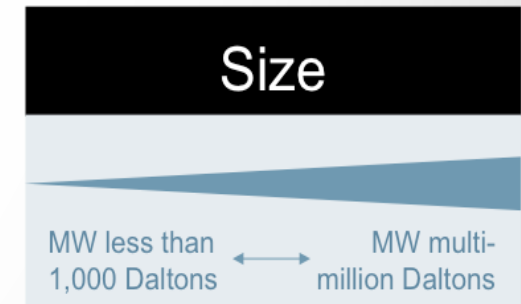
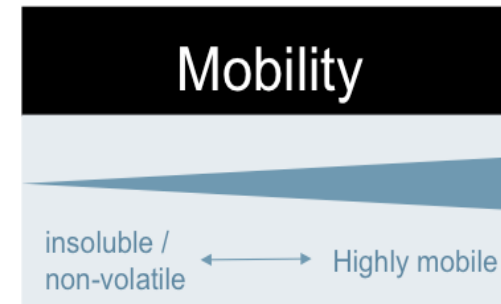
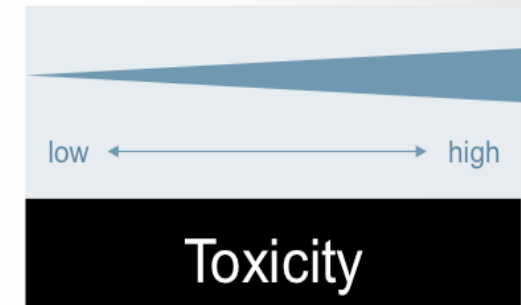
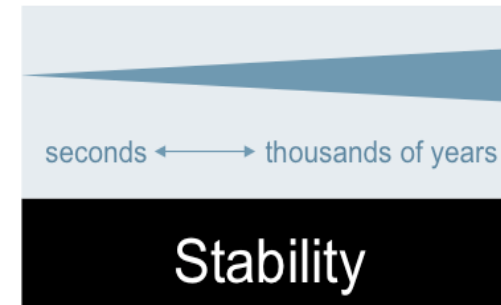
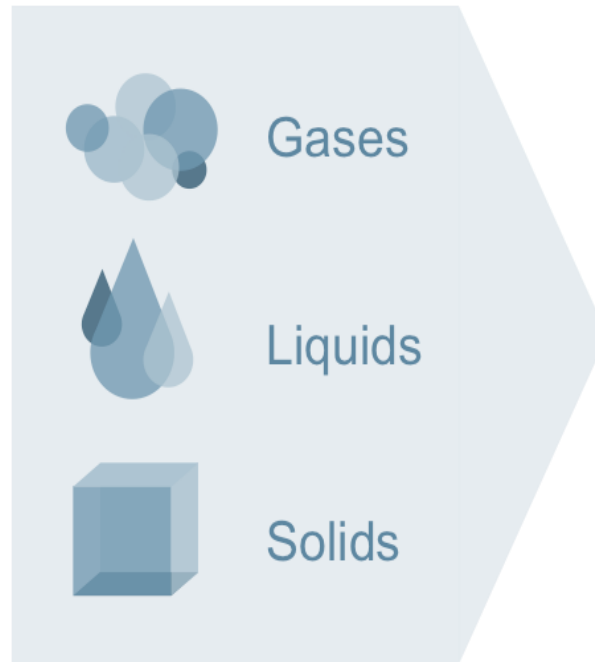
Overview: PFAS includes thousands of substances with very different properties

Similarities

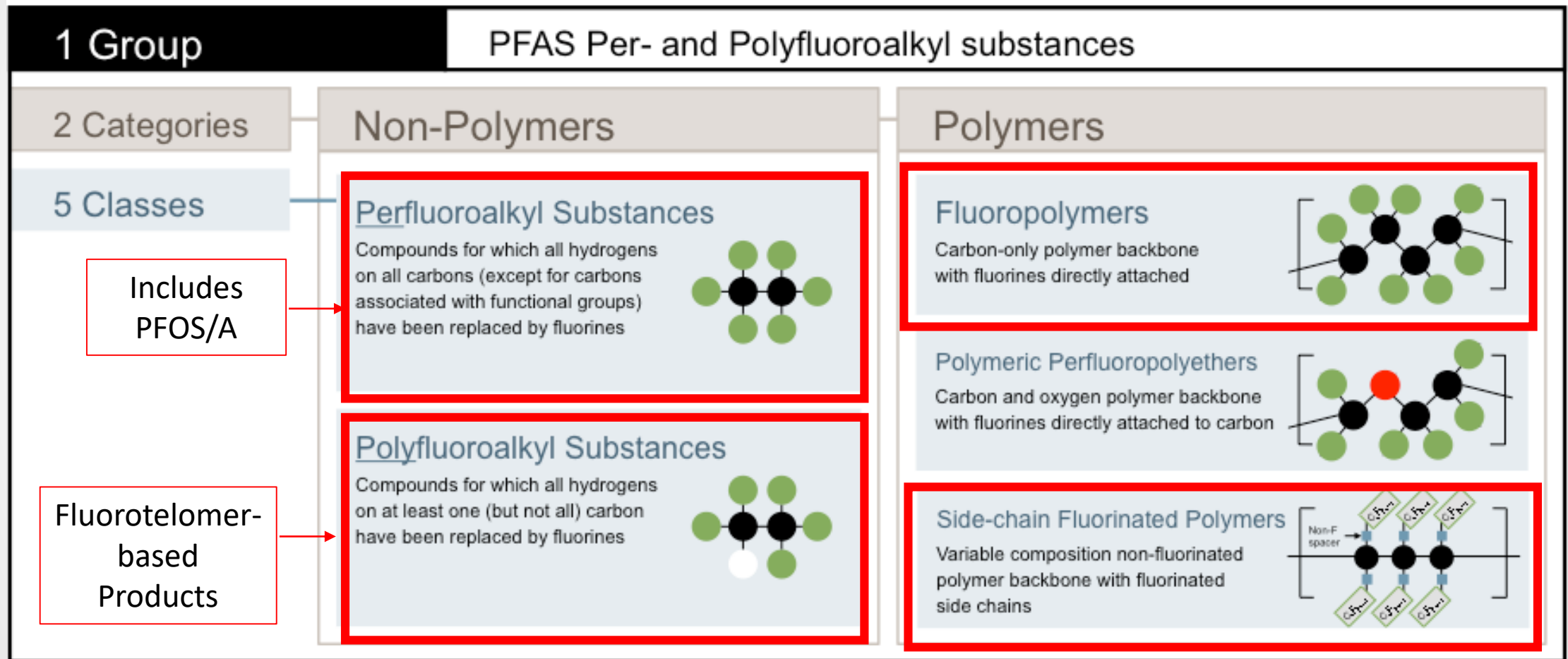
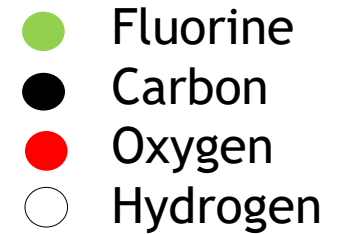


1 fully fluorinated carbon

Differences



PFAS Overview



Perfluoroalkyl and polyfluoroalkyl substances in the environment: Terminology, classification, and origins.

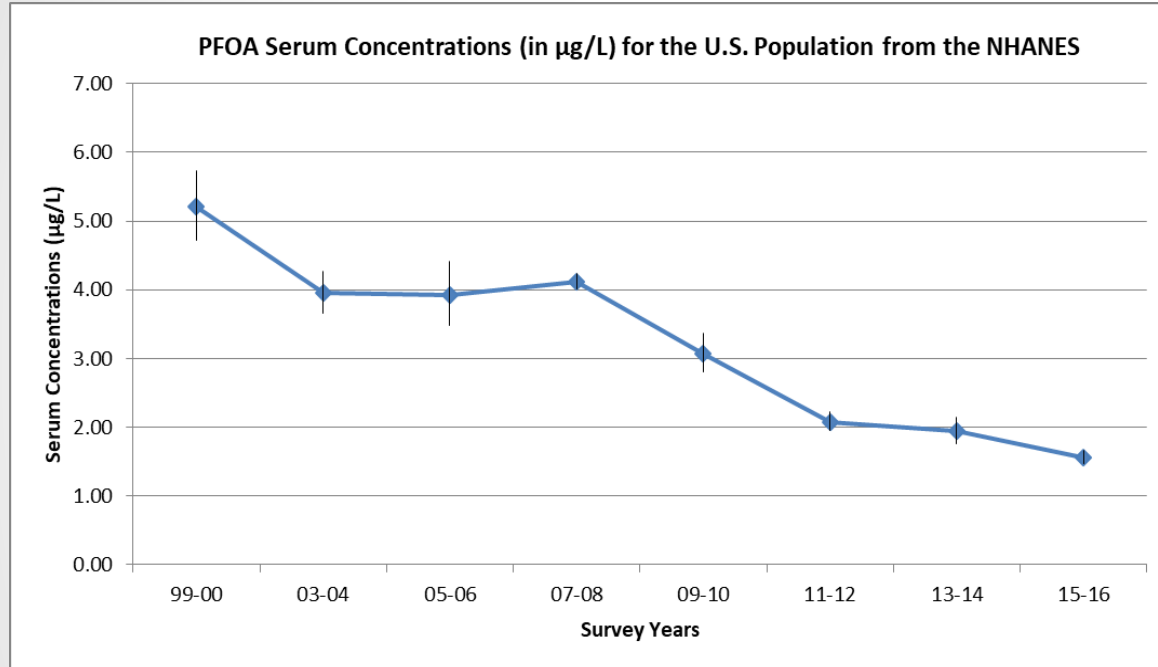
Integrated Environmental Assessment and Management 2011, 7, (4), 513-541.

<http://dx.doi.org/10.1002/ieam.258>

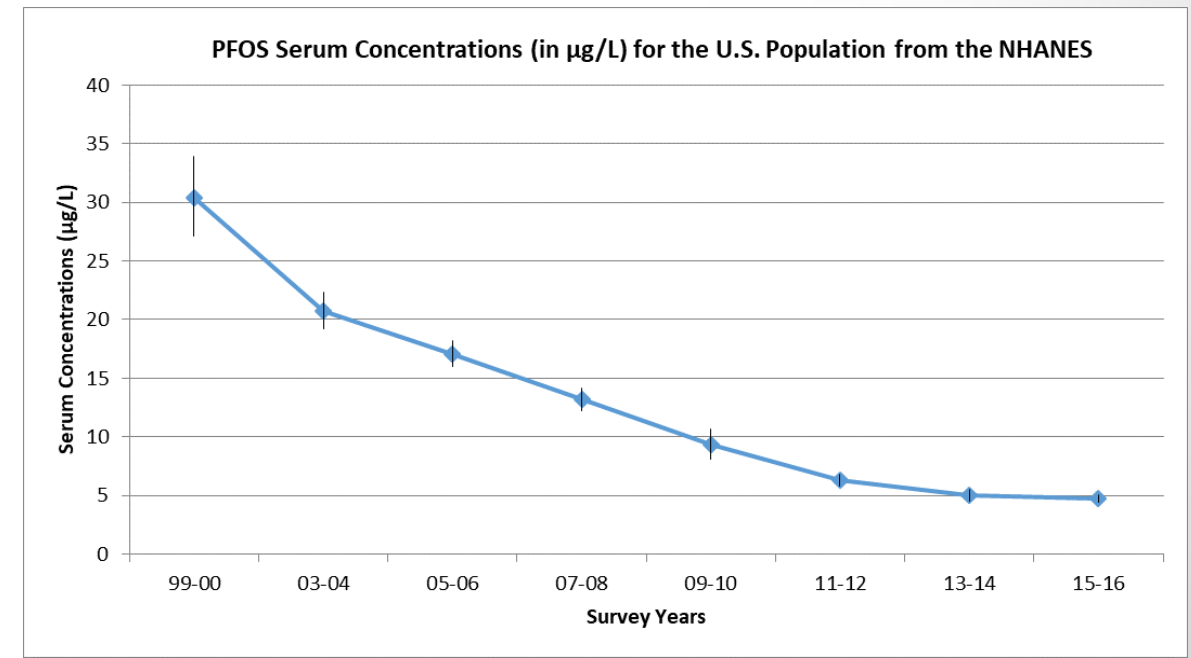
History of PFAS - PFOS & PFOA

- Properties & Use
 - Stable, hydrophobic (water) & lipophobic (oil and grease), superior surfactants
 - Used as a stain/water repellent, surfactant in class B fire-fighting foams (AFFF), polymerization aid in fluoropolymer manufacturing
 - Voluntarily phased out in U.S., Europe, and Japan by major manufacturers in conjunction with EPA
 - As a result, blood levels have dropped by 60 - 80%
 - Manufacturing continues in other countries and can be imported to the U.S.
- Issues
 - Persistent and bioaccumulative
 - Biological half-lives of 2-3 years
 - Associated with multiple health effects in animal testing
 - Including developmental effects
 - Mobile in water
- Federal Actions
 - Various use restrictions (*i.e.*, SNURs) imposed
 - Lifetime health advisories (@70 ppt) for drinking water issued in 2016

Blood Levels of PFOA and PFOS Have Declined Dramatically



NHANES – National Health and Nutrition Examination, Center for Disease Control and Prevention (CDC)



Exposure to PFOA and PFOS is Generally Low

- US EPA survey of public drinking water systems (2013-2015)
 - All large systems + representative sample of small systems
 - PFOA and PFOS were detected in less than 2 percent of the systems tested.
- MI Department of Environmental Quality - 2018 Survey
 - All community, school, child care, and tribal water supplies
 - PFOA and PFOS not detected in 90 percent of the samples
 - An additional 7 percent of the samples <10 parts per trillion (ppt)

Health Risks of PFOA/PFOS Exposure

- Disparity in guidance established by U.S. EPA, other federal agencies, various states, and international organizations has created significant confusion about the potential health risk of exposure to PFOA and PFOS
 - Values range from ~10 to 200+ ppt for PFOA; ~10 to 600 ppt for PFOS
- USEPA and MI DEQ surveys suggest that exposure to these two substances is generally below levels that have been identified as presenting potential health concerns

Regarding Water Standards for PFAS

- ACC supports a science-based rulemaking process for developing standards
 - Focused on PFOA and PFOS
 - Considers best available scientific information
 - Animal and human evidence for health effects
 - Latest information on biological half-lives
 - Standards should apply to individual substances
 - No single standard for multiple PFAS

Fluoropolymers

Material
Properties:

- Chemical resistance, thermal stability, resilience

Toxicity

- High molecular weight polymers that are not bioavailable and do not present a significant risk to human health or the environment

Polymerization
aids

- Major manufacturers phased out use of PFOA/long-chains and moved to alternatives that regulators have approved with conditions (e.g., strict limits on emissions)

Fluoropolymers meet OECD Polymer of Low Concern Criteria

13 Criteria



Polymer composition



MW, M_n,
MWD



wt%
oligomer



Electrical
charge



Reactive
Functional
Groups
(RFG)



Functional
Group
Equivalent
Weight (FGEW)



Low MW
leachables



Water / lipid
solubility,
octanol
water
partition



Particle
size



Polymer
stability



Thermal
stability



Abiotic
stability



Biotic
stability

Example Fluoropolymer Applications

Electronics



High frequency signal transmission; smudge-resistant touch screens

Textiles



Membranes in outdoor apparel, providing a breathable barrier against wind and rain

Medical Devices



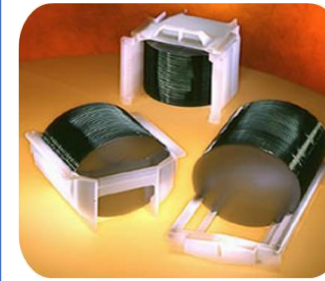
High dielectric insulators in medical equipment that relies on high frequency signals

Aerospace/Auto



Weight reducing fuel lines; heat/chemical resistant wire coatings

Semiconductor Manufacturing



Providing pure environments to transport/store harsh chemicals

Alternative Energy



Insulation properties, durability, and safety enabling lithium batteries, fuel cells and photovoltaic solar panels

Fluorotelomer-based Products

Properties
Provided

- Surface modification & protection
- Water & oil repellency
- Soil resistance and release
- Wetting and spreading

Chain
Length

- Major manufacturers moved to short-chain fluorotelomer-based products

Example Fluorotelomer-based Product Applications

Healthcare



Garments/Drapes that
Protect Against
Disease Transmission

First Responder Gear



Treatments and
Bulletproof Vests that
Maintain Performance
in Extreme Conditions

Specialty Paper



Oil/Grease Resistant
Food Packaging that is
Recyclable, Increases
Shelf-Life, Reduces
Packaging

Upholstery



Textiles with Water/Oil
Repellency, Stain
Resistance and Soil
Release and Longer
Useful Life

Paints and Varnishes



Durable construction
materials coatings

Fire Fighting Foam



Class B (Flammable
Liquid) Foams with
Shorter Extinguishing
Time and Burnback
Resistance

About Short-Chain Fluorotelomer-based Products

- Accepted for use in consumer products by regulators globally
- Recognized as meeting relevant regulatory standards
- Polymers widely understood not to present toxicity concerns
 - Not bioavailable; not a focus of regulators
- Hazard is characterized by their degradation products (namely PFHxA)
- Supported by a robust body of data
- Studies show short-chain fluorotelomer-based products do not present significant adverse impacts

PFHxA Toxicity Summary

- Does not represent a reproductive, developmental or neurobehavioral hazard
- Not carcinogenic
- Not mutagenic
- Does not bioaccumulate in fish
- Quickly eliminated from living organisms
- Not an endocrine disruptor

* PFHxA is an impurity/degradation product

Industry Best Practices - Reduces Environmental Release and Potential For Exposure



**Fire
Fighting
Foam
Coalition**

**Best Practice
Guidance for
Use of Class B
Fire Fighting Foams**

March 2016

1001 19th Street North • Suite 1200 • Arlington, VA 22209 • 571-384-7915 • www.ffc.org

1. Use the product only when necessary
2. Use only what you need
3. Reuse/recycle residual liquids if possible
4. Minimize waste and emissions
5. Dispose of all chemicals properly



FluoroCouncil
Global Industry Council
for FluoroTechnology

**Guidance for Best Environmental
Practices (BEP) for the
Global Apparel Industry**

Including Focus on Fluorinated Repellent Products



May 2014

WI AFFF Bills

- AB 323 (Nygren) and SB 310 (Cowles)
 - Prohibit use of AFFF for training
 - Restricts use of AFFF for testing (requires appropriate containment, treatment, disposal methods)
 - Allows use of AFFF in emergency fire fighting or fire prevention operations
- Codification of best practices
- Similar legislation adopted in other states (e.g., KY, VA, GA, AZ)



Questions, Discussion
