

# Per- and Polyfluoroalkyl Substances (PFAS) 101

**2020 Midwest Environmental Compliance Conference**

**December 1-2, 2020**

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## **PFAS-related assistance:**

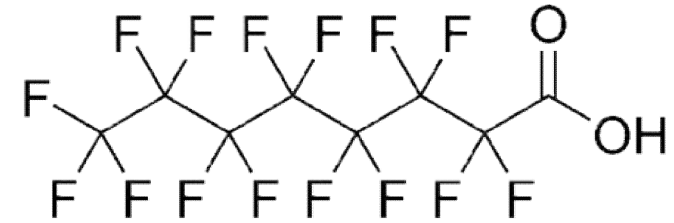
- **strategic best management practices**
- **sampling/investigation**
- **modeling**
- **treatment**

**conducting PFAS sampling, modeling, and remediation for over 20 years**

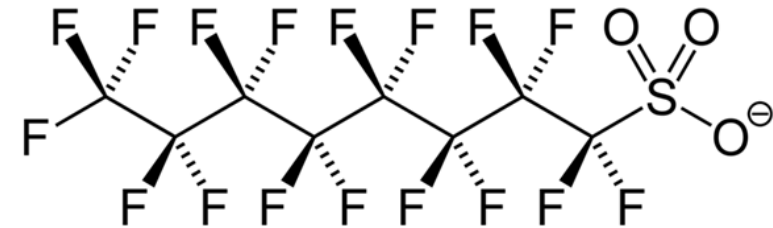


# What are PFAS?

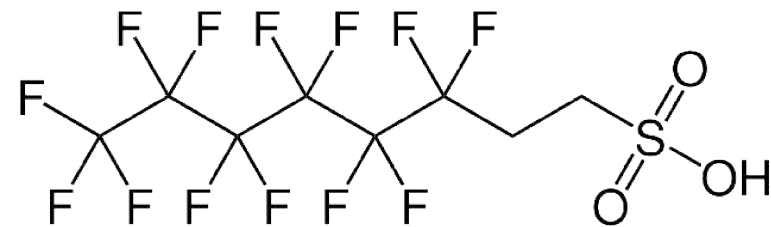
- Manmade chemicals
  - Approximately 4,000 compounds
- Poly vs. per fluorinated
- Per-fluorinated naming convention (common compounds):
  - P-per
  - F-fluorinated
  - X – length of carbon chain
  - A or S – definition of functional group



**PFOA**



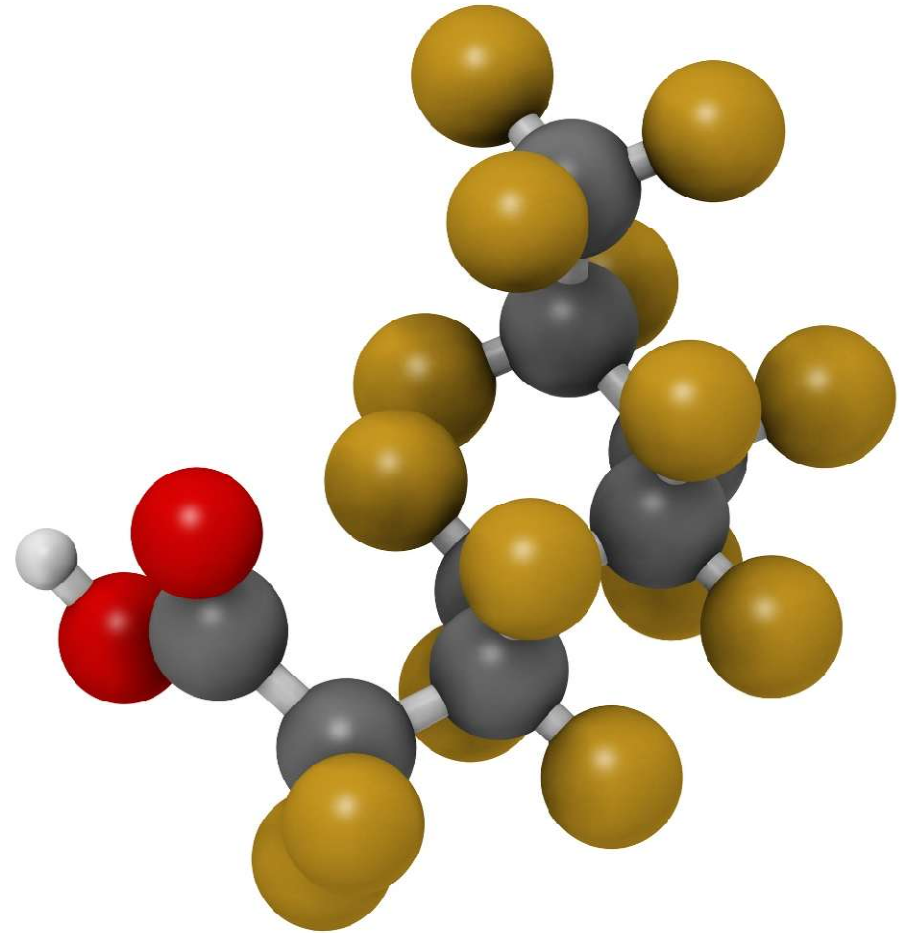
**PFOS**



**6:2 FTS**

# PFAS properties

- heat, oil, stain, and water resistant
- resistant to biodegradation
- destroyed at high temperatures
- semi-volatile
- miscible in water
- some affinity for organic carbon



# Sources: PFAS can be found in consumer products, and municipal and industrial sources



# health risks

- persistent in humans (4-7 years)
- national average human blood level – 2 parts per billion
- gov't task force found (2016) “probable link” between PFOA and
  - kidney cancer
  - testicular cancer
  - thyroid disease
  - high cholesterol
  - ulcerative colitis



# Research on the health effects of PFAS is ever evolving

National median  
blood: 2-5 ppb



- 2016: EPA released **health advisory levels** for PFOA and PFOS
- 2018: ATSDR draft report on PFAS listed additional affects for PFOA and PFOS and **added health concerns** for PFNA, PFHxS, and PFHpA
  - Industry disputes ATSDR methodology and approach
  - ATSDR acknowledges that "...cause and effect relationships have not been established for any of the effects, and the effects have not been consistently found..."

# regulatory roundup – very small concentrations

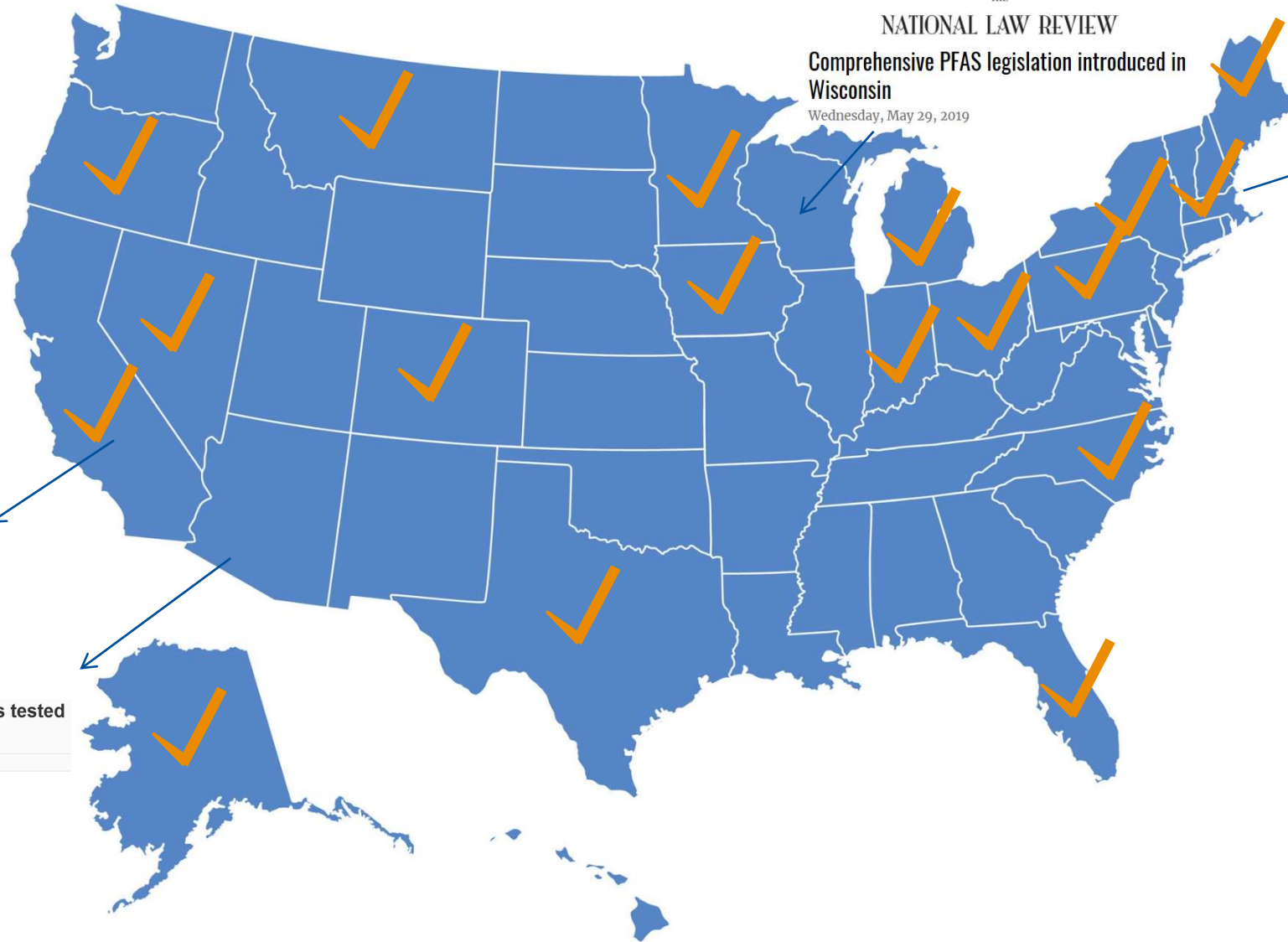
- 2016 EPA Health Advisories (HAs) for total PFOA/PFOS at 70 ppt for combined PFOA and PFOS
  - **part per trillion levels** (1 second in 32,000 years)
- states taking action, some enforcing at very low ppt levels
  - uncontrolled dump sites
  - defense sites (fire fighting foam)
  - recently landfills and WWTP's (MI)
  - other states sampled and evaluating data (ND, MN, WI)



# Regulation: 23 states have established PFAS # for drinking and/or groundwater



State has adopted EPA criteria (PFOA and PFOS) and/or released revised state-specific criteria



THE NATIONAL LAW REVIEW

Comprehensive PFAS legislation introduced in Wisconsin  
Wednesday, May 29, 2019

- Connecticut
- Delaware
- Massachusetts
- New Hampshire
- New Jersey
- Rhode Island
- Vermont

## Los Angeles Times

Hundreds of wells are contaminated across California. Find out where

By ANTHONY PESCE AND ANNA M. PHILLIPS  
OCT. 14, 2019

Not just Luke: Water in 9 other Arizona places has tested high for firefighting foam toxins

Jen Fifelet, The Republic | azcentral.com Published 7:30 a.m. MT May 2, 2019 | Updated 11:49 p.m. MT May 2, 2019

# Regulation: State standards and guidance values for PFAS are varied and changing

	USEPA (PPT)	Minnesota (PPT)	New Jersey (PPT)	Michigan (PPT)	Nevada (PPT)	New Hampshire (PPT)
Standard/ Guidance	Health advisory levels (2016)	Health risk limit or guidance values (2017)	Groundwater Quality Standards (2019)	Generic cleanup criteria (DW/GW, 2018)	BCIs (Dec. 2015)	Final proposed MCL/AGQS (Oct. 2019)
PFOS	70	15	10	70 (8)	667	15
PFOA	70	35	10	70 (9)	667	12
PFBA	--	7,000	--	--	--	--
PFBS	--	3,000	--	(1000)	667000	--
PFHxS	--	47	--	(84)	--	18
PFHpA	--	--	--	--	--	--
PFNA	--	--	13	(9)	--	11