PFAS Awareness Meeting and Safe Water for Muskegon County Kickoff

Muskegon County PFAS Task Force
Co-coordinators Tanya Cabala, WMEAC
Dr. Rick Rediske, Emeritus Professor, GVSU

Muskegon Community College
Stevenson Center for Higher Ed, Room 1300
March 26, 2025

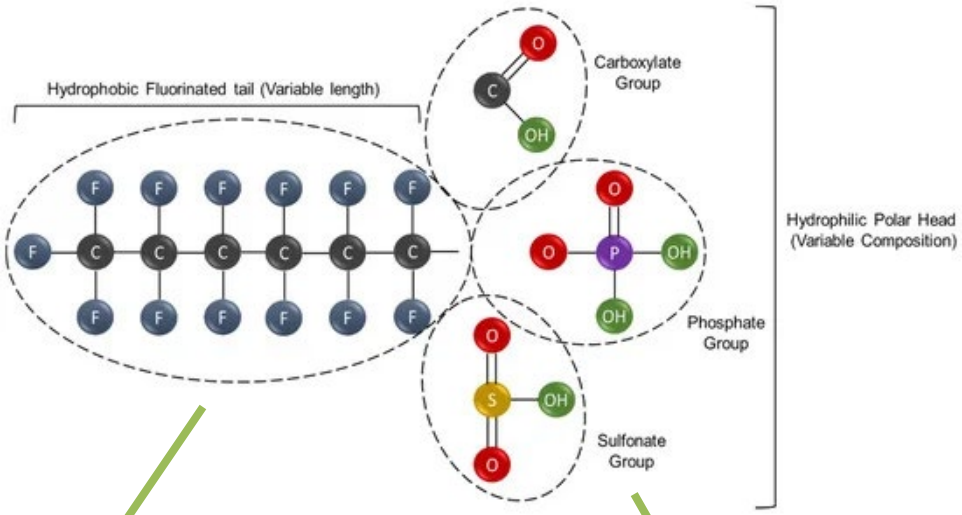
MEETING AGENDA

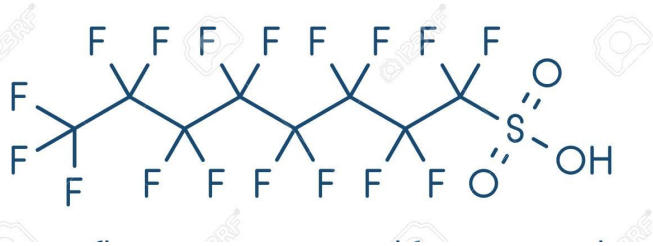
1. Why We Should Be Concerned about PFAS in Muskegon County
2. Safe Water for Muskegon County Pilot Project
3. Education Fact Sheets – Student Perspective on PFAS
4. AWRI PFAS Website
5. Next Task Force Meeting (virtual) – June

PFAS: PFAS: Why Something Small and Inert Can Be Very Significant.

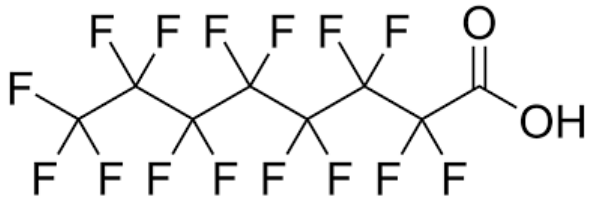
Richard R. Rediske, Ph.D.
Emeritus Professor - GVSU

PFAS – A Class of 12,000+ Chemicals

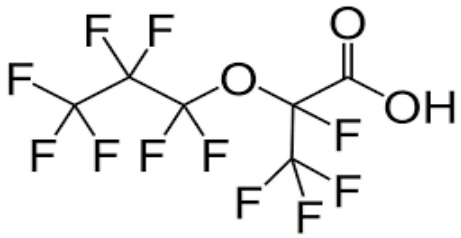




Perfluorooctanesulfonoic acid PFOS



Perfluorooctanoic acid PFOA



GenX

Hydrophobic Fluorocarbon tail

- **4th strongest bond**
- **Repels oil and water**
- **Varying length**
- **Inert**

Hydrophilic Head

- **Strong to weak acids**
- **Dissolves in water**

Panieri, E., et al. "PFAS molecules: a major concern for the human health and the environment." Toxics 10.2 (2022): 44.

PFAS Uses

ADOD2022

Lithium Ion Batteries and Semiconductors use fluorinated compounds

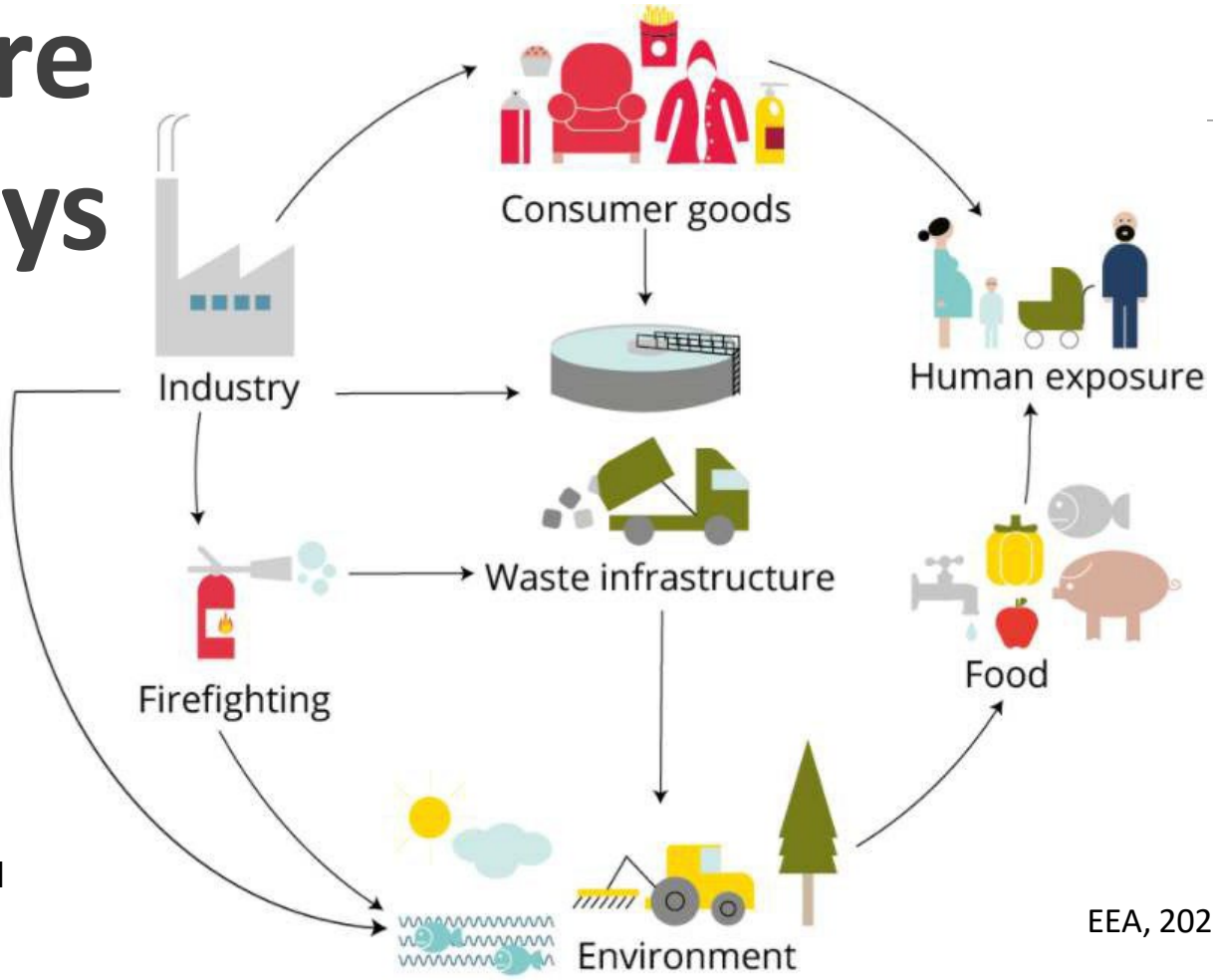
Dispersants and impurities in containers

Makes paint flow better and increases durability

Ski wax

For Leather

Typical Exposure Pathways



PFAS do not degrade. PFAS pass through Wastewater Treatment Plants in the effluent and biosolids

EEA, 2021

PFAS Compounds are Chemically Inert yet Biologically Reactive

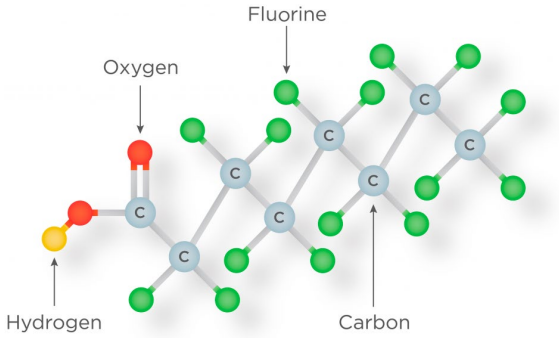
Toxicants like Asbestos and Silica are chemically inert yet small enough to cause repeated tissue injury.

PFAS is chemically inert because of the strong C-F bond and the fact that the carbon chain is shielded by Fluorine

Molecular Mimicry: Many PFAS molecules look like fatty acids or hormones. Because they are structurally similar, they can "fit" into biological receptors—like a key fitting into a lock—even if they don't turn the lock correctly.

Persistent Signaling: In a normal body, a hormone triggers a signal and is then broken down and cleared out. Because PFAS is inert, the body's enzymes cannot break it down. It stays stuck in the receptor, sending a constant, "noisy" signal or blocking natural hormones from getting through.

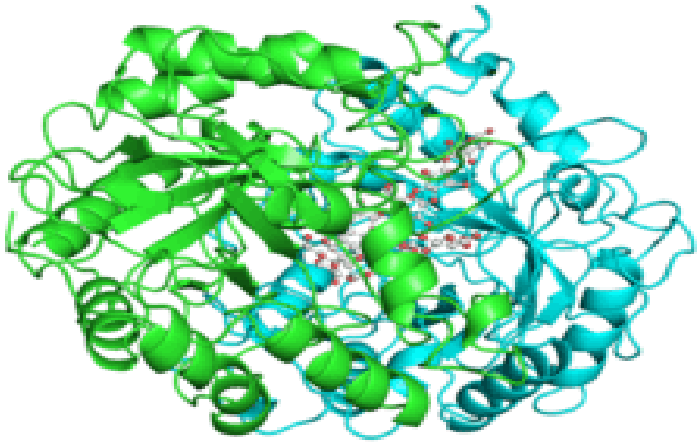
Protein Binding: PFAS has a high affinity for proteins, and it hitches a ride on these proteins to travel through the bloodstream and accumulate in organs like the liver and kidneys.



https://www.thefittest.com/armory/the-silent-threat-of-pfas-understanding-and-avoiding-forever-chemicals

Why be Concerned about PFAS?
PFAS-Albumin Relationship is Important

- **Water Soluble g/l**
- **Bind to proteins and DNA**
- **Circulate in blood bound to albumin, which is the major carrier protein for hormones and antibodies**
- **Reabsorbed by the kidney; resulting in long half-lives (4-9 yrs) and difficulties in the interpretation of data from studies with animals that have more rapid clearance rates**
- **Bioaccumulates in the plants and animals**
- **Not biodegradable**
- **We are dealing with historical releases involving decades of human exposure over multiple generations and life stages**



https://bestanimations.com/gifs/Metabolism.html

Potential Health Effects of PFAS

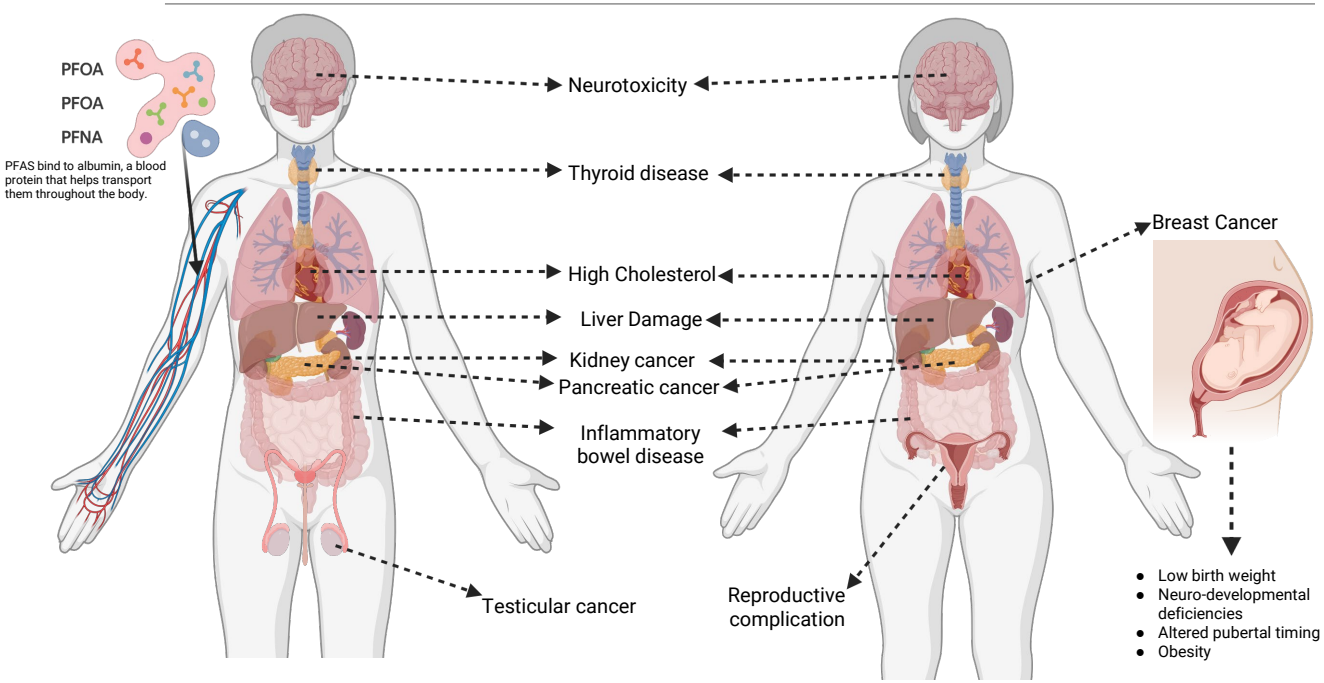


Figure Credit: Created by Calvin University Summer 2025 research team member Reeja Nyachhyon using BioRender based on research conducted with Francesca Turnage and Tolulope Afolabi, under the mentorship of Dr. Dani McBride and Dr. Rick Rediske

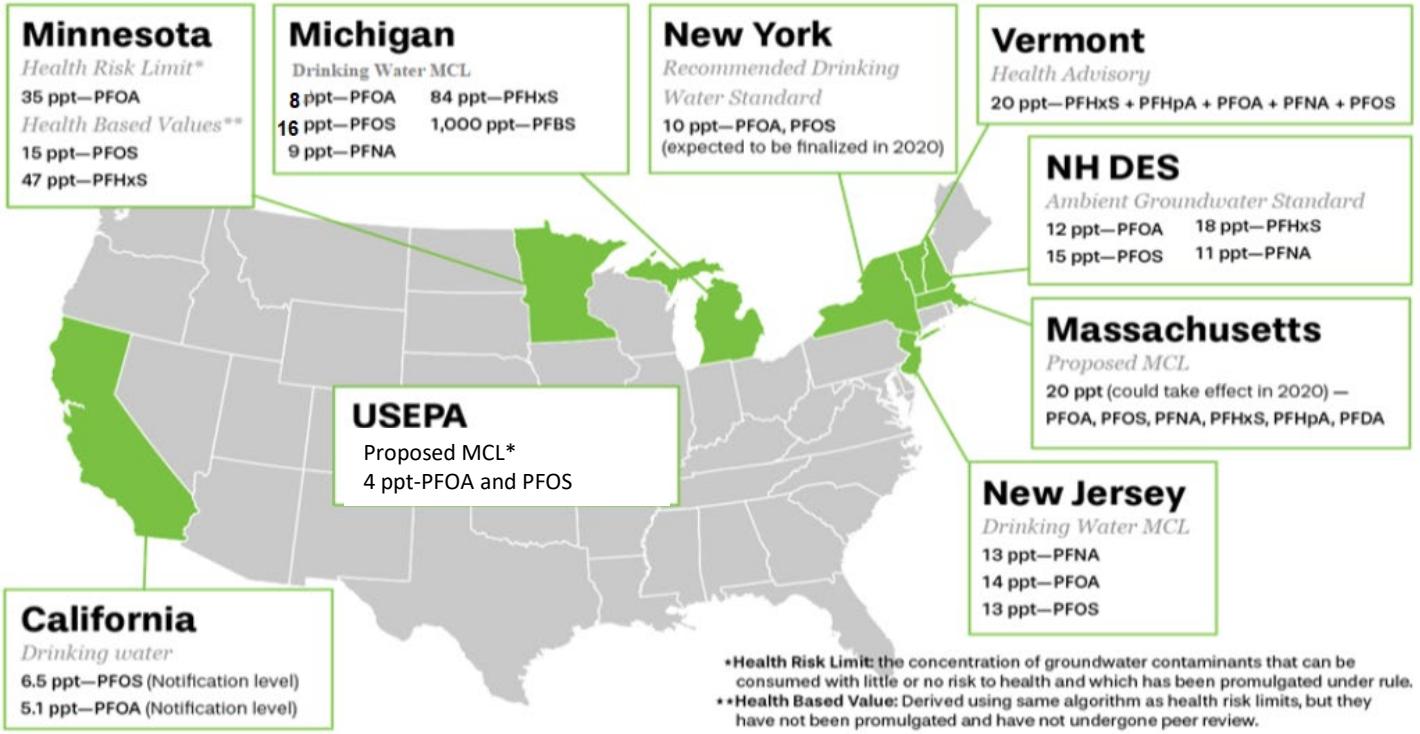
The risk of health effects with PFAS depends on

- Exposure factors (e.g., dose, stage of development, frequency, route, and duration)
- Individual factors (e.g., sensitivity and chronic disease burden)
- Other determinants of health (e.g., access to safer water and quality healthcare)

Is a Part Per Trillion Significant?

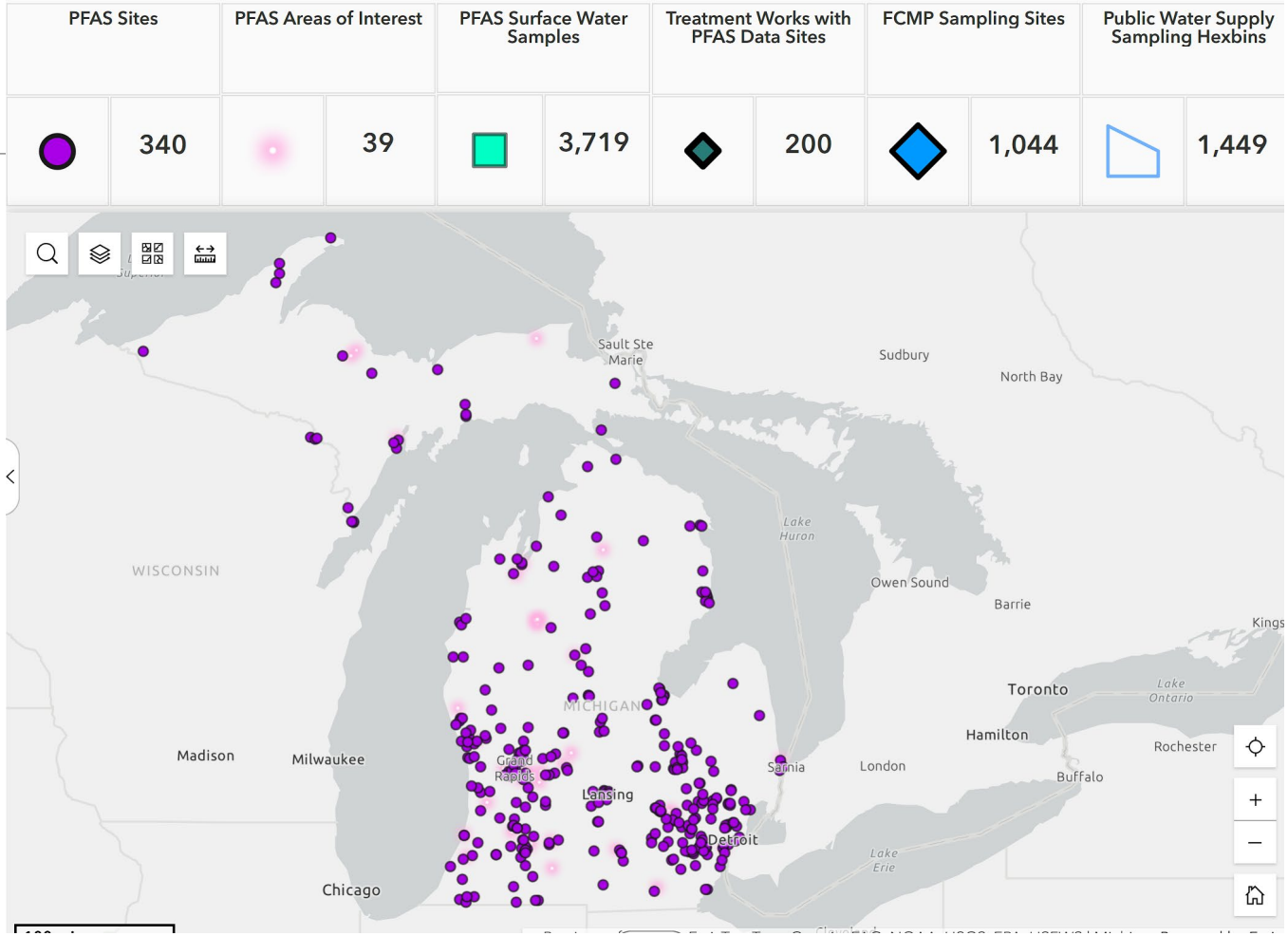
- For most chemicals, a ppt is not significant.
- **For chemicals that bioaccumulate, yes**. Mercury and PCBs are present in ppt concentrations in water and they accumulate in fish to the extent that we have consumption advisories.
- **For chemicals that affect the endocrine system, yes.**
- The normal range for parathyroid hormone in blood is 10 – 65 ppt. The normal range for triiodothyronine (T3) (free) is 2.4-4.2 ppt. The normal range for Corticotropin (ACTH) Pituitary hormone 10-60 ppt
- **Remember PFAS compounds accumulate 10-100x in blood from drinking water exposure due to lack of excretion**

PFAS Drinking Water Standards



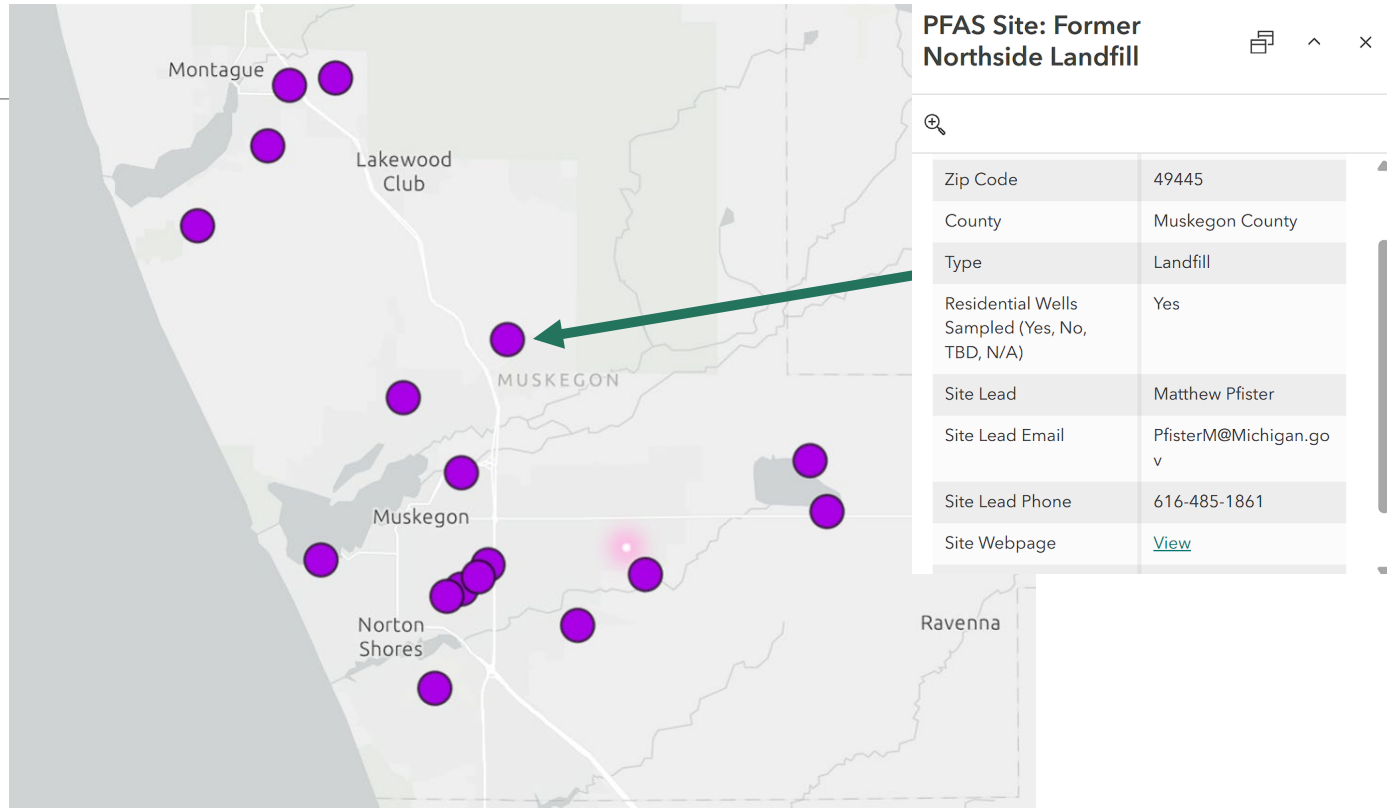
*MCL is based on the current analytical detection Limit.
Actual Health Advisory 0.004 ppt PFOA and 0.02 ppt PFOS

Michigan PFAS Sites



https://experience.arcgis.com/experience/b09b698aa03244f7ae5fa234ee2bf61c/

Muskegon County PFAS Sites



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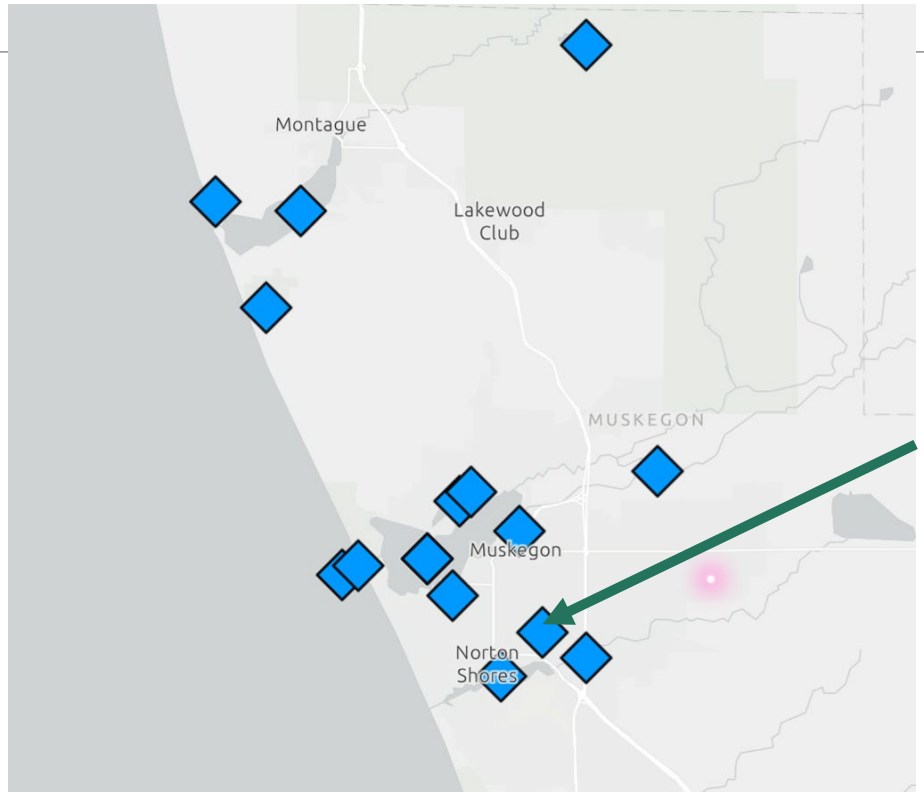
Muskegon County PFAS Fish Samples



Fish Contaminant Monitoring Program: Little Black Creek

Station ID	1,559
Water Body	Little Black Creek
Sampling Location	Johnny O'Harris Park
Latitude	43.20
Longitude	-86.23

Edible Sampling Data

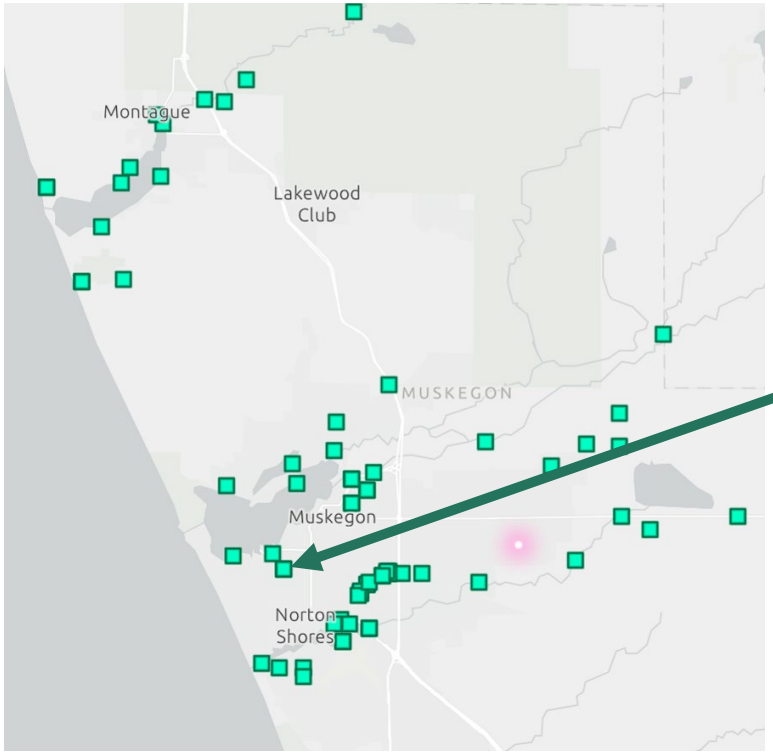
Show all
Total: 20

Creek Chub (4/6/23)

Length (cm)	16.10
Longitude	-86.23
Station ID	1559
Mercury Code	
Mercury (ppm)	0.05
PCB Aroclor Code	NA
PCB Congener Code	
PFOS Code	
PFOS (ppb)	24
Sample ID	2023212-S03
Sample Type	Skin_On_Fillet
Sampling Location	Johnny O'Harris Park

https://experience.arcgis.com/experience/b09b698aa03244f7ae5fa234ee2bf61c/

Muskegon County PFAS Water Sampling Sites



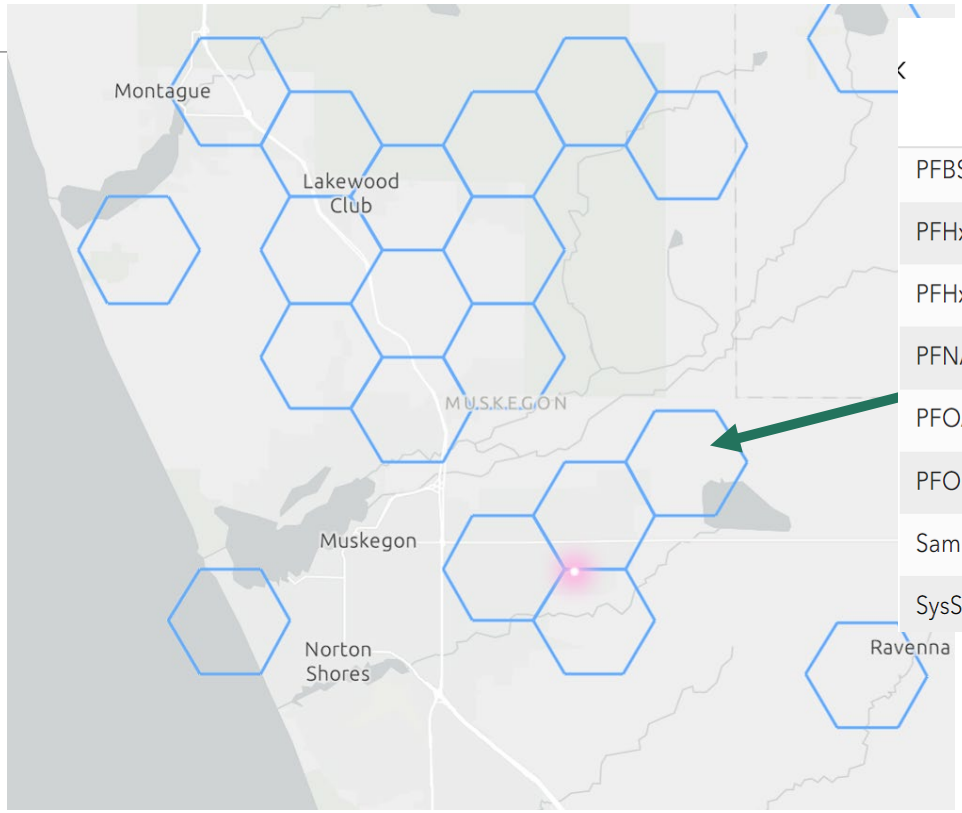
Waterbody: **Ruddiman Creek**
Site Code: **42-RDC-0040**
Collection Date: **8/28/17**
Method: **537 (modified)**

PFAS Surface Water Sampling

If Drinking Water Source	*19 ppt*	1.30 ppt
PFOA *If Drinking Water Source*	170 ppt *66 ppt*	11.00 ppt
PFOS *If Drinking Water Source*	12 ppt *11 ppt*	13.00 ppt
PFHxS *If Drinking Water Source*	210 ppt *59 ppt*	4.50 ppt

https://experience.arcgis.com/experience/b09b698aa03244f7ae5fa234ee2bf61c/

Muskegon County PFAS Public Water Sampling Sites

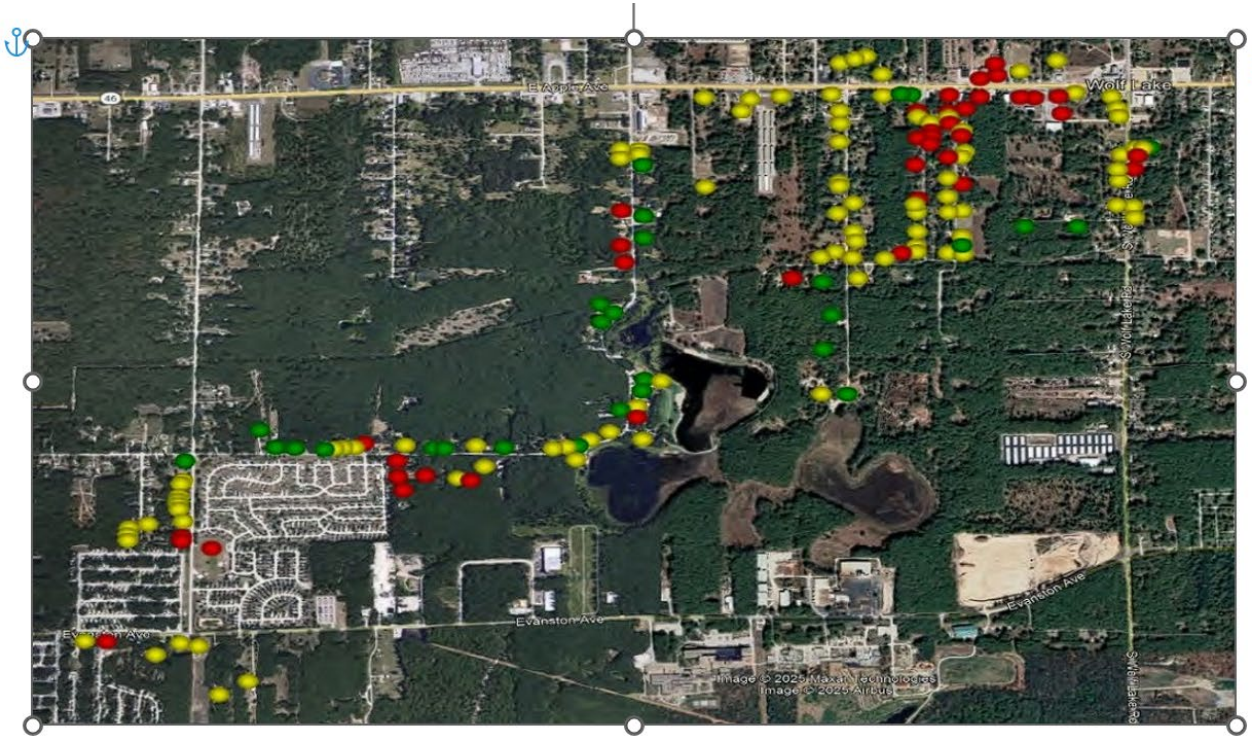


9/29/24: MAPLE ISLAND ESTATES

PFBS	<2
PFHxA	2.6
PFHxS	<2
PFNA	<2
PFOA	2.7
PFOS	<2
SampleDate	9/29/24
SysSampleCode	2410051-02

https://experience.arcgis.com/experience/b09b698aa03244f7ae5fa234ee2bf61c/

Brooks Rd/Laketon Ave Area of Interest



Green dots – Non-Detect

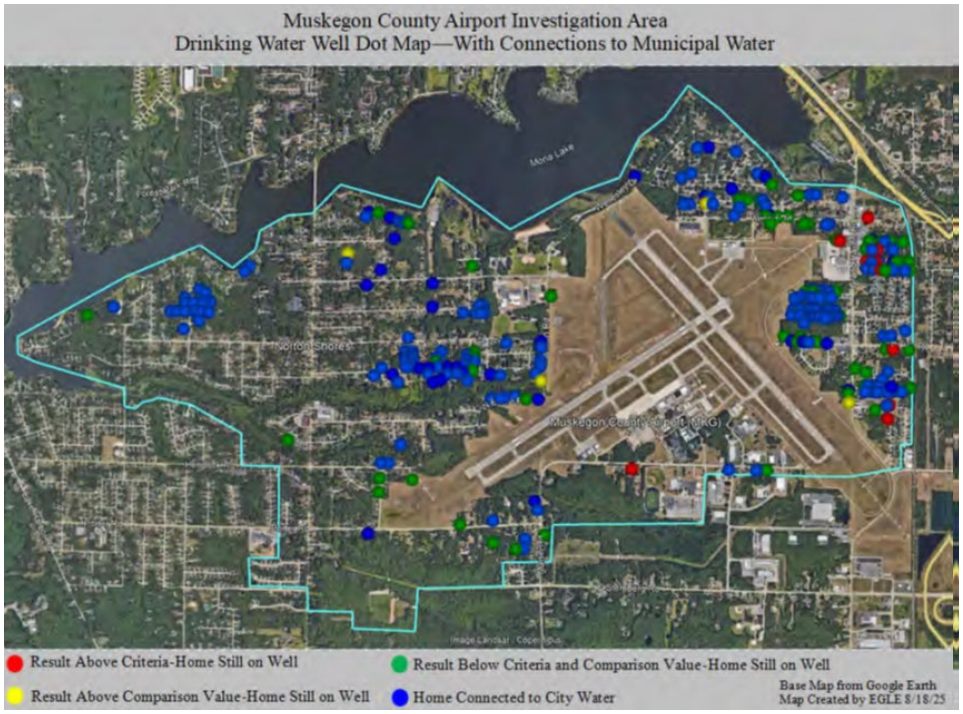
Yellow dots – Detections below EGLE DW Criteria

Red dots – Detections at or above EGLE DW Criteria

290 residents asked to have their wells tested, 161 residential wells were sampled, with 38 showing detection of one or more PFAS compounds at or above drinking water standards. 8 wells were > 50 ppt.

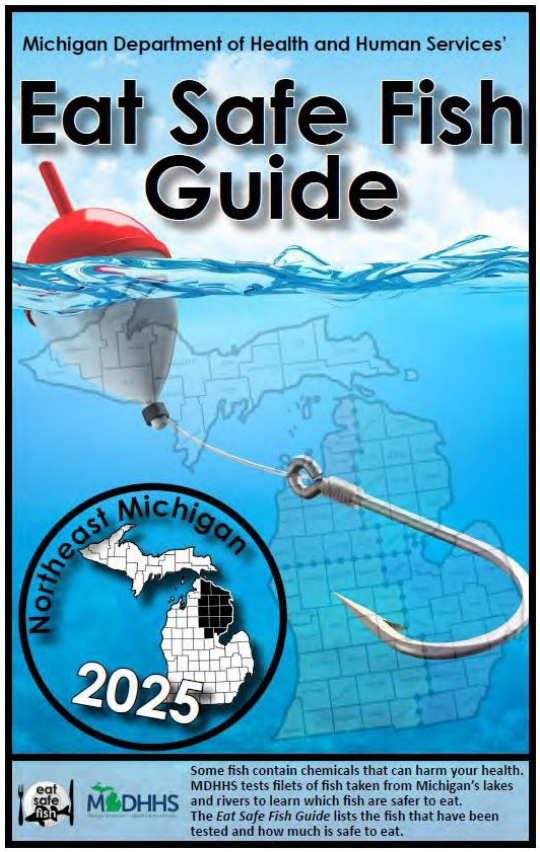
Former Sappi Paper Mill

Muskegon County Airport



2.25 miles of water mains have been extended to serve 294 homes, with 187 homes connected by August 2025

Michigan Fish Consumption Advisory Program Eat Safe Fish Guides – *2025 Update*



2025 fish consumption guidelines were updated to include:

- **Continued increase in understanding of PFOS toxicity.**
- **Continued increase in understanding of PFOS blood levels in the general human population.**
- **Relative Source Contribution**

Do Not Eat Fish level reduced from 300 ppb to 50 ppb

Eat Safe Fish Guidelines By Contaminant

Contaminant	Approximate Number of Guidelines
Mercury	1,923 (57%)
PFOS	782 (23%)
PCBs	526 (16%)
Dioxins	82
DDT	33
Toxaphene	7
Selenium	6

Muskegon Area PFOS Fish Advisories

Pierson Drain

(including Sadony Bayou)

Type of Fish	Chemicals of Concern	Size of Fish (length in inches)	MI Servings per Month*
Bluegill	PFOS	Any	Do Not Eat▲
Sunfish	PFOS	Any	Do Not Eat▲

Organics Analysis:

Range of Years Used		N (All)	Overall Min Length	Legal Min (Inches)	Range of Legal Sized Samples	
Earliest	Most Recent				Min	Max
2021	2021	10	3.5	NA	3.5	6.5

Datasets available: 2021

Chemical	Sample Size (Legal)	Mean (ppm)	Min. Conc. (ppm)	Max Conc. (ppm)	95%UCL (ppm)	Meal Category
PCB	0	--	--	--	--	--
DDT	0	--	--	--	--	--
Chlordane	0	--	--	--	--	--
Toxaphene	0	--	--	--	--	--
PFOS	10	40.4 ppb	11.9 ppb	66.9 ppb	53.6 ppb	2

Chemical	Linear Regression R^2	Exponential Regression R^2
PCB	--	--
DDT	--	--
Chlordane	--	--
Toxaphene	--	--
PFOS	0.117	0.115

Final meal category based on UCL: 2

Muskegon Lake

Type of Fish	Chemicals of Concern	Size of Fish (length in inches)	MI Servings per Month*
Bluegill	PFOS	Any	4
Carp	PCBs	Any	Do Not Eat▲
Lake Herring	PCBs	Any	6 Per Year^{2x}
Largemouth Bass	PFOS	Any	1
Northern Pike	Mercury, PCBs	Any	2
Rock Bass	Mercury, PFOS	Any	4
Smallmouth Bass	PFOS	Any	1
Sunfish	PFOS	Any	4
Walleye	Mercury	Under 18"	4
	PCBs	18" to 22"	6 Per Year^{2x}
		Over 22"	Limited▲
Yellow Perch	PFOS	Any	1
All Other Species	PCBs	Any	6 Per Year^{2x}

Mona Lake

Type of Fish	Chemicals of Concern	Size of Fish (length in inches)	MI Servings per Month*
Carp	PCBs	Any	Limited▲
Creek Chub	PCBs, PFOS	Any	6 Per Year
Largemouth Bass	PCBs	Any	1^{2x}
Smallmouth Bass	PCBs	Any	1^{2x}
Suckers	PCBs	Any	6 Per Year^{2x}
Walleye	PCBs	Under 20"	1^{2x}
		Over 20"	6 Per Year^{2x}
Yellow Perch	PFOS	Any	6 Per Year
All Other Species	PCBs	Any	6 Per Year^{2x}

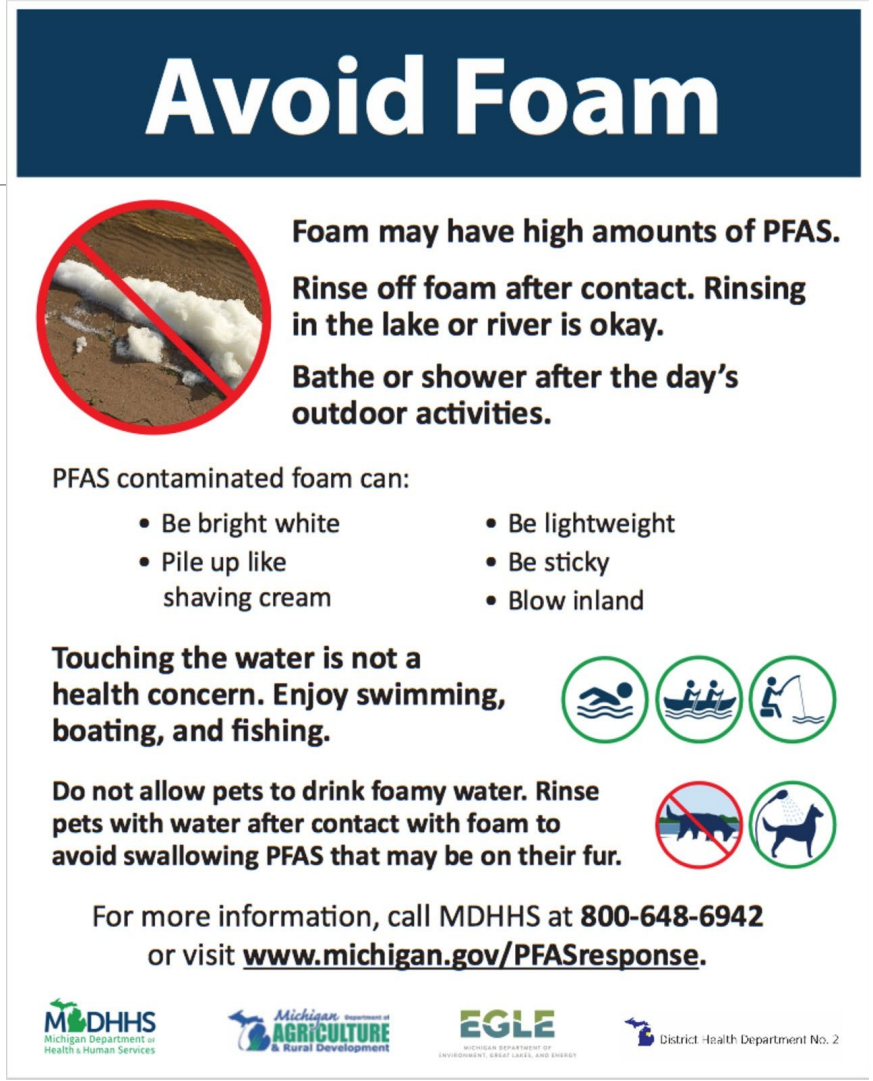
PFAS Foam

High Concentrations of PFOS and PFOA (1,000-250,000 ppt)

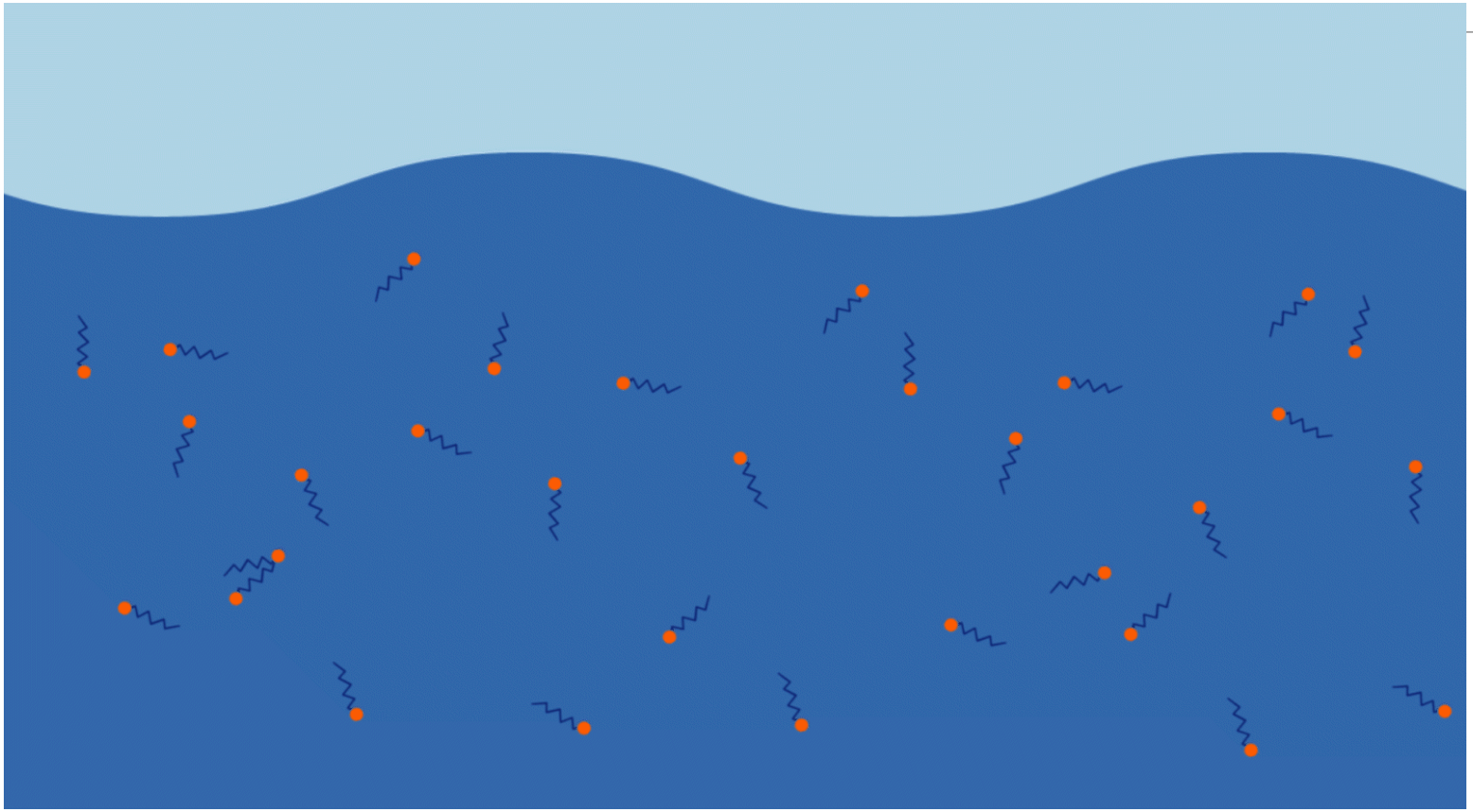
Measured as water concentrations in collapsed foam.

PFAS in foam is not absorbed through the skin.

Can be washed off.



PFAS Attachment to Air Bubbles



CDM 2024

Harbour Towne Beach
9/6/24

R. Tardani

6th St Outfall near AWRI
8/28/24

A. Steinman

Muskegon Lakeshore Trail Park 9/1/24

K. Lynnes

Summary

"Kryptonite?– I'm more worried about PFAS."

PFAS Chemicals are a major problem impacting our water resources.

The most important actions to take are eliminating exposure routes, testing your well water, removing PFAS from consumer products, and remediating active sources.

The Muskegon County PFAS Task Force

Initiated in 2025 by WMEAC and Dr. Rick Rediske

Supported by Freshwater Future

Key partner: Muskegon County Environmental Coordinating Council

Invitees: all municipalities with PFAS sites, Public Health Muskegon County, community organizations, residents

Goal: To complement existing efforts to address the 19 PFAS sites in the county

Safe Water for Muskegon County: PFAS Well Testing Pilot

Project Overview

Community-based pilot to help protect public health by supporting private well testing for PFAS

Focused on Egelston, Muskegon Charter, and Moorland Townships

Targets areas outside state testing programs

36 test kits available (12 per township)

Co-led by WMEAC and Dr. Rick Rediske, in coordination with the Muskegon County PFAS Task Force

Funded by the Environmental Endowment and the Robert and Elizabeth Cutler Family Funds of the Community Foundation for Muskegon County

How It Works

Townships share a simple application and select participants

Test kits distributed through township partners

Residents collect samples and send them directly to the lab

Results are confidential; sharing with township and county public health is encouraged

Follow-up information provided on PFAS, health, and appropriate water filters

Purpose and Learning

Protect public health by increasing awareness of PFAS in private wells

Provide information and support for households with contaminated wells, including guidance on appropriate filters

Help residents understand risks and next steps

Fill local groundwater data gaps

Strengthen coordination among local partners

Pilot project designed to learn what works and guide future efforts

MSU Extension Survey

Wade Syers, DSocSci

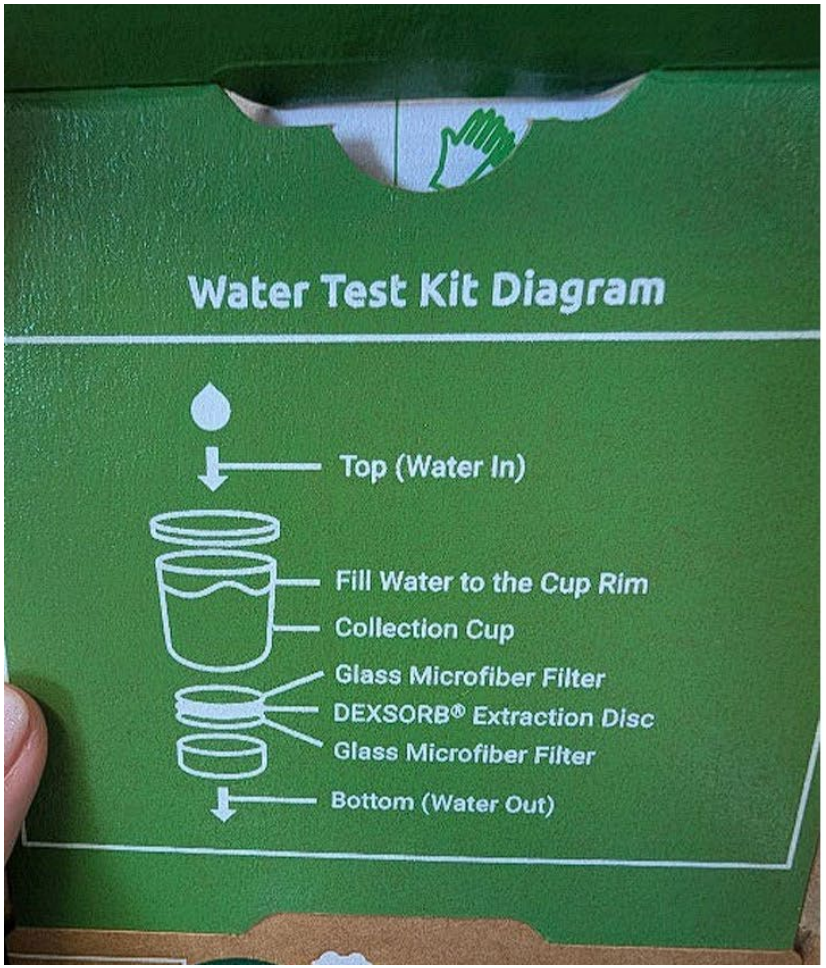
Ext. Specialist, Michigan State University Extension

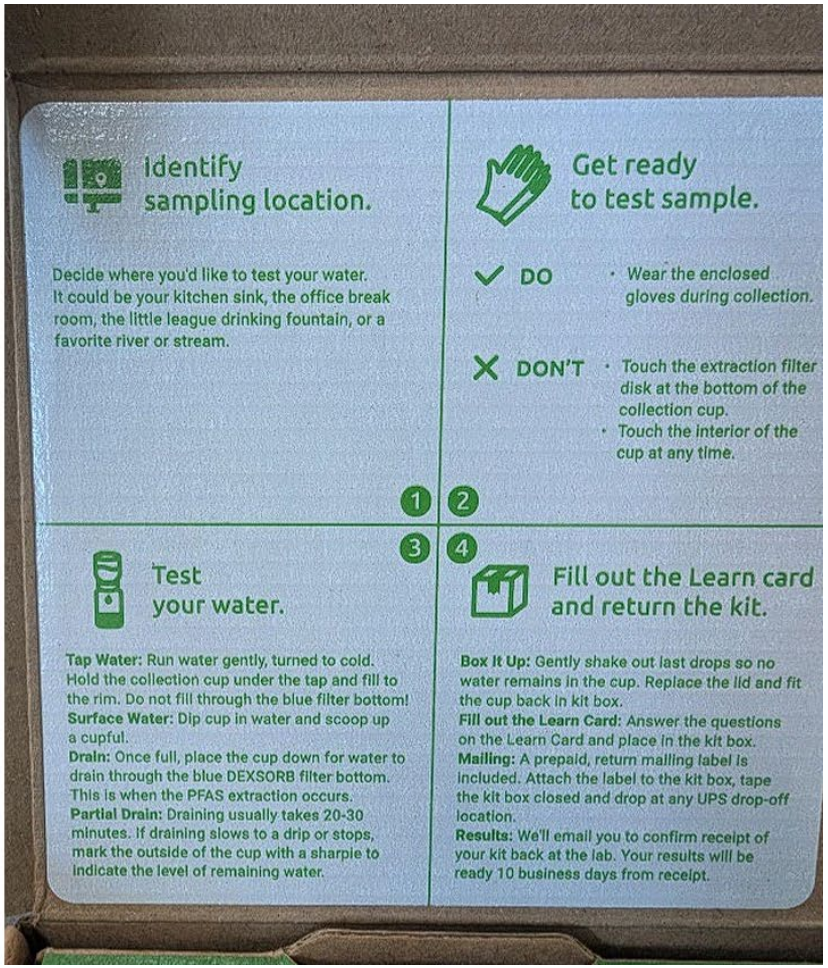
The survey is part of a research project called "PFAS Perceptions Among Muskegon County Residents Receiving Home Test Kits: A Comparison to a Prior Michigan Statewide Study."

The goal of this project is to understand how participants learn about PFAS, what concerns or questions they may have, and whether home testing influences their awareness or decision-making.

Participant input will help improve communication, support, and educational materials for communities affected by PFAS in Michigan.

Cyclopure Test Kit





Study to Determine Comparability of PFAS Drinking Water Samples in Cadillac, Michigan

- A 20-sample comparison study of residential well samples collected from indoor and outdoor sources. Samples were collected by AECOM and sent to the EGLE Lab and Merit Laboratories for testing of PFAS by the EPA Drinking Water Method. A third sample was sent to Cyclopure to be screened for PFAS.

- EGLE and Merit are Certified Drinking Water Testing labs using EPA approved methods. Cost $290-$325 per sample

- CycloPure does not use the EPA method. They use a proprietary adsorbent cartridge to filter the water on site and similar test equipment. Cost $85.

- **Findings – "Overall, the EGLE, Merit and Cyclopure test results taken during this sampling effort showed good comparability between the three different lab results. Results between the three laboratories were typically within a few parts per trillion of one another**."

MPART Project for 2026

PFAS self-test kit project

- Michigan Departments of Health and Human Services (MDHHS) and local health departments (LHDs) will offer **testing for PFAS in drinking water to residents with private drinking water wells.**
  - LHDs, MDHHS and EGLE will identify areas with **limited-to-no prior PFAS testing**.
  - Each LHD can choose what addresses are invited based on:
    - Their communities' concerns.
    - Current knowledge of PFAS testing in their jurisdictions.
  - Residents selected to participate will receive an invitation packet.
  - If resident accepts the invite, they will receive:
    - A PFAS self-test kit.
    - Instructions.
    - Information on the next steps.
- Current timeline:
  - Invitation packets are anticipated to be mailed in April 2026.

What are PFAS?

The “Forever Chemicals” Hiding in Everyday Items

PFAS

PFAS are a group of man-made chemicals that have been used since the 1940s. They resist heat, water, and oil, which makes them useful but also means they do not easily break down in the environment or our bodies.

Why Care?

PFAS can build up over time in people, animals, and the environment. Exposure has been linked to health problems such as hormone disruption, weakened immune systems, and certain cancers. Children are especially at risk since they eat, drink, and breathe more for their size than adults.

What It’s In

- PFAS contaminated wells
- Cooking utensils, such as pots and pans
- Fast food and takeout containers
- Fish
- Carpets, upholstery, and clothing
- Personal care products , such as makeup and shaving cream
- Cleaning products
- Firefighting foam
- And more!

Test Your Water

Your well can serve as a direct, ongoing point of exposure. These "forever chemicals" accumulate in your body over long-term exposure, potentially leading to serious health risks from chronic low-level ingestion. Pregnant women and children are especially susceptible to health risks.

Visit MPART website for more information

Supported by: The Environmental Endowment and Robert and Elizabeth Cutler Family Foundation Funds of The Community Foundation for Muskegon County

Feel free to contact Tanya Cabala at tcabala@wmeac.org or (231) 798-5196 with questions!

EDUCATION FACT SHEET Research Assistant Megan Harvey

PFAS Fact Sheet for Parents

What is PFAS?

PFAS are a large group of synthetic chemicals that have been used since the 1940s to enhance the performance of everyday items, including non-stick pans, stain-resistant fabrics, firefighting foams, coatings, and food packaging. Because they are designed to resist heat, water, and oil, they don't break down easily and can build up in the environment and our bodies. Children face heightened vulnerability due to greater intake of food, water, and air per pound of body weight compared to adults. These chemicals accumulate in the body and are linked to serious health problems.

What You Can Do!

- Know the source of your water. If it is a public system, monitor your community water quality reports.
- If you have a well, test your water for PFAS
- If PFAS is present, use water filters certified to remove PFAS, such as activated carbon or reverse osmosis systems, for drinking and cooking. Consider using bottled water for drinking and mixing infant formula
- Opt for stainless steel or cast iron instead of nonstick cookware
- Limit fast food and takeout packed in grease-resistant wrappers
- Avoid microwave popcorn in PFAS-coated bags
- Check local fish advisories before eating locally caught fish
- Avoid stain-, grease-, or water-resistant carpets, upholstery, and clothing that are PFAS based
- Choose personal care products, cosmetics, and cleaning supplies labeled as PFAS-free
- Look for PFAS-free dental floss, outdoor gear, and toys

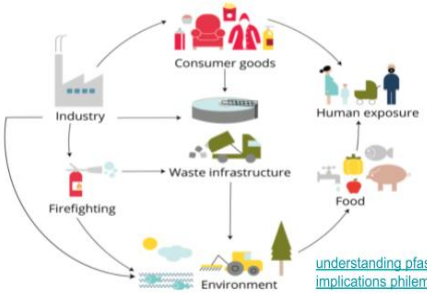
Health Risks

PFAS exposure during pregnancy and childhood may:
affect your child's brain development and learning, cause behavior or attention problems, weaken the immune system and lower vaccine protection, increase cholesterol levels, interfere with growth and thyroid hormones, be linked to low birth weight or early puberty, raise the risk of certain cancers, impact fertility and organ health later in life

PFAS Guide for Companies

What is PFAS?

PFAS are a large group of synthetic chemicals that have been used since the 1940s to enhance the performance of everyday items, including non-stick pans, stain-resistant fabrics, firefighting foams, and food packaging. Because they are designed to resist heat, water, and oil, they don't break down easily and can build up in the environment and our bodies and are linked to serious health problems.

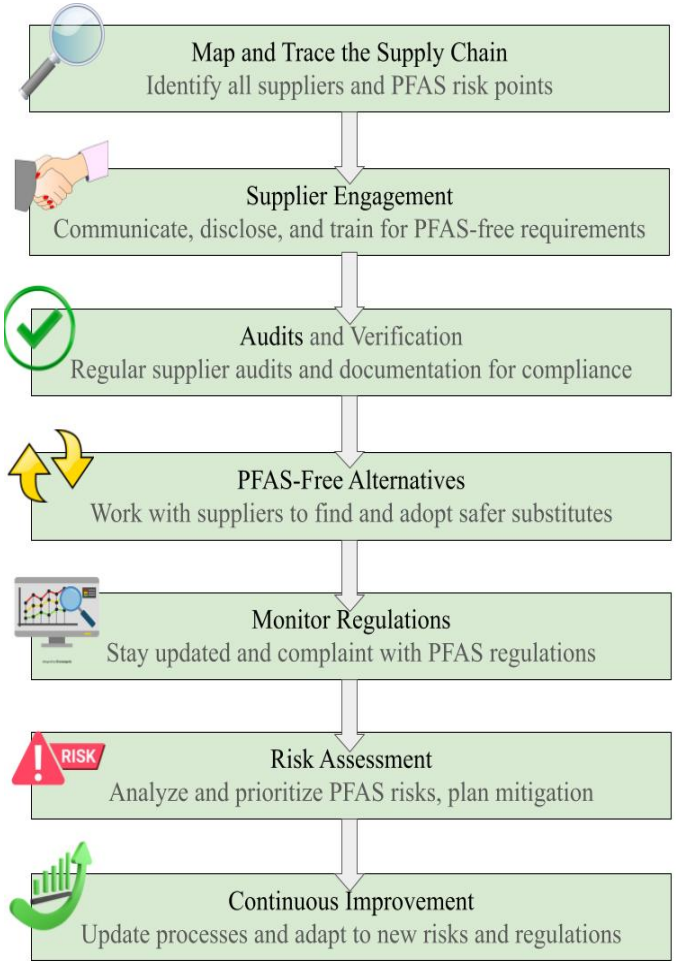


understanding pfas supply chain uses implications philemon anderson

As PFAS (per- and polyfluoroalkyl substances) face increasing scrutiny, companies should focus on supply chain strategies to manage associated risks and establish supply chain transparency.

Key Actions for Companies

- **Map Suppliers:** Identify all suppliers, including subcontractors, where PFAS may enter the supply chain (commonly in contaminated water)
- **Engage Suppliers:** Communicate expectations, request PFAS disclosures, and provide training for PFAS-free requirements.
- **Audit and Verify:** Perform regular audits and require documentation and ongoing testing to ensure no PFAS are introduced.
- **Source Alternatives:** Collaborate with suppliers to transition to PFAS-free materials and support innovation for safer substitutes.
- **Monitor Regulations:** Stay up to date with changing PFAS laws to ensure proactive compliance and avoid disruptions.
- **Assess Risks:** Use data to identify PFAS risks, set mitigation priorities, and allocate resources for remediation.
- **Continuous Improvement:** Regularly review and update processes in response to audits and regulatory or market changes.



AWRI - DIGITAL PFAS RESOURCES

1. Task Force meeting information
2. Educational materials
3. PFAS sites GIS map

Update from Contractor Lauren Calkins

ACKNOWLEDGMENTS/THANKS

The Environmental Endowment and Robert and Elizabeth Cutler Family Funds of the Community Foundation for Muskegon County – Safe Water for Muskegon County Project

Freshwater Future – 2025 Task Force funding

Muskegon County Environmental Coordinating Council – Partner

Muskegon Community College- Tonight's Meeting Room

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