

PFAS (PFC)

Per-Fluorinated Alkyl Substances
Poly-Fluorinated Alkyl Substances
(PerFluoroChemicals)

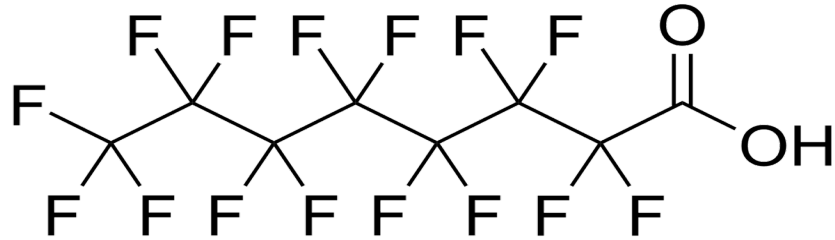
Stephen C Brown, PhD
browns6887@att.net
(734)-604-4582 (m)

PFAS: Key Facts and Figures

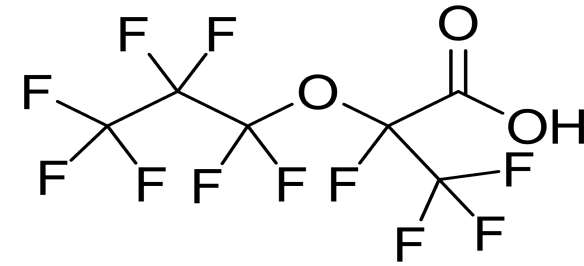
- PFAS is an umbrella term for some 10,000 synthetic chemicals that have multiple Carbon-Fluorine chemical bonds. Health concerns since 2015 are PFOS and PFOA, which had EPA Public Health Advisory Levels (HAL) of 70 ppt each for drinking water. **Michigan enacted MCLs for 7 PFAS in August 2020 about 10-fold lower.**
- **EPA has proposed new HAL values for PFOS (0.2 ppt) and PFOA (0.004 ppt) based on more comprehensive emerging health data. EPA MCLs are expected this year.**
- PFOA and PFOS have been manufactured and sold in the USA since 1943, and can be measured in blood worldwide.
- Principally Used in Consumer products and Firefighting Foams (AFFF)
- **Bioaccumulate** and **Persist** in Body Tissues, such as Blood and Liver
- **Very difficult to destroy** (incineration >1100 °C ; electro-oxidation)

Industry Response → Regrettable Substitutions

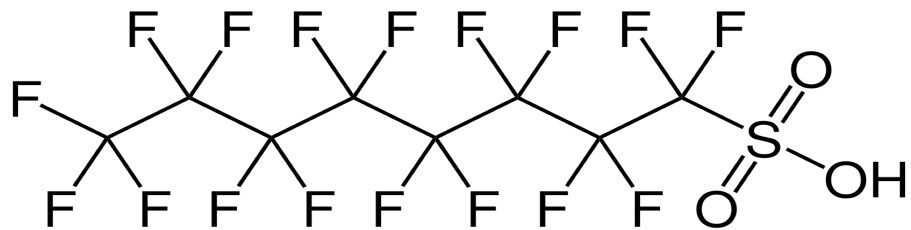
PFOA



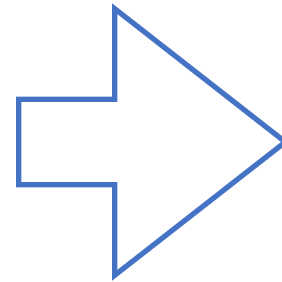
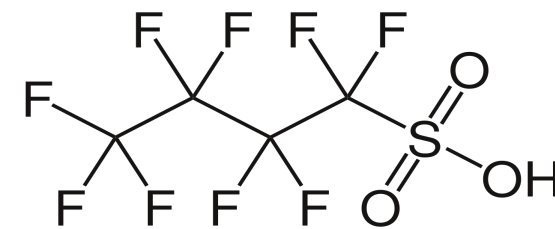
GenX



PFOS



PFBS



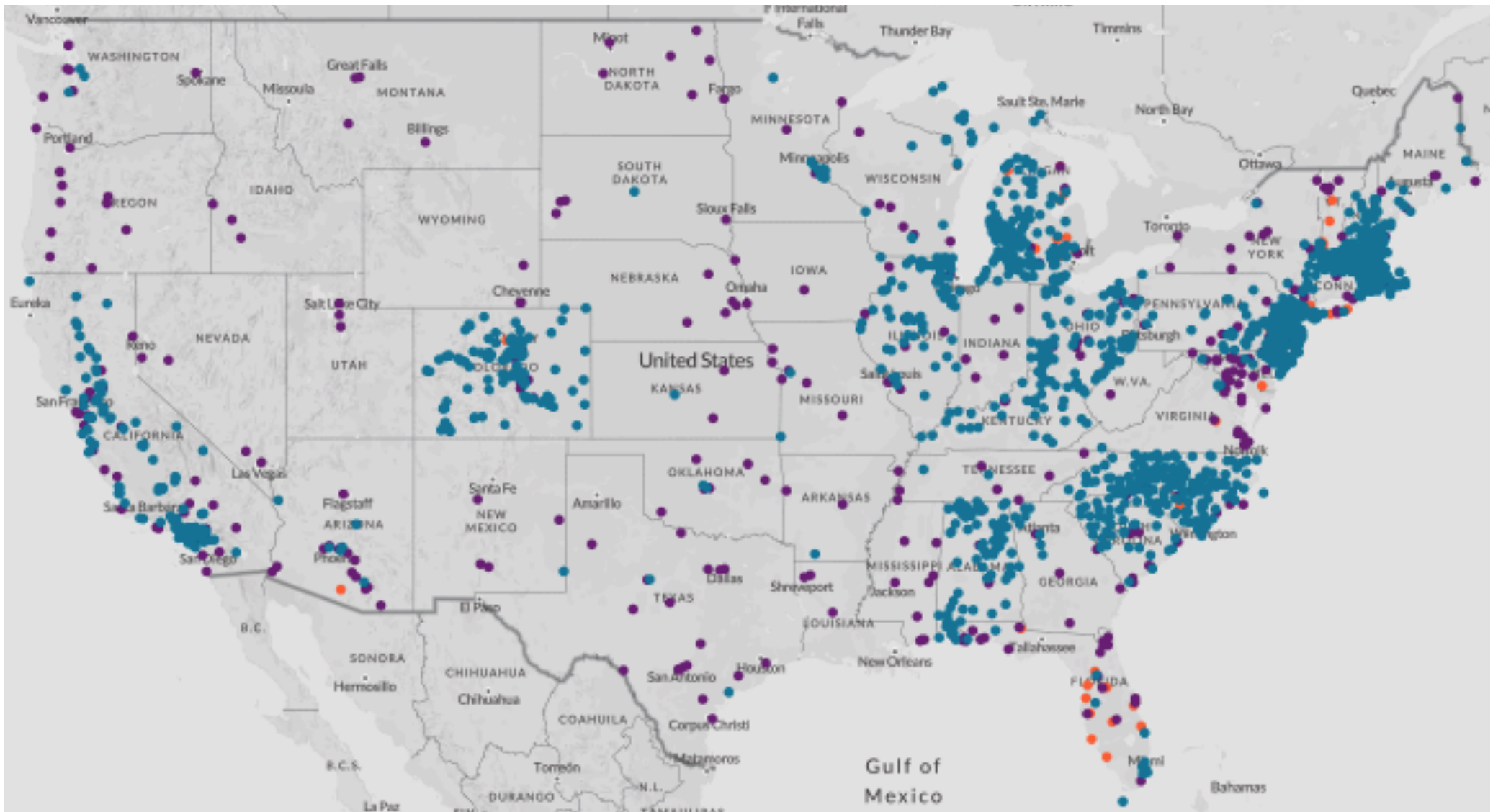
PFAS have been circulating in food and water supplies for decades & are found in blood worldwide

- Industrial and AFFF point sources → Surface and Ground Waters
- Industrial Pretreatment Permits (IPP) → WWTP
- Commercial Distribution → Landfills & Wastewaters
- Waste Water Treatment Plants (WWTP) → Surface Waters & Biosolids
- Biosolids and Composts → Food Chain

- Comprehensive Solutions:
 - Define PFAS as any chemical having at least one carbon atom fully fluorinated-this targets the general PFAS property of *persistence*
 - Eliminate all “non-essential” uses of PFAS-this *turns off the spigot*
 - Reform TSCA to invoke the “Precautionary Principle”, cf. EU REACH Program

Where are PFAS Point-Sources Found?

- **Industrial Sites and AFFF training sites (airports):**
 - **DOD sites, tank farms, fire training facilities**
 - **Wurtsmith AFB, Camp Grayling**
 - **Marathon Oil Refinery (Detroit)**
 - **Cherry Capitol Airport (Traverse City)**
- **Wherever Sewage Sludge aka “Biosolids” have been applied:**
 - **Paper mill sludges (ME dairy farms)**
 - **WWTP sludges with IPP permits (Hartland, MI)**
- **Wherever food packaging is included in Composts**
 - **All tested so far, including Ann Arbor’s composts**
- **Car Washes, Commercial Laundries,**



PFAS Contamination Site



KEY FINDINGS

- ① PFAS compounds are a class of non-stick, waterproof, stain-resistant compounds used in consumer products and industry. Best known are PFOS, formerly used to make DuPont's Teflon, and PFOA, formerly in 3M's Scotchgard.
- ② Very low exposure to some PFAS chemicals has been linked to cancer, thyroid disease, weakened childhood immunity and many other health problems.
- ③ Tests of tap water, military bases and industrial sites have found PFAS contamination in more than 712 locations in 49 states. Drinking water for up to 110 million Americans may be contaminated with PFAS.

DETAILS

Contamination site: 201

Location: Wixom, Michigan

PFAS detected:

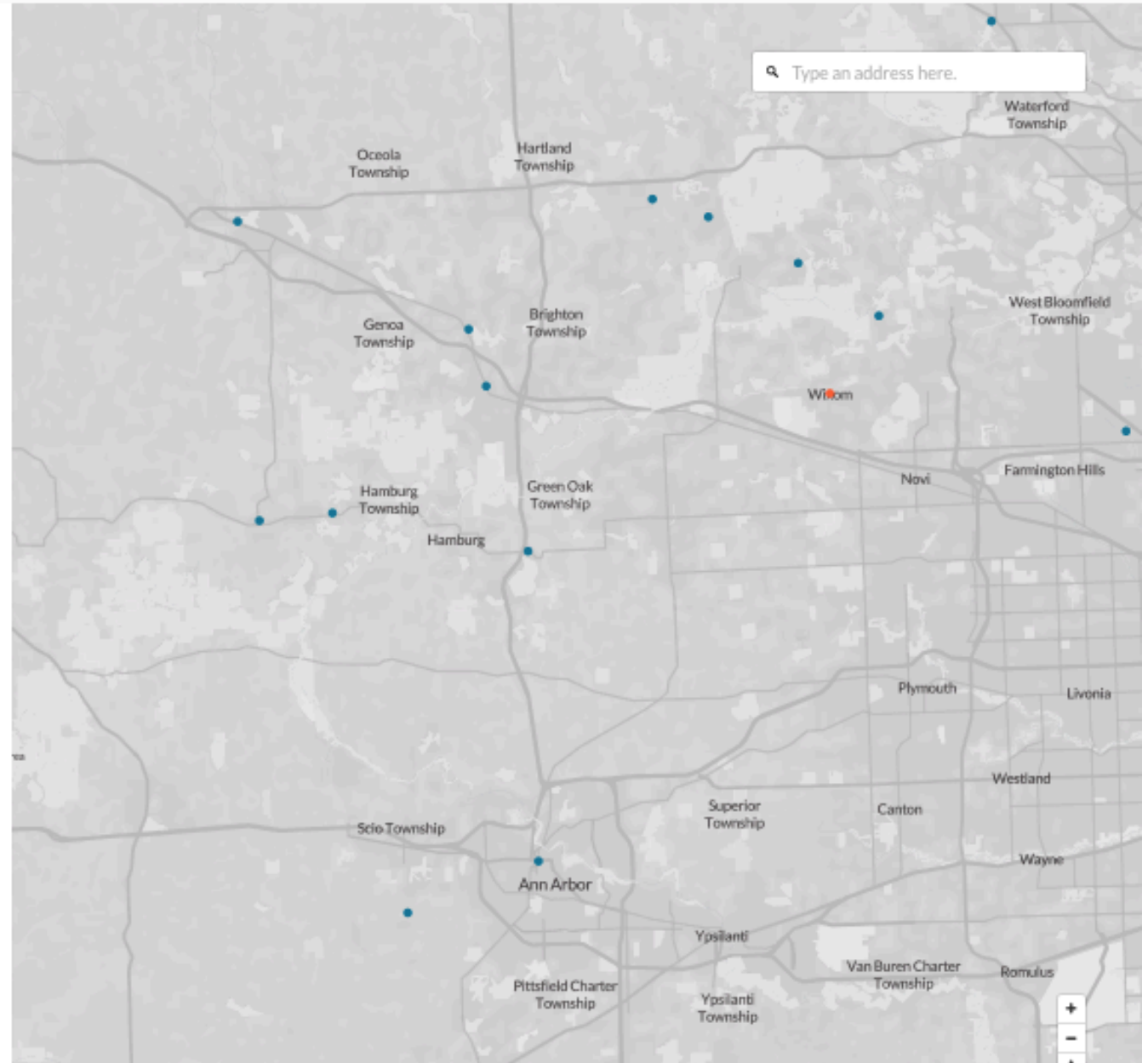
PFA	Source	Maximum Level (ppt) Year(s) tested
PFOS	Adept Plastics Manufacturing Plant 4 Wastewater Effluent	28,000.0 2018
PFOS	Waste water treatment plant discharge Wastewater Effluent	290.0 2018
PFOS	Huron River Surface Water	88.0 0
PFOS	Wixom well Groundwater	6.0 0
PFOS	Norton Creek Surface Water	5,500.0 0
PFOS	Willow Run Creek Surface Water	26.0 0

Suspected source: Industrial Manufacturing

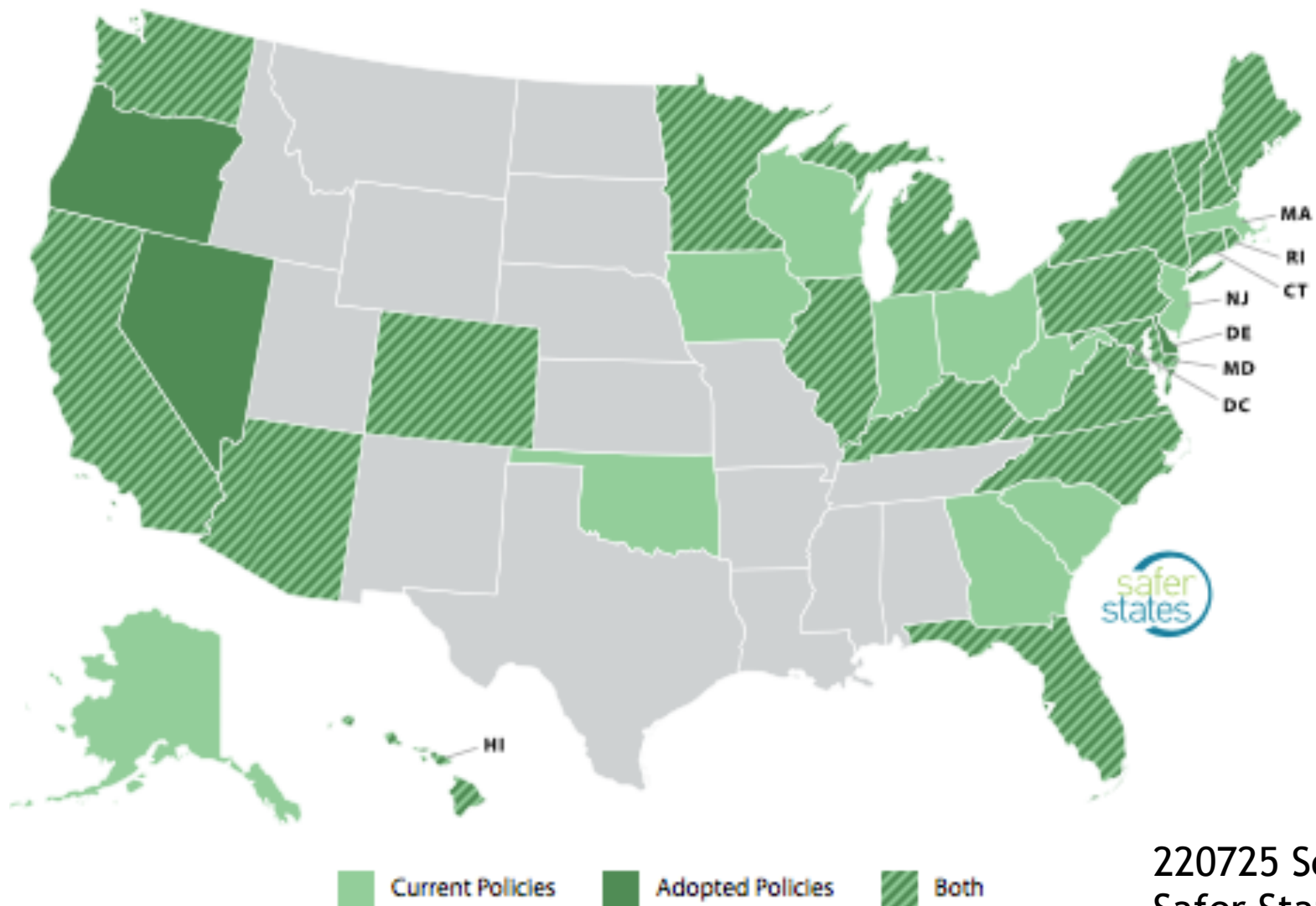
Source: EWG from [Michigan PFAS Action Response Team page for Huron River Watershet](#)



view report



204 current policies in 31 states
94 adopted policies in 23 states



220725 Screenshot from Safer States Website

PFAS Threats to Health and Budgets

- **Health Threats- Long Term Chronic Exposures**
 - **Food: Packaging, Meat, Fish, Dairy, Vegetables**
 - **Water: PFAS difficult to remove, persist in sediments**
 - **Air: Inhalation of volatile PFAS and Household Dusts**
- **Budget Threats- Regulation Coming, Remediation Difficult**
 - **Drinking Water Treatment- GAC vs. Reverse Osmosis**
 - **Wastewater Treatment- Far bigger challenge**
 - **Composts - whenever food wastes are included**
 - **Biosolids Disposal - currently on agricultural lands**
 - **Landfill Leachates -**

Regulatory Laws and Actions are Inadequate

- **Too Little, Too Late for most sites**
- **Comprehensive Solutions:**
 - **Define PFAS as any chemical having at least one carbon atom fully fluorinated-this targets the general PFAS property of *persistence***
 - **Eliminate all “non-essential” uses of PFAS-this *turns off the spigot***
 - **Reform TSCA to invoke the “Precautionary Principle”, cf. EU REACH Program**

Key Information Sources

- ATSDR (Health): <https://www.atsdr.cdc.gov/pfas/>
- NIEHS: <https://www.niehs.nih.gov/health/topics/agents/pfc/index.cfm>
- NLM HSDB: <https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm>

- EPA: <https://www.epa.gov/pfas>
- FDA: <https://www.fda.gov/food/chemical-contaminants-food/authorized-uses-pfas-food-contact-applications>
- ITRC (Interstate Technology Regulatory Council): <https://pfas-1.itrcweb.org>
- Safer States: <https://www.saferstates.com/toxic-chemicals/pfas/>
- 3rd Annual PFAS Conference: <https://pfasproject.com/conference-presentations/2022-pfas-conference/>

- MPART (MDEQ): <https://www.michigan.gov/pfasresponse/>
- PFAS sites in Michigan: https://www.michigan.gov/pfasresponse/0,9038,7-365-86511_95645---,00.html

- Environmental Working Group: <https://www.ewg.org/pfas-resources>
- Silent Spring Institute: <https://silentspring.org/project/pfas-reach>
- Sierra Club Sludge in the Garden Report: <https://www.sierraclub.org/toxics/pfas/pfas-sludge>
- Apps: <https://www.timetocleanse.com/8-mobile-apps-help-reduce-exposure-harmful-chemicals-find-toxin-free-food-cosmetics-household-products/>