Post-Hearing Questions for the Record
Submitted to Peter C. Grevatt, Ph.D.
Office of Ground Water and Drinking Water
Office of Water
U.S. Environmental Protection Agency
House Committee on Energy and Commerce Subcommittee on Environment
Hearing on "Perfluorinated Chemicals in the Environment: An Update on the Response to Contamination and Challenges Presented"
September 6, 2018

The Honorable John Shimkus

1. Your testimony states that there are "many PFAS chemicals."

   a. What is the correct number?

   Approximately 1,220 PFAS are on the Toxic Substances Control Act (TSCA) Inventory, which is a list of chemical substances that are manufactured, processed, or imported in the United States for uses under TSCA. Of these, approximately 550 have been reported as having been in US commerce in the past 10 years. The OECD estimates that 4,730 PFAS-related compounds have been identified globally.

   b. Of the chemicals in the PFAS class -
      i. How many of them are well-understood?

      Few if any of the PFAS are "well understood." Data on human health effects are not available on the majority of PFAS. Even for those compounds for which some animal studies have been done, the studies do not cover all health effects. As such, many questions remain unanswered.

      Our scientific understanding of PFAS compounds stems almost entirely from studies on a select few. Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) have been manufactured the longest, are the most widespread in the environment, and are the most well-studied. The EPA has established health advisories for PFOA and PFOS, in drinking water and released two draft toxicity assessments (perfluorobutane sulfonate, PFBS and hexafluoropropylene oxide dimer acid and ammonium salt, GenX chemicals) in November 2018 for public review. The EPA is working to develop computational toxicity screening tools to better understand the many PFAS in commerce and the environment.

      ii. For how many is the Agency missing health effects data?

      Although the EPA does not have health information for the majority of PFAS, the Agency is working to move research forward to better understand how available epidemiological and toxicological data on PFAS (such as PFOA and PFOS) can be applied to inform our knowledge of other PFAS. For those PFAS that have been reviewed by the EPA's new chemicals program, the EPA has relied on available data on PFAS for which data already exist and/or have requested additional data be generated.

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2. EPA has very robust authority under the reforms made to title I of the Toxic Substances Control Act to require the production of new information on a chemical substance. If there is so little known about PFAS health effects data, why isn't EPA using this authority to quickly fill these information gaps?

   The EPA has made it a priority to identify what data needs to be generated on what types of PFAS to better understand the impacts of PFAS. Once we know this, we will be better positioned to identify the appropriate TSCA authorities to obtain this data. Under Section 4 of TSCA, the EPA may require testing or development of information if such information is needed to evaluate a chemical. In addition, the EPA may, as appropriate and consistent with the requirements of TSCA, require testing under section 4 or reporting of information under Section 8 to prioritize and evaluate existing chemicals.

3. How similar are the chemicals in the PFAS class to each other - in other words, do they all act the same in the environment, do they all have the same effect on the human body?

   Based on differences in structure, not all PFAS will act the same in the environment or have the same effect on the human body, but some may have similar impacts. Due to their strong carbon-fluorine bonds, PFAS are very stable in the environment. Differences associated with chain length, chemical structure, and functional groups incorporated into individual PFAS have important implications for mobility within the environment and uptake, metabolism, clearance, and toxicity in the human body.

4. Your testimony mentions that "there is evidence that exposure to certain PFAS may lead to adverse health effects." This sounds scary, but you just mentioned that the majority of PFAS chemicals are not well understood.

   a. Is there a difference in certainty between "there is evidence" and "science demonstrates"?

      Evidence suggesting adverse health effects may happen is more speculative and less conclusive than "science demonstrates."

   b. What are the "certain PFAS" that "may"?

      The majority of research on the potential health risks associated with PFAS exposure is based on laboratory animal and human epidemiological studies of long-chain PFAS, such as PFOA and PFOS. Exposure to certain PFAS, such as PFOA and PFOS, above certain levels are suspected to cause adverse effects on human health based on results from animal studies and epidemiological studies of human populations. As NIH testified on September 26 before the Senate Committee on Homeland Security and Governmental Affairs' Subcommittee on Federal Spending Oversight and Emergency Management, our understanding of the health effects associated with PFAS and our ability to draw conclusions regarding the contribution of any specific PFAS to human disease is based on combined data from multiple studies investigating epidemiologic associations in human cohort studies, biological plausibility and pathways in animal studies, mechanistic effects seen in human tissues and cell culture systems, and rapid high-throughput screening. It is important to note that epidemiologic association studies cannot definitively find causation, and while animal studies are an important marker of scientific discovery, they are not perfect predictors of human effect. However, by combining and carefully

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considering data from independent studies, we can begin to build an understanding of how PFAS chemicals impact human health.

Depending on the PFAS, potential adverse effects may include developmental effects to fetuses during pregnancy and to breastfed infants (e.g., low birth weight, accelerated puberty, skeletal variations), cancer (e.g., testicular, kidney), liver and kidney effects (e.g., tissue damage), immune effects (e.g., changes in antibody production and acquired immunity), thyroid effects, neurotoxicity, and other effects (e.g., in total serum cholesterol).

c. Are all PFAS toxic?

The EPA is working to gain an understanding of potential human health impacts of PFAS. Due to the similarities in the compounds to well-studied PFAS, such as PFOA and PFOS, it is anticipated that additional PFAS may be of concern to human health. Not all of the approximately 550 PFAS reported as having been in U.S. commerce in the past 10 years have been studied. The toxicity of PFAS is dependent on a number of factors which likely depend on existing body burden, the number of PFAS individuals are exposed to, the chemical identity of PFAS, the life stage and gender of the receptor, along with the duration of exposure. Toxicity alone is not sufficient to determine whether PFAS present risk: potential for exposure to people also needs to be estimated.

5. Your testimony talked about the health advisory level of 70 parts per trillion (ppt), individually or combined, for PFOA and PFOS. How low of a reading can existing monitors detect these contaminants?

The EPA laboratory that developed Method 537 (published September 2009) identified quantitation limits ("Lowest Concentration Minimum Reporting Levels" [LCMRL]) for PFOA and PFOS of 5.1 ppt (ng/L) and 6.5 ppt (ng/L), respectively. Laboratories have developed experience with PFAS analyses since Method 537 was published and some are now able to quantify at lower levels. In November 2018, the EPA updated Method 537 (537.1) to include an additional 4 PFAS and lowered the quantification limit for PFOA and PFOS to 0.82 ppt (ng/L) and 2.7 ppt (ng/L) respectively.

6. Today's hearing has raised questions about EPA being able to protect vulnerable subpopulations from adverse health effects.

a. To do that, wouldn't the Agency necessarily have to do aggregate and cumulative exposure analyses?

No, not necessarily. There are things that can be done to protect vulnerable subpopulations from adverse health effects without conducting aggregate and cumulative exposure analyses. Some examples include encouraging or requiring substitution of hazardous chemicals with safer alternatives or developing risk management guidance and exposure limits based on a toxicological reference value.

b. Does the Agency have an agreed upon protocol for doing aggregate exposure assessments?

The EPA does not have a single protocol for doing aggregate exposure assessments. Different program offices within the EPA are charged with implementing different environmental laws.

Each law has its own regulations and requirements in terms of the kind of assessments needed, which may require protocols to differ.

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7. For site remediation of PFAS,
   a. What are the available methods that may be deployed?

The following methods have been tested and shown to be effective at removing certain PFAS from groundwater:

- *Granular activated carbon*
- *Powdered activated carbon*
- *Anion exchange resin*
- *Reverse osmosis*
- *Nanofiltration*

In addition to contaminated groundwater, remediation of contaminated soil and other solids may be feasible through:

- *Incineration*
- *Land disposal in a lined, permitted landfill*
- *Solidification/stabilization*

Additional remediation technologies for soil and groundwater are under development and assessments by researchers may provide additional cleanup alternatives for PFAS contamination. Remediation effectiveness can vary based on the specific PFAS.

b. What is the Federal government doing to ensure communities have sufficient information to assess the public health benefits against the cost for deploying these systems?

At EPA-led sites, the EPA provides information to communicate the hazards, exposures, risks and uncertainties associated with PFAS as information becomes available. At sites where the EPA is a support agency, the EPA collaborates with the lead organization to promote appropriate communication regarding PFAS. Further, the EPA provides information to communities through its [HYPERLINK "https://www.epa.gov/pfas"] *and social media. On a national level, the EPA is working to develop a PFAS Management Plan using information from the EPA's May 2018 PFAS National Leadership Summit, community engagements, and public comments submitted to the agency. The management plan will provide the EPA's approach on identifying and understanding PFAS, the agency's actions to address PFAS, and effective strategies for communicating with the public on PFAS.*

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8. For drinking water systems,

   a. What are the available remediation methods that communities may deploy to address PFAS contamination?

      Treatment options which have been tested and are known to address certain PFAS in drinking water include activated carbon (granular or powdered), ion exchange, and membrane separation (reverse osmosis, and nanofiltration). These remediation options may generate waste containing PFAS, which will need to be disposed of properly. More information can be found in the EPA's Drinking Water Treatability Database: [HYPERLINK "https://oaspub.epa.gov/tdb/pages/general/home.do"]

   b. How effective are these?

      The effectiveness of these drinking water treatment methods will depend on multiple aspects of the treatment process including the properties of the specific PFAS compounds being remediated, properties of source water, treatment capabilities and operation of the system, as well as competing treatment priorities for other regulated contaminants. The following processes were found to be effective for the removal of certain PFAS:

      - *granular activated carbon (GAC) (up to > 98 percent)*
      - *membrane separation (up to > 99 percent)*
      - *ion exchange (up to > 99 percent).*

      These results cover the removal of specific PFAS including perfluorodecanoate (PFDA), perfluorononanoic acid (PFNA), perfluoroheptanoic acid (PFHxA), perfluorohexane sulfonic acid (PFHxS), perfluorobutanoic acid (PFBA), and PFBS.

      The following drinking water treatment techniques and the effectiveness of each are presented for PFOS:

      - *Granular activated carbon: highly effective for drinking water (at least 99% removal);*
      - *Powdered activated carbon: effective for drinking water (between 75% and 99% removal);*
      - *Anion exchange resin: effective for drinking water (between 75% and 99% removal);*
      - *Reverse osmosis: highly effective for drinking water (at least 99% removal);*
      - *Nanofiltration: highly effective for drinking water (at least 99% removal).*

      More information can be found in the EPA's Drinking Water Treatability Database: [HYPERLINK "https://oaspub.epa.gov/tdb/pages/general/home.do"]

   c. Are there other technologies being examined to address potential drinking water contamination?

      Treatment using chlorine and advanced oxidation processes have been evaluated for their effectiveness at treating PFOS in drinking water but have not been found to be effective. The effectiveness of each treatment method will depend on the properties of the specific PFAS being remediated. The EPA continues to conduct research on additional technologies for addressing PFAS, working in collaboration with water utilities, universities, water treatment companies, and other federal agencies. As new information becomes available about effective technologies,

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it will be added to the EPA's Drinking Water Treatability Database ([HYPERLINK "https://oaspub.epa.gov/tdb/pages/general/home.do"]*)*

9. Please explain how EPA is addressing emerging contaminants, such as PFAS, with respect to environmental cleanups?

   The EPA is currently developing groundwater cleanup recommendations for PFOA and PFOS at contaminated sites.

10. When does EPA intend to have resolution on whether PFOA and PFOS are hazardous substances under Superfund?

    The EPA is beginning the necessary steps to evaluate the designation of PFOA and PFOS as "hazardous substances" through one of the available statutory mechanisms, including potentially the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Section 102.

<u>The Honorable Paul Tonko</u>

1. National Management Plan

   a. What specific EPA actions are being considered as part of the National Management Plan?

      The EPA is using the information gained from the National Leadership Summit, community engagements and public input to develop its PFAS Management Plan. The EPA may include short-term implementation actions, and long-term regulatory and research approaches that the EPA designed to reduce the health risks associated with certain PFAS in the environment. Taken together, the plan is being designed to help the EPA to better assist states, tribes, and local communities to protect public health.

   b. Will the Plan include a decision on whether or not to designate PFOA and/or PFOS as a hazardous substance under CERCLA?

      Following the PFAS Summit in May, the EPA began an intensive effort to examine the statutory options that could be used if it determines it is appropriate to designate PFOA and PFOS as hazardous substances. Available statutes, including the Resource Conservation and Recovery Act (RCRA), TSCA, the Clean Water Act (CWA), the Clean Air Act (CAA), and CERCLA Section 102 are being considered, as well as the timing, benefits and challenges to pursue each option. The EPA has not used its authority under CERCLA Section 102(a) to designate a chemical as a hazardous substance directly under CERCLA. The EPA has concluded that any option to designate PFAS as a hazardous substance would require notice and comment rulemaking.

2. Dr. Grevatt, you mentioned building out capacity for labs to test for PFAS.

   a. How many labs in the United States are now capable of using Method 537 (or an EPA-approved method for testing for PFAS)?

States generally certify/accredit laboratories that support drinking water compliance monitoring for regulated contaminants. The EPA is aware that some states also offer (and others plan to offer) programs for laboratories that wish to be certified/accredited to analyze drinking water for unregulated contaminants such as PFAS using Method 537. For example, the New Hampshire Department of Environmental Services lists 20 analytical labs capable of analyzing PFAS ([HYPERLINK "https://www.des.nh.gov/organization/commissioner/documents/pfoa-testing-labs.pdf"]*.) The EPA is also aware that the Department of Defense (DOD) manages a PFAS laboratory accreditation program that lists DOD accredited labs (*https://www.denix.osd.mil/edqw/accreditation/accreditedlabs/*).*

Any published list, however, is likely not inclusive of every laboratory in the U.S. capable of analyzing PFAS. Other federal or state agencies may have compiled their own lists of laboratories capable of providing analytical services for PFAS.

b. What is the approximate cost of testing for PFAS at one of these labs?

Using EPA method 537, typically, the fee is approximately $300 ± $50 per sample. The analytical cost will depend on multiple factors: current demand for the analysis (high demand and low lab capacity = higher quoted fee), how many PFAS targets are requested for monitoring, and how many samples a specific client will be sending to the lab (volume discounts typically apply).

c. While EPA is considering whether a regulatory determination should be made for PFOA and PFOS, are you also considering what financial or technical assistance options may be available for testing and treating the water of citizens relying upon private wells, which would not be bound by a MCL?

The EPA is currently investigating efficacy of commercially available point-of-use or point-of-entry applications. This work would inform private well owners of their risk management options. The EPA also provides technical assistance to laboratories analyzing drinking water samples on an as-needed basis.

<u>The Honorable Scott H. Peters</u>

1. Studies tracking PFOS in marine organisms and ocean waters, PFOS was added to the Stockholm Convention on Persistent Organic Pollutants in 2009, and we are not party to that Convention but is EPA doing anything to monitor coastal waters for these compounds and are you working with other countries to control the spread of these contaminants?

While it is true that the United States is not a Party to the Stockholm Convention on Persistent Organic Pollutants (POPs), it is a signatory to that Convention and is an active participant in its operation. To that end, the EPA does work with our international partners on emerging contaminant issues, including PFAS, through our observer status under the POPs Convention. The EPA's work on addressing such contaminants, however, is not limited to that forum. For example, the EPA monitors PFAS in fish in coastal waters via the Great Lakes Human Health Fish Fillet Tissue Study (fillet tissue only) and the Great Lakes Fish Monitoring and Surveillance Program (whole fish). Great Lakes work, in particular, is coordinated with Environment and Climate Change Canada, whenever possible.