



MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY

PFAS and Platers

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Environmental Support Office

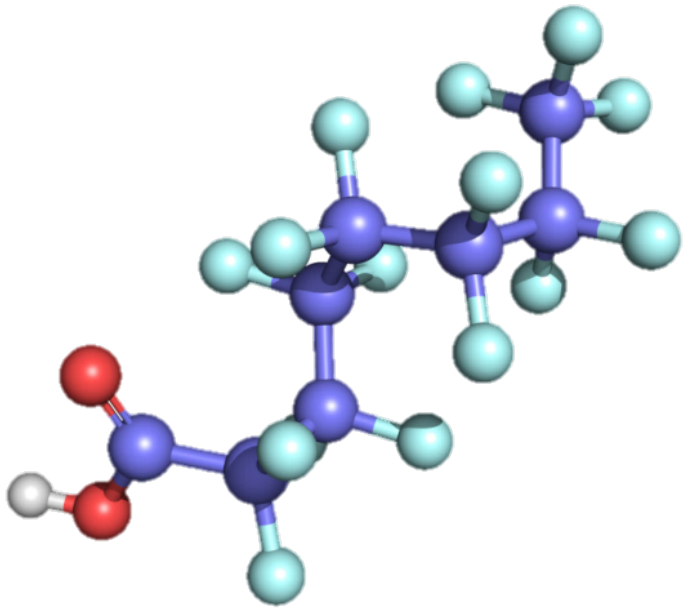
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We'll talk about...

- Background
- What is MI doing?
- Chrome Platers



What is an Emerging Contaminant?



PFAS

- Chemicals and materials entering the environment and present real or potential unacceptable human health or environmental risks
- And either:
 - Do not have peer-reviewed human health standards
 - Standards/regulations are evolving due to new science, detections capabilities or pathways

Over 5000 PFAS compounds!

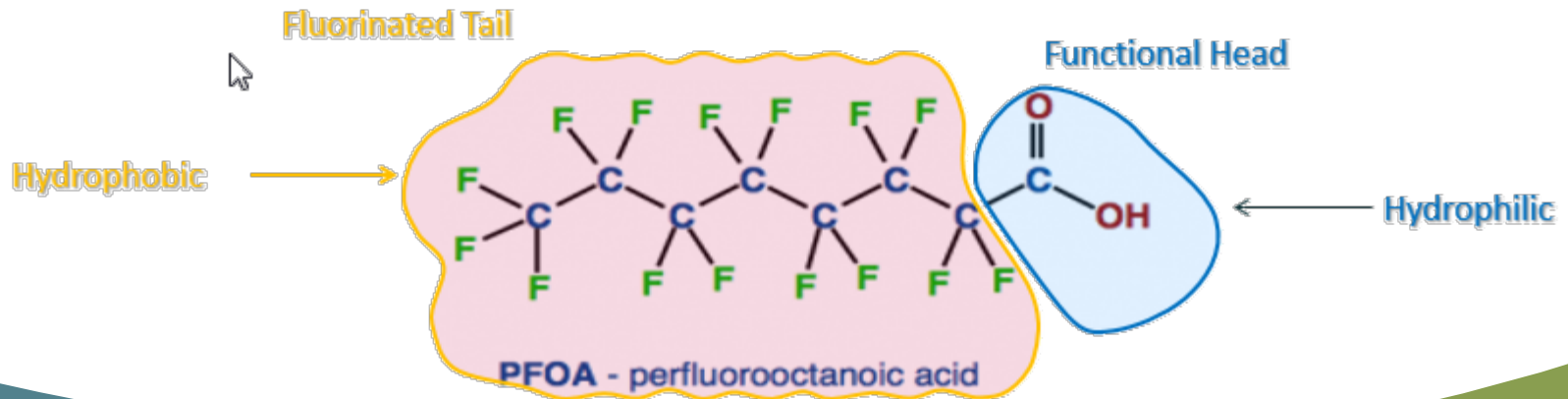
Per-and Poly-fluoroalkyl Substances (PFAS)

- Class of fluorinated compounds resistant to heat, water, and oil
- Persistent compounds – PFAS do not break down in the environment
 - Combined with their widespread use over many years → *UBIQUITOUS* (found everywhere)
- Bio-accumulative – PFAS build up over time in biota
- Linked to adverse health effects in animal models

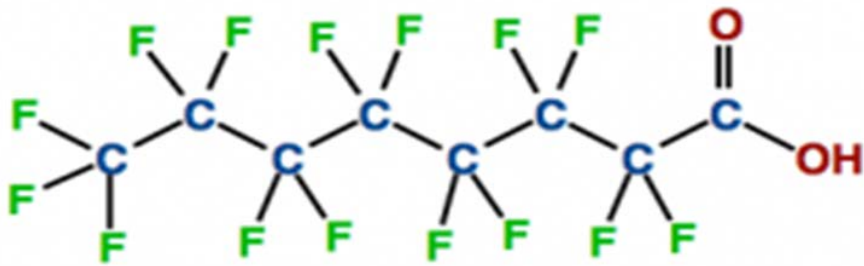
PFAS Chemistry 101

Carbon-fluorine bonds:

- Fluorinated Tail:
 - The fluorine bonds are very strong, inert
 - Resists thermal, chemical, and biological degradation
- Functional Head
 - Surfactant, reduced surface tension
- Together
 - Hydrophobic (repels water) and oleophobic (repels oil/fat/grease)



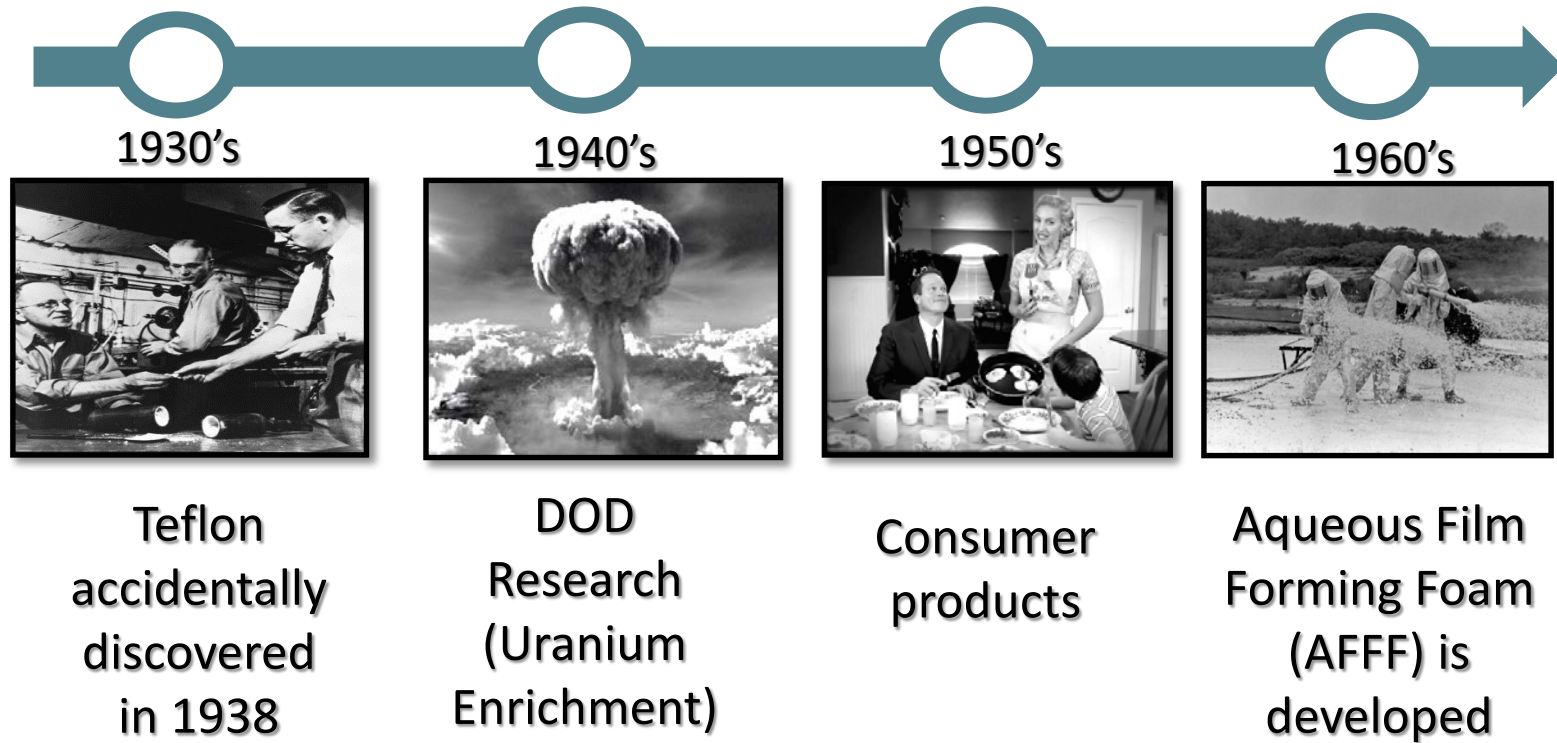
PFAS Chemistry 101 (cont.)



PFOA - perfluorooctanoic acid

- **Strong carbon-fluorine bonds**
- Began developing in 1940's
- 5,000+ known PFAS compounds today

PFAS Development....



... and Evolution

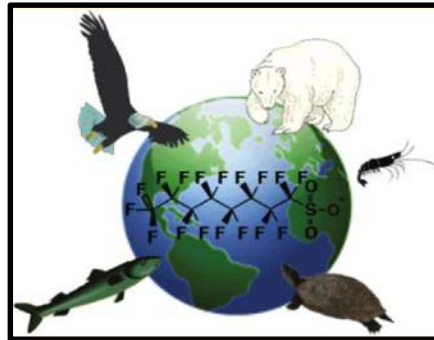


1970's



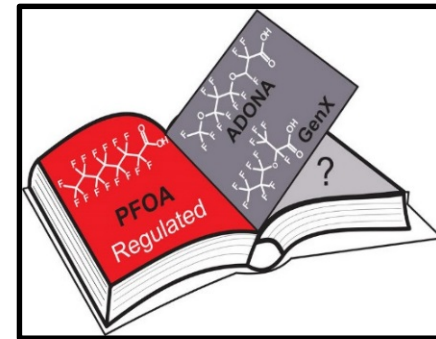
Product enhancement expands

2000's



Global distribution of certain PFAS in biota

Current



Public scrutiny
Changing regulatory climate
Lawsuit settlements
Development of new PFAS

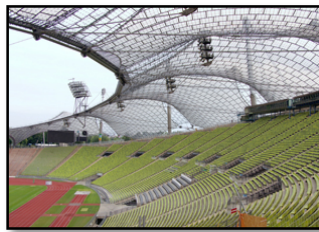
PFAS Uses



Aerospace



Apparel



Building and Construction



Chemicals and Pharmaceuticals



Electronics



Oil & Gas



Energy



Healthcare and Hospitals



Aqueous Film Forming Foam



Semi-conductors

Potential Commercial & Industrial Products that Use PFAS

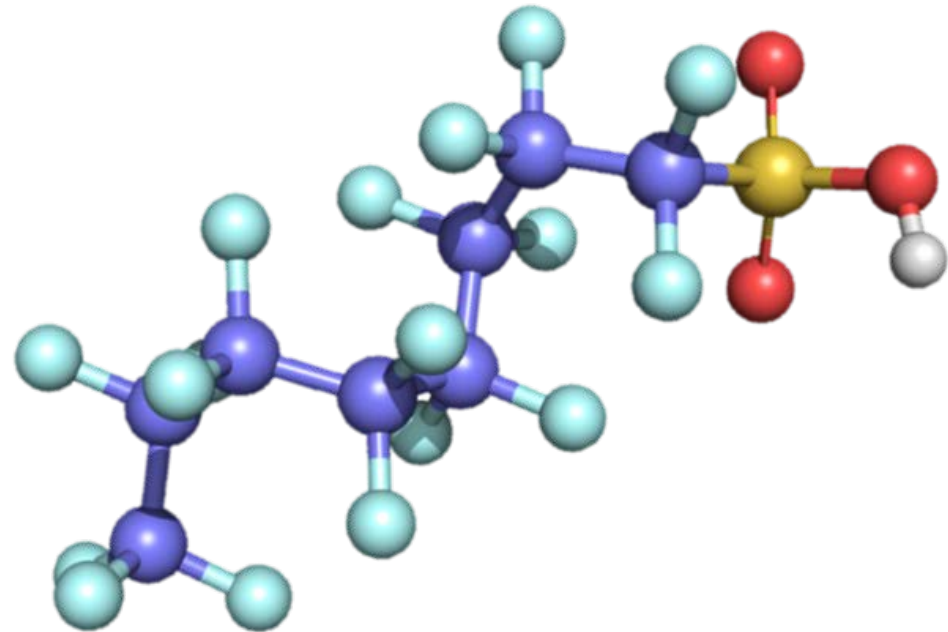
SIC Code	Manufacturer	NAICS Code
2221	Broadwoven Fabric Mills, Manmade Fiber & Silks	313210
2262	Finishers of Broadwoven Fabrics of Manmade Fiber & Silk	313310
2273	Carpets & Rugs	314110
2295	Coated Fabrics, Not Rubberized	313320
2297	Non-woven Fabrics	313230
2299	Textile Goods	313110
2385	Waterproof Outerwear	314999
2392	House Furnishings	314999
2621	Paper Mills	322121
2656	Sanitary Food Containers	322219
2672	Coated & Laminated Paper	322220

Some Common PFAS Abbreviations

- Perfluorooctanoic acid (PFOA)
- Perfluorooctane sulfonate (PFOS)
- Perfluorobutane sulfonic acid (PFBS)
- Perfluorohexane sulfonic acid (PFHxS)
- Perfluorononanoic acid (PFNA)
- GenX
- ...

Why the Concern?

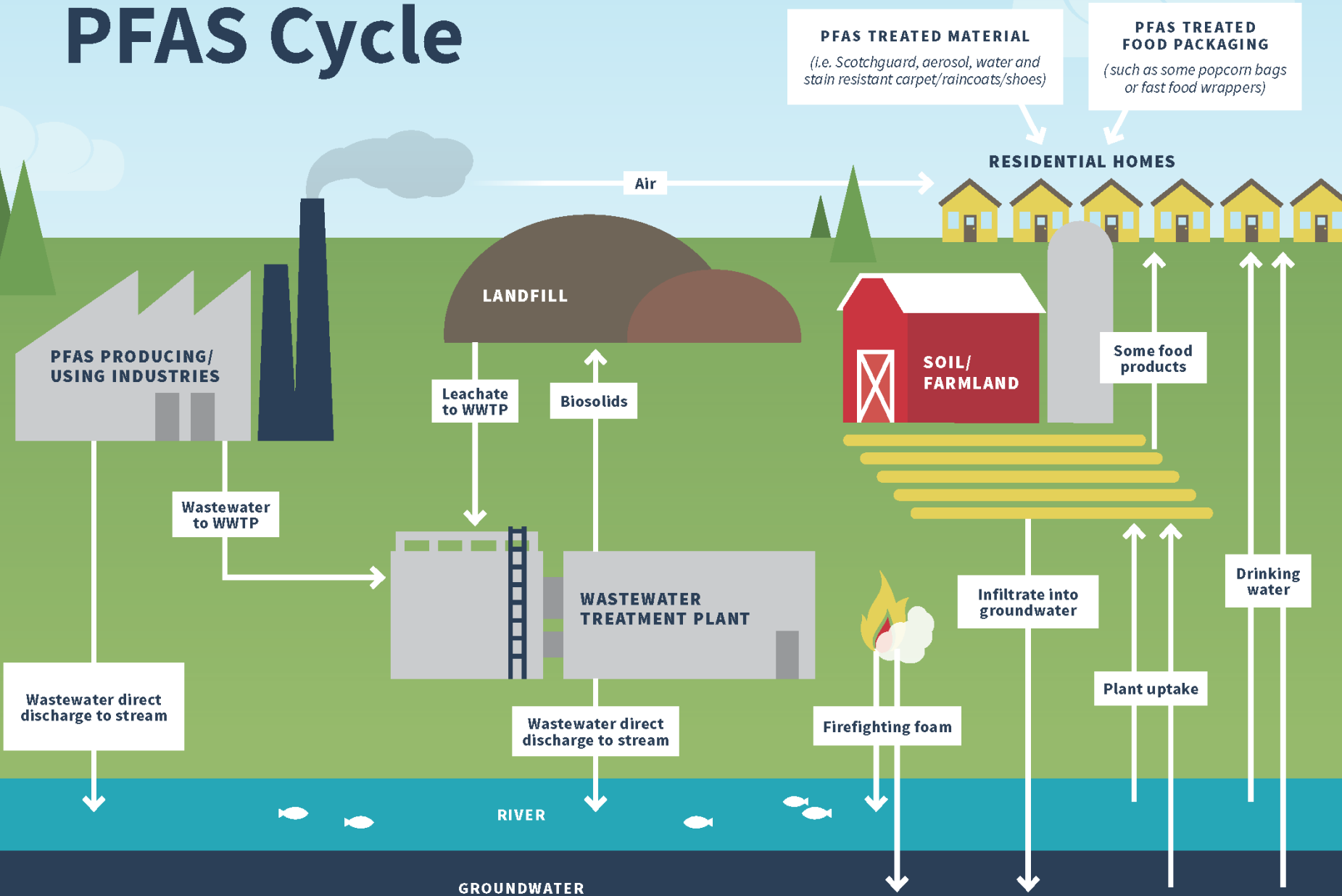
- Pervasive
- Persistent
- Bioaccumulative
- Associated with adverse health effects
- Scarcity of information in scientific literature
- Incomplete regulatory structure



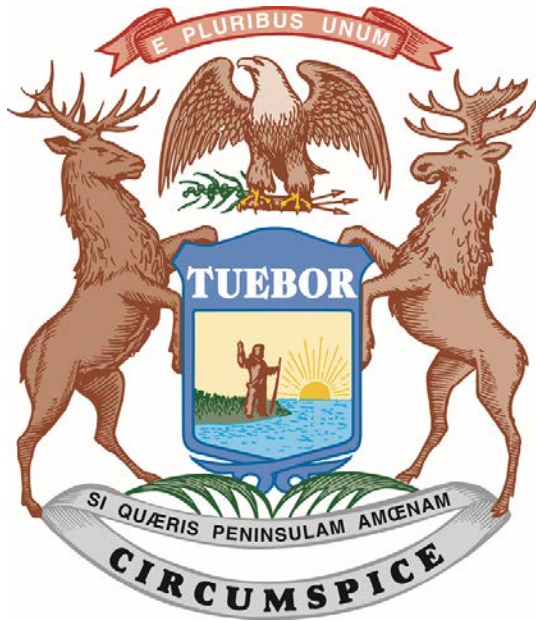
PFAS Health Concerns

- Lowering a woman's chance of becoming pregnant
- Increasing the chance of high blood pressure in pregnant women
- Increasing chance of thyroid disease
- Increasing cholesterol levels
- Changing immune response
- Increasing chance of cancer (kidney, testicular)

PFAS Cycle



Michigan PFAS Action Response Team (MPART)



- Unique multi-agency approach
- Leads coordination and cooperation among all levels of government
- Directs implementation of state's action strategy

MPART Outreach



- Transparency
- Stakeholders
- Other states and associations
- Advisory workgroups
 - Local health
 - Science
 - Citizens

MPART Response



- **Protect Public Health**
- Standardize sampling and analytical
- Study occurrence
- Identify sources and source pathways
- Study environmental transport and fate
- Study ecological effects
- Educate
- Prevent future contamination
- Develop standards

MI Standards



Surface water quality

- ✓ 11/12 ppt PFOS
- ✓ 420/12,000 ppt PFOA

Groundwater cleanup

- ✓ 70 ppt PFOA/PFOS
- ✓ GSI per surface water quality standards

Drinking water

- ✓ 70 ppt PFOA/PFOS lifetime health advisory recommendation
- MCLs (Maximum Contaminant Level)

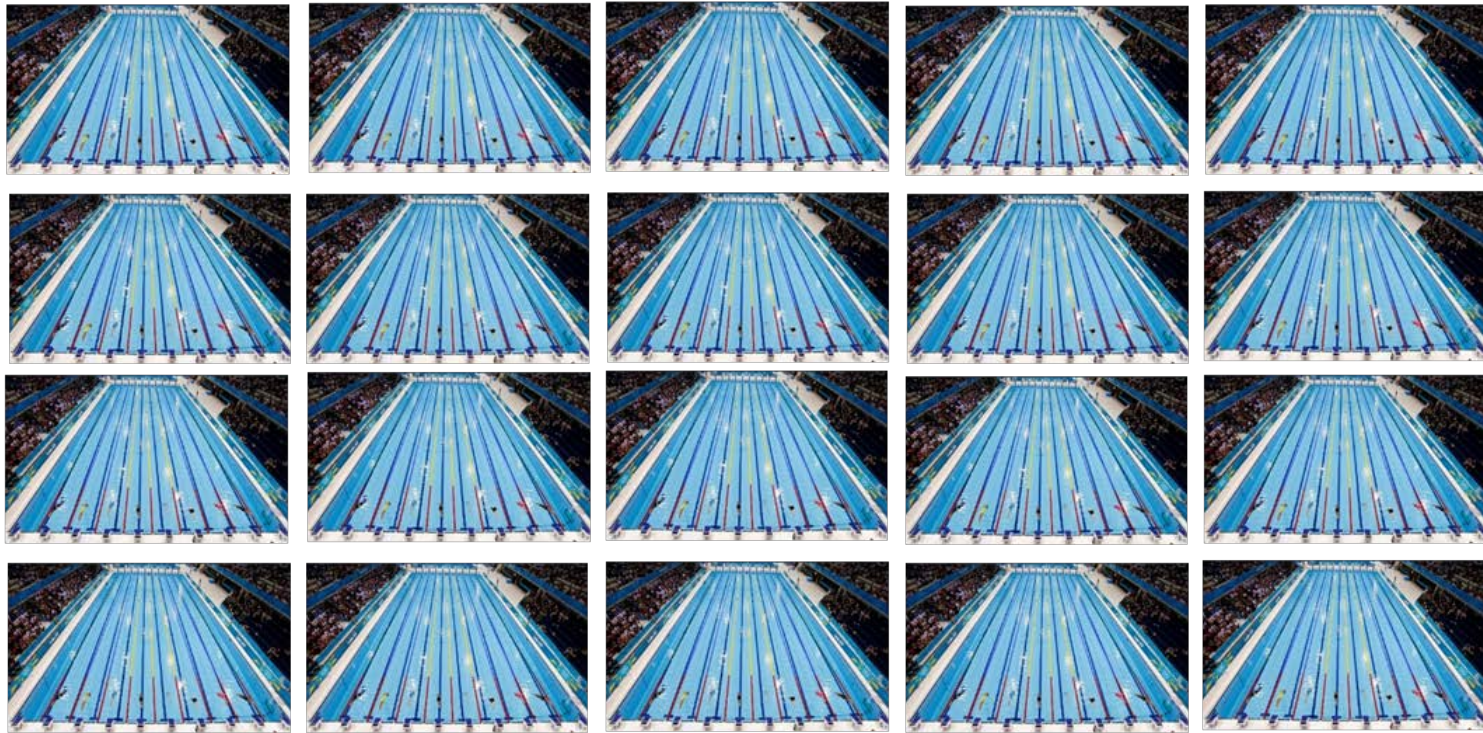
Visualize a *part per trillion*

1 second out of 32,000 years

1 drop of food coloring in 13 million gallons of water



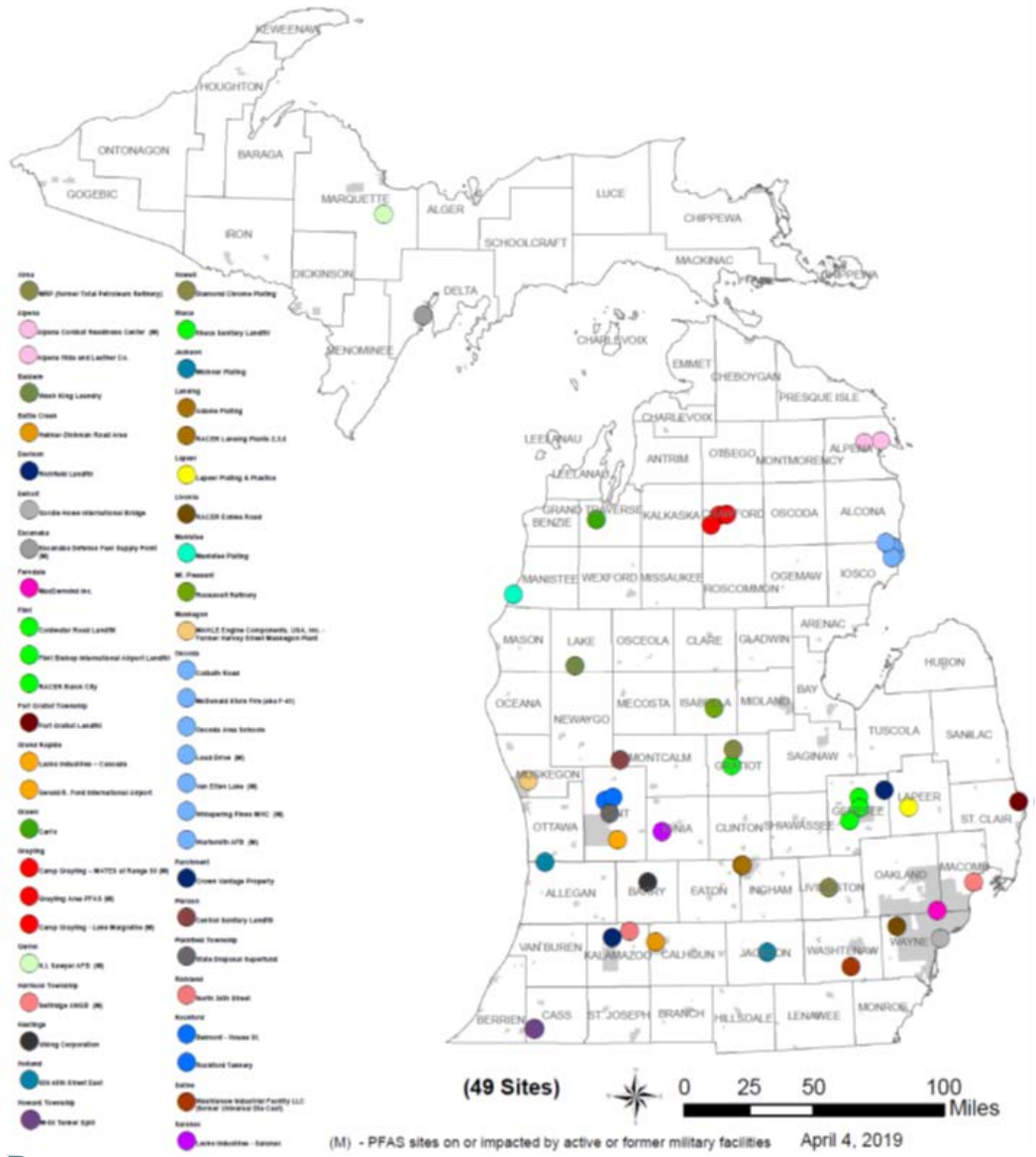
20 Olympic Swimming Pools



Note: 1 Olympic Pool = 660,000 gallons

Sites Being Investigated

- Sources of groundwater contamination over 70 ppt PFOS+PFOA
- Once a source is identified, it becomes an official site
- Multiple other investigations with no known source yet



My connection

www.Michigan.gov/pfasresponse

DEQ PFAS Investigation... 110,435 views SHARE

PFAS Investigation Areas

- House Street
- North Childsdale/10 Mile
- Rogue River
- 12 Mile - Summit
- Wolven Northeast
- North Kent Landfill Area
- Wolven - Jewell Sampling Area

Map labels: Axis Mold Works, Midwest Tool & Die, Infrastructure Alternatives, Burch Body Works, Kent Power, Adhezion, Third Nature Brewing Company, Bridgeway Community Church, River Bluffs, Belmont Avenue NE, 131, Ynalda Packaging, Technologies.

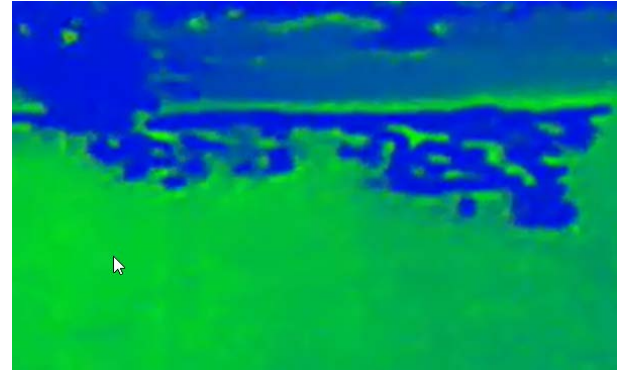
Surface Water Investigations

- Ambient
- Fish
- Foam
- Wastewater



Integrating Technology

- Thermal imaging with drones



Environmental Studies and Research

- Biosolids
- Landfill leachate
- Treatment technologies



MI Public Water Supply Testing

- All community water supplies
- All schools and day cares
- May – December 2018
- Informs next phase of testing



Public Health Advisories

- Fish and deer consumption
 - 9 – 300 ppb PFOS
- Surface water foam
 - Do not touch or inject foam
- Do not eat advisories for 5 waterbodies (including the Huron River)



Fire Fighting Foam

- State Fire Marshal survey of fire departments
- MDOT survey of airports
- Special equipment for required training
- Collection and disposal program



Air Quality Division looks at

PLATERS AND PFAS

Chrome Platers

- 40 CFR 63 Subpart N - National Emission Standards for Chromium Emissions From Hard and Decorative Chromium Electroplating and Chromium Anodizing Tanks



Rule 225 Health-based Screening Levels

- Perfluorooctane sulfonic acid (**PFOS**)
 - ITSL 0.07 $\mu\text{g}/\text{m}^3$ (24 hour averaging time)
- Perfluorooctanoic acid (**PFOA**)
 - ITSL 0.07 $\mu\text{g}/\text{m}^3$ (24 hour averaging time)
- **PFOS + PFOA**
 - ITSL 0.07 $\mu\text{g}/\text{m}^3$ (24 hour averaging time) per Footnote 37

Chrome Platers

Hard Chrome Plating

- PFAS additions in electroplating tank
- PFAS are used in tanks even if air pollution control devices are in place. PFAS used for worker protection regardless of control strategy for Subpart N
- More loss of PFAS to precipitates, including to tank liners and APC devices/ventilation



Chrome Platers

Decorative Chrome Plating

- PFAS additions in electroplating tank
- “drag out” of PFAS to downstream tanks

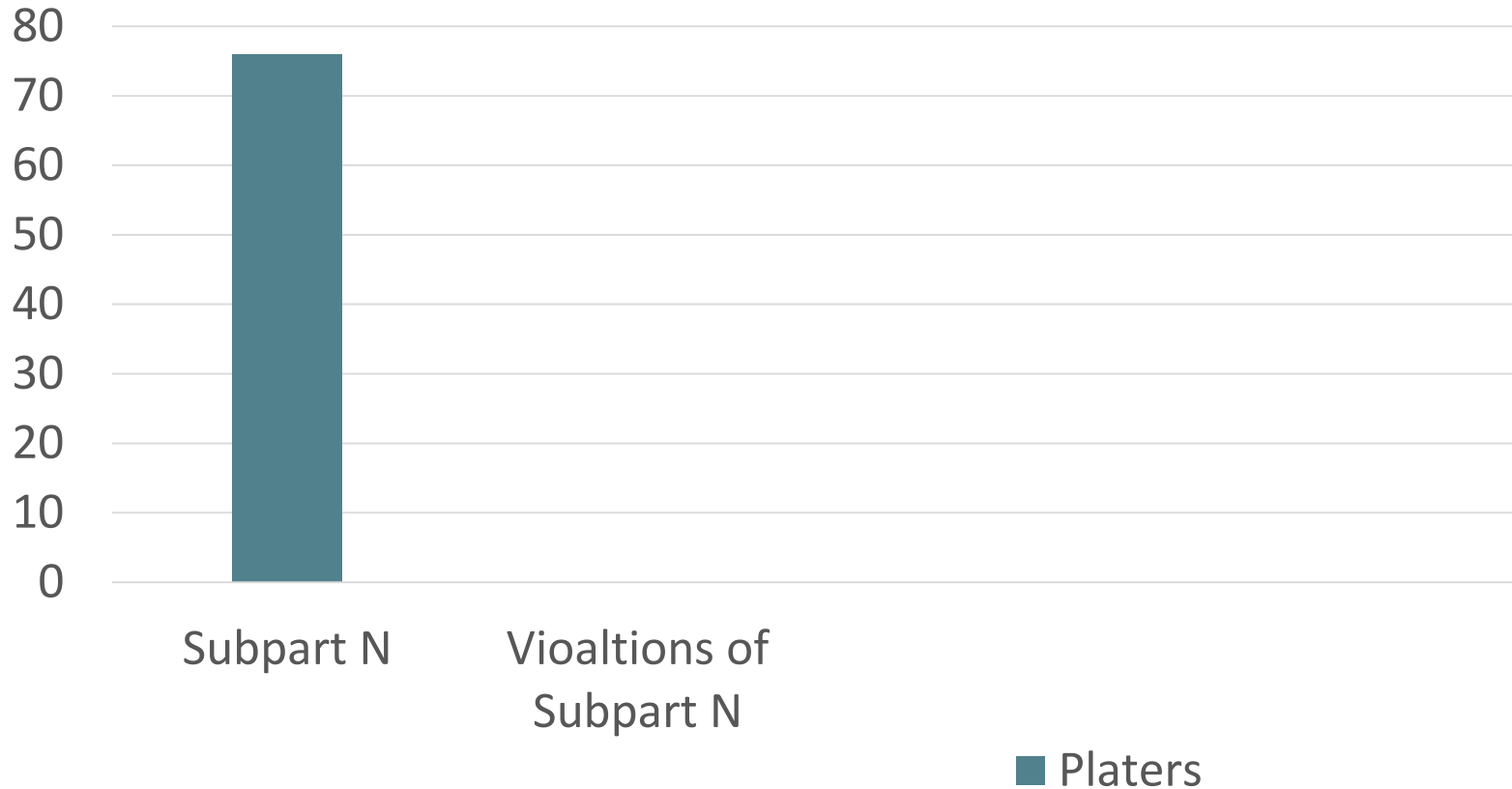


What did we ask for?

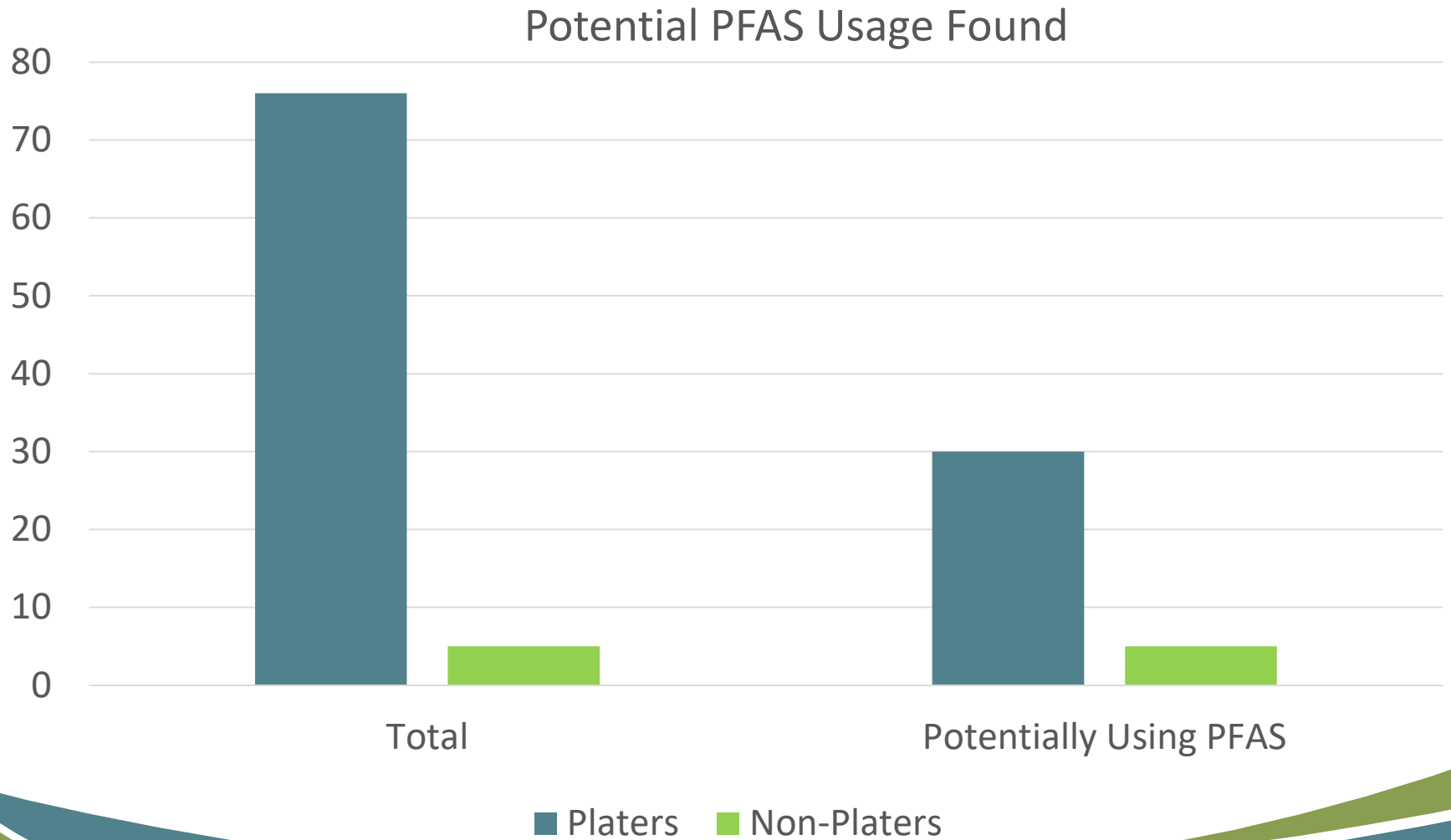
- Fume suppression chemical
 - Still in use? If not, when stopped?
- Contains PFAS?
- Plating substrate (metal or plastic)
- Quantity of electroplating tanks
- Fugitive source or controlled
- If controlled, how?
- Stack dimensions
- Air Flow

What did we find?

76 Inspections on Platers



What did we find?



Conclusions



PFAS is still being widely used



Industry may not be making the connection



Regulatory staff uncomfortable asking for information outside of regulation.



We continue to gather data and move forward.

Michigan Department of
Environment, Great Lakes, and Energy

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