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**Scientist Emeritus and**  
**Former Director, National Institute of Environmental Health Sciences (NIEHS)**  
**and National Toxicology Program (NTP)**

March 2, 2022

**In support of: HB570 Pesticides – Mosquito Control Products and PFAS Chemicals  
Before the House Health and Government Operations Committee**

Dear Chairwoman Pendergrass, Vice Chair Penya-Melnyk and members of the committee:

I am a toxicologist and microbiologist by training and as the former director of the [National Institute for Environmental Health Sciences](#), as well as the [National Toxicology Program](#), positions I held from January 2009 until October 2019, I have been one of the scientists sounding the alarm on PFAS—known as the “forever chemicals”—and have been engaged in efforts with other scientists and public health experts to address the serious health concerns related to PFAS. I also worked for the EPA for 19 years prior to my work at NIEHS and NTP, directing the largest division focused on environmental health research. My research has focused on the health impacts of environmental chemicals. I have been granted NIH scientist emeritus status and I still maintain a laboratory at NIEHS.

Many PFAS are what is known as fluorinated polymers which can breakdown and release monomer PFAS with unmeasurable half-lives, therefore earning the distinction of being considered forever chemicals. The contaminants known as PFAS cause multiple health problems in people. And I can definitively say “cause” instead of “are linked”. While thousands of scholarly articles have linked the chemicals to a plethora of health effects, I believe we can currently say there is sufficient evidence for causation of adverse impacts on our health.

While I was leading the NIEHS, one of the Institutes of the National Institutes of Health, whose mission is to discover how the environment affects people, in order to promote healthier lives, I was not allowed to use the word “cause” when referring to the health effects from PFAS or other chemicals. If I was talking about human data or impacts on people, I had to always say there was an association with a laundry list of effects. This was because there are no double-blind, placebo controlled clinical trials for PFAS. It would be unethical to intentionally expose people to chemicals of great concern.

Association, the coincidence of a chemical exposure and disease, and causation, in which a health problem happens *as the result* of the exposure, are different. Because many factors, including chance and genetics and exposures to other substances, can influence the development of disease, the term “cause” is used rarely and cautiously in the field of environmental health.

But I have studied PFAS compounds for decades and believe the global contaminants have cleared that high bar. In my mind, PFAS cause health effects because you have the same kind of effects reported in multiple studies in multiple populations. You have longitudinal studies showing the same effects in multiple populations done by multiple investigators and you have animal models showing the same impact.

That is pretty good evidence that PFAS or certain PFAS can cause health effects in people. It is not as strong for every effect, but there are quite many effects where they’re strong enough to say “caused,” in

particular to the relationship between these chemicals and immune response, kidney cancer, and cholesterol in humans—the data is very clear.

And given the current ongoing pandemic, it's important to note that PFAS reduces our antibody response to vaccines and that elevated PFAS levels are associated with Covid-19 susceptibility and with an increased risk of a more severe course of COVID-19.

PFAS also increases asthma in children, during pregnancy can impact the health of the mother and her child, can cause poor executive functioning, decreased kidney function, ulcerative colitis, high cholesterol, thyroid disruption, liver malfunction, prostate and ovarian cancer, lower birth weight and size, delayed puberty, early menopause and more.

A striking feature of PFAS is how they can cause harm to so many systems within our bodies—our livers, our kidneys, our immunity, our metabolism. Other health issues caused by PFAS include elevated cholesterol levels, liver dysfunction, weight gain, reproductive problems, and kidney cancer, which have been shown to increase along with the levels of the chemicals in blood.

PFAS has been of great concern to me and many other scientists around the globe for decades. PFAS-exposure related health concerns began in the 1960s starting with DuPont raising concerns re: health risks of PFAS in an internal 1962 document—fast forward to 1978 when an unpublished study shows adverse effects of PFOA in monkeys, then in 1980 PFAS was detected in serum of workers, in 1981 concerns arose about birth defects in children born to women workers, in 1987 PFOA was shown to cause cancer in a rat study, and later on in 1998, samples from U.S. blood donors in the general population were shown to contain PFAS.

In 2000, PFOA and PFOS were detected in nearly 100% of Americans and 3M announced plans to phase-out PFOA and PFOS. In 2004, DuPont settled a class action suit (>80,000 plaintiffs) for \$343 million. In 2006, EPA invited 8 major company producers to phase out PFOA by 2015. In 2012, immune system effects related to PFAS were reported in children.

Most recently, the [EPA released a statement](#) December 20, 2021 announcing a nationwide monitoring effort for 29 per- and polyfluoroalkyl substances (PFAS) in drinking water. The Fifth Unregulated Contaminant Monitoring Rules (UCMR5) will provide data on the frequency and magnitude at which these chemicals are found in the nation's drinking water systems and will improve EPA's ability to conduct state and regional assessments of contamination.

As you will also hear from other experts, the current total **number of PFAS is more than 12,000 chemicals—that includes** PFOS, PFOA, PFMOAA, GenX, ADONA, Nafion Byproduct 2, etc.—these compounds are environmentally persistent, mobile, and bio-accumulative.

Production of many products, including certain pesticides, involves the addition of PFAS additives, as either active or inert ingredients. The chart below shows you the diverse range of products found to contain PFAS:

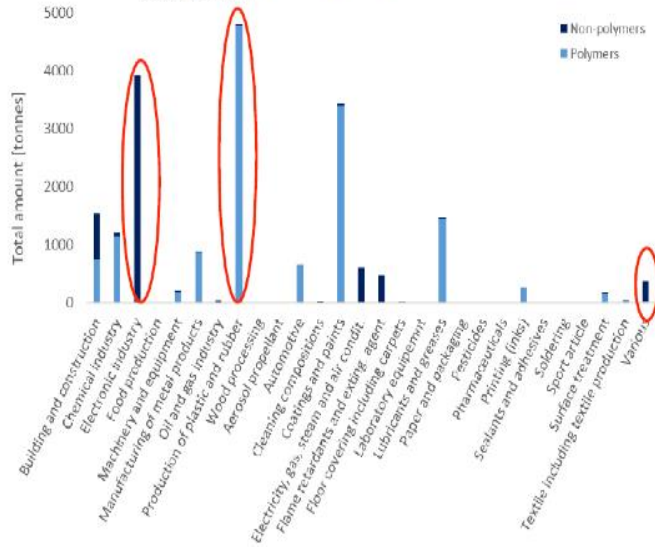
# Uses of PFAS?

Environmental  
Science  
Processes & Impacts



PAPER

An overview of the uses of per- and polyfluoroalkyl substances (PFAS)  
 Authors: Juliane Glöck, Martin Scheringer, Ian T. Cousins, Jamie C. DeWitt, Gretta Coakley, Doris Herzke, Rainer Lormann, Carl A. Nri, Aron Yoon and Zhanyu Wang



- More than 200 uses identified for more than 1400 PFAS
- Less well known uses:
  - ammunition,
  - climbing ropes,
  - guitar strings,
  - artificial turf,
  - soil remediation

While we need to ultimately turn off the tap on PFAS and find safe alternatives, until that day arrives, we need, at least, to promote safer alternatives and affect changes wherever possible. Given that about 14,000 pesticides are registered in the state of Maryland annually and are used widely across the state, and given a currently unknown percent of them contain or are contaminated with PFAS, it behooves the state to initially address the widely used pesticides applied in a large part of the state on a regular basis for 4-5 months to control mosquito.

Testing for PFAS is challenging as there is no one test that can fully assess all 12,000 PFAS which may be in a pesticide. For example, all PFAS are organofluorine (OF) compounds, but not all OFs are PFAS. So, when a pesticide is tested to assess if it is an OF, then we know it's possible it's a PFAS containing product. This test is a good starting point, since if a product is shown not to contain an OF, it is confirmed to be PFAS-free. A manufacturer can then confidently submit the lab test for having the product registered for sale and use in the state. If it is an OF, then the product can either be replaced with one that tests OF-free or be further tested for specific PFAS. That said, current testing for specific pesticides is expertly explained in Dr. Peaslee's testimony regarding these current two options. Targeted PFAS testing is still limited to testing for up to 70 PFAS. However, testing for these widely used OF compounds is an important measurement for assessing PFAS in a pesticide. If used together, they can provide critical data.

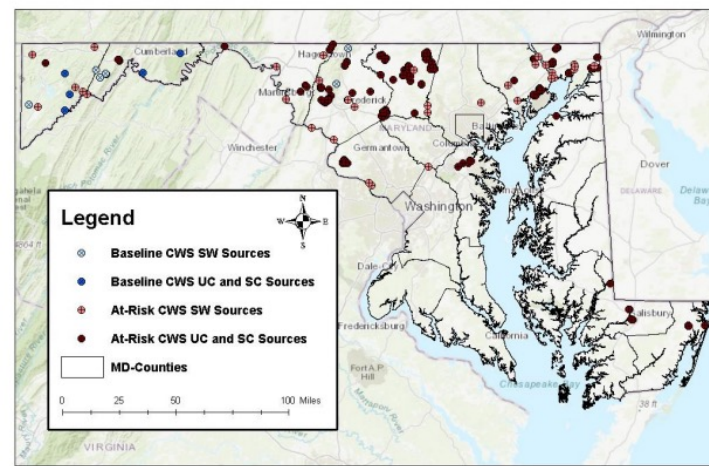
That said, the reasoning for the specific language in the bill on how testing should be conducted, by EPA-authorized laboratories that manufacturers, are to assess whether the product contains PFAS, is critical guidance that sets limits on what level of PFAS is currently deemed acceptable and considered PFAS-free. Given new research, the limits could be further lowered tomorrow, but we at least must take these steps now.

Turning off the tap of PFAS-containing pesticides, is a critical step forward, given how frequently a community or private residence is exposed, often 4-5 months of the year. To help protect future

generations, we urgently need comprehensive state policies to end unnecessary uses of PFAS, as traditionally states tend to do so, prior to EPA setting federal policies. While the EPA is working to address PFAS, we cannot continue to wait for needed federal regulations. States like Maryland need to protect their residents. And states are leading the way... for example, Maine adopted a state law banning all intentionally added PFAS in products unless the use is deemed unavoidable. Mosquito control products do not necessitate the use of PFAS as either inert or active ingredients.

I urge this committee to take a crucial step in protecting Marylanders by passing HB#570.

Phase I: At-Risk and Baseline Community Water System (CWS)  
Surface Water (SW), Unconfined (UC) and Semi-Confined (SC) Untreated Sources



# The Perils of PFAS

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Annapolis – Former Naval Weapons Facility:



Is the water at the Naval Academy safe to drink?

Aberdeen Proving Ground, Harford County, MD



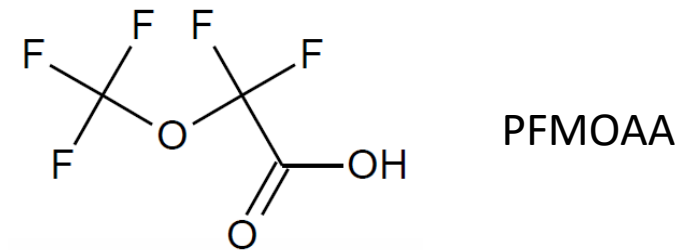
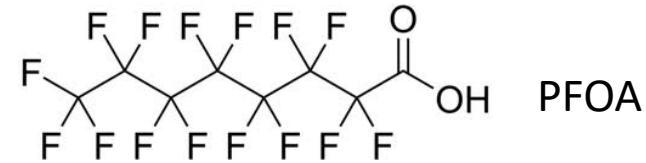
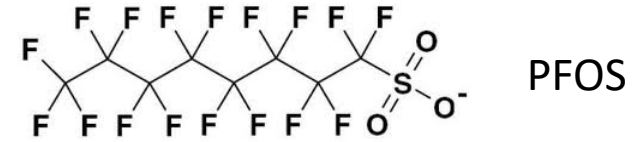
The heavily contaminated Aberdeen Proving Ground is located in a sensitive environment on the Chesapeake Bay in Harford

Maryland House Health and Government  
Operations Committee

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# What are Per- and Polyfluoroalkyl Substances (PFAS)?

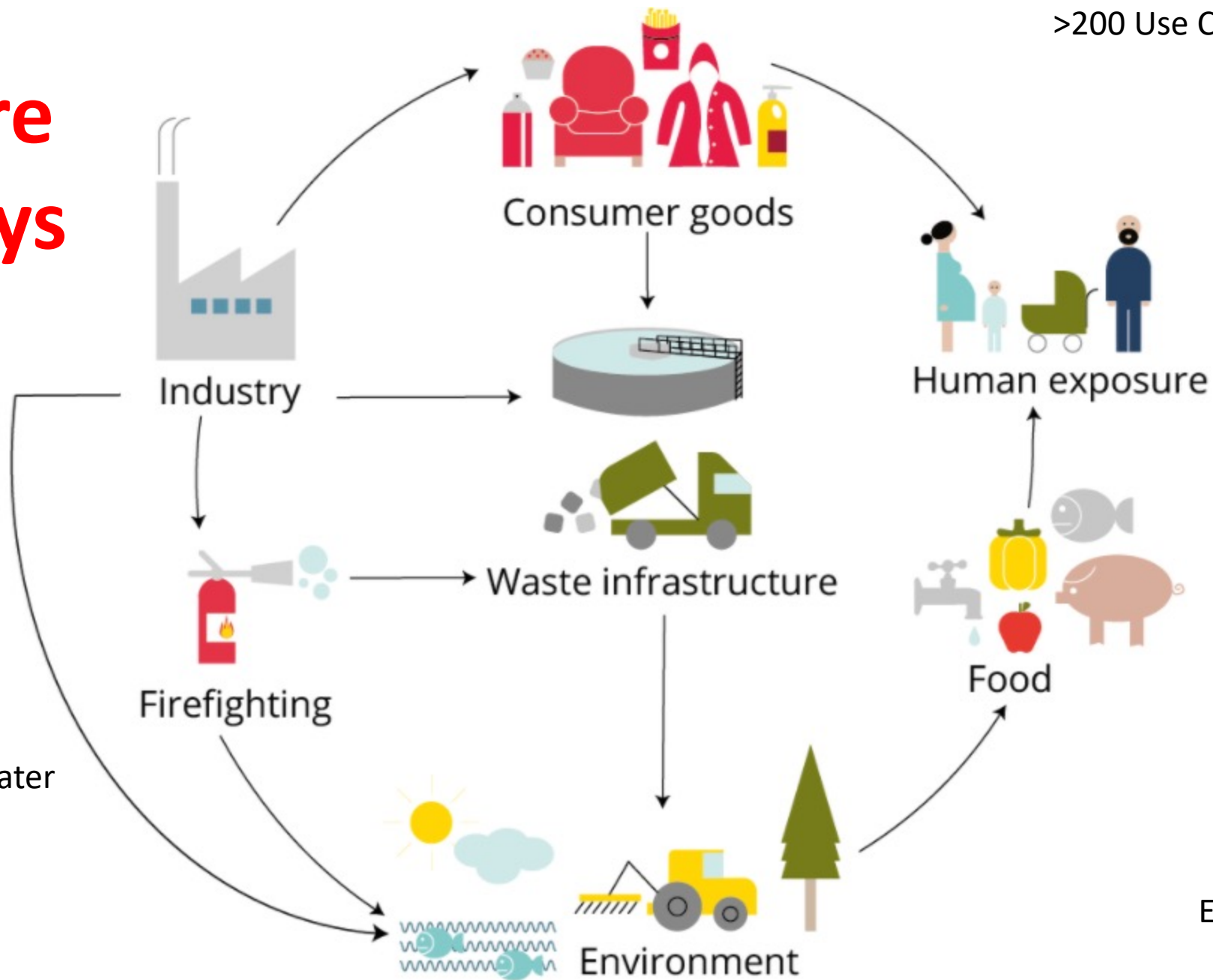
- **Total number of PFAS**
  - **>12,000 chemicals**
  - Includes products, impurities and degradants
    - Teflon
    - Scotchguard
    - Aqueous Film Forming Foams (AFFFs)
  - Many unknown formulation
- Resistant to grease, water & oil
  - Surfactants, stain repellants
  - Fire suppression - AFFF
- Persistent, mobile, and bioaccumulative
- Emergence of short-chain alternatives - less well studied
  - Few studied – same effects as long chains



# Typical Exposure Pathways

>200 Use Categories of PFAS  
Gluge et al., 2021

PFAS do not degrade.  
PFAS pass through Water  
Treatment Plants



EEA, 2021

# Wide Range of Health Effects of PFAS

## *Animal & Human*

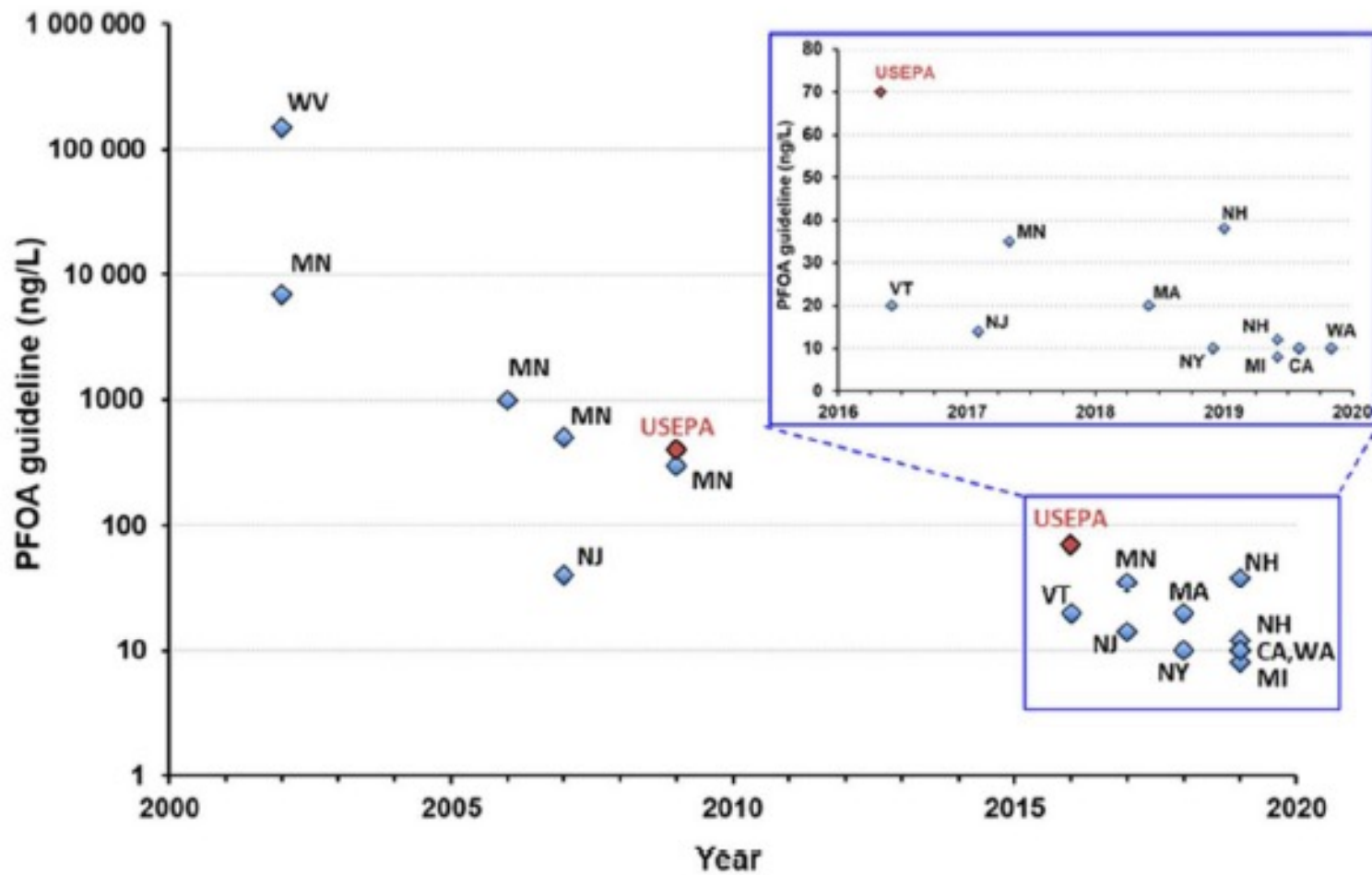
- Testicular cancer
- Kidney cancer
- Ulcerative colitis
- High cholesterol
- Pregnancy-induced hypertension
- Thyroid disruption
- Hormonal changes
- Liver malfunction
- Obesity
- Immunotoxicity, incl. interference with child and adult vaccine response
- Lower birth weight and size
- Delayed puberty, decreased fertility, early menopause
- Reduced testosterone
- Prostate cancer
- Ovarian cancer



# States are Moving Ahead

- AFFF
  - 36 states in process of banning or restricting PFAS-containing AFFF
- Food Contact Materials
  - 14 states are in process of banning PFAS in food packaging materials
- Textiles and Furnishing
  - 4 states ban on selling or PFAS-containing textiles
  - 4 states banning in other consumer products, personal care products, and cosmetics
- Water
  - US EPA Office of Water Developing Stringent MCLs for PFOA and PFOS
  - Michigan, New Hampshire, New Jersey, Massachusetts, Maine, and Vermont established MCLs for up to 6 PFAS
    - California listed PFOA and PFOS under Proposition 65
    - Denmark banned ALL PFAS in food packaging
    - EU treating PFAS as a class on moving forward to ban all but essential uses
    - Canada moving to treat PFAS as a class





Post GB. Recent US State and Federal Drinking Water Guidelines for Per- and Polyfluoroalkyl Substances. *Environ. Toxicol. Chem.* 2021;40:560563. DOI: 10.1002 /etc.4863

Thank  
You!



Questions???