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# Per and Polyfluorinated Alkyl Substances (PFAS)

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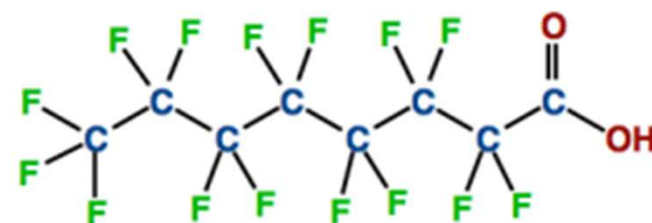
May 22, 2019

## The Role of MDHHS

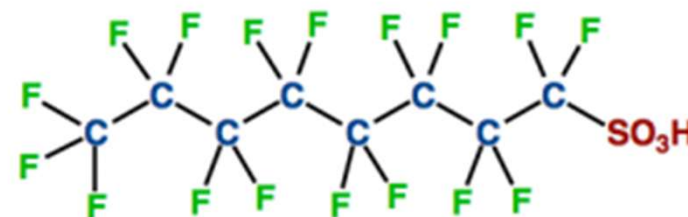
- Understand the chemicals
- Maintain scientific knowledge
- Provide public health information and advice
- Public health response actions
- Be proactive
- Outreach to residents, healthcare providers, others

# PFAS

- Synthetic class of compounds
- About 4600 chemicals
- Well known and well studied – PFOA and PFOS
- PFOA – **P**er**F**luoro**O**ctanoic **A**cid (1947 – 2002)
- PFOS – **P**er**F**luoro**O**ctane **S**ulfonate (1949 – 2002)



PFOA - perfluorooctanoic acid



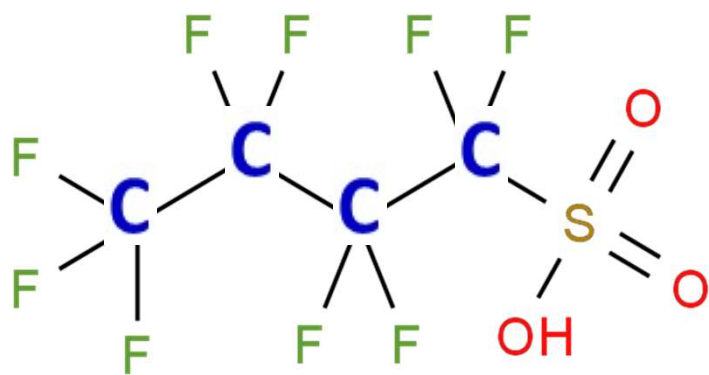
PFOS - perfluorooctanesulfonic acid

# Chain Lengths

## Short-chain

PFBS  $n = 4$

PFPeS  $n = 5$



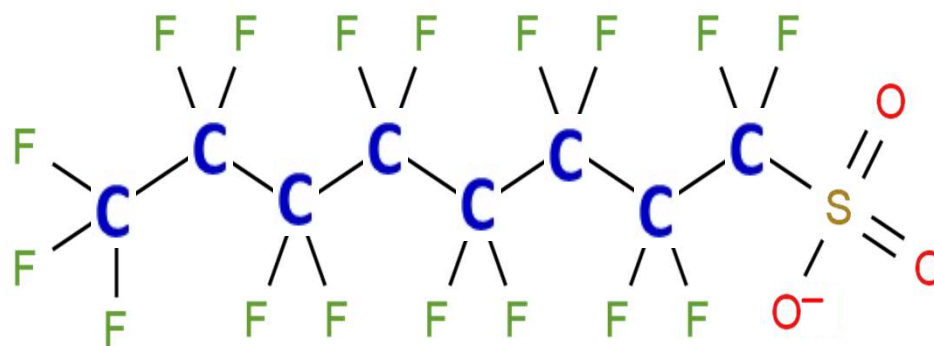
PFBS

## Long-chain

PFHxS  $n = 6$

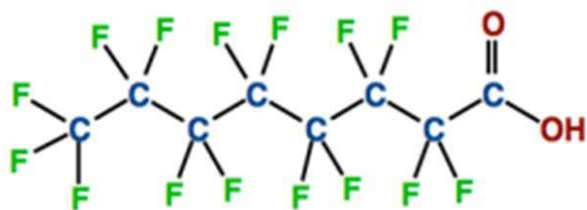
PFHpS  $n = 7$

PFOS/PFOA  $n = 8$

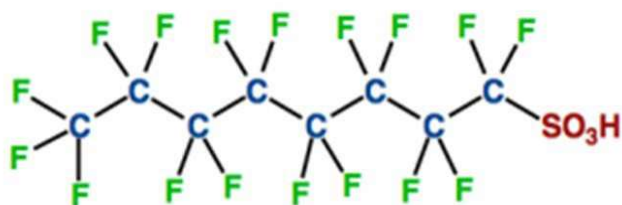


PFOS

# Characteristics



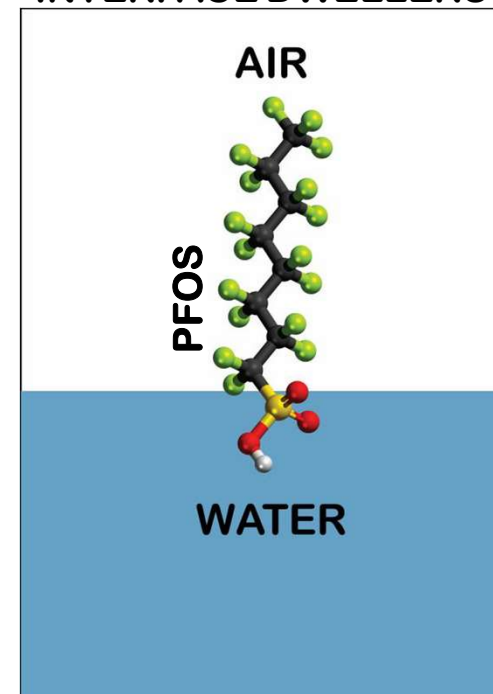
PFOA - perfluorooctanoic acid



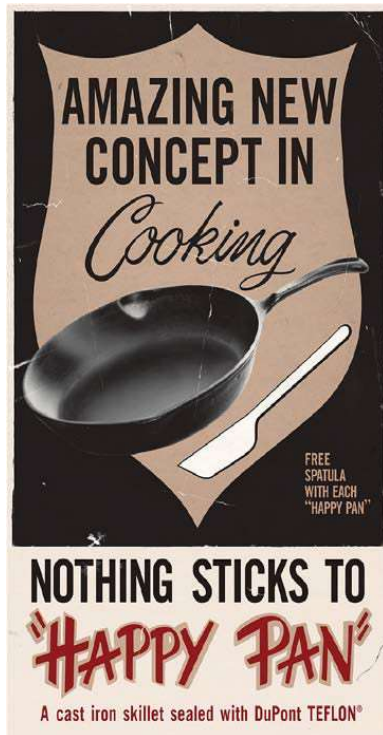
PFOS - perfluorooctanesulfonic acid

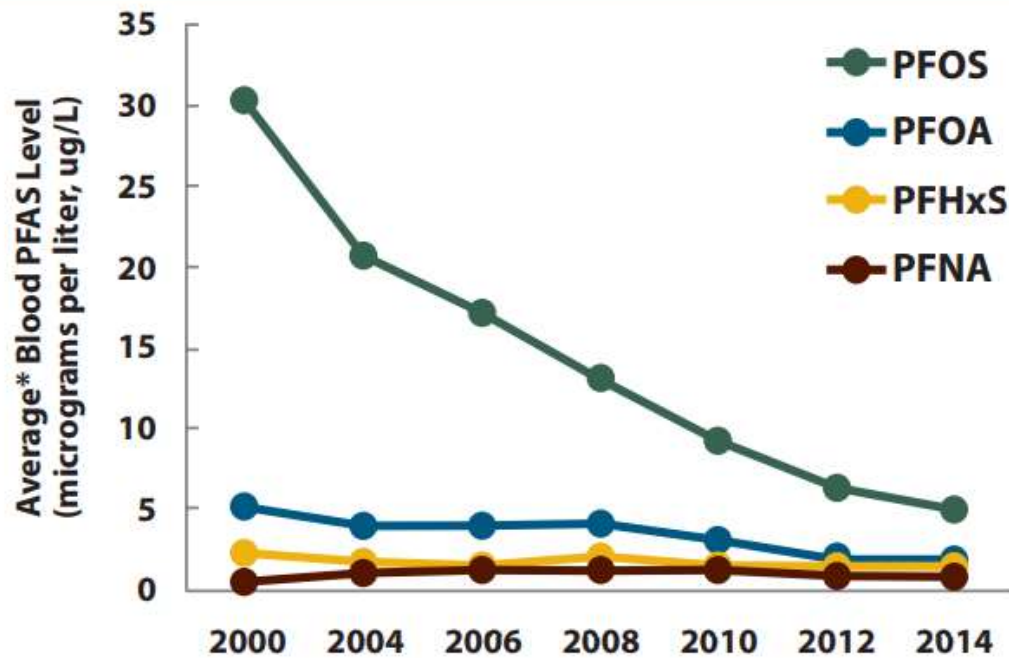
- Incredibly Stable
- Highly soluble and mobile
- Grease, soil and water-repellant properties
- Bioaccumulative in fish

## INTERFACE DWELLERS



# Sources





\* Average = geometric mean

**Data Source:** Centers for Disease Control and Prevention. Fourth Report on Human Exposure to Environmental Chemicals, Updated Tables, (January 2017). Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.

Blood Levels of  
the Most  
Common PFAS in  
People in the U.S.  
from 2000-2014

# Exposure to PFAS chemicals

- Drinking contaminated water
- Eating fish caught from water contaminated by PFAS
  - “Do Not Eat” Health Advisories
- Incidentally swallowing contaminated soil or dust
- Eating food packaged in materials containing PFAS
- Using some consumer products (i.e. non-stick cookware, treated fabrics)
- PFAS absorption through skin is negligible





## Potential Associated Health Outcomes – PFOA and/or PFOS

### Humans

- Lowering a woman's chance of getting pregnant
- Increasing the chance of high blood pressure in pregnant women
- Increasing the chance of thyroid disease
- Increasing cholesterol levels
- Changing immune response
- Increasing chance of cancer, especially kidney and testicular cancers

### Animals

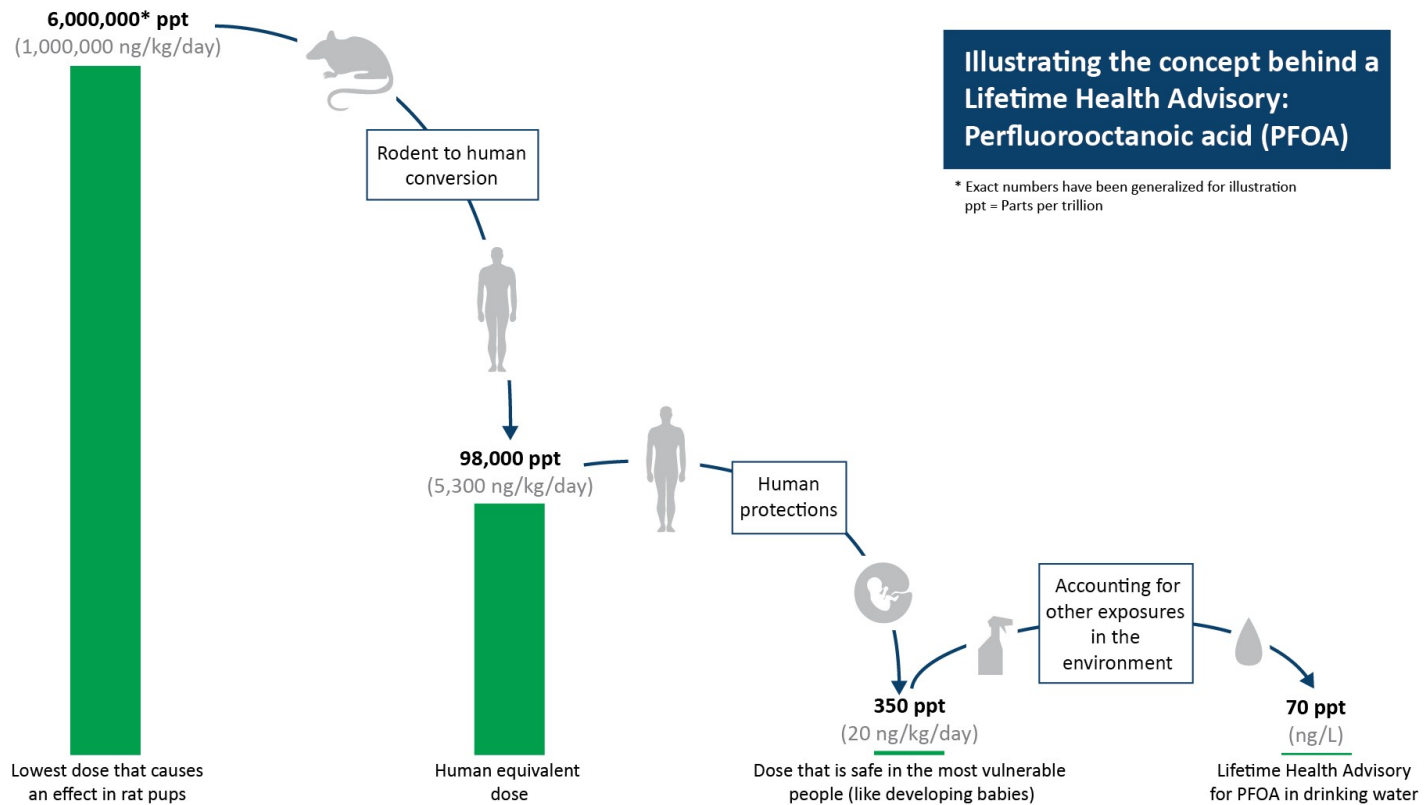
- Developmental effects
- Reproductive effects
- Liver effects
- Endocrine effects (thyroid)
- Immune effects
- Tumors (liver, testicular\*, pancreatic)

\* PFOA only

# Health Advisories

- No federal regulations
- Health Advisories for Drinking Water
  - **EPA Provisional Health Advisory, 2009**  
*Short-term adverse health effects*  
PFOS: 200 ppt  
PFOA: 400 ppt
  - **EPA Lifetime Health Advisory, 2016**  
*Long-term adverse health effects*  
PFOS + PFOA: 70 ppt
- Protective of unborn baby against developmental effects
- Protective of all against non-cancer and cancer effects

# USEPA's Lifetime Health Advisory



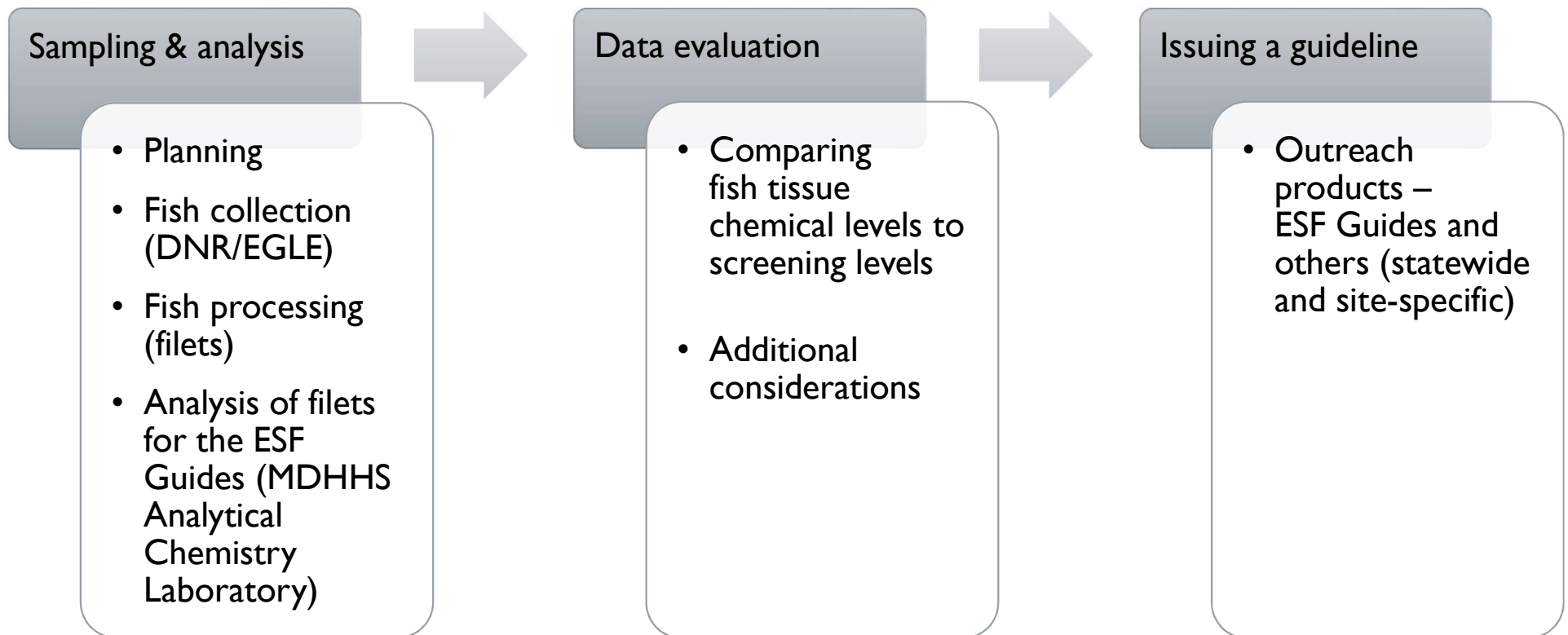


# The Michigan Fish Consumption Advisory Program

Michigan Department of Health  
and Human Services

[www.mi.gov/EatSafeFish.com](http://www.mi.gov/EatSafeFish.com)

# General Process For Consumption Guideline Development



## Eat Safe Fish – Silver Lead Creek

**2018**

Type of Fish	Chemicals of Concern	Size of Fish (length in inches)	MI Servings per Month*
Brook Trout	PCBs	Any	2 <sup>2x</sup>

**2019**

Type of Fish	Chemical Causing MI Serving Recommendation	Size of Fish	Recommended MI Servings Per Month
Brook Trout	PCBs & PFOS	Any	2

Type of Fish	Chemical of Concern	Size of Fish (length in inches)	MI Servings per Month*
Black Crappie	Mercury	Any Size	4
Bluegill	Mercury	Any Size	8
Carp	PCBs	Any Size	2
Catfish	PCBs & Mercury	Any Size	4
Largemouth Bass	Mercury	Under 18"	2
		Over 18"	1
Muskellunge (Muskie)	Mercury	Any Size	1
Northern Pike	Mercury	Under 30"	2
		Over 30"	1
Rock Bass	Mercury	Any Size	4
Smallmouth Bass	Mercury	Under 18"	2
		Over 18"	1
Suckers	Mercury	Any Size	8
Sunfish	Mercury	Any Size	8
Walleye	Mercury	Under 20"	2
		Over 20"	1
White Crappie	Mercury	Any Size	4
Yellow Perch	Mercury	Any Size	4

## Statewide Safe Fish Guidelines

- Based on typical amount of chemicals found in fish filets tested from around the state.
- Can be used for lakes, rivers, and fish species not included in the Eat Safe Fish Guide.

## Resources

- MPART Website – [www.michigan.gov/pfasresponse](http://www.michigan.gov/pfasresponse)
- Handouts at Sign-in Table
  - *PFAS in Drinking Water* Fact Sheet
  - *Eat Safe Fish For Your Health*



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