



# Per and Polyfluorinated Alkyl Substances (PFAS)

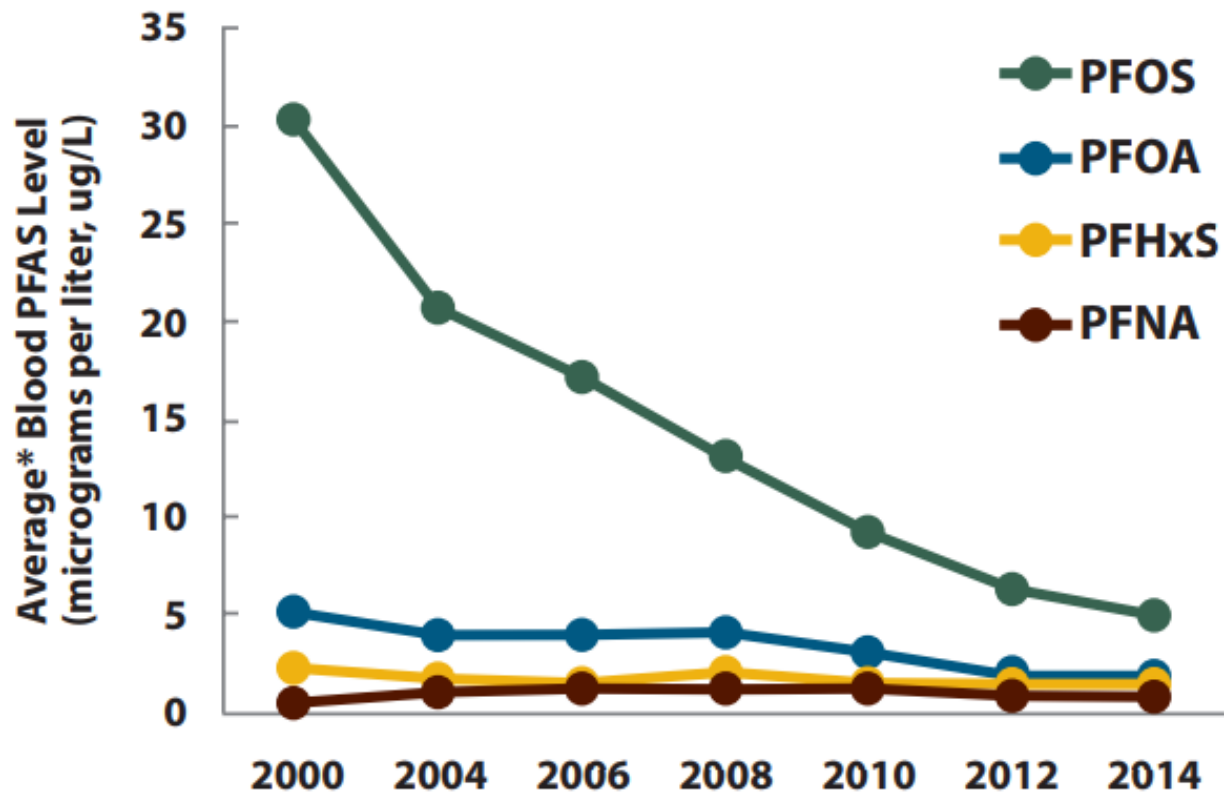
**Bill Farrell**

Michigan Department of Health and Human Services

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# The Role of MDHHS/VBCDHD

- Provide Public Health information and advice
  - Support VBCDHD and other agencies
  - Respond to Public's questions and concerns
- Be proactive/respond immediately to protect health of people
- Understand the chemicals
  - How they move, how they could impact health, what can be done to prevent harm
- Evaluate residential well results and provide recommendations/public health response actions
- Maintain scientific knowledge
  - Science is constantly changing
  - Provide Expert
- Outreach to residents, healthcare providers, others



\* 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  
United States  
from 2000-2014

# Exposure to PFAS Chemicals

Health problems are  
not immediate



If you drink high levels  
of PFAS chemicals  
over time you could  
be more likely than  
the average person to  
develop some health  
problems in the future

# Associated Health Outcomes – PFOA and/or PFOS

## Animals

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

## Humans

- Liver effects (serum enzymes/bilirubin, cholesterol)
- Immunological effects (decreased vaccination response, asthma)
- Developmental effects (birth weight)
- Endocrine effects (thyroid disease)
- Reproductive effects (decreased fertility)
- Cardiovascular effects (pregnancy induced hypertension)
- Cancer\* (testicular, kidney)

\* PFOA ONLY

# USEPA's "Lifetime Health Advisory"

- Based on Reference Dose (RfD) derived from developmental toxicity study in rats
- Lifetime Health Advisory for Drinking Water
  - PFOA + PFOS = 70 ppt
  - Short-term (during pregnancy) and long-term (lifetime) exposure
- Protective of unborn baby against developmental effects
- Protective of all against non-cancer and cancer effects

**6,000,000\* ppt**  
(1,000,000 ng/kg/day)



Rodent to human  
conversion



**98,000 ppt**  
(5,300 ng/kg/day)



Human  
protections



**350 ppt**  
(20 ng/kg/day)



Accounting for  
other exposures  
in the  
environment



**70 ppt**  
(ng/L)

Lowest dose that causes  
an effect in rat pups

Human equivalent  
dose

Dose that is safe in the most vulnerable  
people (like developing babies)

Lifetime Health Advisory  
for PFOA in drinking water

## Illustrating the concept behind a Lifetime Health Advisory: Perfluorooctanoic acid (PFOA)

\* Exact numbers have been generalized for illustration  
ppt = Parts per trillion

# What are PFAS public health drinking water screening levels?

- PFAS public health drinking water screening levels
  - Health-based
    - Protective of fetus and breastfed infant
    - Also protective of formula fed infant and other ages
  - Used to determine if further evaluation of PFAS is needed
  - Used to determine if public health actions are needed
  - Non-regulatory



# MDHHS Public Health Screening Levels

PFAS	MDHHS Public Health Drinking Water Screening Level
PFOA	9 ng/L (parts per trillion [ppt])
PFOS	8 ng/L (ppt)
PFNA	9 ng/L (ppt)
PFHxS	84 ng/L (ppt)
PFBS	1000 ng/L (ppt)

# Multiple Lines of Consideration for Determining Public Health Response Actions

- USEPA Lifetime Health Advisory
- MDHHS Public Health Screening Levels
- Residential Well Results (individually and collectively)
- Site –specific information (e.g., known source, geology, etc.)