MICHIGAN STATE UNIVERSITY

7/28/2022

Dear Senator Peters and the Committee on Homeland Security and Governmental Affairs,

Thank you for the opportunity to submit testimony related to Improving Interagency and Intergovernmental Coordination on PFAS for Michigan Communities. My name is Cheryl Murphy, and I am a Professor in the Department of Fisheries and Wildlife at Michigan State University, and I also serve as Director of the MSU Center for PFAS Research.

Introduction

For several decades, PFAS compounds have infiltrated and accumulated in our drinking water, ecosystems and food supplies. Despite this accumulation, they are continually manufactured in various forms and are still being used for a variety of commercial and industrial processes. PFAS are a group of more than 5,000 man-made chemicals that consist of chains of carbon atoms attached to fluorine. PFAS are found in a variety of industrial and consumer products including carpets, clothing, nonstick pans, fire-fighting foams, cleaning products (and more), and are found globally. These compounds are very resistant to degradation, remaining in the environment and in organisms for many years, perhaps centuries. Furthermore, many are sufficiently water soluble that they are readily transported throughout the environment in ground and surface waters and taken up by living things, including humans. Properties of these compounds vary, making it impossible to generalize about how fast they move in the environment and how they affect health across all compound types. PFOS and PFOA are abbreviations given to two most commonly produced PFAS compounds, but these have been phased out by industries in the U.S. (but not worldwide) since the early 2000s. Despite this phase out, PFOS and PFOA still persist in the environment. These two chemicals in particular are known to have toxic effects and bioaccumulate in organisms.

Statement of Need

Despite the quantity of PFAS in existence, only about 40 of these chemicals are routinely included in studies. Due to their historically high production, much research has been directed at PFOS and PFOA. But, with the cessation of PFOS production by many industries, substitute PFAS chemicals were developed, and attention is now turning to the many known (and unknown) compounds for which there is little information (e.g. GenX). Characterization of PFAS contamination has been hindered by a lack of known chemical structures and analytical standards. Perhaps one of the most critical areas of research is therefore an assessment of where PFAS compounds are in the environment and the nature of the compounds. Without such information, it is

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impossible to characterize chemical structure, understand fate and transport, determine bioaccumulation and toxicity and even determine mass balance to confirm how effective remediation technologies are performing. Moving to an understanding of the scope of the contamination, beyond the two legacy compounds, is therefore a critical research need.

The PFAS issue is not only pervasive in Michigan communities, but also throughout the U.S. and worldwide. It is a problem that affects multiple aspects of our daily lives. Because they do not breakdown, they continue to accumulate and will do so until suitable safe replacements are found. Right now, we are dealing with accumulation of thousands of these types of compounds with a variety of different chemical properties in our soils, our waters and in most biological entities, including our food supplies. The time to deal with these compounds as isolated and independent cases is long past, and we need to change our focus from delegating the responsibilities to single agencies and specific researchers to more collaborative, united collectives of several vastly different but complementary disciplines to prioritize needs and focus on the rapid development of solutions to these problems.

Specifically, we need to unite researchers of broad interests, and not just PFAS experts, to find solutions in measuring and tracking the 5,000+ PFAS contaminants in water, food, ecosystems and humans, and we need to do this rather quickly. It may not be feasible to assess the potential health effects of all PFAS chemicals individually. We need to determine the toxic effects of these contaminants that have such disparate chemical properties and multiple modes of action on humans and millions of species, keeping in mind these chemicals are usually not operating as single entities, but rather as mixtures. My colleagues and I have been applying the tools we have developed for other contaminants to the PFAS problem, but we are realizing that PFAS are a diverse suite of chemicals that operate differently than classic environmental toxins, acting on multiple biological targets. As such, we are not getting a complete picture of how PFAS harms life. We will need to develop new tools for toxicity evaluation that could also be used simultaneously for assessing the toxicity of potential alternatives. We also need to determine what exposure levels make these chemicals toxic, and the harmful exposure routes (air, water, food, personal care and consumer products). We have to safeguard our food systems (agricultural and natural resources), by determining routes of exposure, monitoring programs, and in cases where contamination is found, develop appropriate mitigation strategies. Further, we must advance remediation strategies so that they are scaleable, cost-effective and deployable to clean up large areas within our water supply, farmlands, ecosystems, and atmosphere, but also our domestic and working environments. Also, given that most humans are contaminated with PFAS, often at higher levels than we tolerate in drinking water, we should look to determine strategies on how to clear these chemicals from our bodies. We will not be successful with any of these endeavors unless we find suitable, safe replacements and stop the influx and buildup of these chemicals into our environment. Finally, strategies dedicated to risk assessment and communication of PFAS health risk to our citizens must be developed and deployed effectively so that our citizens can be engaged and contributing to our solutions, helping us to develop effective policy solutions.

This complex and widespread issue is forcing us to work across disciplines to find solutions. This focus on uniting many disciplines to tackle this widespread, wicked problem is arising out of necessity. For example, the State of Michigan quickly realized that when they started to monitor for PFAS occurrence, PFAS was a problem that spans all areas of their mission. Thus, they formed the PFAS Action Response team (MPART), which unites agencies to coordinate and focus monitoring efforts and to find solutions.

Here at MSU, our trajectory was somewhat similar. We quickly realized that effective research solutions would only come from a multidisciplinary focus. PFAS contamination spans every aspect of our land-grant mission, and while there have been thousands of studies in the last 20 years on PFAS, there is still much that is unknown, and there need to be systematic and unified ways of compiling, organizing, identifying research gaps and disseminating the information. We formed our Center for PFAS research to unite several colleges and schools to come up with innovative solutions to this issue, including chemists, toxicologists, ecologists, transport modelers, engineers, social scientists, human health and large animal scientists, extension specialists and packaging developers. While we have been successful at acquiring several specific research grants from federal agencies (EPA, DOD, NSF, USDA), and philanthropic foundations, there seems to be no specific funding mechanism that would provide larger, overall support for an initiative as broad and as comprehensive as the one is required to address the PFAS problem.

Each separate funding agency has its own specific mission, but we argue that PFAS is also a cross-cutting issue across the separate funding agencies. To illustrate this, consider the idea that the National Science Foundation (NSF) is not likely to award grants for research on contaminant effects on human health, as this is the domain of other agencies. However, some of their initiatives are relevant - especially related to organismal and ecosystem stressors, and efforts to reintegrate biology from molecular response to ecosystems (but not in response to contaminants). NSF does fund theoretical, chemical and engineering research, as well as remediation research. Although the EPA would seem to be a logical funding entity for much of the PFAS research needs, we are unaware of center-type funding opportunities available within the EPA, and typical research grant awards are generally too small for such large-scale collaborative work; efforts are usually directed towards a limited research space. Some of the high-throughput testing and systems toxicology approachs will require considerable investment into validation to reduce uncertainty and increase confidence in the risk assessment. Some of these ideas intersect with the missions of NSF and NIH. DOD is mostly concerned with Aqueous Film Forming Foams (AFFF) used to quench fires, and contamination of AFFF into environments and communities surrounding military installments related to military operations, as well as developing safer alternatives to AFFF. NIH is focused on PFAS impacts on human health and interventions but would probably not fund research on the transport of these contaminants into our agricultural and natural ecosystems. USDA would primarily be focused on agricultural impacts and food safety and NIST is concerned with the development of standards and technologies. Clearly, all these separate agencies have programs that are relevant to PFAS research and coordination between these would help us arrive at solutions much more efficiently.

The benefits to improving interagency and intergovernmental coordination on PFAS for Michigan communities are considerable, and nationwide establishment of guidelines and action levels for dealing with PFAS are essential. Assuming this coordination would lead to more comprehensive funding for research, this would allow us to coalesce a larger pool of expertise of researchers that may not typically contribute to the PFAS issue given the current separate agency model. This could lead to a number of focused research hubs across the U.S. that all contribute to solving key research problems, thereby invigorating innovation. Competing for smaller funding opportunities is not likely to achieve these synergies, and at the moment, it is likely duplicating effort on the easier-to-solve issues. With broader expertise enabled and tasked with a solutions-based mandate, we should be able to achieve solutions more rapidly. Coordination among agencies that facilitate broader center initiatives would allow for cohesive data collection and storage, and efficient investment into infrastructure needs (equipment and facilities) that could be used by many researchers. In such a model, there will be more room and agency for our essential social scientists to participate, so that we can ensure transparency, involvement of citizens, policy solutions and care of marginalized communities and social justice. The pursuit of solutions, with broader engagement of federal and regional agencies, will also attract the attention of industries that will be invested in safer replacements and green economic solutions. Further, this coordination would allow for some nimbleness, where resources can be quickly allocated to research areas in immediate need of solutions (for example, contaminated food supplies and marginalized communities). This model would serve the PFAS crisis, but could also help facilitate future research initiatives into other large, overarching problems.

Workforce training has long been a bottleneck to scientific and economic developments needed to make progress to solve the problems presented by PFAS contaminants, even before COVID-19 reshaped the national workforce. We are aware of several local companies that have encouraged us to help them find skilled people that can fill open jobs, but sadly, the pool of skilled workers is limited. Part of this problem derives from the high costs of laboratory equipment used for measuring PFAS chemicals, as this limits opportunities for students (and workers looking to update their skill sets) to learn essential skills and techniques. Development of larger funding opportunities across multiple federal agencies should be aimed at building educational infrastructure and enabling training of the next generation of scientists and engineers such that they are prepared to tackle these issues.

The complex web of local, federal, and international regulations regarding PFAS chemicals has presented the U.S. with numerous great challenges. Action levels, such as for drinking water quality, have varied substantially between individual States, and have undergone numerous recent changes. Such uncertainty hinders the development of solutions to PFAS contamination. While we are encouraged that the U.S. EPA has shown recent renewed efforts to define what levels of a few PFAS chemicals in drinking water are safe for human consumption, we have concerns that most laboratories may not be capable of achieving the low limits of detection proposed in recent interim guidance from the agency. We encourage an active and science-based approach to development of appropriate actions for assessing and dealing with PFAS contamination, not just in drinking water, but other media as well.

In summary, interagency and intergovernmental coordination and cooperation on PFAS research would be a much-needed and welcome initiative that would facilitate the development of rapid and effective solutions to widespread PFAS contamination, improve engagement with regional and federal agencies, and lead to strategies aimed at protecting our communities from the toxic effects of these chemicals, while developing technologies to create safer alternatives.

Respectfully,

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