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THE FEDERAL ROLE IN THE TOXIC PFAS CHEMICAL CRISIS

HEARING

BEFORE THE

SUBCOMMITTEE ON FEDERAL SPENDING
OVERSIGHT AND EMERGENCY MANAGEMENT

OF THE

COMMITTEE ON
HOMELAND SECURITY AND
GOVERNMENTAL AFFAIRS
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THE FEDERAL ROLE IN THE TOXIC PFAS CHEMICAL CRISIS

WEDNESDAY, SEPTEMBER 26, 2018

U.S. SENATE,
SUBCOMMITTEE ON FEDERAL SPENDING,
OVERSIGHT AND EMERGENCY MANAGEMENT,
OF THE COMMITTEE ON HOMELAND SECURITY
AND GOVERNMENTAL AFFAIRS,
Washington, DC.

The Subcommittee met, pursuant to notice, at 2:33 p.m., in room SD–342, Dirksen Senate Office Building, Hon. Rand Paul, Chairman of the Subcommittee, presiding.

Present: Senators Paul, Peters, Harris, Jones, and McCaskill (ex officio).

Also present: Senators Shaheen, Carper, and Hassan.

OPENING STATEMENT OF SENATOR PAUL

Senator PAUL. I call this hearing on Federal Spending Oversight Subcommittee to order. Today we are here to discuss the issue of per- and polyfluoroalkyl substances (PFAS), which is a chemical grouping that includes approximately 3,000 individual chemical chains. Two chains in particular, perfluorooctanic acide (PFOA) and perfluorooctane sulfonate (PFOS), are of issue here today.

This issue was brought to my attention by Ranking Member Peters as numerous Michigan communities have exposure to this chemical. Fortunately, my home State of Kentucky seems to have little exposure to these chemicals, and since it is such an issue of interest in the Ranking Member's State, I will yield to him for his opening statement and submit mine for the record.[1]

OPENING STATEMENT OF SENATOR PETERS[2]

Senator PETERS. Thank you, Mr. Chairman. Thank you for working in such a bipartisan way to convene today's hearing and for your support through the entire process.

In Michigan, we have seen firsthand the devastation a community experiences when it cannot trust the water coming out of the tap. In Flint, thousands of families were exposed to dangerous levels of lead in their water, and many residents, unfortunately, still use filters and bottled water to ensure that their water is safe.

Just over 100 miles north of Flint, residents of Oscoda, Michigan, have spent years voicing their concerns about another serious envi-

[1] The prepared statement of Senator Paul appears in the Appendix on page 41.
[2] The prepared statement of Senator Peters appears in the Appendix on page 43.

ronmental and public health threat in their drinking water, this time from highly fluorinated chemicals known as PFAS. These chemicals are widely used in products like non-stick cookware, water-repellent clothing, stain-resistant upholstery, and many firefighting foams. They are extraordinarily persistent, meaning they do not break down naturally in the environment. They accumulate in the soil, in our water, in our food, and too often in our bodies. They are toxic and they are not well regulated.

I am grateful to Mr. Leriche for being here today to talk about the impact of contamination on his community in Oscoda and the challenges residents face around the former Wurtsmith Air Force Base.

Unfortunately, Oscoda is not alone. There are contaminated sites throughout Michigan and the entire Nation. Sandy Wynn-Stelt of Belmont, Michigan, who is here today and I met with earlier, was exposed to one of the highest concentrations of these chemicals that have been identified in the United States, and now has PFAS levels in her blood that are more than 750 times the national average.

Tobyn McNaughton is also here. Her 2-year-old son, Jack, this beautiful young boy, has what may be the highest documented PFAS levels known for children at 484,000 parts per trillion. He is just 2 years old. Families in Parchment Township, Michigan, were also forced to switch to bottled water earlier this summer, and now they fear that their children have been poisoned since their birth.

As a Senator from the State of Michigan, a State surrounded by the Great Lakes, the world's largest source of fresh water, I am appalled by the number of water crises that we have faced. My constituents and people across the country are facing this crisis and are also fed up as well.

Mr. Chairman, I request the permission to enter into the record a few statements from Michiganders who are urging swift action on these fluorinated chemicals, without objection.[1]

I asked for this hearing because I believe that everyone in this great country should have access to safe drinking water, and I want to do everything I can to ensure that the Federal Government is effectively managing this crisis.

Soon the Senate will approve a Federal Aviation Administration (FAA) bill that includes my language to remove Federal mandates requiring the use of these chemicals in firefighting foams, and I have also worked with my colleagues to urge the Environmental Protection Agency (EPA) to swiftly establish national enforceable standards to enable longer-term cleanup.

I look forward to hearing more from the EPA today. These are important bipartisan steps that we are taking today, but they are certainly just the beginning. I look forward to hearing more today about what Federal agencies are doing, what more they can do, and what Congress must do to identify contamination, prevent exposure, reduce harm to human health, and to expedite the cleanup and assistance to the affected communities.

Mr. Chairman, before I introduce our panel, I know one of our colleagues, Senator Harris, would like to give an opening statement. Without objection, she could take that time, and then I will

[1] The information submitted by Senator Peters appears in the Appendix on page 103.

introduce each of the panelists for their statements. Senator Harris.

OPENING STATEMENT OF SENATOR HARRIS

Senator HARRIS. Thank you, Senator Peters. I want to thank the Committee for having this hearing and for the witnesses' being here today to testify about PFAS contamination.

I hope we can all agree that everyone deserves the right to breathe clean air and drink clean water. The issue of contamination from PFAS chemicals is a critical public health issue, impacting the water supplies of millions of Americans and the consumer products of millions more.

I know we have a number of people impacted by PFAS here and in the audience, and I want to thank you for being here and for your courage to speak up and to let us recognize you.

PFAS chemicals can be found in the non-stick cookware that families use every day. They are in stain-resistant and water-repellent fabrics that consumers wear. Multiple water systems across California have tested positive for PFAS concentrations above recommended levels with our military bases experiencing especially high concentrations of PFAS from foams that have been used to put out aircraft fires.

These chemicals can accumulate and stay in the human body for long periods of time with potentially devastating impact. Studies indicate that chemicals such as PFAS can increase cholesterol levels. They can lead to low infant birth weights, to thyroid hormone disruption, and to an increased risk of cancer.

As we learn more about the toxic nature of these chemicals, it is critical that the government take steps to protect public health, improve data gathering and transparency, increase public awareness and education, and make decisions based in fact and hard science.

I am very troubled by reports that administration officials sought to block publication of a report on this PFAS contamination crisis because they feared "a potential public relations nightmare." Our government should not pretend that PFAS contamination is not happening, and we should do something about it.

I am proud that California is leading the way in addressing PFAS contamination. Earlier this year, California began the process to consider carpets and rugs containing PFAS chemicals a priority product under the State's Safer Consumer Products Program, and I hope California can be a model for other States. Hearings like this, in closing, are important, Mr. Chairman and Mr. Ranking Member, to elevate issues impacting public health, and I appreciate that all of the witnesses are here and everyone who traveled to Washington, D.C., to share your stories.

Thank you.

Senator PETERS. Thank you, Senator Harris.

I am pleased to intorduce our first panel. This hearing will consist of two panels. In the first panel, we are joined by four experts in this area.

First, Dr. Grevatt is the Director of the Office of Groundwater and Drinking Water at the Environmental Protection Agency. He

is responsible for safeguarding America's drinking water and overseeing State drinking water programs.

Ms. Sullivan is the Deputy Assistant Secretary of Defense for the Environment in the Office of the Assistant Secretary of Defense for Energy, Installations and Environment. She is responsible for policies and programs related to environmental laws, cleanup of contaminated sites, and emerging contaminants. Her professional career spans 38 years serving in the Office of the Secretary of Defense and the Defense Logistics Agency in Virginia, Michigan, Ohio, and Germany.

Dr. Birnbaum is the Director of the National Institute of Environmental Health Sciences (NIEHS) at the National Institutes of Health (NIH) and the National Toxicology Program (NTP). She is a renowned expert and board-certified toxicologist. Dr. Birnbaum is responsible for researching environmental influences on human health.

Mr. Lepore is the Director of Defense Capabilities and Management at the U.S. Government Accountability Office (GAO), where he directs audits on the Department of Defense (DOD) Infrastructure and Facility Programs, Construction, and Environmental Management. Mr. Lepore, I will say, is a frequent flyer with this Committee, and we often rely on his hard work and astute analysis.

Good afternoon, and again thank you to all four of you for being here today to discuss this extremely important topic. Dr. Grevatt, we will begin with your testimony.

TESTIMONY OF PETER C. GREVATT, PH.D.,[1] DIRECTOR, OFFICE OF GROUND WATER AND DRINKING WATER, U.S. ENVIRONMENTAL PROTECTION AGENCY

Mr. GREVATT. Thank you. Good afternoon, Chairman Paul, Ranking Member Peters, and Members of the Subcommittee. I am Peter Grevatt, Director of the U.S. Environmental Protection Agency's Office of Groundwater and Drinking Water, and I also serve as the Chair of EPA's cross-agency efforts to address per- and polyfluoroalkyl substances. Thank you for the opportunity to testify today.

Protecting America's drinking water is one of EPA's top priorities. I am here today to share with you the actions the agency is taking to address PFAS.

PFAS are a group of manmade chemicals that have been in use since the 1940s. PFAS are, or have been, found in a wide variety of consumer products and as an ingredient in firefighting foam. PFAS manufacturing and processing facilities, airports, and military installations are some of the contributors of PFAS releases into the air, soil, and water.

Because of their widespread use, most people have been exposed to PFAS, and there is evidence that exposure to certain PFAS may lead to adverse health effects.

The EPA has taken steps under its various statutory authorities to understand and address these chemicals. For example, under the Toxic Substances Control Act (TSCA), the agency has issued various significant new use rules for certain PFAS chemicals to guard

[1] The prepared statement of Mr. Grevatt appears in the Appendix on page 45.

against their reintroduction or new use without prior EPA review. Under the Safe Drinking Water Act (SDWA), which my office oversees, EPA has also monitored for six PFAS to understand the nationwide occurrence of these chemicals in our drinking water systems.

In 2016, EPA issued drinking water lifetime health advisories (LHAs) for two well-known PFAS—PFOA and PFOS—of 70 parts per trillion. EPA is also working to move research forward on PFAS to better understand their health impacts, options for treatment, and how information on better-known PFAS can be applied to inform our knowledge of other PFAS.

To build on these actions, EPA hosted a PFAS National Leadership Summit in May of this year. The summit provided an opportunity for participants to share information on ongoing efforts, to identify specific near-term actions, and to address risk communication challenges with PFAS.

At the event, EPA committed to work on four significant actions:

First, to evaluate the need for a maximum contaminant level for PFOA and PFOS;

Second, to begin the necessary steps to consider designating PFOA and PFOS as "hazardous substances;'

Third, to develop groundwater cleanup recommendations for PFOA and PFOS at contaminated sites;

And, last, to develop draft toxicity values for two PFAS—GenX and perfluorobutane sulfonic acid (PFBS).

EPA also continues to provide support to States, tribes, and communities who are addressing PFAS issues. As EPA takes these actions, the Agency is also committed to working with our Federal partners, including the Department of Defense and the Department of Health and Human Services (HHS). We look forward to continuing our interagency dialogue and collaboration.

Additionally, EPA recognizes the need to hear from citizens. Since June, EPA has traveled to five States across the country to hear directly from communities. EPA is also planning to travel to Michigan next week to hear directly from constituents in the State. These experiences are invaluable, and community feedback will help shape how we move forward.

EPA will consider information from the National Leadership Summit, community engagements, and the public docket to develop a PFAS Management Plan.

Protecting public health is EPA's top priority. Acting Administrator Andrew Wheeler has expressed his continued commitment to considering actions on PFAS so that EPA can lead efforts that meet the needs of impacted communities.

Once again, Chairman Paul, Ranking Member Peters, and Members of the Subcommittee, thank you for the opportunity to discuss PFAS, and I look forward to answering any questions that you may have.

Senator PETERS. Thank you, Dr. Grevatt. Ms. Sullivan.

TESTIMONY OF MAUREEN SULLIVAN,[1] DEPUTY ASSISTANT SECRETARY OF DEFENSE FOR ENVIRONMENT, OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE FOR ENERGY, INSTALLATIONS AND ENVIRONMENT, U.S. DEPARTMENT OF DEFENSE

Ms. SULLIVAN. Chairman Paul, Ranking Member Peters, and distinguished Members of the Subcommittee, I am Maureen Sullivan, the Deputy Assistant Secretary of Defense for Environment. My portfolio includes oversight of DOD's programs to comply with environmental laws such as the Safe Drinking Water Act and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). I want to thank Congress for your strong support for the Department of Defense, our national security priorities, and for the funding we need to protect our Nation. Ensuring the health and safety of our servicemembers, the families living on our installations, and the surrounding communities is one of our top priorities.

I also want to thank this Committee for the opportunity to discuss the establishment of a national approach to per-and polyfluoroalkylide substances. We believe DOD has been leading the way to address these substances.

One commercial product that contains PFAS is Aqueous Film Forming Foam (AFFF). This highly effective firefighting foam has been used by DOD, commercial airports, local fire departments, and the oil and gas industry. However, it only accounts for approximately 3 to 6 percent of the PFAS production in the calendar year 2000, and DOD is just one of many users.

DOD has committed substantial resources in the last 2 years and has taken action to respond to concerns from PFOS PFOA. When EPA issued the lifetime health advisories, for PFOS and PFOA in May 2016, the Department acted quickly to voluntarily test our 525 drinking water systems that serve approximately 2 million people on our installations worldwide. Twenty-four of these systems tested above EPA's lifetime health advisory level. Although it is only an advisory, DOD has followed EPA's recommendations to include providing bottled water or additional water treatment.

CERCLA provides a consistent approach across the Nation for cleanup. The Department of Defense Environmental Restoration Program statute provides authorities to DOD to perform and fund actions, and requires they be carried out in accordance with CERCLA. The first step is to identify the source of known or suspected releases. DOD has identified 401 active and Base Realignment and Closure installations with at least one area where there is a known or suspected release of PFOS or PFOA.

The Military Departments then determined whether there is exposure through drinking water and, if so, the priority is to cutoff human exposure where drinking water exceeds EPA's lifetime health advisory. Once the exposure path is broken, the Military Departments are prioritizing the sites for further action using the longstanding CERCLA risk-based process, "worst first." These known or suspected PFOS and PFOA release areas are in various stages of assessment, investigation, and cleanup.

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[1] The prepared statement of Ms. Sullivan appears in the Appendix on page 50.

To prevent further releases into the groundwater, DOD issued a policy in January 2016 requiring the Military Departments to prevent uncontrolled, land-based AFFF releases during maintenance, testing, and training activities. The policy also requires the Military Departments to remove and properly dispose of the supplies of AFFF containing PFOS—other than for shipboard use.

Currently no fluorine-free version of AFFF meets the military's very stringent performance requirements to extinguish petroleum fires. However, between fiscal year (FY) 2017 and fiscal year 2019, we solicited research projects to identify and test the performance of fluorine-free AFFF. These efforts support DOD's commitment to finding an AFFF alternative that meets critical mission requirements while protecting human health and the environment and will represent $10 million in research and development (R&D) funding.

In summary, DOD is taking actions to reduce the risks. We are committed to mitigating PFOS and PFOA releases to the environment that are a direct result of DOD activities. DOD is making significant investments in research and development for fluorine-free AFFF, and these combined efforts reinforce DOD's commitment to meet critical mission requirements while protecting human health and the environment.

We look forward to working with you as you move forward. Thank you.

Senator PETERS. Thank you, Ms. Sullivan. Dr. Birnbaum.

TESTIMONY OF LINDA S. BIRNBAUM, PH.D., D.A.B.T., A.T.S.,[1] DIRECTOR, NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES AND NATIONAL TOXICOLOGY PROGRAM, NATIONAL INSTITUTES OF HEALTH, DEPARTMENT OF HEALTH AND HUMAN SERVICES

Ms. BIRNBAUM. Good afternoon, Mr. Chairman, Ranking Member Peters, and distinguished Members of the Subcommittee. I am Linda Birnbaum, Director of NIH's National Institute of Environmental Health Sciences. I am also Director of the National Toxicology Program, which develops and coordinates toxicological testing across HHS.

For more than 39 years, I have personally conducted research in toxicology, and I am here today to provide a scientific perspective about the large, complex, and ever-expanding class of chemicals known as per-and polyfluoroalkyl substances.

PFAS are some 4,700 manmade chemicals that contain fluorine atoms bonded to a carbon chain. The carbon-fluorine bond is one of the strongest ever created by man, and it is rarely seen in nature. The chemical composition of PFAS imparts high stability for consumer product design but also makes PFAS extremely problematic in the environment because they do not easily degrade. In fact, PFAS remain in the environment for so long that scientists are unable to estimate an environmental half-life.

The use of PFAS is growing, and they are being incorporated into more processes and products than ever before. PFAS chemicals are making their way into our environment and can undergo long-

[1] The prepared statement of Ms. Birnbaum appears in the Appendix on page 56.

range atmospheric and oceanic transport. PFAS are now ubiquitous and have been identified in even the most remote environments.

NIEHS has sponsored basic research investigating health effects associated with human exposure to PFAS for three decades. Our understanding of the health effects associated with PFAS and our ability to draw conclusions is based on combined data from many studies, including epidemiological associations in human cohort studies, biological plausibility and pathways studies in animals, mechanistic effects seen in human tissue and cell culture systems, and rapid high-throughput screening. By combining and carefully considering data from all these studies, we can build an understanding of how PFAS chemicals impact human health.

Research conducted to date reveals statistically significant associations between human PFAS exposures and specific adverse human health outcomes. These include potential effects on children's cognitive and neurobehavioral development, immune system dysfunction, endocrine disruption, obesity, diabetes, lipid metabolism, and cancer. While further studies are necessary, mechanistic studies in animals support our understanding of the biological underpinnings for these associations. NIEHS continues to conduct research to understand the biological processes affected by PFAS and how this may be harming human health.

I would like to emphasize four key points.

First, PFAS are extremely stable and, therefore, persist for a very long time in the environment.

Second, human exposures to PFAS are extremely widespread, and humans are exposed to PFAS through many pathways, practices, and products. While ingestion, particularly through drinking water, is the predominant human exposure pathway, recent studies suggest other routes of exposure, including inhalation and dermal.

Third, while we have studies that indicate potential adverse health effects due to a few PFAS, our findings are limited, and we do not have data for thousands of PFAS that have not been well studied. Based on what we know so far, we can extrapolate conclusions about structurally similar compounds which we can reasonably expect to act through the same pathways and have similar effects. With so many PFAS compounds, we cannot test our way out of this.

Finally, I want to point out that we are learning about new and different PFAS exposures in many communities, even as we learn more about the potential hazards to human health. Inevitably questions arise about whether PFAS should be used so widely or if safer alternatives exist that still provide sufficient product performance. As part of our research portfolio, NIEHS contributes substantively to the fields of alternatives assessment to ensure harmful chemicals are not replaced by equally harmful but less well studied compounds.

To conclude, Mr. Chairman, NIEHS is well positioned to provide new and essential scientific knowledge about PFAS consistent with our missions under both the Public Health Service Act and CERCLA. We are coordinating our efforts with other agencies to prevent duplication, and we are sharing our results.

Thank you for inviting me to participate in this hearing today, and I look forward to answering your questions. Thank you.

Senator PETERS. Thank you, Dr. Birnbaum. Mr. Lepore.

TESTIMONY OF BRIAN J. LEPORE,[1] DIRECTOR, DEFENSE CAPABILITIES AND MANAGEMENT, U.S. GOVERNMENT ACCOUNTABILITY OFFICE

Mr. LEPORE. Thank you, Senator. Mr. Chairman, Ranking Member Peters, and Members of the Subcommittee, I am delighted to be here today to discuss the Department of Defense's efforts to manage contaminants in its drinking water systems. I am here on behalf of myself and my colleague Alfredo Gomez, a Director in our Natural Resources and Environment team. Our two teams collaborated on our statement today and the underlying report on which our statement is based.

You asked us to discuss the Federal role in addressing PFAS contamination nationwide. I will make two points. I will discuss the actions DOD has taken to address elevated levels of PFAS and PFOA in drinking water, and I will describe steps DOD is taking to address health and environmental concerns with its firefighting foams containing PFAS. But, first, I think it is important to emphasize EPA has not yet issued drinking water regulations for PFAS.

EPA has reported working with States and communities to monitor water systems for six types of PFAS chemicals. This may help them to understand the occurrence of these chemicals across the country. Such monitoring is part of a larger framework established under the Safe Drinking Water Act. Under the framework, EPA is to identify unregulated contaminants presenting the greater public health concern, establish a program to monitor drinking water for them, and decide whether or not to regulate at least five contaminants every 5 years.

EPA included six PFAS, including PFOS and PFOA, in its unregulated contaminant monitoring rule process, and EPA can issue a drinking water regulation if warranted.

Now, even when EPA does not issue a regulation, it may publish drinking water health advisories. These advisories are not enforceable, but they do recommend the amount of contaminants that can be present in drinking water at levels that are not expected to cause adverse health effects.

While EPA has not regulated PFAS, in May 2016 EPA issued lifetime health advisories for PFAS and PFOA at individual or combined concentrations of 70 parts per trillion in drinking water. DOD considers these health advisories in deciding on cleanup at its installations with PFAS or PFOA contamination, which brings me to my first point.

DOD's actions to address elevated levels of PFAS and PFOA in drinking water. Since issuance of the lifetime health advisory, each of the Military Departments have directed their installations to: first, identify locations with PFAS or PFOA releases and address any consequent risks to human health; second, test for PFAS or PFOA and address any contamination above the EPA health advisory level. As you heard earlier, DOD has identified 401 active or closed bases with known or suspected PFAS or PFOA released.

[1] The prepared statement of Mr. Lepore appears in the Appendix on page 69.

In January 2017, we recommended to DOD that they include the cost of PFAS and PFOA cleanup in annual reports to Congress. DOD implemented our recommendation in its June 2018 report. The estimate at that time was about $200 million.

DOD has also addressed PFAS and PFOA contamination off the installations. DOD has shut down drinking water wells, provided alternative sources of drinking water, and installed water treatment systems. DOD has also indicated it may still take several years to determine the full cleanup costs for PFOS and PFOA contamination.

Now I will turn to my second point: steps DOD is taking to address environmental concerns with its firefighting foam. These steps include: restricting the use of existing foams containing PFAS; testing current foams to determine the amount of PFAS they contain; and funding research into PFAS-free replacement foams that meet DOD's performance and compatibility standards.

DOD's military specification for firefighting foam requires such foam to contain PFAS. At the time of our report, no PFAS-free foam was available that met the military specification. Now, the Navy authors the military specification, and Navy officials told us if a PFAS-free foam that meets the specification becomes available, they would change the requirements. However, as of June 2018, DOD still reported no commercially PFAS-free foam met the performance requirements of the military specification. DOD-funded research efforts are continuing, however.

Mr. Chairman, Ranking Member Peters, and Members of the Subcommittee, I would be delighted to answer any questions that you may have.

Senator PETERS. Thank you to each of you for your testimony and highlighting what is indeed a significant problem and a concern for all of us.

I am going to start my questions with Dr. Birnbaum. Again, thank you for being here. A lot of what is known and discussed about PFAS chemicals focuses on two specific chemicals, which is PFOS and PFOA. But your testimony included the following point, and I would like to take a moment to underscore it because I think it is very important.

You said, "Approaching PFAS as a class for assessing both exposure and biological impact is the best way to protect public health." That is a significant statement. I think it has to be taken to heart, and I want you to paint a little picture here for us so we understand exactly what we are dealing with.

Would you please explain just how bad PFAS is relative to other more commonly understood contaminants? Basically, if you were to compare PFAS to some other contaminant that was eventually regulated as a toxic substance, what would you suggest as a comparison?

Ms. BIRNBAUM. Senator Peters, thank you for the question. Some of the problems with PFOS and PFOA and many other members of the class is the fact that they never go away. They will persist in the environment certainly as long as any of us are here, and many of them, like those two as examples, also persist in our bodies with half-lives on the order of years—in fact, many years. These chemicals build up not only in the environment but in our bodies.

For the compounds that do not last as long in our bodies, they still last in the environment so that they will build up, so that ongoing exposure can be a problem as well.

I think if we look at other persistent bio-accumulative chemicals, if we compare it to some things like DDT or DDE, which, although it was banned 40-some years ago, is still in every one of us, or polychlorinated biphenyls (PCBs) that were banned by Congress in the late 1970s, and we still all carry them in our bodies. I think that is a concern for this class of compounds, that they will be with us long after they stop being made.

Senator PETERS. That is disturbing, and, in fact, I have heard from one researcher who said basically if you are a geologist at some point in the future, however many millions of years, and you look at the strata in the rock, you will actually find PFAS chemicals. That is how long-lasting they are. That should be a wake-up call to everyone of what we are dealing with.

I recently spoke with a scientist who also compared the presence and use of PFAS in our everyone to the situation we once created with lead, as an example. Lead was once used everywhere. It was in gasoline, our cars, our pipes and our plumbing, and the paint that we used on our walls. As a result of that widespread use, lead has created some very serious and some very tragic consequences. While we have made progress to reduce lead, we are still struggling to replace outdated infrastructure with those lead pipes.

PFAS chemicals strike me as very similar. They seem to be used everywhere. What is known about how people are exposed to PFAS? How are the contaminants taken into the body? What sort of impact would we expect?

Ms. BIRNBAUM. PFAS chemicals, we can be exposed to them in many ways since they are present in many consumer products, including the clothes that we wear, the carpets that we walk on, the paper products that are used for food, as well as, for example, being released into drinking water. We can ingest them from all those routes.

Also, especially at production facilities or use facilities, we can inhale them. When things are inhaled into our body, they often have very different effects than when we ingest them. Some of the PFAS can be absorbed through our skin, so young children crawling around on the carpet may have more exposure, for example, than adults.

Senator PETERS. Nationally, communities seem to be focused on finding PFAS chemicals, but primarily looking at only a handful of those PFAS chemicals. What should we be doing differently going forward to better capture the potential risk that you are outlining here?

Ms. BIRNBAUM. Thank you for that question. It is a very difficult question because we really do not know very much about the thousands of chemicals that have been produced. There are CAS numbers, which are chemical abstract numbers, for 4,700 of them, but there are additional PFAS which are being produced in the environment by breakdown of some of the very long chain, the polymeric forms of PFAS.

Let us see. I think I am forgetting the question.

Senator PETERS. What should we be doing differently to deal with all these others?

Ms. BIRNBAUM. Yes, so I think the thing is I had suggested at the EPA summit several months ago the possibility of monitoring for total organic fluoride. There are essentially no sources of naturally occurring organic fluorides, and we can search for that. There are technological ways that we can do that, and we can at least use that for a screening approach. Just measure all the organic fluorides and determine where we might have a problem and where we do not find many. I would say that that is one way for us to get a handle on it.

Senator PETERS. Ms. Sullivan, thank you as well for being here and the work that you have been doing on this issue. You and I have spoken about Wurtsmith and other sites in Michigan, and I know you hear very similar and very sobering concerns about hundreds of other sites across the Nation. Yet residents of Oscoda are frustrated, to say the least, and I believe justifiably so, with the slow pace of both the State and Federal action in that area. The EPA withdrew oversight of Wurtsmith in 2016, leaving the Air Force and the State to handle that cleanup. I realize that you are not in a position to discuss specifics, as it is currently the subject of a dispute resolution process right now with the State.

But let me ask you this: From a national perspective, would the EPA groundwater cleanup recommendation for PFOA and PFAS at a contaminated site be helpful for you at the Department of Defense?

Ms. SULLIVAN. Thank you for the question, sir. We have been requesting that guidance for a number of years. Although we can, in fact, use the reference dose behind the lifetime health advisory under the CERCLA process to calculate an unacceptable risk, it is a site-by-site determination, and it is not a national approach, a consistent approach to how to deal with these sites. It creates confusion on the part.

We are moving forward. As I stated, we have identified where we are directly impacting drinking water, and we have short-circuited the CERCLA process to cutoff those exposures where the drinking water exceeds EPA's lifetime health advisory. But consistent guidance from EPA would be extremely helpful to not only us but all of the entities that have sources of PFAS and PFOA.

Thank you.

Senator PETERS. Thank you, Ms. Sullivan. I am out of time. I am going to have more questions for the panel but Chairman Paul has some questions.

Senator PAUL. I was just thinking about when Dr. Birnbaum said there are no natural sources of organic fluoride compounds. When you use the term "organic fluoride," do you mean fluoride hooked up to carbon? Is that why you call it "organic?"

Ms. BIRNBAUM. Yes, that there are—I should have said "almost no"——

Senator PAUL. OK, because we add fluoride to our water. We add fluoride salts, right?

Ms. BIRNBAUM. We do add fluoride salts to some drinking water.

Senator PAUL. Fluoride salts do not—is there a possibility they can chemically react with alkyl substances that are in the water

separately and you could be fluorinating things and actually creating PFAS?

Ms. BIRNBAUM. There is no evidence for that occurring.

Senator PAUL. But, chemically, does that happen? How hard is it to polyfluorinate an alkyl substance? Does it take electricity? Does it take some—to get the reaction to work? Or is it something that if you mix fluoride with carbon, you can get carbon hooked up to fluoride?

Ms. BIRNBAUM. I do not think it is an easy reaction to cause, but I will be glad to provide more information on that.

Senator PAUL. I am not saying there is a problem with fluoride in the water. What I am just saying is that we do put it in there, and somebody should have an answer for that. Does anybody else have an answer to the question?

Mr. GREVATT. Not beyond what Dr. Birnbaum stated. We would be happy to circle back with you, but I know it is a fairly complicated process to manufacture——

Senator PAUL. It is probably scientifically not really possible. If somebody would just look it up and get back to us in a written form, I think to reassure people about fluoride in the water, that fluoride does not react with alkyl substances, I think that would be helpful.

The only other question I had was, we are going to have some people, I think, who are going to present, who have very large levels of this in their system. Is there a theory as to why some people would get so much of it and then others would not, in that we are all sort of exposed to a lot of the same things as far as the drinking water and carpets, etc?

Ms. BIRNBAUM. I think that there is some data that suggests that people living near use facilities may have higher levels because there is more release into the environment——

Senator PAUL. Living near what?

Ms. BIRNBAUM. Living near a use facility. In other words, a place where the PFAS are being used to make products, or by a production facility. There is some data that suggests that very young children have higher levels, for example, than their parents, and much of that, again, is related to their behavior.

Senator PAUL. Then the only other question I have is that when you are looking at regulating something like this or trying to prevent it from happening, there are certain things that probably would be easier to get into the water—a piece of plastic, a plastic bottle, or something—the PFAS from that getting into the drinking water is less likely than, say, foam sprayed on a runway and it rains and gets into the storm water drainage. Is there an estimate of where more of the problem is coming from? Is a lot of it this firefighting foam? Or, are we saying that the problem is more related to one entity that makes this as opposed to non-stick cookware?

Mr. GREVATT. If I may, Dr. Birnbaum. Thank you for the question, it is a really important one, and this really is about the sources. As Dr. Birnbaum mentioned, we know that across the population in the United States, through the NHANES Survey, we know that there are levels in most of our bodies. But there are much higher levels where there are particular sources like near sites where firefighting foams have been used—that is not only

military bases; that can be airports and other fire training areas—near manufacturing facilities, and we have seen some instances where we actually have visited EPA communities impacted by manufacturing facilities. There are particular areas around known sources where the concentrations can be quite elevated beyond the rest of the population in the country.

Senator PETERS. Thank you, Chairman Paul. Senator Hassan.

OPENING STATEMENT OF SENATOR HASSAN

Senator HASSAN. Thank you very much, Chairman Paul and Ranking Member Peters, for holding today's really important hearing. To all of the witnesses, thank you as well for being here.

Before I begin with questions, I would also like to thank a lot of the advocates from around the country who have really taken this on, particularly in my home State of New Hampshire. Thank you for taking the time to come meet with me and my colleagues to discuss how the PFAS crisis is affecting communities in New Hampshire and around the country. Mr. Chairman, I have had numerous people write in about their experiences with PFAS, and I believe these letters provide a resource for those who want to learn more. They tell personal stories, and I would like to submit them for the record.[1]

Senator PAUL. Without objection.

Senator HASSAN. Thank you.

Dr. Birnbaum, I want to build a little bit on the testimony you have already provided to us. We have heard a lot about PFAS exposure around Department of Defense bases, and I think you know, and Dr. Grevatt just actually mentioned, it is also important to discuss industrial contamination as well.

In New Hampshire, a number of communities, including Merrimack, have been struggling for 2 years to address PFAS-tainted water wells around a use facility called "Saint-Gobain." You spoke about the multiple exposure pathways that we should be paying attention to. Can you elaborate on how your agency is coordinating between and among the Federal agencies on developing toxicological profiles and human health risk assessments for PFAS chemicals?

Ms. BIRNBAUM. Thank you for the question. NIEHS is part of NIH, and it conducts biomedical research. We are conducting and funding a great amount of research looking at what the potential health impacts would be from exposures to this very large class of chemicals. Our National Toxicology Program is actually conducting rapid studies to try to get a handle of a much larger number than just PFOA and PFOS, and we collaborate with our Federal partners—the EPA, the Department of Defense, the Centers for Disease Control and Prevention (CDC), the FDA, and others—so that they will have the information they need to make good policy choices.

Senator HASSAN. Thank you. That is very helpful, and we may follow up with you a little bit more about where that coordination is happening and how we can help support it.

[1] The letters referenced by Senator Hassan appears in the Appendix on page 103.

Dr. Grevatt, PFAS is a national issue, and the need to understand the significance of this chemical class within our impacted public drinking water systems is critical. However, much of New Hampshire and, frankly, the Northeast, for that matter, is serviced by private drinking water wells and systems. Can you please share with me what type of technologies exist to effectively, safely, and affordably conduct tests at private wells to ensure safe water quality? What is the EPA doing to make these testing technologies available to those who believe they have been affected?

Mr. GREVATT. Yes. Thank you very much for the question, and we were very pleased to be able to visit with many of the folks who are here in Exeter when we traveled up there for our first community engagement meeting.

As you stated, this has been an issue both in community water systems and in private wells. EPA has studied the Nation's drinking water systems in terms of occurrence, but also has been supporting sampling of private wells in communities, particularly in terms of providing technical assistance on those issues.

We are currently examining the utility of various treatment technologies, both for community water systems and also for point-of-use devices for private wells to make sure that we can help to identify strategies to address those concerns that have risen in a number of communities. This has been a very important part of our work.

Senator HASSAN. I thank you for the work. Are there technology improvements that are being worked on or lie ahead to improve the treatment of drinking water and reduce the cost to private well owners?

Mr. GREVATT. Absolutely, without question, and EPA has an active research program, in collaboration with other Federal partners, to identify technologies for treating these compounds not only in drinking water but actually in other sources like a contaminated site. This is a very active area of research for us.

Senator HASSAN. Thank you.

To Ms. Sullivan, as you mentioned, the CERCLA, establishes liability for remediation and natural resource damages for releases of hazardous substances into the environment, but not other pollutants or contaminants.

What is the position and moral obligation of the Department of Defense on responding to releases of PFAS from current and former U.S. military installations for which there is no current liability under CERCLA?

Ms. SULLIVAN. I want to think through that question, ma'am.

Senator HASSAN. Sure, yes.

Ms. SULLIVAN. That is a complicated question, to be honest with you, because our obligations do stem from CERCLA and from the Defense environmental restoration account statute on what our responsibilities are. Once there is enough toxicological information about a compound, EPA has established a clear process, a longstanding clear process, of how you enter into the CERCLA process when you have enough information. The reference dose behind the lifetime health advisory is that trigger to say, yes, there is enough information about the toxicology to roll it into the CERCLA risk assessment process.

Senator HASSAN. I am going to push back a little bit here because we have a process established, and I think for people in New Hampshire whose wells have been impacted, whose water systems have been impacted, or parents whose children are crawling on carpeting on industrial uses, but when we are talking about DOD base exposures, people are very concerned about the harmful nature of these chemicals, and they want DOD to be stepping up now to help them get clean drinking water and to help reduce their exposure for firefighting foam. Waiting for the perfect situation where CERCLA would apply under its current parameters may not get people the help that they are looking for right now.

Ms. SULLIVAN. Ma'am, I appreciate what you are talking about. That is why we said that our first priority is cutting off drinking water exposure——

Senator HASSAN. Right.

Ms. SULLIVAN [continuing]. That is above the lifetime health advisory. We have done that as, in essence, a removal action under the CERCLA process. Doing it prior to going through the full CERCLA investigation risk assessment process, to work with the communities, and as you know, the Air Force has just signed an agreement to provide Portsmouth with over $14 million to build a treatment facility there.

Senator HASSAN. Right, and I appreciate that. I think we are going to be looking for scaling that kind of response up.

I see that I am over, but the other part of this question is: What is DOD doing with handling waste materials, for instance, that contain PFAS? We can follow up on that.

Ms. SULLIVAN. I would be glad to.

Senator HASSAN. Thank you.

Senator PETERS. Thank you, Senator Hassan. Senator Shaheen.

OPENING STATEMENT OF SENATOR SHAHEEN

Senator SHAHEEN. Thank you very much, Chairman Paul and Ranking Member Peters. I very much appreciate your willingness to let me sit in with this Subcommittee as you are holding this hearing. Thank you to all of the witnesses. As you could tell from my colleague from New Hampshire Senator Hassan, and as many of you already know, this is a huge issue for us in New Hampshire.

I would like to actually begin with you, Dr. Grevatt, because I think Senator Peters referenced the report which we learned that the Agency for Toxic Substances and Disease Registry (ATSDR), had delayed, that indicated the impact of the minimum risk levels for PFOA and PFOS should be 10 times lower than what the agency had previously determined.

Dr. Grevatt, based on those findings, is the EPA considering updating the lifetime health advisories for those chemicals?

Mr. GREVATT. Thank you very much for the question, and thank you also for your support of our work in New Hampshire. We are very close collaborators with ATSDR. We work with them on their toxicity profile, and they are actually working with us right now on toxicity assessments we are doing on additional compounds—PFBS and GenX—as is Dr. Birnbaum, the folks at NIEHS, and at the Department of Defense.

We are not planning currently to update our drinking water health advisories for PFOA and PFOS. We recognize, as does ATSDR, that the purposes of their toxicity profile differ from our health advisories. Theirs is really focused on a screening approach, and that is part of the reason why they have lower values than we have. We believe that our health advisories are supported by the strongest science, and we also appreciate why they took the direction they did in their toxicity profiles.

Senator SHAHEEN. As you are working with them, do you have any kind of timetable whereby you expect to definitively determine whether the levels make sense going forward? Or are you telling me that, based on the science, you believe that you have set the correct levels for human health?

Mr. GREVATT. Yes, based on the current science, we believe that the health advisory value that we have developed is supported, and we subjected that to independent external peer review, and we believe that the findings were supported. But in saying so, I am not trying in any way to discount the importance of ATSDR's toxicity profile, but really to recognize that the purposes of their profile differ somewhat. It is really a screening tool. If levels are found above the values they have established, that is an indicator of the need for additional investigation as opposed to our drinking water health advisories are really trying to identify a level below which we believe it is safe and above which we believe that action should be taken. In fact, that is the way the drinking water health advisory has been used.

Senator SHAHEEN. Are you going to be paying attention to the health study that they currently have underway? Will the outcome of that have any impact on whether you decide to change the levels that you are recommending?

Mr. GREVATT. We will be paying very careful attention to that work, as we are paying very careful attention to the work that Dr. Birnbaum has underway at NIEHS and other research organizations as well. As the science continues to develop, we will look back at this issue and make sure that we continue to have a value that reflects the best science. That is our commitment.

Senator SHAHEEN. I think there is a great deal of concern among people in New Hampshire who have been affected by these chemicals that we really do not know enough yet about the science to be able to make definitive determinations, and that is why the health study is so important.

Dr. Birnbaum, in July, the Centers for Disease Control and Prevention issued a report that said New Hampshire had for the period of time between 2003 and 2014 the highest rates of pediatric cancer in the country. There is a cluster of pediatric cancer in the seacoast, close to where we have seen those elevated levels of PFAS chemicals from the closure of Pease Air Force Base. I wonder if you could describe the work that you are doing at NIEHS to connect PFAS exposure to cancer and how you are working with ATSDR as they are looking at this health study?

Ms. BIRNBAUM. Thank you for your question, Senator Shaheen. We are working very closely with and providing consultation to ATSDR related to the funding that they have gotten through the Department of Defense to deal with eight sites at different places

in the country. The studies are initially going to be looking at exposures so that we really know what people are exposed to at those sites, and then the health effects parts will come later. We are looking at quite a number of years before we will have a lot of data from those studies.

At the same point, we——

Senator SHAHEEN. I am sorry to interrupt, but can you be a little more specific when you say "quite a number of years." Are you talking about 5 years, 10 years, or 20 years?

Ms. BIRNBAUM. I would say we are looking at a 5-year window. That would be realistic. These are very difficult studies to conduct, especially when you are dealing with people living on or around military bases, there is a lot of movement, so it is sometimes hard to track people.

Senator SHAHEEN. Sure.

Ms. BIRNBAUM. Many of our grantees are actually looking at the relationship between this class of chemicals and different kinds of cancer. So far there are associations that have been reported by our grantees and others that have shown associations with a wide variety of cancers. We are not talking about just one type. But we have not seen an increase in pediatric cancers in the studies that have been conducted to date. That may in part be because the question has not yet been asked, so I think that there is an opportunity to investigate this elevated rate that appears to be especially in a specific region of New Hampshire. We would welcome grants in that area.

Senator SHAHEEN. I am not quite clear when you say "because the question has not been asked." What exactly do you mean by that?

Ms. BIRNBAUM. When people design, say, whether it is an animal study or a human study, people usually have a hypothesis that they are testing. Most of the animal studies which provide the biological plausibility to say what we might see in an epidemiology study makes sense have focused on adult animals, not developing animals.

Senator SHAHEEN. As you all know, there were two child-care centers that were located on Pease where children drank that water almost from birth. I hope that that question will be asked as part of the study.

Thank you all very much. Mr. Chairman, I am out of time, but I have a statement here from the Merrimack Citizens for Clean Water[1] as well as the Commissioner of our Department of Environmental Services in New Hampshire that I would like to ask be introduced for the record.[2]

Senator PAUL. Without objection.

Senator PETERS. Without objection.

Senator SHAHEEN. Thank you.

Senator PETERS. Thank you, Senator Shaheen. Senator Jones.

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[1] The statement referenced by Senator Shaheen appears in the Appendix on page 159.
[2] The statement referenced by Senator Shaheen appears in the Appendix on page 167.

OPENING STATEMENT OF SENATOR JONES

Senator JONES. Thank you, Senator Peters, and I appreciate the opportunity. Thank you all for coming here today.

Like New Hampshire, I have a different issue in Alabama. We have a number of water supplies in Alabama that a bunch of constituents are affected by what appears to be private manufacturers, and the water supplies have been contaminated. It is obviously a very real concern to those constituents. I know there is some litigation. But I was wondering, Doctor, you stated that you have begun the necessary steps to consider designating PFOA and PFOS as hazardous substances. Could you walk me through that process and give me some kind of estimate—and I know as you sit here today, it will not be firm. It is always a moving target. But walk me through that process and give me some idea of the timeline for a potential designation.

Mr. GREVATT. Right, certainly. Thank you, Senator. This is a very important question and a very important action we are exploring carefully at EPA. The reason why this is so important is that designation as a hazardous substance will provide EPA with the authority and States that are implementing CERCLA with the authority to both order cleanup actions at contaminated sites and also recover costs that are expended by the agency for those actions. There are five statutory mechanisms through which these substances could be listed as hazardous substances, and that includes a number of statutes in addition to CERCLA. We are looking carefully at the various avenues by which this could be accomplished, and we are going to include this as an important component in the agency's management plan that we hope to have completed by the end of the calendar year.

As you point out, such an action is a public notice and rulemaking action, so there would be a proposed rule, regardless of the statutory mechanism, a proposed rule, public comment, and then consideration, careful consideration and comment to get to a final rule. We are talking about years before we could have that completed in all likelihood, just recognizing that if the process started, even at the end of the year, we would have to go through the proposal and then the final rule to get there.

Senator JONES. Right. Given the other testimony we have heard about how stable these substances are, I would encourage EPA to get that moving as quickly as possible. I have had some experience as a Special Master when Anniston—for the PCB cleanup there, I did that for a number of years.

I have another question that is related to that, and I know that there will be at some point a public comment, but I am curious as to if you are already hearing anything from any of these manufacturers, any kind of pushback or—have any of these manufacturers started contacting the EPA with any information or anything like that before this comment period starts?

Mr. GREVATT. Related to the question of listing as a hazardous substance, I do not know that we have had discussion with manufacturers on that particular issue, although I will note that we did have the manufacturing community present at the National Leadership Summit this past May, and this was a topic of discussion there. But, without question, primarily through our TSCA program,

we have ongoing engagement with the manufacturing community on a wide variety of issues, but probably the most prominent ones that we have implemented through EPA using TSCA are both the voluntary phase-out of PFOA and PFOS, but also the significant new use rules that I mentioned that have kind of locked that phase-out in place and requires manufacturers to notify EPA through TSCA Section 5 before they can take steps to begin to reintroduce those compounds into commerce. There has been quite a bit of work with the manufacturing community on those particular issues.

Senator JONES. All right. I hate to belabor the point because it is a pretty complicated process that you guys go through. Has there been any specific pushback to say do not designate this as a hazardous substance?

Mr. GREVATT. Not that I am aware of, sir.

Senator JONES. All right. That is great. Thank you.

This would be to anyone, but, again, particularly to EPA. Are there any steps being taken right now to just kind of raise awareness of the issues so that people are looking at this? What can we do particularly for small water systems? That is where my big concern is in a State like Alabama.

Mr. GREVATT. Yes, thank you for the question. There is a great deal underway to raise awareness of this issue and also to engage the public and the States and local communities on these challenges, both through the National Leadership Summit and then through the community engagement meetings we have had now in five States around the country. I cannot emphasize how important it has been to meet with local citizens to hear the challenges that they are experiencing as we think about the development of the National Management Plan, which is going to be a comprehensive view of steps that we can take across our statutory authorities in collaboration and support of States and local communities to address these issues.

We are hoping to have that completed by the end of the calendar year, and we will continue both through our website presence but also reaching out to communities—and I mentioned to Senator Peters we will be in Michigan next week for another engagement with constituents there. We are going to continue to talk to communities across the country on these issues. Small systems are, without question, a challenge, and technical assistance is a priority for us to small systems, and I think you know that we fund a number of technical assistance activities for small systems.

Senator JONES. Great. Thank you very much. Let me just say in the remaining time I would invite you to north Alabama. There are people anxious to talk to you as soon as possible, so I would invite you, and my office will be happy to help arrange and facilitate that as part of Region IV down in the Atlanta——

Mr. GREVATT. We appreciate the invitation. Thank you.

Senator JONES. All right. Mr. Chairman, I am going to yield the remaining part of my time. Thank you.

Senator PETERS. Thank you, Senator Jones. Senator Carper.

OPENING STATEMENT OF SENATOR CARPER

Senator CARPER. I want to thank my friend from Alabama for yielding 47 seconds to his colleague.

Senator JONES. It is the least that I could do. [Laughter.]

Senator CARPER. Welcome. It is good to see you all again, some of you for the first time, others not the first time. This past February, the little town of Blades, Delaware, which is in the southwestern corner of our State, just under 1,500 people, found that the drinking water had been contaminated with PFOA, one of the PFAS classes of chemicals. Delaware State officials, along with—it was really an "all hands on deck" situation. You had the fire company, you had the Delaware National Guard, you had the Delaware Division of Health, the Department of Natural Resources, and our congressional delegation, all descended on this little town to try to make sure that they got the help that they needed. They got it in the form of bottled water provided to town residents. They got it in the form of a filtration system which was added to the public water supply system.

The likely source that was subsequently identified was plating companies in the area that used PFOA to coat cookware, and the reality of this situation in communities around the country is that the discovery of these chemicals is now a fairly frequent occurrence, as we know. By the time the contamination is discovered, though, citizens may have been exposed not for just weeks or months but actually for years.

We have a big Air Force base, a big airlift base in Dover. I believe that the Federal agencies such as DOD, which used these chemicals in ways that resulted in releases into the environment need to take the necessary steps to clean up this contamination wherever it is threatening harm.

I also believe that the companies that made these chemicals need to share some of the responsibility for finding solutions to the contamination that their chemicals created.

A company called "Chemours," which is an offshoot, if you will, of DuPont, a big chemical company—the chemical part of DuPont is called "Chemours." But Chemours, for example, has taken responsibility for past contamination. They have announced future plans to reduce air and water process emissions of these chemicals, not just by a little bit but by 99 percent or greater, and we commend them for that.

However, just last week, representatives of a new industry-funded group provided my office with documents that appear to be aimed at calling into question the science that shows these chemicals to be dangerous. Specifically, the document states, and I quote, "The weight of the scientific evidence does not show that PFOA or PFOS cause health effects in humans."

Let me just repeat that. It says, "The weight of the scientific evidence does not show that PFOA or PFOS cause health effects in humans."

I would just like to ask all of you—I do not ask a lot of yes or no questions, but this is going to be one. Do any of you agree with this industry statement that says that neither PFOA nor PFOS cause health effects in human? Does anybody agree? If you agree with that, raise your hand.

[No hands raised.]

Senator CARPER. OK. If you do not agree with that, raise your hand?

[Hands raised.]

Thank you. All right. It looks like nobody raised their hand the first time through, and about two of you on the second, and a couple people reached a little bit, but not a full extension. Let the record show that. [Laughter.]

A question to Dr. Grevatt. Is there enough data for EPA to decide to regulate these chemicals? The industry document that my office obtained and that I just mentioned also states that, "Policies and actions must be guided by the best available science rather than fear-driven discussions."

Now, I actually agree with that statement, but unlike the industry group that wrote this document, I do believe that enough study has been done to take action, and I would just ask of you, Dr. Grevatt, in your opinion, is there enough available science about PFOA or PFOS for EPA to decide whether to regulate them?

Mr. GREVATT. Yes, sir, I believe there is enough information for us to make that decision, and I think you are familiar with the criteria under the Safe Drinking Water Act to support that decision. Those are issues that the Administrator is looking very carefully at right now.

Senator CARPER. All right. Thank you.

I am going to ask other questions of the other folks. I am not picking on you, but I do have at least one more. I was going to ask: What steps is EPA considering and when? There are several ways EPA could regulate these chemicals. First, I believe that EPA could announce it is setting a drinking water safety standard for these chemicals. My question would be: When do you expect EPA might announce whether it plans to regulate these chemicals in drinking water? How long do you believe it would take EPA to finalize a drinking water standard?

Mr. GREVATT. Thank you. Similar to the question on hazardous substance listing, we plan to address this issue in the National Management Plan, which we hope to have completed by the end of the calendar year. This would also be a public notice and rulemaking action, so we would have to do a proposed rule with public comment and a final rule before we could move forward, and that would take over a year, certainly, to do that. I would think we would be talking about some number of years to complete that action.

Senator CARPER. All right. Just to follow up, and you may have just answered this, but EPA could also list these chemicals as hazardous substances under the Superfund law, which would facilitate the cleanup of these chemicals, as you know. Let me just ask this question: When will EPA—and if you have already answered this, I apologize, but when will EPA announce whether it plans to designate these chemicals as hazardous substances? How long would such a designation take to finalize?

Mr. GREVATT. Thank you. A very similar answer to the last, that we will be addressing this issue in our National Management Plan, which we hope to have completed by the end of the calendar year.

It would have to go through a proposal and then a final rule, so that will take some number of years to complete.

Senator CARPER. All right.

Mr. GREVATT. Those are the two most significant regulatory actions that we are talking about right now, the hazardous substance listing and the development of an MCL. There are other things certainly much broader that we are looking at at EPA comprehensively, but those are the two biggest regulatory actions that we are currently contemplating.

Senator CARPER. All right, good. You are just doing so well, I am going to just ask you one more. In 2015, EPA proposed regulation of some of the uses of some of these chemicals through what I think is called a "significant new use rule" under TSCA, which has not yet been finalized. Since that time, Congress also gave EPA more authority to assess chemical safety under TSCA.

My question would be: When do you expect that EPA will announce whether it plans to use its TSCA authority to regulate these chemicals? Could you give us a sense of the range of options that might be under consideration?

Mr. GREVATT. Certainly. Your statements are exactly correct. We did propose a significant new use rule, and then we have the Lautenberg Act with additional authorities to the Agency under TSCA. We are currently in the process of developing a supplementary proposal to that rule that reflects the new authorities that we have received from Congress through TSCA, and that work is underway. We would be glad to follow up with your office with specific further input on that from our TSCA team if that would be helpful to you.

Senator CARPER. All right. That would be great.

Ms. Sullivan, I was going to ask you the next question, but we are going to let Mr. Grevatt answer it for you. No, I think my time has expired, so thank you all. Thanks very much. This is important stuff to us in Delaware, and I know it is in other States as well, so thank you very much.

Senator PETERS. Thank you, Senator Carper.

We do want to get to a second panel, but I think a few of us have a couple of other questions that we would like to follow up on, and we will try to move that along. Then we will bring on the second panel.

Dr. Grevatt, you have mentioned a couple times now about the meeting next week in Michigan. Could you be more specific as to when you plan to be there and who will be there as well?

Mr. GREVATT. Right. Thank you very much, sir. We plan to be there on the 5th, Friday the 5th, and also on the 4th, and I know our team in our congressional office is working with your staff as well as the rest of the Michigan delegation on the specifics of that. I do not have a location to announce for you, but we are going to be very happy to work with you and the other representatives' staff and the rest of the team from Michigan on setting this event forward.

We plan to have a roundtable event. We expect to have some opportunity for the public to participate and also for press to participate in that. But we are going to want to bring together key stakeholders from the State reflecting the challenges that you, in fact,

have addressed from the multiple different areas in the State of Michigan.

Senator PETERS. Right. There is going to be plenty of opportunity for people in Michigan to be heard at this meeting. That is the important thing, which I appreciate.

We heard before, as I ended my questioning with Ms. Sullivan, about the importance of having some EPA recommendations for contaminated sites to have some standards. My understanding is that the EPA is currently developing those recommendations for contaminated sites. I am a little clearer on some of the answers that you had to some of my colleagues, but that was supposed to be done and completed this fall. Are you still on track to have those recommendations for contaminated sites?

Mr. GREVATT. We hope to have those completed this fall. As Ms. Sullivan knows, those are currently in interagency review. We just, in fact, received comments from the Department of Defense and others on the draft, and so we are making progress on that. But there are additional discussions that need to be had before we can land that document. But we are still hoping to have that completed this fall.

Senator PETERS. In the next couple of months, then?

Mr. GREVATT. That is what we are hoping for, yes, sir.

Senator PETERS. Great. Ms. Sullivan, the question that I often get is: What water filters is the Department typically providing to homeowners that are impacted by PFAS? How confident are you that these filters are actually protecting human health?

Ms. SULLIVAN. That is an interesting question. I am sorry, sir, I do not know the specifics, but I am glad to get that for you for the record.

Senator PETERS. Yes, it is critically important that we have that.

Ms. SULLIVAN. We will do that.

Senator PETERS. Dr. Birnbaum, do you have a comment on filters?

Ms. BIRNBAUM. I think there is some evidence that granular activated charcoal filters can remove some of the PFAS, like PFOS and PFOA, at least when it is new. But the efficiency of removal decreases over time so you need to replace it. There is not much evidence that it removes some of the newer alternatives that have been developed.

Senator PETERS. That is a major concern. We are going to follow up with both of you on that, if we could.

Mr. Lepore, I know that GAO has recently added the Federal Government's environmental liabilities to the High-Risk List. If you could give us some insight as to what the GAO may believe is the Federal cost of cleaning up PFAS contamination that you are finding?

Mr. LEPORE. Yes, thank you, Senator, for that question. In 2017, for the first time, we added the government's financial exposure to environmental liabilities to our High-Risk List. The numbers I am going to give you are 2016 numbers. We do expect to have some updates next year when we issue the next high-risk update. But at that time, the government's environmental exposure was $447 billion for environmental remediation.

Now, this is much more than just water. This is a whole variety of different contaminants. The Department of Energy (DOE) had the largest share; it was $372 billion. That is about 83 percent of the total. The Department of Defense was next at $63 billion, which was 14 percent of the total. All the other agencies combined, other than DOD and Department of Energy, were $12 billion, or 3 percent. It is a pretty substantial liability. We will have updated numbers next year if we keep them on the High-Risk List. That is still under discussion right now.

Senator PETERS. But that is overall environmental liabilities, not PFAS-specific?

Mr. LEPORE. Correct.

Senator PETERS. Do you have any specific to PFAS?

Mr. LEPORE. We do not have a PFAS or PFOA number in there. The biggest issue, I think, is the nuclear weapons complex. That is why the Department of Energy is such a large component of that.

Presumably, unregulated contaminants in drinking water would be a piece of it, although we do not actually have a real number for that. We do not have that right now. We could try to get that for you, Senator, if that is helpful.

Senator PETERS. I think it is important that we work on that number, especially as you are updating these numbers in the months ahead.

Mr. LEPORE. We are happy to do that.

Senator PETERS. I appreciate that.

In the interest of time, I will now defer to Senator Hassan, although I will be providing questions for each of you after the meeting.

Senator Hassan.

Senator HASSAN. Thank you, Senator Peters.

Ms. Sullivan, I wanted to return to the topic we were beginning on at the end of my first round. Given that PFAS chemicals are not currently listed as a hazardous substance, how is DOD currently handling waste materials that contain PFAS chemicals?

Ms. SULLIVAN. Thank you, ma'am, for that question. Our waste materials we are sending to licensed hazardous waste disposal facilities. For the most part, the excess supplies of PFAS and those things are going for incineration. Soil-contaminated is going to permitted hazardous waste landfills.

Senator HASSAN. OK. What is DOD's timeline for research and development of fluorine-free foams? When will DOD stop using PFAS-containing foams to the maximum extent practicable?

Ms. SULLIVAN. We have already stopped using the foams for training and testing.

Senator HASSAN. OK.

Ms. SULLIVAN. That really limits the exposure to where we are fighting actual fires.

Senator HASSAN. Right.

Ms. SULLIVAN. As you can appreciate, especially in shipboard uses, there are some critical timeframes to be able to fight fires.

We have invested a significant amount of money to do the research. I am going to say it is going to take 2 to 3 years. We are working in partnership with Dr. Birnbaum's group on dem-

onstrating the foams that are currently available that are fluorine-free to see if they meet our standards and also working with her on testing the ones that are currently on the market to figure out how much is actually in there. But it is research. It takes time, 2 to 3 years.

Senator HASSAN. Are there other countries that use foams that do not have these chemicals in them?

Ms. SULLIVAN. Yes, there are, ma'am. There are foams—for example, in England they are, and we are working closely with them to test the efficacy of them to see if they will, in fact, meet our standards. We are in close touch and monitoring all of these efforts that are going on.

Senator HASSAN. That is good to know.

The last thing in this second round, we are hearing, obviously, a lot of concerns from firefighters whose protective gear contains PFAS. Is there research being done by DOD concerning DOD firefighters and their gear and related exposure to PFAS?

Ms. SULLIVAN. Ma'am, I am not aware of any research on the gear itself, but we are working with our health affairs counterparts to begin tracking certain exposure levels for our active-duty members and former members so we have the long-term records of who is exposed when. Of course, we work in partnership to share that information with the Veterans Administration.

Senator HASSAN. That is really helpful. I would urge you to continue to research this area. Here we have people putting their lives on the line, first responders, firefighters, people in active service for us, and the great irony here is that the protective gear may, in fact, be causing them long-term devastating health consequences. I think this really should be a priority, and I look forward to working with you on it.

Ms. SULLIVAN. Thank you.

Senator PETERS. Thank you, Senator, and I would like to thank each of the panelists for being here today. This is going to be an ongoing issue. We will look forward to working with you in the months and years ahead.

At this time I would like to call up——

Senator SHAHEEN. Excuse me, Senator Peters. I have one more question, if I could ask that.

Senator PETERS. Absolutely. Go ahead, Senator Shaheen.

Senator SHAHEEN. This is for Dr. Grevatt. I know that the EPA has been working very hard to try and help address the contamination, but it has been nearly 10 years since EPA established provisional health advisories for PFOA and PFOS. Why after 10 years hasn't the EPA come up with an enforceable drinking standard for PFOA and other PFAS chemicals?

Mr. GREVATT. Thank you very much for the important question. There are three criteria in the Safe Drinking Water Act that guide this decision on whether to develop an enforceable standard.

The first is whether a contaminant has an impact on the health of persons, and I think we have discussed that issue extensively here.

The second is whether that contaminant occurs at a frequency and level of concern in the Nation's drinking water systems.

The third is, in the sole judgment of the Administrator, there is a meaningful opportunity to reduce public health risk through a national drinking water regulation.

It is really those last two criteria that are the ones that the Administrator is thinking about very carefully now. When we did our national survey of the Nation's drinking water systems for these compounds, we sampled nearly 5,000 systems. It was a census of every large drinking water system in the United States and a representative sample of the smaller ones. It covered 80 percent of the United States population that is served by community water systems. We found in that effort 1.3 percent or 63 of the Nation's systems had levels of these PFOA and PFOS above our health advisory values. Additional work in the State of Michigan that is underway right now, a comprehensive sample of all the drinking water systems in the State of Michigan, results for about 750 drinking water systems have come back as a part of that effort, and thus far one parchment has come back above the health advisory levels.

These are important considerations about what is the most effective tool to make sure that we can protect local citizens from contamination in drinking water. Is it a national standard that requires all the Nation's systems to sample on some regular basis and has the tools to get treatment in place? Or is it something that it will address more locally? Those are the issues that the Administrator is thinking through. I am not trying to signal a direction on that, but just to say these are important questions that Acting Administrator Wheeler is thinking about, and we will be including this in the National Management Plan that we hope to have done at the end of the calendar year.

Senator SHAHEEN. Thank you.

Thank you, Mr. Chairman.

Senator PETERS. Thank you, Senator Shaheen. Actually, that raises another question I have for you, but then we will release you to the second panel.

Dr. Grevatt, your testimony talked about the Safe Drinking Water Act and support of the establishment of criteria for PFOS and PFOA. But certainly many people, including myself, and I think folks on this Committee, would urge that the Agency may need to think more broadly considering the wide range of substances that we are talking about.

Has a broader class-based approach ever been utilized before by the Agency for other types of contaminants pursuant to the Safe Drinking Water Act?

Mr. GREVATT. Yes, sir, and there are a couple of examples, but in particular, the microbial disinfection byproducts rule addresses a suite of disinfection byproducts. We have taken a group approach in the past, and I would emphasize that while we have been talking—I personally have been talking a lot about PFOA and PFOS, EPA has a very active successful effort underway to help us to transition to think about the broader group of compounds. We think that the work that we are doing on several individual compounds is going to help to inform that shift, also using some of the tools that Dr. Birnbaum mentioned, like the computational toxicology tools to look at a broader suite of information, to think about

hundreds of compounds, or even more, rather than two or three. Your point is very well taken.

Senator PETERS. We will look forward to having that broader approach taken by the EPA.

Thank you again to our panelists, and we look forward to hearing from our second panel.

[Pause.]

Welcome to our second panel. We appreciate your presence here to talk about this issue. We are going to introduce our three witnesses, but I think we will start—Senator Hassan, I know you have a guest here. If you want to start introducing our first witness, then I will immediately introduce the two others.

Senator HASSAN. Thank you, Mr. Chairman. I know Senator Shaheen joins me in welcoming our first witness here today. It is my pleasure to introduce Andrea Amico, co-founder of Testing for Pease, a community action group that aims to educate and advocate for residents impacted by the water contamination at the former Pease Air Force Base in Portsmouth, New Hampshire.

Andrea was rightfully concerned when media reports began to surface that an emergent contaminant called "PFAS" had gotten into the water her children drank at their daycare center. Fearing for their health and the health of her neighbors, Andrea began to research and make calls to State officials to determine what this contamination might mean for her community.

Her efforts to raise public awareness and get blood tests for those who had been exposed to the contaminant propelled her cause to the mainstream, gaining attention from the Department of Health and Human Services as well as the Environmental Protection Agency. She also started the Testing for Pease group in 2015, which continues to this day to keep the Pease community well informed of the meetings, media, coverage, and latest research on PFAS contamination.

Andrea holds both a B.S. and a Master's in occupational therapy. Those degrees, combined with over a decade of experience in the health care field, made her particularly well suited to head up efforts to advocate on behalf of other concerned residents.

Since beginning her efforts in 2014, Andrea has turned her activism on behalf of the Pease community into a second full-time job. As far as PFAS contamination goes, no one is better informed or more motivated than Andrea. She exemplifies New Hampshire's "all hands on deck" spirit where we roll up our sleeves, we come together, and we work together to solve issues facing Granite Staters.

I urge our Federal agencies and this Subcommittee to listen to Andrea and carefully consider her priorities so that we can take meaningful action to keep communities in New Hampshire and across our Nation safe.

Thank you, Mr. Chairman.

Senator PETERS. Thank you, Senator Hassan.

We also have with us today Arnold Leriche, who is a founding member and community co-chair of the Wurtsmith Restoration Advisory Board in Oscoda, Michigan, and a board member of the Pine River-Van Etten Lake Watershed Coalition. He has worked for 30 years as an environmental engineer with the EPA and served for

23 years in the United States Army National Guard and Reserves. Mr. Leriche has retired to Oscoda to enjoy fishing on the famous Au Sable River, Lake Huron, and surrounding inland lakes and streams, which sounds a lot better than being stuck here in a hearing room in Washington. But we are certainly very glad that you are here, sir.

Mr. Putnam is our third witness who began his career 28 years ago as a firefighter, a crash fire rescue with the United States Marine Corps, continuing to serve as crew chief as well as an instructor for the American Red Cross. Currently, he is a lieutenant with Mid-Atlantic Navy Regional Fire and Emergency Services, a certified firefighter, fire officer, fire inspector, fire instructor, hazmat technician, and an emergency medical technician, has decades of experience with all manner of firefighting foams. Mr. Putnam is also vice president of Tidewater Federal Firefighters Local F–25 of the International Association of Fire Fighters (IAFF), representing Federal firefighters at Joint Expeditionary Base Fort Story and Little Creek.

We appreciate all three of you being here with us today. We look forward to your testimony, and, Ms. Amico, if you would begin.

TESTIMONY OF ANDREA AMICO,[1] CO-FOUNDER, TESTING FOR PEASE

Ms. AMICO. Thank you to Chairman Paul, Ranking Member Peters, and honorable members of the Subcommittee. Thank you, Senator Hassan, for that incredibly kind and heartfelt introduction.

My name is Andrea Amico, and PFAS water contamination is a very personal issue for me. My husband and two small children were exposed to highly contaminated drinking water at the former Pease Air Force Base while at work and attending daycare at the Pease Tradeport. My husband took a job on Pease in 2007, in 2011 we had our first child, a daughter, and in 2013 we were blessed with our second child, a son. We were thrilled to learn of a beautiful new daycare center on Pease that was right next door to my husband's work. Both of my children started daycare at the young age of 12 weeks old.

When looking into child care facilities, we asked many questions of the daycare facilities we considered, but never did it cross our minds that we had to question the quality of the water.

You can imagine the devastation I felt when I learned that the Pease drinking water was highly contaminated with PFAS from AFFF use in May 2014. I live every day with worry that my children, who were exposed to high levels of PFAS in their early life and at critical stages of their development, will now suffer adverse health effects over their lifetime.

However, I have channeled those feelings of anxiety and worry into my advocacy work by forming a community action group called "Testing for Pease" with two other mothers, Alayna Davis and Michelle Dalton. We have successfully advocated for a blood testing program, remediation and filtration of our water, and a health study to better understand the health impacts to our family and our community.

[1] The prepared statement of Ms. Amico appears in the Appendix on page 82.

We also collaborate with other PFAS community leaders across the Nation to share best practices, streamline efforts, and work together toward making positive change at a national level for PFAS-impacted communities. With the incredible support of our New Hampshire congressional delegation, Senator Hassan and Senator Shaheen are leading the way and making Federal policy changes related to PFAS contamination that will benefit so many.

There are many areas of concern related to PFAS exposure. They are extremely persistent in the environment; they bio-accumulate in the body with very long half-lives; and they are associated with multiple adverse health effects that impact multiple systems of the body, such as different types of cancer, impaired immune function in children, elevated cholesterol, fertility issues, and more. They also cross the placenta to unborn children and can be passed to infants through breast milk, which means future unborn generations are at risk for the contamination we are facing today.

The Environmental Working Group estimates PFAS is in the drinking water of 110 millions of Americans. As a community leader, I feel strongly that we must help impacted communities that are suffering now; we must learn more about the long-term health impacts of PFAS; and we must take steps to put in place more protective measures to prevent any other families from being exposed to harmful contaminants in drinking water in the future.

A few of the major challenges and concerns impacted community members are facing:

PFAS are presumed safe until proven toxic and ongoing exposure continues. This is evidenced by the EPA only setting lifetime health advisories for two of the thousands of PFASs in this class of chemicals. With the lack of Federal health advisories for all PFAS, millions of Americans continue to be exposed to several PFAS in their drinking water today. In the absence of leadership and guidance from the Federal Government, States are scrambling to find resources and construct their own plan on how to manage this growing and widespread issue. We see a fragmented and disjointed effort among States, and it is critical that we have a consistent and coordinated action plan by the Federal Government to tackle this nationwide issue.

Communities need action now. For far too long, our government has not taken swift and meaningful action to address PFAS contamination. Although a large amount of contaminated communities have been identified in the last few years, the reality is that these communities have been exposed to these harmful contaminants for decades and are already suffering the consequences of this exposure. We need action now, and we cannot wait any longer.

Last, communities should not be financially responsible for the cost of this contamination. Sadly, impacted communities are facing the financial burden of the costs associated with obtaining alternative water supplies, remediation, filtration, blood testing, medical bills, and lost wages due to illness. The financial responsibility should fall on the polluters, such as DOD and industry responsible for the use and manufacturing of these chemicals.

Impacted community members cannot even begin to compete with the billion-dollar budgets and extensive legal teams of the responsible parties. Instead, we rely heavily on our government agen-

cies charged with protecting our health and the environment to take the action that puts our best interests first.

In conclusion, we need to stop giving these chemicals the benefit of the doubt and instead give public health the benefit of the doubt by implementing much stricter standards for all PFAS and eliminating ongoing exposure. We need meaningful action now from our Federal Government to help those suffering, and we must make the polluters pay for the damage they have done. We cannot lose sight that water is the most basic need for all living beings, and if we are not prioritizing safe and clean drinking water for our Nation, then we are failing at a very basic level.

Thank you for the opportunity to testify in front of you today, and I look forward to any questions you may have.

Senator PETERS. Thank you, Ms. Amico. I appreciate that testimony. Mr. Leriche.

TESTIMONY OF ARNOLD LERICHE,[1] COMMUNITY CO-CHAIR, WURTSMITH RESTORATION ADVISORY BOARD

Mr. LERICHE. Good afternoon, Chairman Paul, Ranking Member Peters, and honorable Members of the Subcommittee. My name is Arnold Leriche, and I am a retired environmental engineer from the EPA and a Vietnam era veteran.

I retired to Oscoda, Michigan, mostly because I wanted to go fishing on the Au Sable River—which some of you have mentioned—the many beautiful inland lakes, and Lake Huron.

One thing I quickly learned after moving to Oscoda is that many people fill their freezers with the fish they catch and the wildlife they hunt. It is second nature to the residents of northern Michigan.

Oscoda sits next to the former Wurtsmith Air Force Base on the banks of the Au Sable River and the shores of Lake Huron. The Air Force used firefighting foam at a training site on the base. That training site is adjacent to Clark's Marsh, a beautiful wetland.

For more than 25 years, PFAS contamination drained into Clark's Marsh and from that marsh into the rivers and lakes of northern Michigan. The base closed in 1993, but it was not until 2010 that our State environmental department started to investigate the site for potential PFAS contamination.

I learned from news reports in 2012 that they had discovered fish in Clark's Marsh with the highest levels at that time of PFAS contamination found anywhere in the world. Then they found very high levels of contamination in the adjacent Au Sable River. I learned then of the health effects of PFAS contamination. We were advised, "Do not eat the fish." You can imagine how that feels to residents of Oscoda who have spent their lives eating contaminated fish and serving it to their children.

We now know that the contamination is in the groundwater and drinking water, and it is even spreading into Lake Huron, which is a source of drinking water for hundreds of thousands of Michiganders.

I participated in sampling the drinking water around Van Etten Lake which adjoins the base. I will never forget the lake resident

[1] The prepared statement of Mr. Leriche appears in the Appendix on page 89.

who asked, "How long has the contamination been in my well?" I could see the fear in her eyes as she thought about her grandchildren who had been drinking that water for 20 years.

The Air Force owned a beach on Van Etten Lake, adjacent to the base, which has been given to the township. On this beach, our friends fish and have picnics, children play and learn to swim. At this beach, on most days you will find a bright white foam washing up on shore. The EPA says that PFAS contamination in drinking water is safe up to 70 parts per trillion. In this foam, the Air Force has found the level at 165,000 parts per trillion.

Would you want your children and grandchildren playing in that water? Would you want them eating the fish?

The harm extends beyond the residents of Oscoda. We now know that there was contamination in the drinking water on Wurtsmith when it was an active base. I have personally heard from veterans, such as Staff Sergeant Rick Thempto and Airman James Bussey, who are to this day suffering from health effects.

I appreciate that the Air Force has taken some steps to address the contamination at Wurtsmith, including recently one step, they are looking at a State standard of 12 parts per trillion in groundwater as it enters a water body. That is Rule 57. They are finally acknowledging it.

I listened to the testimony of the government witnesses. I am glad that they are beginning to acknowledge this problem and think about steps to fix it.

But the people of Oscoda do not have any more time for delays or missteps. We need action now. We want the responsible parties and the Federal Government to take this seriously right now.

We need interim mitigation. They already have enough information to take these actions. For businesses on the former base, we need assistance with indemnification and insurance to secure employment and encourage development. We need assistance in providing municipal water to residents who cannot drink their own well water.

I ask this Subcommittee, please do not forget about the people of Oscoda-Au Sable Townships and those like us all around the country. Thank you for the opportunity to speak on their behalf. I look forward to you questions.

Senator PETERS. Thank you, Mr. Leriche. I appreciate your testimony. Mr. Putnam.

TESTIMONY OF TIMOTHY PUTNAM,[1] VICE–PRESIDENT, TIDEWATER FEDERAL FIREFIGHTERS LOCAL F–25, INTERNATIONAL ASSOCIATION OF FIRE FIGHTERS

Mr. PUTNAM. Thank you, Chairman Paul, Ranking Member Peters, and distinguished Members of the Subcommittee. My name is Timothy Putnam. I am the vice president of Tidewater Federal Fire Fighters Local F–25 of the International Fire Fighters Association. I appreciate the opportunity to testify today on behalf of General President Schaitberger and over 315,000 firefighters and emergency medical personnel who serve this Nation as the first line of defense against emergencies and disasters.

[1] The prepared statement of Mr. Putnam appears in the Appendix on page 92.

For over 28 years, I have been employed by the Department of Defense. After 4 years of military service, I transitioned into a civilian fire fighter position with the Department of the Navy, where I currently hold the rank of lieutenant at Joint Expeditionary Base Little Creek-Fort Story. As a firefighter, I have witnessed and participated in routine apparatus checks of AFFF which is known to contain the toxic chemicals referred to as PFAS.

While engaged in operations utilizing AFFF, firefighters are regularly exposed to toxic PFAS. I have worked with AFFF on a continuous basis throughout my career. During my 28 years with the Department of Defense, the majority of my contact with AFFF is without benefit of adequate personal protection equipment.

During the 1990s the use of firefighting foam agents at military bases was virtually unchecked. There was an abundant supply kept in the fire station without any limitation on its use or a requirement of protecting oneself with PPE.

AFFF was thought to be so safe that I recall using it as a substitute for truck soap and station soap. We cleaned vehicles and station floors. Firefighters were required to train with and ensure the ready availability of such foam. I performed daily checks of my ARFF-assigned vehicles by flowing a few gallons of water and AFFF. We also conducted training exercises involving hands-on fire extinguishment of jet fuel burning pits. While training with handlines, firefighters would wade into the flaming fuel pit to practice the technique called "pushing foam" across the burning jet fuel. Exposure to AFFF was a regular and common occurrence.

As awareness of the environmental impact of toxic foam grew, base officials limited where firefighters were permitted to release AFFF. Additionally, the frequency of the foam discharge occurring as part of regular vehicle checks decreased. By 2009, discharges dropped off to a monthly basis. Today such discharges are taking place on a substantially reduced quarterly or semiannual basis under very controlled situations.

We know that regular exposure to AFFF causes PFAS to present in a firefighter's blood and tissue where it can remain for years and build up to concentrations that may cause health effects. Scientific studies link PFAS to cancer, thyroid and liver damage, and other disorders. It was not until recently that I became educated about the potential health impacts of AFFF. Alternate foams such as C6 or fluorine-free foam provide a less toxic option. Fluorine-free foams are gaining acceptance in Europe and Australia where the use of mil-spec AFFF is not required. European locations having transitioned to a new formulation have reported acceptable firefighting experiences with the foam. As we learn more about the toxic impact of PFAS, we must take steps to reduce firefighters' exposure and protect their health. We, therefore, seek to ultimately discontinue the use of toxic foams. Meanwhile, we know that firefighters have been and will continue to be exposed to toxic PFAS. Although the EPA and manufacturers have worked to phaseout AFFF, PFOS, and PFOA foams may still be used or in stockpiles stored in fire stations and warehouses for years to come, continuing to expose firefighters and place their health at risk.

Additionally, in the past PFOA was found in turnout gear as a component of such gear as moisture barriers. Although major U.S.

manufacturers have assured the IAFF that PFOA is no longer present within turnout gear, the toxin may persist in the legacy gear. To protect firefighters' health, we support discontinuing the use of legacy foams and turnout gear containing PFOA.

We also believe all firefighters should receive mandatory training on the hazards of toxic foam and annual physicals to determine the level of PFAS in a firefighter's bloodstream. Such information will allow doctors to take active steps to better protect health and treat potential health impacts which may have already occurred.

In conclusion, we must take immediate steps to limit firefighters' exposure to the toxic formulations of AFFF. Again, I appreciate the opportunity to testify, and I am happy to answer any questions at this time.

Senator PETERS. Thank you, Mr. Putnam.

Mr. Leriche, you certainly spoke in a very heartfelt way about the impact that this contamination has had on your community and seeing how it is impacting really every family in the area as well. As your background was with the EPA and working on many technical aspects of environmental cleanup, what specifically would you like to see out of the EPA and Federal agencies? Who do you believe should be responsible for that remediation? What advice would you give us in terms of our dealings with the EPA as they move forward?

Mr. LERICHE. Thank you, Senator, for the question. I must say at the outset that is above my pay grade, at least in the EPA, and my area of expertise at EPA was not with CERCLA or Superfund but other enforcement statutes.

However, I can address definitely the Department of Defense. As the co-chair of the Wurtsmith Restoration Advisory Board, I will answer in that area, and I will stay out of trouble.

Senator PETERS. Please do.

Mr. LERICHE. The timing of their investigations and how long it takes for them to investigate a site, especially under their current implementation of CERCLA, has been very frustrating because it is linked so significantly to the lifetime health advisory.

In my calls almost weekly with my counterpart co-chair in the Air Force, it is constantly causing problems in trying to get remediation and investigation action happening quickly. That particular interpretation of the CERCLA is—and the answer I think over here—has caused us so much delay that it is very troublesome. I think that is an important thing that needs to be opened up, and that is the biggest one, because if they had the money and they had the interpretation of the national policy to support real quick remediation and investigation, then we would have much more done at this point. There have been years of delay on this particular point because they are following national policy.

Senator PETERS. Obviously, the people of Oscoda cannot wait any longer. When you hear talk about this may take 5 or 10 years, that is simply unacceptable.

Mr. LERICHE. That is correct, especially when we know the health effects can possibly skip generations, so we are talking about grandchildren. We are not going to be here when they have the effects. Timing cannot be bought back. We have to do it now.

Senator PETERS. What would citizens of Oscoda consider adequate remediation? When it is all said and done, what would you like to see?

Mr. LERICHE. Rule 57 I mentioned—and I am sorry I added that to my testimony—that is a huge step, because it was based somewhat on health studies by the State in 2014 to control the bio-accumulating effect of PFOS in fish and then humans eat the fish. That is why there is "Do Not Eat the Fish" around Wurtsmith. But it is an advisory. That statute is an advisory for fish consumption. But this standard is an enforceable standard by the State, and it must be incorporated into the Department of Defense's remediation plans and action. That is where they have been avoiding putting it in their action plans, and now they are thinking about it.

Senator PETERS. Thank you.

Mr. Putnam, thank you for your service and your long career fighting fires as a professional firefighter. I must say I appreciate the support from the International Association of Fire Fighters when we worked on removing the Federal mandate that the FAA regulations require fluorinated chemicals. We are going to be changing that as we move the FAA reauthorization forward as we look at alternatives.

I think you may have heard some testimony of the folks before you who claim that the military still believes that these chemicals are necessary to fight fires, although in your testimony you talk about a number of alternatives.

Please elaborate on that based on your experience as a professional firefighter. Can we effectively fight fires with alternatives?

Mr. PUTNAM. Senator Peters, I would first like to thank you for your leadership on these fluorine-free foams. It is critical that we provide these to our firefighters. The elements that are out there, the research is being done now. We are taking a back seat to Europe and Australia at this time. Will they work? Absolutely. Will we have to adjust how we train? Yes. Every time we have a new tool, we change and we train. With what we are using right now, the training is very limited, and it is on a very sporadic basis. A new fluorine-free foam would work outstanding for us.

Senator PETERS. Great. Thank you. Senator Hassan.

Senator HASSAN. Thank you again, Senator Peters, and thank you again to this panel.

Ms. Amico, I just wanted to thank you again for taking the time out of what I know is a very busy schedule and time away from your family to come here to D.C. to tell your story. As you mentioned in our meeting earlier, your husband was employed for a company on Pease for almost 9 years, and both of your children have attended daycare on Pease since they were, what, about 12 weeks old?

Ms. AMICO. Yes.

Senator HASSAN. You have spoken about some of the ways PFAS contamination impacted your community and other communities across the Nation, but I thought I would just give you this opportunity to expand on that a little bit, and then I want to follow up on what we can do to help.

Ms. AMICO. Thank you for the question. PFAS contamination is clearly a widespread issue. It is impacting several communities

across the country, and it is causing a lot of stress for people. The fear of the unknown, having these exposures, in some communities having blood testing that shows high levels but not quite knowing what those high levels in the blood mean is creating worry and fear for people. We are extremely grateful for the health study that will be coming down the pike for our community that may will benefit from. But we are also seeing that people are having to absorb the financial costs of the contamination, which is incredibly wrong. Like I said in my testimony, people are having to pay for their own filters or for bottled water. If communities are not being offered blood testing, some are opting to pay for their own blood testing, which is very expensive. There are medical bills and lost work due to health effects from PFAS exposure. And like I touched upon, there is the emotional toll.

I think we are seeing communities face emotional, physical, and financial impacts because of this contamination.

Senator HASSAN. Thank you. You noted that without Federal leadership, States are left to investigate PFAS contamination and provide remedial action to contaminated sites on their own. Do you think the government is acting in a timely manner to address PFAS contamination across the country?

Ms. AMICO. I do not. I think we need a more consistent approach among the Federal agencies, particularly through ATSDR, EPA, NIEHS, and I was happy to hear of some of that collaboration today in the testimony from the first panel members, but we need more of that. We need a much more consistent approach, because we are seeing other States take different steps, different measures, and it is leaving us, as community members across this country, wondering why is Vermont lowering a standard to 20 parts per trillion for five different PFAS when the EPA is saying 70 parts per trillion for two different PFAS. Then we are seeing New Jersey propose lower standards. We are seeing Massachusetts and Connecticut take five different PFAS into consumer for their 70 parts per trillion. It is very confusing for community members, and it is also very alarming—what are these States seeing, what science are they analyzing that they are coming to these different numbers? We need a much more consistent and coordinated approach than what we have.

Senator HASSAN. That really leads me to the next question, and you have answered it in part. Do you feel that the current EPA lifetime health advisories for PFOS and PFOA of 70 parts per trillion are protective enough?

Ms. AMICO. I do not. I say that based on information that I have read in some of the New Jersey data that has come out of their Drinking Water Quality Institute and looking at most sensitive populations and also in my discussions with other researchers and academics across the country. I think that we need to make sure EPA is taking into consideration the most sensitive populations such as unborn children and infants. Also, I would like to see the EPA, ATSDR, and NIEHS look at exposed communities because they need to be considered a sensitive population as well. Should a community member who drank high levels of PFAS with high levels in their blood be allowed to continue to drink 65 parts per trillion because it is under 70? No, to me that is a sensitive popu-

lation that we need to be more protective of. As we heard earlier in the statements by the government officials, it is a widespread issue. It is found in the blood of almost every single American. We all have some level of exposure, but we have a large and growing amount of community members that we are discovering have a very high exposure, and we need to take those folks into consideration as well as we move forward with next steps.

Senator HASSAN. Thank you for that. I just want to commend you again. You and your colleagues Alayna Davis and Michelle Dalton have done incredible work, and you are continuing to do it with community groups like Testing for Pease. It has been, obviously, really important to the safety of all citizens impacted by dangerous contaminants in our drinking water.

In your opinion, what can we as elected officials do to help important action groups like yours continue to succeed?

Ms. AMICO. I think a few major things that government can do is we can take action now. It is disheartening to hear that meaningful action can take 5 and 10 years when at Pease we are coming up on 5 years of discovering our contamination. I do not think that we can continue to delay anymore.

We also need to see meaningful action to the entire class of PFAS, so just trying to do one contaminant at a time is not working. We have thousands of them in our environment. We have several of them found in drinking water across the country, and we need to regulate it as a class.

We also need to provide biomonitoring and blood testing for impacted community members, and we also need to provide medical monitoring, which is a program that folks can participate in with their physicians to better monitor their health in the setting of the exposure. I like to point out the difference. The health study, there will be a lot of benefits that come from that, but we heard from Dr. Birnbaum that could take 5 years to get that information.

What can I do today? I have two children with high levels in their blood. What can I do today with their pediatrician to monitor their health? Does that mean check additional labs? Should they be seen twice a year instead of once a year? We need some more clear guidance to impacted community members. We could not prevent this contamination from happening, but what can we do moving forward to protect our health?

Senator HASSAN. Thank you for that. Again, I want to thank Senator Peters and Chairman Paul for having this hearing.

I want to ask a very quick last question to Mr. Putnam just to clarify what I think I heard you say to Senator Peters. Earlier Ms. Sullivan from the Department of Defense said it would take more research before the Defense Department could decide to move to PFAS-free foam or protective gear. I take it, given that Europe and, I think you said, Australia already have gotten there, that you might think that we do not need more research, we just need to use their example and get going on a transition.

Mr. PUTNAM. Thank you for the question. I believe we should use it as a tool.

Senator HASSAN. OK.

Mr. PUTNAM. We should use it for our own research and moving forward and getting what we need here.

Senator PETERS. OK. Thank you very much, and thank you again, Senator Peters.

Senator PETERS. Thank you, Senator Hassan. Senator Shaheen.

Senator SHAHEEN. Thank you, Senator Peters. Again, I very much appreciate being able to be part of this very important hearing on an issue that, as we heard from the first panel—and you all clearly can confirm—this is an issue that affects tens of millions of people across the country. The cost of cleanup to address this is tens of billions of dollars. We do not even know yet what the long-term health impacts are.

We have a lot of work to do, and I want to begin with you, Ms. Amico. Thank you for all of your advocacy and for the group that you started. We affectionately call you all the "Pease Moms" because of all of the work that you have done to make sure that something was done at the local, State, and Federal level to address the contamination that has affected you and your family and so many people.

I want to follow up on Senator Hassan's question about what we can do. You laid out some very impressive recommendations for what we ought to be thinking about as we are addressing this issue. If you could ask Congress to do one thing in the immediate term, what would it be?

Ms. AMICO. Thank you for the question. I would say our top priority would be to stop the ongoing exposure, so we would need to strictly regulate PFAS as an entire class to a much lower standard than what we have right now to prevent ongoing exposure. That would be a top priority, stop the exposure.

Senator SHAHEEN. Clearly, prevention makes a lot more sense than cleanup later on.

I want to ask you, Mr. Leriche, because it is my understanding that you and Andrea have worked together with other groups across the country to raise concern about this. Can you talk about how you have done that, how you all have worked together?

Mr. LERICHE. Thank you for the question, Senator Shaheen. What has not come out yet is my birth State was New Hampshire.

Senator SHAHEEN. I knew you looked familiar. [Laughter.]

Mr. LERICHE. I am surprised you did not pick up on the accent. But your question, if you could repeat just quickly?

Senator SHAHEEN. Just I am interested because we have obviously got——

Mr. LERICHE. Oh, how we work together. I am sorry.

Senator SHAHEEN [continuing]. People in the audience who have been affected by this across the country, and I know from talking to Andrea that one of the things you all have done very effectively is network with groups across the country to see how you could advocate and build on what you are learning in different parts of the United States. Can you talk about some of the things that you have done?

Mr. LERICHE. Thank you. When I first started realizing the significance in Oscoda, I started to see that there was a process where the Air Force would bring the community in, and it is called the "Restoration Advisory Board (RAB)." I went back home, and I attended the RAB at Pease, and I linked up with some of the program managers for remediation there from my old agency. That is

where I first started. I met Alayna there. I did not meet Andrea until today, actually, face to face, but I had talked to her, plus other groups. I think that that is where the community members, such as myself, need to do is we have to become educated on how the Federal agencies do their business, because if we do not, then we are just listening. We are not able to act and be activists until we understand what motivates them and what regulations do they have. That was the first exposure. The energy that these three ladies and others have done their business over the last 4½ years is outstanding.

That is where we gain the knowledge, and I would suggest that all communities, at least around Department of Defense sites, do that, they engage with this group, the PFAS National Coalition that holds calls, and that is where I have learned a lot about what is going on. We can use all of our expertise to bear on the large agencies that may not be acting as fast as we need.

Senator SHAHEEN. All right. Let me just say how effective you have all been, because when I introduced the amendment in the defense authorization bill 2 years ago for the health study, we went around and talked to people on the committee from all over the country. There were a significant number of them who had heard from their constituents that this was an issue in their communities and in their States. It has made a huge difference, and that advocacy is going to continue to make a difference as we go forward.

I just want to ask a final question of you, Mr. Putnam, because one of the things that Congress did this summer was to pass the Firefighters Cancer Registry. Talk about why that is so important, especially as we think about an issue like this.

Mr. PUTNAM. Thank you for the question. As we move forward, firefighters have a 60 percent more likely chance to get cancer. This is going to give us a basis to lead and help the IAFF lead this drive to help find out what is causing it. Whether it may be the PFAS or the environmental concerns that we deal with, this is going to drive that, and the Cancer Network is a big part of it also.

Thank you.

Senator SHAHEEN. Thank you.

Thank you very much again, Mr. Chairman, for holding this hearing.

Senator PETERS. Thank you, Senator Shaheen. I appreciate both my colleagues for being here to the very end on this very important topic. I would certainly like to thank everybody here in attendance today. This is clearly a significant issue, a significant issue that may be impacting tens of millions, perhaps a hundred million Americans. It is an issue that we are going to likely be dealing with for a long period of time. We have to be focused on it because we do not have time. We already have folks, as we heard from our witnesses here today, that have been dealing with this for far too long, over a decade, and may have been exposed over several decades, which requires action.

I would also like to let folks know we have been getting not only the testimony here but a lot of letters and comments coming in. I got additional comments as I was sitting here from folks across Michigan. I would encourage anyone else to submit anything they would like to be put into the official hearing record. The hearing

record will remain open for 15 days until October 11 at 5 p.m. for the submission of statements as well as questions for the record, questions that individuals may want to ask of folks who appeared before this Committee.

With that, thank you again to all of our witnesses, and the hearing is adjourned.

[Whereupon, at 4:41 p.m., the Subcommittee was adjourned.]

APPENDIX

Opening Statement of Chairman Rand Paul, M.D.
Federal Spending Oversight Subcommittee

The Federal Role in the Toxic PFAS Chemical Crisis
9/26/2018

I call this hearing of the Federal Spending Oversight Subcommittee to order.

Today we are here to discuss the issue of PFAS, which is a chemical grouping that includes approximately 3000 individual chemical chains. Two chains in particular, PFOA and PFOS are of issue here today.

By way of background, PFAS were originally developed in the 1940s and are water and temperature resistant, while not electrically conductive. As you can imagine, this made them very attractive for use in firefighting foams.

PFAS applications go well beyond firefighting including as important components in everything from medical scrubs and respirator tubes, non-stick cookware, stain resistant carpet, and computer components.

However, like many things, this once wonder product, has been suggested to be linked to health issues. In humans, high cholesterol is the most common result, but liver complications and even cancer have been found in lower order animals which raised some level of concern.

For that reason, the PFOA and PFOS chains are no longer manufactured in the U.S., Europe, and Japan. However, they are still available for import, much of which come from China. Moreover, PFAS are very stable, meaning they have a basically indefinite shelf life.

Perhaps because of these qualities, the human body doesn't process PAFS well; meaning that if ingested in high enough amount over a long enough time, these chemicals will build up in a person's blood chemistry, perhaps reaching levels that would cause troubling health issues. I should point out, that one has to ingest PFAS; they are not absorbed through contact exposure.

So, why is this of concern to the Federal Spending Oversight subcommittee? Well, PFAS have infiltrated certain water supplies, not so much in my home state of Kentucky, but very much so in the Ranking Member's state of Michigan.

This meaning people are unwittingly being exposed to these chemicals through the very tap water, and the conventional wisdom is that this water infiltration has been caused primarily due to firefighting foams that were allowed to seep into ground water or run off into streams and lakes.

Often this occurred in training exercises, not actual firefighting; and while your local fire department may have had a hand in this, U.S. military bases appear to be a significant contributor to this problem.

There have been some developments. The EPA has issued a health advisory related to PFAS at 70 parts per trillion is further exploring the issue, as are the other federal agencies

represented here today. But, is 70 the right number? Some states have set it much lower, while others have followed the EPA guidelines, which some say are lower than needed. The fact that the appropriate level is being debated begs the question, how were these levels set in the first place?

Some are calling for quick action while others warn moving faster may lead to improper or unneeded regulation. The U.S. military seems to be acting by changing procedures for use of PFAS firefighting foams, including more robust clean ups when it is used and has turned to alternative fire retardants. They have also spent over $200 million on testing and remediation efforts where contamination has already occurred. More good news is that sampling from the Red Cross and the National Health and Nutrition Examination Survey, a CDC activity, have shown a dramatic decline in PFOA and PFOS concentrations in blood chemistry over the past two decades. It does not mean all is well, but it appears things are moving in a positive direction.

But the question remains, is this enough, what are the continuing risks, and what will the long term cost to the federal government's be? Hopefully the witnesses we have here today will be able to help us answer these questions.

With that, I'll recognize the Ranking Member Peters who brought this issue to my attention, to give his opening statement.

U.S. Senate Homeland Security and Governmental Affairs Committee

Subcommittee on Federal Spending Oversight and Emergency Management

"The Federal Role in the Toxic PFAS Chemical Crisis"

September 26, 2018

Senator Gary C. Peters, Ranking Member

Opening Statement

Thank you Mr. Chairman, for working in a bipartisan way to convene today's hearing.

In Michigan – we've seen firsthand the devastation a community experiences when they can't trust the water coming out of the tap. In Flint, thousands of families were exposed to dangerous levels of lead in their water, and many residents still use filters and bottled water to ensure their water is safe.

Just over 100 miles north of Flint – residents of Oscoda, Michigan have spent years voicing their concerns about another serious environmental and public health threat in their drinking water – this time from highly-fluorinated chemicals – known as PFAS.

These chemicals are widely used in products like non-stick cookware, water-repellent clothing, stain-resistant upholstery, and many firefighting foams. They are extraordinarily persistent, meaning they don't break down naturally in the environment. They accumulate in our soil, our water, our food, and too often, in our bodies. They are toxic – and they are not well regulated.

I'm grateful to Mr. LeRiche for being here today to talk about the impact of contamination on the community in Oscoda and the challenges residents face around the former Wurtsmith Air Force Base.

Unfortunately Oscoda is not alone – there are contaminated sites throughout Michigan and the nation.

Sandy Wynn-Stelt of Belmont, Michigan, who is here today, was exposed to one of the highest concentrations of these chemicals that has been identified in the United States – and now has PFAS levels in her blood that are more than 750 times the national average. Tobyn McNaughton is also here, also from Belmont. Her two year old son Jack has the highest documented PFAS levels known, at 484,000 parts per trillion. He's two years old.

Families in Parchment Township, Michigan were forced to switch to bottled water earlier this summer – and now they fear that their children have been poisoned since birth.

As a Senator from Michigan – a state surrounded by the Great Lakes – the world's largest source of surface freshwater – I'm appalled by the number of water crises we've faced. My constituents – and people across the country facing this crisis – are fed up as well. Mr. Chairman, I request

permission to enter in the record a few statements from Michiganders urging swift actions on fluorinated chemicals.

I asked for this hearing because I believe that everyone in this great country should have access to safe drinking water – and I want to do everything I can to ensure the federal government is effectively managing this crisis.

Soon the Senate will approve an FAA bill that includes my language to remove federal mandates requiring the use of these chemicals in firefighting foams. I've also worked with my colleagues to urge EPA to swiftly establish national enforceable standards to enable longer term clean-up – I look forward to hearing more from EPA today. These are important bipartisan steps – but they are just the beginning.

I look forward to hearing more today about what federal agencies are doing – and what more they can do – and what Congress must do – to identify contamination, prevent exposure, reduce harm to human health, and to expedite clean-up and assistance for affected communities.

TESTIMONY OF
PETER C. GREVATT, Ph.D.
DIRECTOR
OFFICE OF GROUND WATER AND DRINKING WATER
U.S. ENVIRONMENTAL PROTECTION AGENCY
BEFORE THE
SENATE COMMITTEE ON HOMELAND SECURITY AND GOVERNMENTAL AFFAIRS
SUBCOMMITTEE ON FEDERAL SPENDING OVERSIGHT AND EMERGENCY MANAGEMENT

SEPTEMBER 26, 2018

Good afternoon, Chairman Paul, Ranking Member Peters, and members of the Subcommittee. I am Peter Grevatt, Director of the U.S. Environmental Protection Agency's Office of Ground Water and Drinking Water. I also serve as the chair of the EPA's cross-agency efforts to address per- and polyfluoroalkyl substances (PFAS). Thank you for the opportunity to testify today.

Protecting America's drinking water is one of the EPA's top priorities. I am here today to share with you the actions the agency is taking to provide states, tribes, and communities with the tools they need to effectively address PFAS.

BACKGROUND

Per- and polyfluoroalkyl substances (PFAS) are a group of man-made chemicals that have been in use since the 1940s, and are (or have been) found in a wide array of consumer products like cookware, food packaging, and stain repellants. PFAS have also been used in aqueous film-forming foams. PFAS manufacturing and processing facilities, airports, and military installations that use firefighting foams are some of the contributors of PFAS releases into the air, soil, and water, including sources of drinking water. There are many PFAS chemicals, including the

chemicals perfluorooctanoic acid (PFOA), perfluorooctane sulfonate (PFOS), and GenX (HFPO dimer acid).

Because of their widespread use, most people have been exposed to PFAS. Some PFAS can accumulate and can stay in the human body for long periods of time. There is evidence that exposure to certain PFAS may lead to adverse health effects.

EPA'S WORK ON PFAS

The EPA has taken steps under its statutory authorities to understand and address these chemicals. For example, certain PFAS chemicals are no longer manufactured in the United States as a result of the EPA's PFOA Stewardship Program in which eight major chemical manufacturers agreed to phase out the use of PFOA and PFOA-related chemicals in their products and as emissions from their facilities. All companies met the PFOA Stewardship Program goals by 2015. In support of this effort, through the EPA's work under the Toxic Substances Control Act, the agency has issued various significant new use rules (SNURs) to guard against the unreviewed reintroduction and new use, through domestic production or import, of certain PFAS chemicals in the United States. However, the SNUR authority did not cover ongoing uses such as low-volume use of some PFAS in limited industrial applications.

The EPA has also worked with the states and local communities to monitor for six PFAS under the Safe Drinking Water Act to understand the nationwide occurrence of these chemicals in our drinking water systems. In 2016, the EPA issued drinking water lifetime health advisories for PFOA and PFOS of 70 parts per trillion individually or combined. The health advisories are non-regulatory values that help to provide technical information to state agencies and other public

health officials on the level of PFOA and PFOS that would provide Americans, including the most sensitive populations, with a margin of protection from a lifetime of exposure to PFOA and PFOS from drinking water. The EPA is also working to move research forward on other PFAS to better understand their health impacts, options for treatment, and how information on better-known PFAS (such as PFOA and PFOS) can be applied to inform our knowledge of other PFAS chemical classes.

To build on these actions, the EPA hosted a PFAS National Leadership Summit in May 2018 that brought together state, tribal, and federal partners, as well as key stakeholders including industry, utilities, Congressional staff, and nongovernmental organizations. The Summit provided an opportunity to share information on ongoing efforts, to identify specific near-term actions, and to address risk communication challenges.

At the event, the EPA committed to work on four significant actions:

1. Initiating the steps to evaluate the need for a Safe Drinking Water Act maximum contaminant level for PFOA and PFOS.
2. Beginning the necessary steps to consider designating PFOA and PFOS as "hazardous substances" through one of the available statutory mechanisms, including potentially CERCLA Section 102.
3. Considering groundwater cleanup recommendations for PFOA and PFOS at contaminated sites.
4. Working in close collaboration with federal and state partners to develop draft toxicity values for GenX (HFPO dimer acid) and for perfluorobutane sulfonic acid (PFBS).

The EPA also continues to provide support to states, tribes, and communities who are addressing PFAS issues. For example, at the request of the North Carolina Department of Environmental Quality, the EPA continues to perform independent laboratory analysis for GenX and several other PFAS compounds in water samples collected along the Cape Fear River. In Michigan, the EPA is providing technical assistance to the Michigan Department of Environmental Quality as the state responds to PFAS contamination in communities such as Parchment.

As the EPA takes these actions, the agency is also committed to working with our federal partners, including the Department of Defense and the Department of Health and Human Services, on response actions and continuing research into the health and environmental impacts of these substances. For example, the EPA is coordinating with its federal agency partners as the agency develops draft toxicity values for GenX and PFBS. Interagency coordination is key to providing a common Federal approach to addressing these substances in order to best support our state, local, and tribal partners as well as the public. We look forward to continuing to our interagency dialogue and collaboration on PFAS issues.

COMMUNITY ENGAGEMENT

The EPA recognizes the need to hear directly from communities that have been and/or continue to feel the impact of PFAS. Since June, the EPA has traveled to Exeter, New Hampshire; Horsham, Pennsylvania; Colorado Springs, Colorado; Fayetteville, North Carolina; and Leavenworth, Kansas. The EPA also engaged with tribal representatives at the Tribal Lands and Environment Forum in Spokane, Washington. At these events, the EPA has engaged with nearly a thousand individuals, including more than 150 people who delivered remarks about their personal experiences. We listened to these community members to better understand their

concerns and to learn from them ways that the agency can best support the work being done at the state, local, and tribal levels. The EPA is also seeking recommendations from state and local officials through the agency's Local Government Advisory Committee. Hearing directly from impacted communities has been invaluable, and community feedback will shape how we move forward on this important issue.

To ensure that everyone who would like to provide input can do so, the EPA has set up a public docket that will remain open until September 28, 2018. The EPA will consider information from the National Leadership Summit, community engagements, and the public docket to develop a PFAS Management Plan. The Management Plan is expected to include actions that the EPA will take to provide tools that states, tribes, and communities can use to address PFAS.

CONCLUSION

Protecting public health is the EPA's top priority. Acting Administrator Wheeler has expressed his continued commitment to considering actions on PFAS so that the EPA can lead efforts that meet the needs of impacted communities.

Once again, Chairman Paul, Ranking Member Peters, and Members of the Subcommittee, thank you for the opportunity to discuss PFAS and the EPA's ongoing commitment to working to find solutions to address these chemicals. I look forward to answering any questions you may have.

HOLD UNTIL RELEASED BY THE COMMITTEE

Statement of

Ms. Maureen Sullivan

Deputy Assistant Secretary Of Defense

(Environment)

Before the Committee on Homeland Security and Governmental Affairs

Subcommittee on Federal Spending and Oversight

The Federal Role in the Toxic PFAS Chemical Crisis

September 26, 2018

Federal Spending Oversight Subcommittee
Committee on Homeland Security and Governmental Affairs

Hearing: September 26 @ 2:30 pm
SD-342 Dirksen Senate Office Building

Chairman Paul, Ranking Member Peters and distinguished members of the Subcommittee. Thank you for the opportunity to discuss DoD's actions related to perfluorinated chemicals.

Background:

Perfluoroalkyl substances (PFAS) refers to the entire class of poly- and per-fluoronated alkyl substances, of which perfluorooctane sulfonate (PFOS) and perfluorooctanic acid (PFOA) are the most well-studied substances. These substances are ubiquitous in many industrial and consumer products because they increase a product's resistance to heat, stains, water, and grease. As such, they are not uniquely attributable to Department of Defense (DoD) activities. The Interstate Technology and Regulatory Council (ITRC) determined three to six percent of the perfluorooctanyl chemicals produced were used as firefighting foam.[1] Of this percentage, DoD is only one of many users of Aqueous Film Forming Foam (AFFF), which also includes commercial airports, the oil and gas industry, and local fire departments. The remaining perfluorooctanyl chemicals produced were used in the following industrial and consumer applications: approximately 41 percent for paper and packaging protectors; 36 percent for textiles, leather and carpet treatment, and fabric protection; and 19 percent for industrial surfactants, additives, and coatings. Perfluorooctanyl chemicals are used in electroplating and etching, household additives, insecticides, and other applications.

DoD's limited use of PFAS started in the 1970s, with the introduction of AFFF for aircraft fuel fire-fighting purposes. AFFF may contain PFOS and, in some formulations, PFOA. AFFF is mission-critical because it quickly extinguishes petroleum-based fires, which is why the Federal Aviation Administration has also adopted its use at airports nationally. AFFF containing PFOS, other than in potential trace amounts, is no longer manufactured or available for purchase in the United States, although legacy stocks of these AFFF remain.

On May 19, 2016, the EPA issued Safe Drinking Water Act (SDWA)lifetime health advisories (LHA) recommending individual or combined levels of PFOS and PFOA concentrations in drinking water be below 70 parts per trillion. While the LHA is non-regulatory guidance under the SDWA and not a required or enforceable drinking water standard, DoD began proactively taking action to address drinking water impacted by DoD releases.

Despite the fact that the EPA drinking water LHA for PFOS and PFOA is only an advisory, DoD has taken a three-pronged approach: 1) DoD has taken quick action to address

[1] The Interstate Technology and Regulatory Council (ITRC) analysis is based on a 3M July 7, 2000 letter to the U.S. Environmental Protection Agency Office of Prevention, Pesticides and Toxic Substances on 3M Phase-Out plan for perfluorooctane sulfonyl fluoride (POFS)based products. This analysis does not include PFOA produced by 3M or PFOS/PFOA or other PFAS production by other manufacturers

PFOS and PFOA in the drinking water it supplies, 2) DoD has taken response action in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA, aka Superfund), and 3) DoD has committed significant funds in research and development to identify and test fluorine-free AFFF.

Drinking Water:

DoD provides drinking water to approximately 2 million people on its installations worldwide. The Department began testing DoD-operated drinking water systems worldwide in June 2016 to identify drinking water that exceeded EPA's LHA. DoD completed testing of all 524 DoD-owned drinking water systems worldwide in August 2017. These tests determined that twenty-four DoD drinking water systems contained PFOS and PFOA above the LHA. Accordingly, though not required by law or regulation, DoD has followed the EPA LHA recommendations, to include providing consumers bottled water or additional water treatment. In cases where DoD purchases drinking water, the Department identified 12 drinking water systems where the results were above the EPA LHA level. These installations are working with the drinking water supplier(s) to encourage appropriate actions.

Remediation Action:

CERCLA provides a consistent approach across the Nation for cleanup and includes environmental regulators and public participation. The Department addresses on-base and off-base migration of its PFOS and PFOA releases to protect human health and appropriately spend taxpayer dollars. The Defense Environmental Restoration Program (DERP) (10 USC 2701-2711) provides authorities to DoD to perform and fund these actions, and requires they be carried out in accordance with CERCLA. Our first step is to identify the source of a known or suspected release. The Military Departments identified installations where DoD stored or used AFFF containing PFOS or PFOA and suspects there was a release. DoD has identified 401 active and former (Base Realignment and Closure) installations with at least one area where there is a known or suspected release of PFOS or PFOA.

The Military Departments then determined whether there is exposure through drinking water and, if so, the priority is to address high exposure levels. DoD's actions are consistent with EPA's LHA recommended actions, which include treatment of drinking water or closing drinking water wells and providing alternative water supplies, such as bottled water or connecting private residents to public drinking water systems. Once the exposure pathway is broken, the Military Departments are prioritizing sites for further actions using the normal CERCLA risk-based process. This longstanding site prioritization process is based on "worst first," meaning the Military Departments will address sites that pose a greater potential risk to human health and the environment first. [2]

[2] Further details for this longstanding CERCLA prioritization process was developed by EPA and state regulators, as well as the other stakeholders such as DoD, and documented in recommendations of the Federal Facilities Environmental Restoration Dialogue Committee (FERDEC 1999).

DoD follows the CERCLA process to fully investigate the release and determine the appropriate cleanup actions based on risk. These known or suspected PFOS and PFOA release areas are in various stages of assessment, investigation, and cleanup. Although the EPA LHA level is only guidance under the SDWA and is not an enforceable drinking water standard, DoD considers the EPA's LHA toxicity information when assessing risk to human health under CERCLA. Under the EPA's longstanding risk assessment and hierarchy of toxicity value policies, the LHA toxicity information is used to determine a site-specific risk-based cleanup level for groundwater used as drinking water. This calculated risk cleanup level may be higher than the EPA LHA, which can cause communication challenges when explaining to the public how this groundwater cleanup level is within safe parameters.

Before Fiscal Year (FY) 2018 when the Department first included such cleanup in the President's Budget, DoD had to prioritize funds from other cleanup activities in order to address PFOS/PFOA. Now that we have an initial inventory, we are determining the potential cleanup costs as we collect information on the nature and extent of the releases. It will also be necessary to understand the regulatory cleanup standards for PFOS and PFOA to adequately plan and budget for DoD responsibilities. As DoD moves through the CERCLA process, the Department will work in collaboration with regulatory agencies and communities, and will share information in an open and transparent manner.

Research and Development:

In May 2000, 3M, the sole American manufacturer, began voluntarily phasing out the production of PFOS-related products, including AFFF containing PFOS, in response to proposed EPA regulations under the Toxic Substances Control Act. Since PFOS is no longer manufactured in the U.S., the U.S. AFFF on the market today should not contain PFOS, although legacy stocks of these AFFF remain. However, some formulations still contain trace amounts of PFOA. While AFFF containing PFOS (other than potential trace amounts) is no longer manufactured for purchase in the U.S., the Military Departments may still have AFFF containing PFOS in equipment, such as aircraft hangar fire suppression systems. There is currently no fluorine-free formulation of the foam commercially available that meets the critical Military Specification (MILSPEC) requirement to suppress aircraft fires effectively, although DOD is testing alternative formulations. DoD must maintain the capability to fight fires to protect the men and women serving in the military and the communities surrounding their installations.

To address this challenge, DoD is taking several steps. To prevent further releases into the ground water, DoD issued a policy in January 2016 requiring the Military Departments to prevent uncontrolled, land-based AFFF releases during maintenance, testing, and training activities. The policy also requires the Military Departments to remove and properly dispose of local warehouse supplies of AFFF containing PFOS (other than for shipboard use), where practical. Each Military Department is taking actions to remove this AFFF containing PFOS from its inventory.

The Department is also researching and developing technologies to enhance our response to PFAS and to ensure the safe use of AFFF through two key programs: the Strategic Environmental Research and Development Program (SERDP), which focuses on basic and

applied research, and the Environmental Security Technology Certification Program (ESTCP), whose mission is to validate more mature technologies to transition them to widespread use.

SERDP initiated research into the fate, transport, and remediation of PFOS and PFOA shortly after EPA released the 2009 Provisional Health Advisories for these compounds. Follow-on research beginning in 2014 has targeted developing several approaches for treating groundwater containing PFOS and PFOA. These efforts have matured from the small scale to field demonstrations that began under ESTCP in 2017, with an additional demonstration in 2018.

In addition to these initial projects on PFOS and PFOA, the SERDP and ESTCP Environmental Restoration Program Area has launched an aggressive effort to develop more cost effective treatment options for other, newly-identified PFAS. At the conclusion of the ongoing projects, the Department will have invested $40M in PFAS-related research and development through SERDP and ESTCP.

In FY 2017 and FY 2018, SERDP solicited research projects to identify and test fluorine-free surfactants for use in next-generation AFFF that can meet the military's stringent performance requirements while eliminating PFAS. Two core projects and seven limited-scope, quick-look projects have been initiated in this effort.

In FY 2019, ESTCP will initiate demonstrations of existing replacement AFFF formulations at DoD facilities to determine if their performance can meet mission requirements. These combined efforts support DoD's commitment to finding an AFFF alternative that meets critical mission requirements while protecting human health and will represent $10M in research and demonstration funding.

The Department of the Navy is funding research and development efforts related to AFFF alternatives and development of analytical methods to test commercial products for PFAS. Recognizing the need to continue to have a foam that fights aircraft fires effectively while also looking for options without PFOA, the Navy is working with the manufacturers to test various alternative products. The Navy has tested commercially available fluorine free foams to determine if they can meet MILSPEC. These tests are critical from a personnel safety perspective and validate a foam's performance capabilities. To date no commercially available fluorine free foam has demonstrated comparable performance on critical MILSPEC required performance tests.

Exposure Assessment and Health Study:

We are working with the Agency for Toxic Substances and Disease Registry (ATSDR) to support the effort to conduct an exposure assessment at not less than 8 military installations and a nation-wide health study, as required by the FY2018 NDAA. We recently provided ATSDR $10M to begin conducting the exposure assessment and health study and are preparing to send them an additional $10M in FY2018. Another $10M will be transferred in FY2019. ATSDR is establishing the criteria to select the military installations.

Conclusion

In summary, DoD is proactively taking action to reduce the risks of PFOS and PFOA to human health. The Department is committed to mitigating PFOS and PFOA in the drinking water it supplies, as well as addressing releases to the environment under CERCLA that are the direct result of DoD's AFFF use. DoD has also invested in research to develop fluorine-free substitutes for AFFF that meet the military's stringent performance criteria, and develop technologies to quantify and clean up PFOS and PFOA and related PFAS chemicals. These combined efforts reinforce DoD's commitment to meeting critical mission requirements while protecting human health.

As the Department addresses this national issue, we strive to work in collaboration with regulatory agencies and communities to ensure our resources are applied effectively to protect human health across the country as part of a national effort led by EPA. We must ensure our response and clean-up resources are effectively applied to result in a reduced risk and exposure of personnel on our installations and in the surrounding communities around the country. We are prioritizing our investments to those actions which will address the greatest degree of risk. Although this is a national problem involving a wide array of industries and commercial applications, DoD has taken the lead in protecting the health of persons on and near DoD installations by following the CERCLA process to fully investigate releases and determine the appropriate cleanup actions based on risk.

DEPARTMENT OF HEALTH AND HUMAN SERVICES

NATIONAL INSTITUTES OF HEALTH

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES

Hearing on "The Federal Role in the Toxic PFAS Chemical Crisis"

Testimony before the
Senate Committee on Homeland Security and Governmental Affairs
Subcommittee on Federal Spending Oversight and Emergency Management

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September 26, 2018

Chairman Paul, Ranking Member Peters, Distinguished Members of the Senate Committee on Homeland Security and Governmental Affairs, Subcommittee on Federal Spending Oversight and Emergency Management, thank you for inviting me to testify at this hearing on a topic of increasing interest to the scientific community and to the greater public. I am Linda Birnbaum, the Director of the National Institute of Environmental Health Sciences (NIEHS). I am also the Director of the National Toxicology Program (NTP), which serves to develop and coordinate toxicological testing across the Department of Health and Human Services, to conduct hazard assessments of hazardous substances, and to manage the Interagency Coordinating Committee on the Validation of Alternative Methods. For over 39 years I have conducted primary research in toxicology, and I am here today in my role as Director of NIEHS to provide a scientific perspective about the large, complex, and ever-expanding class of chemicals known as per and polyfluoroalkyl substances (PFAS).

The National Institute of Environmental Health Sciences (NIEHS)

The NIEHS is one of several Federal agencies actively working to address various aspects related to PFAS. The NIEHS mission, as set forth under the Public Health Service Act, is to conduct and support research, training and health information dissemination with respect to environmental factors that may affect human health, directly or indirectly.[1] With this mandate, NIEHS researchers use state-of-the-art science and technology to investigate the interplay between environmental exposures, human biology, genetics, and human disease to help prevent illness, morbidity, and mortality, and improve human health. No age group or disease is beyond the NIEHS mission. Considering this fact, NIEHS researchers collaborate with their peers at the other NIH Institutes focused on specific life stages, organ systems, or diseases.

NIEHS also has responsibilities under the Superfund Amendments and Reauthorization Act of 1986 (SARA) which created the Superfund Research Program (SRP) within NIEHS. The SRP is a broad university-based research program capable of addressing the wide array of scientific uncertainties facing the national Superfund program.[2] Within this purview is the development of methods and technologies to detect hazardous substances in the environment; advanced techniques for the detection, assessment, and evaluation of the effects on human health of hazardous substances; methods to assess the risks to human health presented by hazardous substances; and basic biological, chemical, and physical methods to reduce the amount and toxicity of hazardous substances.

For nearly three decades,[3] NIEHS has been the leading Federal agency sponsoring basic research investigating health effects associated with human exposures to PFAS. It is important to note that I said health effects *associated* with exposure, I did not say *caused*. That fact should neither magnify nor diminish the science. It is simply a facet of environmental health. Our science is challenging because, although we can and do use animal models, *in vitro* tissue and cell culture

[1] Section 301 and Title IV of the Public Health Service Act.
[2] Section 209(b) of the Superfund Amendments and Reauthorization Act of 1986. Public Law 99-499. October 17, 1986. (42 USC 9660).
[3] Harris MW, Birnbaum LS. Developmental toxicity of perfluorodecanoic acid in C57BL/6N mice. *Fundam Appl Toxicol.* 1989;12(3):442-448. DOI:10.1093/toxsci/12.3.442.

systems, *in silico* approaches, and high throughput toxicological screening, we cannot ethically conduct prospective mechanistic studies in humans.

The most conclusive human health research isolates a single variable to understand the cause and effect of that variable, whether it be a drug, a microorganism, or a mutated gene. With possibly toxic chemicals, we are largely limited to natural history and population-based studies that attempt to find connections between populations exposed and health effects in the real world. For that reason, you will hear me talk about "associations" – certain health effects happened to more people than normal in populations that are exposed.

The research conducted to date reveals associations between human PFAS exposures and specific adverse human health outcomes. These include potential effects on children's cognitive and neurobehavioral development, immune system dysfunction, endocrine disruption, obesity, diabetes and lipid metabolism, and cancer. While knowledge about these epidemiologic associations has steadily expanded in recent years, many questions remain unanswered. The NIEHS and NTP, in coordination with other government agencies, continue to conduct research to enhance our understanding of the potential mechanisms and biological processes through which PFAS may be impacting human health. In addition, NIEHS has assumed a lead role in coordinating governmental research among agencies to assure applicability, disseminate findings, and prevent duplication of effort. To this end, NIEHS has co-hosted and participated in numerous symposia and working groups.

Per and Polyfluoroalkyl Substances (PFAS)

Before detailing the health effects associated with PFAS exposures, it is necessary to describe this class of chemicals. First created in the 1930s and 1940s, PFAS are among some 4,700 man-made chemicals that contain fluorine atoms bonded to a carbon chain.[4] The carbon-fluorine bond is one of the strongest ever created by man and is rarely seen in nature. The unique chemical composition of PFAS imparts desirable physical and chemical properties for consumer and industrial products, such as oil and water repellency, high and low temperature stability, and friction reduction. These properties have led to PFAS incorporation in a wide range of consumer products, including textiles, paper products, semiconductors, automotive and aerospace components, cookware, food packaging, and stain repellants. In addition, PFAS play an important role in industrial processes and have been used in aqueous film-forming foams (AFFF).

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. PFOA was used in the production of Teflon®, and PFOS in Scotchgard®. PFOA and PFOS are considered "long-chain" PFAS due to the length of their carbon chain backbones and have been studied for several decades. A wide range of "short-chain" PFAS have been introduced recently as alternatives to the linear, "long-chain" compounds. They have garnered increased attention by both the scientific community and the general public. Current efforts

[4] While approximately 4,700 flourine-containing, man-made compounds have been created, not all of these compounds have entered into commerce or been actively used.

within the NIEHS and NTP to greatly enhance our understanding of additional long-chain as well as short-chain PFAS are detailed later in this testimony.

The chemical composition of PFAS impart high stability for product design, but also makes PFAS extremely stable in the environment. In fact, PFAS and complex PFAS degradation products remain in the environment for so long that scientists are unable to estimate an environmental half-life. As PFAS are incorporated into more diverse processes and products, they have greater potential for release into the environment. Manufacturing and processing facilities, airports, and military installations that use firefighting foams are contributors of PFAS releases into the air, soil, and water, including sources of drinking water.[5] Because PFAS are resistant to typical environmental degradation processes, they are subject to long-range atmospheric and oceanic current transport. PFAS have been identified in some of the most remote areas on earth, and PFAS are ubiquitous in a variety of environments.

As new knowledge is acquired about the breadth of exposures in many communities and the potential hazards to human health, questions arise about whether continued use of PFAS in specific applications is necessary, or if alternatives exist that may still provide sufficient performance. As part of our portfolio, NIEHS and NTP contribute substantively to the field of alternatives assessment to ensure harmful chemicals are not replaced by equally harmful but less well-studied related compounds.

Human Exposures

Humans are exposed to PFAS through a myriad of pathways, practices, and products. Ingestion, particularly through drinking water, is the predominant human exposure pathway for many individuals or communities,[6] but recent studies suggest that other exposure pathways, including inhalation and dermal absorption, may have significance for human exposure.[7,8,9,10] Some PFAS

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[5] Hu XC, Andrews DQ, Lindstrom AB, Bruton TA, Schaider LA, Grandjean P, Lohmann R, Carignan CC, Blum A, Balan SA, Higgins CP, Sunderland EM. Detection of Poly- and Perfluoroalkyl Substances (PFASs) in U.S. Drinking Water Linked to Industrial Sites, Military Fire Training Areas, and Wastewater Treatment Plants. *Environ Sci Technol Lett.* 2016;3(10):344-350. DOI:10.1021/acs.estlett.6b00260.

[6] Agency for Toxic Substances and Disease Registry (ATSDR). Routes of Exposure and Health Effects. An Overview of Perfluoroalkyl and Polyfluoroalkyl Substances and Interim Guidance for Clinicians Responding to Patient Exposure Concerns. Interim Guidance. Revised on May 7, 2018. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. Internet: https://www.atsdr.cdc.gov/pfas/docs/pfas_clinician_fact_sheet_508.pdf.

[7] D'eon JC, Mabury SA. Is indirect exposure a significant contributor to the burden of Perfluorinated acids observed in humans? *Environ Sci Technol.* 2011;45(19):7974–84. DOI:10.1021/es200171y.

[8] Schaider, LA, Balan, SA, Blum, A, Andrews, DQ, Strynar, M, Dickinson, ME, Lunderberg, DM, Lang, JR, Peaslee, GF. Fluorinated Compounds in U.S. Fast Food Packaging. *Environ Sci Technol Lett.* 2017;4(3):105-111. DOI:10.1021/acs.estlett.6b00435.

[9] Franko J, Meade BJ, Frasch HF, Barbero AM, Anderson SE. Dermal penetration potential of perfluorooctanoic acid (PFOA) in human and mouse skin. *J Toxicol Environ Health A.* 2012;75(1):50-62. DOI:10.1080/15287394.2011.615108.

[10] Winkens K, Vestergren R, Berger U, Cousins IT. Early life exposure to per- and polyfluoroalkyl substances (PFASs): A critical review. *Science Direct.* June 2017;(3)2:55-68. DOI:10.1016/j.emcon.2017.05.001.

bioaccumulate, leading to concentrations in animals that are significantly higher than the surrounding environment, and they can enter the human food chain.[11]

Evidence suggests that human exposures to PFAS are extremely widespread. The Centers for Disease Control and Prevention's (CDC) National Center for Health Statistics' 2011–2012 U.S. National Health and Nutrition Examination Survey (NHANES) reported detectable PFAS blood serum concentrations in virtually all individuals (97 percent).[12] The most recent NHANES data indicate a reduction in serum concentrations of PFOS and PFOA since their removal from consumer products in the early 2000s, but replacement PFAS appear to be rising quickly and exposure is more difficult to assess accurately due to a lack of analytical standards.

Health Effects Research

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

When looking for possible human health effects of chemical compounds distributed in nature, it is also important to recognize that environmental impact is very hard to study and there are thousands of individual PFAS chemicals. While we have studies that indicate adverse health effects due to PFOA and PFOS exposure, we do not have strong data on which to base conclusions for the great majority of thousands of PFAS and we have only limited findings that support the following adverse health effects. Our current scientific method involves using our understanding of the biological and chemical processes being influenced by the few well-studied chemicals to extrapolate potential conclusions about structurally similar compounds which we can reasonably expect to act through the same pathways and have similar effects. More research is needed to form definitive links between exposure to PFAS chemicals and adverse health effects in humans.

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[11] Scher, DP, Kell JE, Huset CA, Barry KM, Hoffbeck RW, Yingling VL, Messing RB. Occurrence of perfluoroalkyl substances (PFAS) in garden produce at homes with a history of PFAS-contaminated drinking water. *Chemosphere*. 2018;196:548-555. DOI:10.1016/j.chemosphere.2017.12.179.

[12] Hu XC, Andrews DQ, Lindstrom AB, Bruton TA, Schaider LA, Grandjean P, Lohmann R, Carignan CC, Blum A, Balan SA, Higgins CP, Sunderland EM. Detection of Poly- and Perfluoroalkyl Substances (PFASs) in U.S. Drinking Water Linked to Industrial Sites, Military Fire Training Areas, and Wastewater Treatment Plants. *Environ Sci Technol Lett.* 2016;3(10):344-350. DOI:10.1021/acs.estlett.6b00260.

Decreased Immune System Function
As early as 1978, scientists observed immunotoxicity in non-human primates exposed to PFAS.[13] In 2016, NTP concluded that PFOA and PFOS are presumed to be a hazard to healthy immune system function in humans, based on a systematic literature review.[14] This conclusion is based on a high level of evidence that PFOA and PFOS suppressed the antibody response in animal studies, and a moderate level of evidence that these chemicals affect multiple aspects of the immune system in humans. Adult PFAS exposure has also been associated with decreases in antibody production.[15]

NTP is in its earliest stages of conducting another systematic review on PFAS immunotoxicity; this one will focus on six related chemicals: PFDA, PFNA, PFHxA, PFBA, PFBS and PFHxS.

Cancer
The epidemiological data on associations between PFAS and cancer risk are limited. Those published studies were recently summarized by the Agency for Toxic Substances and Disease Registry (ATSDR) in their Draft Toxicological Profile for Perfluoroalkyls.[16] According to the Toxicological Profile, "Occupational and community exposure studies have found increases in the risk of testicular and kidney cancer associated with PFOA. No consistent epidemiologic evidence for other cancer types were found for PFOA.[17,18] For PFOS, one occupational exposure study reported an increase in bladder cancer,[19] but this was not supported by subsequent occupational studies. General population studies have not consistently reported increases in malignant tumors for PFOS. Epidemiologic studies examining other perfluoroalkyl compounds consisted of two case-control studies. No increases in breast cancer risk were observed for PFHxS or PFNA; an increased breast cancer risk was observed for PFOSA.[20] Another case-control study did not find increases in prostate cancer for PFOA, PFOS, PFHxS, PFNA, PFDeA, or PFUA.[21] However, among men with a first-degree relative with prostate cancer, associations

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[13] Goldenthal EI, Jessup DC, Geil RG, Mehring JS. Final report, ninety day subacute rhesus monkey toxicity study, International Research and Development Corporation, study no. 137–090, November 10, 1978, U.S. EPA Administrative Record, AR226–0447. 1978.
[14] Sept. 2016. Monograph on Immunotoxicity Associated with Exposures to PFOA and PFOS. Research Triangle Park, NC: National Toxicology Program. Internet: https://ntp.niehs.nih.gov/pubhealth/hat/noms/pfoa/index.html.
[15] Kielsen K, Shamim Z, Ryder LP, Nielsen F, Grandjean P, Budtz-Jørgensen E, Heilmann C. *J Immunotoxicol.* 2016;13(2):270-3. DOI:10.3109/1547691X.2015.
[16] Agency for Toxic Substances and Disease Registry (ATSDR). 2018. Toxicological profile for Perfluoroalkyls. (Draft for Public Comment). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. Internet: https://www.atsdr.cdc.gov/toxprofiles/tp.asp?id=1117&tid=237.
[17] Barry V, Winquist A, Steenland K. Perfluorooctanoic acid (PFOA) exposures and incident cancers among adults living near a chemical plant. *Environ Health Perspect.* 2013;121(11-12):1313-1318. DOI:10.1289/ehp.1306615.
[18] Steenland K, Woskie S. Cohort mortality study of workers exposed to perfluorooctanoic acid. *Am J Epidemiol.* 2012;176(10):909-917. DOI:10.1093/aje/kws171.
[19] Alexander BH, Olsen GW, Burris JM, Mandel JH, Mandel JS. Mortality of employees of a perfluorooctanesulphonyl fluoride manufacturing facility. *Occup Environ Med.* 2003;60:722-729. DOI:10.1136/oem.60.10.722.
[20] Bonefeld-Jorgensen EC, Long M, Fredslund SO, Bossi R, Olsen J. Breast cancer risk after exposure to perfluorinated compounds in Danish women: A case-control study nested in the Danish National Birth Cohort. *Cancer Causes Control.* 2014;25(11):1439-1448. DOI:10.1007/s10552-014-0446-7.
[21] Hardell E, Karrman A, van Bavel B, Bao J, Carlberg M, Hardell L. Case-control study on perfluorinated alkyl acids (PFAAs) and the risk of prostate cancer. *Environ Int.* 2014;63:35-39. DOI:10.1016/j.envint.2013.10.005.

were found for PFOA, PFOS, PFHxS, PFDeA, and PFUA, but not for PFNA."[22] Animal studies are consistent with the human epidemiologic studies of cancer endpoints.

Child Development

PFOA and PFOS cause developmental toxicity in animals.[23,24,25] Human epidemiology studies also show associations between some PFAS and developmental effects.[26] One human study found that PFAS exposure during pregnancy was associated with decreased birth weight and head circumference only in males.[27] Similar decreases in birth weight have been reported in rodents for over a decade.[28] Recent findings from NIH-supported epidemiological studies of a cohort of mothers and babies showed that prenatal exposure to PFOS is associated with cognitive effects and decreased ability to regulate behavior in school-age children. However, no similar association was observed in this study for PFOA exposure.[29]

A review of the epidemiological literature by an NIEHS-funded scientist summarized findings from several prospective cohorts on the relationship between prenatal exposure to certain PFAS and neurodevelopmental and neurobehavioral outcomes – for example, cognitive abilities, psychomotor development, attention-deficit hyperactivity disorder, and cerebral palsy. So far, the available body of evidence is inconsistent with respect to these associations, both with respect to which compounds may have adverse effects and timing of potential windows of vulnerability. Additional studies are needed to resolve these questions.[30]

Endocrine Disruption

Studies suggest that some PFAS may interfere with healthy hormonal function in the body. Our endocrine system controls our basic physiology, including metabolism, growth, fertility, and

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[22] Ibid.

[23] White SS, Calafat A M, Kuklenyik Z, Thibodeaux J, Wood C, Fenton, SE. Gestational PFOA exposure of mice is associated with altered mammary gland development in dams and female offspring. *Toxicol. Sci.* 2007;96(1):133-144. DOI:10.1093/toxsci/kfl177.

[24] Butenhoff JL, Ehresman DJ, Chang SC, Parker GA, Stump DG. Gestational and lactational exposure to potassium perfluorooctanesulfonate (K+PFOS) in rats: developmental neurotoxicity. *Reprod Toxicol.* 2009 Jun;27(3-4):319-30. DOI:10.1016/j.reprotox.2008.12.010.

[25] Chen T, Zhang L, Yue JQ, Lv ZQ, Xia W, Wan YJ, Li YY, Xu SQ. Prenatal PFOS exposure induces oxidative stress and apoptosis in the lung of rat off-spring. *Reprod Toxicol.* 2012 Jul;33(4):538-45. DOI:10.1016/j.reprotox.2011.03.003.

[26] White SS, Fenton SE, Hines EP. Endocrine disrupting properties of perfluorooctanoic acid. *J Steroid Biochem Mol Biol.* 2011 Oct;127(1-2):16–26. DOI:10.1016/j.jsbmb.2011.03.011.

[27] Valvi D, Oulhote Y, Weihe P, Dalgård C, Bjerve KS, Steuerwald U, Grandjean P. Gestational diabetes and offspring birth size at elevated environmental pollutant exposures. *Environ Int.* 2017 Oct;107:205-215. DOI:10.1016/j.envint.2017.07.016.

[28] Hines, EP, White, SS, Stanko, JP, Gibbs-Flournoy, JE, Lau C, Fenton, SE. Phenotypic dichotomy following developmental exposure to perfluorooctanoic acid (PFOA) in female CD-1 mice: low doses induce elevated serum leptin and insulin, and overweight in mid-life. *Mol. Cell Endocrinol.* 2009 May 25;304(1-2):97-105. DOI:https://doi.org/10.1016/j.mce.2009.02.021.

[29] Vuong AM, Yolton K, Webster GM, Sjödin A, Calafat AM, Braun JM, Dietrich KN, Lanphear BP, Chen A. Prenatal polybrominated diphenyl ether and perfluoroalkyl substance exposures and executive function in school-age children. *Environ Res.* 2016 May; 147:556–564. DOI:10.1016/j.envres.2016.01.008.

[30] Braun J. Early-life exposure to EDCs: role in childhood obesity and neurodevelopment. *Nat Rev Endocrinol.* 2017 Mar; 13(3):161–173. DOI:10.1038/nrendo.2016.186.

development. Studies suggest that early-life exposure to some PFAS may contribute to the development of metabolic diseases, including obesity and type 2 diabetes, which are major public health problems. Although further confirmation is required, the findings from one study suggest that exposures to some PFAS during pregnancy may influence lipid metabolism and glucose tolerance.[31] A study of pregnant women in Cincinnati found that those with higher prenatal PFAS levels had children with higher body fat levels at age eight[32]—a finding reinforced by other epidemiological studies[33],[34] and similar effects on excessive body weight gain reported for experimental animals.[35] It appears that some PFAS may also affect body weight later in life. Scientists at the Harvard School of Public Health have found that adults with higher blood levels of some PFAS have lower resting metabolic rates, meaning they burn fewer calories while resting, which makes it difficult for them to maintain weight loss.[36] Effects on weight gain have been seen in numerous animal studies,[37,38,39] supporting this association in humans. It is particularly concerning that some PFAS alter thyroid hormone homeostasis that regulates metabolism and growth.[40,41,42]

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[31] Matilla-Santander N, Valvi D, Lopez-Espinosa MJ, Manzano-Salgado CB, Ballester F, Ibarluzea J, Santa-Marina L, Schettgen T, Guxens M, Sunyer J, Vrijheid M. Exposure to Perfluoroalkyl Substances and Metabolic Outcomes in Pregnant Women: Evidence from the Spanish INMA Birth Cohorts. *Environ Health Perspect*. 2017 Nov 13;125(11):117004. DOI:10.1289/EHP1062.

[32] Braun JM, Chen A, Romano ME, Calafat AM, Webster GM, Yolton K, Lanphear BP. Prenatal perfluoroalkyl substance exposure and child adiposity at 8 years of age: The HOME study. *Obesity (Silver Spring)*. 2016 Jan;24(1):231-7. DOI:10.1002/oby.21258.

[33] Mora AM, Oken E, Rifas-Shiman SL, Webster TF, Gillman MW, Calafat AM, Ye X, Sagiv SK. Prenatal Exposure to Perfluoroalkyl Substances and Adiposity in Early and Mid-Childhood. *Environ Health Perspect*. 2017 Mar;125(3):467-473. DOI:10.1289/EHP246.

[34] Karlsen M, Grandjean P, Weihe P, Steuerwald U, Oulhote Y, Valvi D. Early-life exposures to persistent organic pollutants in relation to overweight in preschool children. *Reprod Toxicol*. 2017 Mar;68:145-153. DOI:10.1016/j.reprotox.2016.08.002.

[35] Hines EP, White SS, Stanko JP, Gibbs-Flournoy EA, Lau C, Fenton SE. Phenotypic dichotomy following developmental exposure to perfluorooctanoic acid (PFOA) in female CD-1 mice: Low doses induce elevated serum leptin and insulin, and overweight in mid-life. *Mol Cell Endocrinol*. 2009 May 25;304(1-2):97-105. DOI:10.1016/j.mce.2009.02.021.

[36] Liu G, Dhana K, Furtado JD, et al. Perfluoroalkyl substances and changes in body weight and resting metabolic rate in response to weight-loss diets: A prospective study. Basu S, ed. *PLoS Medicine*. 2018;15(2):e1002502. DOI:10.1371/journal.pmed.1002502.

[37] Grün F, Blumberg B. Endocrine disrupters as obesogens. *Mol Cell Endocrinol*. 2009 May 25;304(1-2):19-29. DOI:10.1016/j.mce.2009.02.018.

[38] Shi Z, Zhang H, Ding L, Feng Y, Xu M, Dai J. The effect of perfluorododecanonic acid on endocrine status, sex hormones and expression of steroidogenic genes in pubertal female rats. *Reprod Toxicol*. 2009 Jun;27(3-4):352-9. DOI:10.1016/j.reprotox.2009.02.008.

[39] Holtcamp W. Obesogens: an environmental link to obesity. *Environ Health Perspect*. 2012;120:a62–8. DOI:10.1289/ehp.120-a62.

[40] Byrne SC, Miller P, Seguinot-Medina S, Waghiyi V, Buck CL, von Hippel FA, Carpenter DO. Exposure to perfluoroalkyl substances and associations with serum thyroid hormones in a remote population of Alaska Natives. *Environ Res*. 2018 Oct;166:537-543. DOI:10.1016/j.envres.2018.06.014.

[41] Kim MJ, Moon S, Oh BC, Jung D, Ji K, Choi K, Park YJ. Association between perfluoroalkyl substances exposure and thyroid function in adults: A meta-analysis. *PLoS One*. 2018 May 10;13(5):e0197244. DOI:10.1371/journal.pone.0197244.

[42] Preston EV, Webster TF, Oken E, Claus Henn B, McClean MD, Rifas-Shiman SL, Pearce EN, Braverman LE, Calafat AM, Ye X, Sagiv SK. *Environ Health Perspect*. 2018 Feb 27;126(2):027013. DOI:10.1289/EHP2534.

Fertility is another outcome related to endocrine effects. A literature review of recent human epidemiologic evidence on the association between exposure to some PFAS and measures of human fertility show the potential for effects on female fecundability (i.e., the probability of conception).[43] In addition, several recent studies have shown an association between women with higher PFAS exposure and the length of time they are able to nurse their child after birth, although not at all levels of exposure.[44,45] This is similar to 2006 findings in animals reporting impaired breast development and breastfeeding during and after pregnancy in mice.[46]

NIEHS Superfund Research Program (SRP)

Last year, NIEHS competitively awarded a five-year grant to the University of Rhode Island to fund its "Sources, Transport, Exposure and Effects of PFASs (STEEP) Superfund Research Program Center" (Fiscal Years 2017-2022).[47] The Center is assessing the impact of PFAS exposures on immune dysfunction and metabolic abnormalities by examining the health of nine year-old children from birth cohorts in the Faroe Islands (Denmark). The Center is also tracing unique PFAS chemical signature fingerprints at a contaminated groundwater site on Cape Cod, leading to exposure through drinking water, as a function of PFAS chemistry, geochemistry and distance from the source. Additionally, the Center is developing and validating novel passive sampling tools for PFAS to measure time weighted average concentrations for some PFAS and their volatile precursors. These tools can be deployed to aid site managers in their risk characterization. Finally, the Center is engaging communities and advising stakeholders on ways to effectively reduce human exposure to PFAS. Other NIEHS Superfund Research Program Centers are providing technical assistance about PFAS to state and local governments, water authorities, and private well users. The University of Michigan and Brown University Superfund Research Centers have sponsored or participated at workshops and webinars on the subject attended by Federal and state officials—including many facilitated by the Northeast Waste Management Officials' Association. The Northeastern University Superfund Center held a workshop on PFAS which was widely attended by community organizations as well as state and local officials and academics.

Through Small Business Innovation Research (SBIR) grants, the Superfund Research Program provides support to scientists and engineers developing novel technologies for mitigation and remediation of PFAS in the environment. SBIR grantee CycloPure, Inc., is developing novel, high-affinity cyclodextrin polymers for the cost-effective remediation of hazardous PFAS from

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[43] Bach CC, Vested A, Jørgensen K, Bonde JP, Henriksen TB, Toft G. Perfluoroalkyl and polyfluoroalkyl substances and measures of human fertility: a systematic review. *Crit Rev Toxicol.* 2016 Oct;46(9):735-55. DOI:10.1080/10408444.2016.1182117.

[44] Timmermann CA, Budtz-Jørgensen E, Petersen MS, Weihe P, Steuerwald U, Nielsen F, Jensen TK, Grandjean P. Shorter duration of breastfeeding at elevated exposures to perfluoroalkyl substances. *Reprod Toxicol.* 2017 Mar;68:164-170. DOI:10.1016/j.reprotox.2016.07.010.

[45] Romano ME, Xu Y, Calafat AM, Yolton K, Chen A, Webster GM, Eliot MN, Howard CR, Lanphear BP, Braun JM. Maternal serum perfluoroalkyl substances during pregnancy and duration of breastfeeding. *Environ Res.* 2016 Aug;149:239-246. DOI:10.1016/j.envres.2016.04.034.

[46] White SS, Calafat AM, Kuklenyik Z, Villanueva L, Zehr RD, Helfant L, Strynar MJ, Lindstrom AB, Thibodeaux JR, Wood C, Fenton SE. Gestational PFOA exposure of mice is associated with altered mammary gland development in dams and female offspring. *Toxicol Sci.* 2007 Mar;96(1):133-44. DOI:10.1093/toxsci/kfl177.

[47] NIH Grant No. P42ES027706. Sources, Transport, Exposure and Effects of PFASs (STEEP). McCann, Alyson. University of Rhode Island. Awarded August 30, 2017. NIH RePORTER Link.

water.[48] In another SBIR project, EnChem Engineering, Inc. is developing and demonstrating an innovative combined in-situ / ex-situ technology to cost-effectively expedite treatment of PFAS at Superfund sites. The EnChem approach combines: (1) a non-toxic cyclic sugar (CS) to flush sorbed PFAS from the in-situ soil; (2) extraction of the CS-PFAS complex with groundwater and treatment in a high efficiency ex-situ reactor that simultaneously degrades, removes, and concentrates (100-1000 times) the PFAS; (3) ultimate on-site destruction by alkaline ozonation (99+ percent removal); and (4) returns the treated water with low concentration CS amendment to injection wells for continued flushing. The ex-situ treatment reactor can also be used as pre-treatment to existing granular activated carbon.[49] Additionally, the Michigan State University Superfund Research Center is developing energy efficient nanoreactors capable of breaking the carbon-fluorine bond.[50] Also of note, the University of California, Berkeley Superfund Research Center is combining biological and chemical treatment options to degrade and destroy AFFF.[51]

Recent Time-Sensitive Research Awards

In addition to its regular funding programs, NIEHS has used a mechanism to fund time-sensitive research opportunities related to PFAS. Researchers at the Colorado School of Public Health, the University of Colorado Anschutz Medical Campus, and the Colorado School of Mines are studying PFAS exposures in residents near Colorado Springs whose wells and public water systems were contaminated with a wide range of PFAS, including high levels of perfluorohexane sulfonate (PFHxS).[52,53] This time-sensitive study started near the peak of exposure after contamination was discovered and will explore ways to measure how exposure levels to PFAS in the residents change over time.

In 2016, elevated levels of GenX, a short-chain PFAS containing an ether link generated in the production of non-stick coatings, were detected in North Carolina's Cape Fear River. The Cape Fear River provides drinking water for approximately 300,000 people and a production facility had been releasing GenX upstream. NIEHS funded a study at North Carolina State University to address community questions about GenX exposure and health effects, including GenX's

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[48] NIH Grant No. R43ES029401. Remediation of Perfluorinated Chemicals in Water Using Novel High-Affinity Polymer Adsorbents. Barin, Gokhan. CycloPure, Inc. Awarded March 22, 2018. NIH RePORTER Link.

[49] NIH Grant No. R43ES028649. Bench Scale Studies of Novel In-situ Aquifer Remediation of Recalcitrant Fluorinated Organic Compounds at Superfund Sites. Ball, Raymond. EnChem Engineering, Inc. Awarded August 28, 2017. NIH RePORTER Link.

[50] Tian H, Gao J, Li H, Boyd SA, Gu C. Complete Defluorination of Perfluorinated Compounds by Hydrated Electrons Generated from 3-Indole-acetic-acid in Organomodified Montmorillonite. *Sci Rep*. 2016;6:32949. DOI:10.1038/srep32949.

[51] Yi S, Harding-Marjanovic KC, Houtz EF, Gao Y, Lawrence JE, Nichiporuk RV, Iavarone AT, Zhuang W, Hansen M, Field JA, Sedlak DL, Alvarez-Cohen L. Biotransformation of AFFF Component 6:2 Fluorotelomer Thioether Amido Sulfonate Generates 6:2 Fluorotelomer Thioether Carboxylate under Sulfate-Reducing Conditions. *Environ Sci Technol Lett*. 2018:5(5);283-288. DOI:10.1021/acs.estlett.8b00148.

[52] NIH Grant No. R21ES029394. Exposure and Health Effects from Poly- and Perfluoroalkyl Substances in Colorado Water. Adgate, John L. University of Colorado Denver. Awarded December 13, 2017. NIH RePORTER Link.

[53] Exposure study to assess people and water near Colorado Springs; Toxic chemicals have contaminated water supplies for 65,000. *CU Anschutz Today*. December 21, 2017. Internet: https://www.cuanschutztoday.org/exposure-study-assess-people-water-near-colorado-springs.

potential toxicity, how it is stored in the body, and how long it remains in the environment.[54,55] Initial results from nearly 200 homes show detectable levels of GenX in treated tap water from the Cape Fear River but none above 140 parts per trillion, the current North Carolina public health goal for GenX in drinking water. Many other PFAS were also measured in treated Cape Fear River tap water. GenX was not detected in the tap water of homes whose groundwater was treated with granular activated carbon filtration. Additional analysis, including testing of blood and urine samples from study participants, is ongoing. NTP is also studying how GenX moves through the body and whether it is toxic to the placenta, immune system, liver, and other tissues.

NTP REACT Program

The NTP Responsive Evaluation and Assessment of Chemical Toxicity, or REACT, Program is studying subclasses of PFAS, due to potential similarities in chemical properties and toxicity within subclasses. Scientists will be able to compare one PFAS to another, determine the relationship between chain length, branching, and toxicity, and work toward understanding a common basis for toxicity.

REACT uses a combination of methods. First, the project analyzes the chemical structure of PFAS compounds to see what information is available in databases for that compound or others with similar structure. Chemical structure plays a major role in how chemicals interact and chemicals with similar structure often have similar toxicity. This computer-based step is known as *in silico* screening. Based on *in silico* results, chemicals are prioritized for further laboratory testing with cells, known as *in vitro* testing. Examples include testing whether PFAS cause cells to die or substantially alter the function of human liver, placenta, or mammary gland derived cells. Some of these tests are conducted through the automated Toxicology in the 21st Century (Tox21) Program, a Federal collaboration among the NIH, the U.S. Environmental Protection Agency (EPA), and the U.S. Food and Drug Administration (FDA).[56] The *in vitro* data are then examined to prioritize select chemicals for toxicity testing in animals, known as *in vivo* studies, so the data can be considered all together. REACT is a collaborative program with EPA. The Program plans to test over 100 individual PFAS across the PFAS class. Both NTP and EPA are generating chemical libraries to consolidate and share what is known about individual chemicals.

Current Challenges

Real-world human exposures to PFAS involve complex mixtures, not individual chemicals. This fact complicates both the science of exposure and the assessment of health risks.[57] Currently, analytical techniques are limited for determining which specific PFAS are contained in a given

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[54] NIH Grant No. R21ES029353. Assessing Impact of Drinking Water Exposure to GenX (Hexafluoropropylene Oxide Dimer Acid) in the Cape Fear River Basin, North Carolina. Hoppin, Jane. North Carolina State University, Raleigh. Awarded on October 31, 2017. NIH RePORTER Link.

[55] Researchers receive grant to study GenX exposure in New Hanover County residents. NC State News. November 1, 2017. Internet: https://news.ncsu.edu/2017/11/genx-study/.

[56] Toxicology Testing in the 21st Century (Tox21). U.S. Environmental Protection Agency. Internet: https://www.epa.gov/chemical-research/toxicology-testing-21st-century-tox21.

[57] Kotthoff, M, Bücking M. 2018. Four Chemical Trends Will Shape the Next Decade's Directions in Perfluoroalkyl and Polyfluoroalkyl Substances Research. *Front Chem.* 2018 Apr 5;6:103. DOI:10.3389/fchem.2018.00103.

complex mixture. Further, toxicological information on these combined PFAS mixtures remains incomplete. Additional research is needed to assess environmental exposures to mixtures and determine their combined effects.

Apart from the challenge of characterizing PFAS in environmental samples is the challenge of studying PFAS in the human body. Our present understanding is that the time required for elimination of PFAS from the human body can vary. While some longer chain molecules may remain in the blood for years, shorter chain PFAS may be more quickly eliminated. Differences in elimination rates of longer and shorter chain PFAS complicates biomonitoring as well as toxicological studies. However, lack of biological persistence does NOT mean lack of toxicity, particularly for chemicals like PFAS that may have consistent daily exposures.

Traditional methods for measuring the body burden of PFAS—namely analyzing serum—are not as effective for shorter chain PFAS as for longer chain PFAS. Scientists are beginning to measure PFAS in urine,[58] in plasma, and in whole blood, as well as in serum.[59] These expanded biomonitoring techniques for sampling and analyses will further inform our understanding of exposures and risks. Using these techniques, many scientists are rightly focusing on measuring the total exposure to all PFAS as opposed to the past focus on one substance in isolation. This is important as it allows for understanding cumulative effects of PFAS mixtures as a class. Examining the person in the context of the measure of all the exposures they have experienced in their lifetime and how they relate to their health is in step with the latest science.

Approaching PFAS as a class for assessing exposure and biological impact is the best way to protect public health. Based upon their persistent nature, widespread exposure, and known toxicity, it begs the question: does the value of PFAS production and use for modern-day convenience outweigh the potential costs and risks to public and environmental health? Thus, science is moving in the direction of safer alternatives.

Manufacturers have begun recently to produce and market AFFF devoid of any PFAS. Such fluorine-free AFFF is now being used at Heathrow Airport in London, United Kingdom and at major airports in Sweden. It will be important to evaluate these alternatives for potential health effects as well.

Federal Collaboration

NIEHS and the NTP will continue to provide scientific leadership with respect to PFAS research. Communication and collaboration both within the Department of Health and Human Services, and across the Federal Government, about PFAS is intensifying. In February 2018, a Federal information exchange meeting about PFAS was held on the NIH campus in Bethesda, Maryland.[60] NIEHS was among other Federal agencies that participated at the PFAS National

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[58] Hartmann C, Raffesberg W, Scharf S, Uhl M. Perfluoroalkylated substances in human urine: results of a biomonitoring pilot study. *Biomonitoring* 2017; 4:1-10. DOI:10.1515/bimo-2017-0001.

[59] Poothong S, Thomsen C, Padilla-Sanchez JA, Papadopoulou E, Haug LS. Distribution of Novel and Well-Known Poly- and Perfluoroalkyl Substances (PFASs) in Human Serum, Plasma, and Whole Blood. *Environ Sci Technol/* 2017 Nov 21;51(22):13388-13396. DOI:10.1021/acs.est.7b03299.

[60] Federal agencies exchange PFAS updates. NIEHS *Environmental Factor*. March 2018. Internet: https://factor.niehs.nih.gov/2018/3/science-highlights/pfas/index.htm.

Leadership Summit hosted by EPA in May 2018.[61] Within the Department of Health and Human Services and primarily through NTP, NIEHS works closely with the FDA and the Centers for Disease Control and Prevention (CDC) on PFAS matters. Additionally, NIEHS is specifically being consulted by ATSDR on the execution of the exposure assessments and health studies authorized by the National Defense Authorization Act for Fiscal Year 2018, as amended.[62]

Conclusion

Thank you again for allowing me to share a scientific perspective on this important topic. In closing, I note that NIEHS is well-positioned to continue contributing essential scientific knowledge about this complex and large class of chemicals. This knowledge can help regulators make sound, science-based decisions and informs the medical and public health communities about the potential health effects associated with exposure to PFAS. I welcome your questions.

[61] EPA PFAS National Leadership Summit and Engagement. May 22-23, 2018.
Internet: https://www.epa.gov/pfas/pfas-national-leadership-summit-and-engagement.
[62] Sec. 316 of the National Defense Authorization Act for Fiscal Year 2018. Public Law 115-91. December 12, 2017.

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DRINKING WATER

Status of DOD Efforts to Address Drinking Water Contaminants Used in Firefighting Foam

Statement of Brian J. Lepore, Director, Defense Capabilities and Management

J. Alfredo Gómez, Director, Natural Resources and Environment

September 26, 2018

GAO Highlights

Highlights of GAO-18-700T, a testimony before the Subcommittee on Federal Spending Oversight and Emergency Management, Committee on Homeland Security and Governmental Affairs, U.S. Senate

DRINKING WATER

Status of DOD Efforts to Address Drinking Water Contaminants Used in Firefighting Foam

Why GAO Did This Study

According to health experts, exposure to elevated levels of PFOS and PFOA could cause increased cancer risk and other health issues in humans. DOD has used firefighting foam containing PFOS, PFOA, and other PFAS since the 1970s to quickly extinguish fires and ensure they do not reignite. EPA has found elevated levels of PFOS and PFOA in drinking water across the United States, including in drinking water at or near DOD installations.

This statement provides information on actions DOD has taken to address elevated levels of PFOS and PFOA in drinking water at or near military installations and to address concerns with firefighting foam.

This statement is largely based on a GAO report issued in October 2017 (GAO-18-78). To perform the review for that report, GAO reviewed DOD policies and guidance related to PFOS and PFOA and firefighting foam, analyzed DOD data on testing and response activities for PFOS and PFOA, reviewed the four administrative orders issued by EPA and state regulators to DOD on addressing PFOS and PFOA in drinking water, visited seven installations, and interviewed DOD and EPA officials. This statement also includes updated information based on two 2018 DOD reports to Congress—one on PFOS and PFOA response and one on firefighting foam—as well as discussions with DOD officials.

View GAO-18-700T. For more information, contact Brian J. Lepore at (202) 512-4523 or leporeb@gao.gov or J. Alfredo Gómez at (202) 512-3841 or gomezj@gao.gov.

What GAO Found

GAO reported in October 2017 that the Department of Defense (DOD) had initiated actions to address elevated levels of perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) in drinking water at or near military installations. PFOS and PFOA are part of a larger class of chemicals called per- and polyfluoroalkyl substances (PFAS), which can be found in firefighting foam used by DOD. In May 2016, the Environmental Protection Agency (EPA) issued nonenforceable drinking water health advisories for those two chemicals. Health advisories include recommended levels of contaminants that can be present in drinking water at which adverse health effects are not anticipated to occur over specific exposure durations.

In response to those health advisories, DOD's military departments directed their military installations to (1) identify locations with a known or suspected release of PFOS and PFOA and address any releases that pose a risk to human health, which can include people living outside DOD installations, and (2) test for PFOS and PFOA in installation drinking water and address any contamination above the levels in EPA's health advisories. For example:

- As of August 2017, DOD had identified 401 active or closed military installations with known or suspected releases of PFOS or PFOA.
- The military departments had reported spending approximately $200 million at or near 263 installations for environmental investigations and responses related to PFOS and PFOA, as of December 2016. According to DOD, it may take several years for the department to determine how much it will cost to clean up PFOS and PFOA contamination at or near its military installations.
- DOD reported taking actions (such as providing alternative drinking water and installing treatment systems) as of August 2017 to address PFOS and PFOA levels exceeding those recommended in EPA's health advisories for drinking water for people (1) on 13 military installations in the United States and (2) outside 22 military installations in the United States.

In addition to actions initiated by DOD, GAO reported in October 2017 that the department also had received and responded to four orders from EPA and state regulators that required DOD to address PFOS and PFOA levels that exceeded EPA's health advisory levels for drinking water at or near four installations.

GAO also reported in October 2017 that DOD was taking steps to address health and environmental concerns with its use of firefighting foam that contains PFAS. These steps included restricting the use of existing foams that contain PFAS; testing foams to identify the amount of PFAS they contain; and funding research on developing PFAS-free foam that can meet DOD's performance requirements, which specify how long it should take for foam to extinguish a fire and keep it from reigniting. In a June 2018 report to Congress, DOD stated that no commercially available PFAS-free foam has met DOD's performance requirements and that research to develop such a PFAS-free foam is ongoing.

Chairman Paul, Ranking Member Peters, and Members of the Subcommittee:

Thank you for the opportunity to be here today to discuss our report on the Department of Defense's (DOD) attention to drinking water contaminants, part of our body of work on the federal government's environmental liabilities.[1] The federal government is financially liable for cleaning up areas where federal activities have contaminated the environment. Today's hearing addresses federal liability for and procurement of per- and polyfluoroalkyl substances (PFAS), a large group of man-made chemicals that include perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA).[2] PFOS, PFOA, and other PFAS can be found in firefighting foam used by DOD since the 1970s for training and emergency response activities to put fires out quickly while also ensuring that they do not reignite.[3]

Exposure to elevated levels of PFOS and PFOA could cause increased cancer risk and other health issues in humans, according to the Agency for Toxic Substances and Disease Registry. The Environmental Protection Agency (EPA) has found PFOS and PFOA in drinking water across the United States, including in drinking water at or near DOD installations. EPA has not regulated PFOS and PFOA in drinking water, but EPA did issue nonenforceable drinking water health advisories for these contaminants in May 2016, which we discuss further in this statement. Addressing PFOS and PFOA contamination represents a potentially significant environmental liability for DOD because the regulatory requirements are still evolving, the scientific community is still developing the underlying science, and the scope of work needed for cleanup is not yet known.

In our statement today, we discuss actions DOD has taken to address elevated levels of PFOS and PFOA in drinking water at or near military installations and to address concerns with DOD's

[1]In 2017, we added U.S. Government's Environmental Liabilities to our areas identified as government operations with greater vulnerabilities to fraud, waste, abuse, and mismanagement or in need for transformation to address economy, efficiency, or effectiveness challenges. In fiscal year 2016 this liability was estimated at $447 billion (up from $212 billion in 1997) and is likely to continue to increase. The Department of Energy is responsible for 83 percent of these liabilities and DOD for 14 percent. Agencies spend billions each year on environmental cleanup efforts but the estimated environmental liability continues to rise. GAO, *High-Risk Series: Progress on Many High-Risk Areas, While Substantial Efforts Needed on Others*, GAO-17-317 (Washington, D.C.: Feb. 15, 2017).

[2]PFOS and PFOA are no longer manufactured in the United States but have been used since the 1940s. PFOS and PFOA have been the most extensively produced and studied PFAS chemicals, and are very persistent in the environment and human body—meaning they do not break down and can accumulate over time.

[3]PFAS have also been used to make consumer products more resistant to stains, grease, and water; keep food from sticking to cookware; and make clothes and mattresses more waterproof.

firefighting foam. This statement is largely based on our October 2017 report on DOD's efforts to manage contaminants in drinking water.[4] To perform our review for the October 2017 report, we reviewed DOD policies and guidance related to PFOS and PFOA and firefighting foam; analyzed DOD data on testing and response activities for PFOS and PFOA; reviewed four administrative orders issued by EPA and state regulators; visited seven installations; and interviewed DOD and EPA officials. More detailed information on the scope and methodology for that work can be found in the issued report. This statement also includes updated information since our October 2017 report, based on our review of two 2018 DOD reports to Congress—a March 2018 report on the department's response to PFOS and PFOA contamination and a June 2018 report on firefighting foam alternatives—and on our discussions with DOD officials about these issues and their actions in September 2018.[5]

We conducted the work on which this statement is based in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

EPA regulates drinking water contaminants by issuing legally enforceable standards under the Safe Drinking Water Act that generally limit the levels of these contaminants in public water systems.[6] EPA has issued such regulations for approximately 90 drinking water contaminants.

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[4]GAO, *Drinking Water: DOD Has Acted on Some Emerging Contaminants but Should Improve Internal Reporting on Regulatory Compliance*, GAO-18-78 (Washington, D.C.: Oct. 18, 2017). In addition to PFOS and PFOA issues, we reported in October 2017 that DOD had not internally reported all data on compliance with health-based drinking water regulations. We also reported that DOD had not used available data to determine why systems that provide DOD-treated water had different compliance rates from systems that provide non-DOD-treated water. We made five recommendations to improve DOD's reporting and use of drinking water data. DOD concurred with the recommendations and in May 2018 reported actions that were planned or underway to implement them. For example, the military departments stated that they were providing training to their installations on DOD's drinking water reporting requirements. We will continue to monitor DOD's status in implementing these recommendations.

[5]The Deputy Assistant Secretary of Defense for Environment, Safety, and Occupational Health, *Addressing Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA)* (March 2018); Under Secretary of Defense for Acquisition and Sustainment, *Department of Defense Alternatives to Aqueous Film Forming Foam Report to Congress* (June 2018).

[6]The term "public water system" refers to the provision of piped drinking water to the public, where the system serves at least 15 service connections or serves an average of at least 25 people at least 60 days out of the year; it does not refer to whether the system is publicly or privately owned.

Public water systems, including the DOD public water systems that provide drinking water to about 3 million people living and working on military installations, are required to comply with EPA and state drinking water regulations.

While EPA has not issued legally enforceable standards for PFAS in drinking water, the agency has monitored water systems in the United States for six types of PFAS chemicals—including PFOS and PFOA—in order to understand the nationwide occurrence of these chemicals.[7] This monitoring effort was part of a larger framework established by the Safe Drinking Water Act to assess unregulated contaminants. Under this framework, EPA is to select for consideration from a list (called the contaminant candidate list) those unregulated contaminants that present the greatest public health concern, establish a program to monitor drinking water for unregulated contaminants, and decide whether or not to regulate at least 5 such contaminants every 5 years (called a regulatory determination).[8]

EPA's regulatory determinations are to be based on the following three broad statutory criteria, all of which must be met for EPA to decide that a drinking water regulation is needed:

- the contaminant may have an adverse effect on the health of persons;
- the contaminant is known to occur or there is a substantial likelihood that the contaminant will occur in public water systems with a frequency and at levels of public health concern; and
- in the sole judgment of the EPA Administrator, regulation of such contaminant presents a meaningful opportunity for health risk reduction for persons served by public water systems.

To date, PFOS and PFOA are unregulated because EPA has not made a positive regulatory determination for these chemicals.

Even when EPA has not issued a regulation, EPA may publish drinking water health advisories. In contrast to drinking water regulations, health advisories are nonenforceable.[9] Health

[7]This monitoring took place from 2013 through 2015 under EPA's unregulated contaminant monitoring rule program. According to DOD, 63 DOD public water systems were sampled during this time. For more information on EPA's unregulated contaminant monitoring rule program, see GAO, *Drinking Water: EPA Has Improved Its Unregulated Contaminant Monitoring Program, but Additional Action is Needed*, GAO-14-103 (Washington, D.C.: Jan. 9, 2014).

[8]PFOS and PFOA were placed on the contaminant candidate list in 2009 and again in 2016. EPA met the time frame for publishing the first contaminant candidate list, but has not adhered to the 5-year cycle for subsequent lists.

[9]EPA has issued administrative orders to address contaminated drinking water based on health advisory levels. We discuss such orders related to PFOS and PFOA later in this statement.

advisories recommend the amount of contaminants that can be present in drinking water—"health advisory levels"—at which adverse health effects are not anticipated to occur over specific exposure durations. Most recently, in May 2016 EPA issued lifetime health advisories for PFOS and PFOA.[10] These advisories set the recommended health advisory level for each contaminant—or both contaminants combined—at 70 parts per trillion in drinking water.[11] According to DOD, the department also considers information in these health advisories when determining the need for cleanup action at installations with PFOS and PFOA contamination.

DOD Has Initiated Actions to Address Elevated Levels of PFOS and PFOA in Drinking Water and Concerns with Firefighting Foam

DOD Has Initiated Actions to Identify, Test, Address, and Respond to Orders from Regulators Regarding PFOS and PFOA in Drinking Water

We reported in October 2017 that, following the release of EPA's lifetime health advisory for PFOS and PFOA in May 2016, each of the military departments directed their installations to

- identify locations with any known or suspected prior release of PFOS and PFOA and to address any releases that pose a risk to human health—which can include people living outside DOD installations; and
- test for PFOS and PFOA in their drinking water and address any contamination above EPA's lifetime health advisory level.

We further reported that, as of December 2016, DOD had identified 393 active or closed military installations with any known or suspected releases of PFOS or PFOA.[12] Since we issued our report, DOD has updated that number to 401 active or closed installations, according to August

[10]EPA, *Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS)* (May 2016); EPA, *Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA)* (May 2016). These lifetime health advisories for PFOS and PFOA replaced provisional health advisories that were issued by EPA in January 2009, which set health advisory levels of 200 parts per trillion for PFOS and 400 parts per trillion for PFOA.

[11]One part per trillion is comparable to one drop in a swimming pool covering the area of a football field 43 feet deep.

[12]We reported in October 2017 that this number included 391 installations identified by the military departments and, according to DOD officials, 2 installations identified by the Defense Logistics Agency. DOD efforts to test for and respond to PFOS and PFOA at overseas installations were outside the scope of our October 2017 report.

2017 data provided in a March 2018 report to Congress on the department's response to PFOS and PFOA contamination.[13]

We stated in our October 2017 report that the military departments had reported spending approximately $200 million at or near 263 installations for environmental investigations and response actions, such as installing treatment systems or supplying bottled water, as of December 2016.[14]

- The Air Force had identified 203 installations with known or suspected releases of PFOS and PFOA and had spent about $153 million on environmental investigations and response actions (accounting for about 77 percent of what the military departments had spent on PFOS and PFOA activities as of December 2016). For example, the Air Force reported spending over $5 million at Peterson Air Force Base in Colorado. During our visit to that installation in November 2016, officials showed us the current and former fire training areas that they were investigating to determine the extent to which prior use of firefighting foam may have contributed to PFOS and PFOA found in the drinking water of three nearby communities. Additionally, the Air Force had awarded a contract for, among other things, installing treatment systems in those communities.

- The Navy had identified 127 installations with known or suspected releases of PFOS and PFOA and had spent about $44.5 million on environmental investigations and response actions (accounting for about 22 percent of what the military departments had spent on PFOS and PFOA activities as of December 2016). For example, the Navy reported spending about $15 million at the former Naval Air Station Joint Reserve Base Willow Grove in Pennsylvania.[15] During our visit to that installation in August 2016, officials told us that the Navy was investigating the extent to which PFOS and PFOA on the installation may have contaminated a nearby town's drinking water. At the time, the

[13]The Deputy Assistant Secretary of Defense for Environment, Safety, and Occupational Health, *Addressing Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA)* (March 2018). This report was provided in response to language included in House Report 115-200, accompanying a bill for the National Defense Authorization Act for Fiscal Year 2018.

[14]DOD did not provide updated information on costs for responding to PFOS and PFOA in its March 2018 report to Congress. According to DOD data in our October 2017 report, 204 of the 263 installations where environmental investigations and response actions occurred were active installations, and 59 had been closed under the Base Realignment and Closure process—a process DOD has used to reduce excess infrastructure.

[15]Naval Air Station Joint Reserve Base Willow Grove was closed under the 2005 Base Realignment and Closure round.

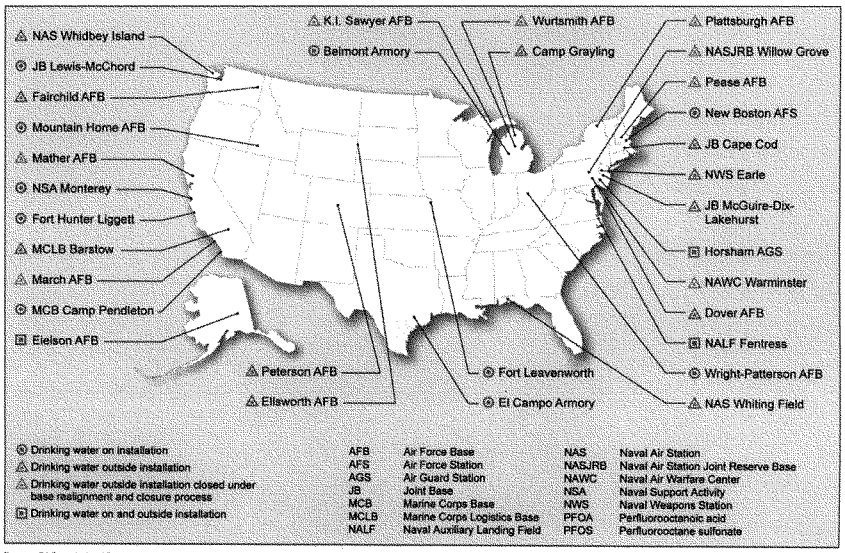
Navy had agreed to pay for installing treatment systems and connecting private well owners to the town's drinking water system, among other things.

- The Army had identified 61 installations with known or suspected releases of PFOS and PFOA and had spent about $1.6 million on environmental investigations (accounting for less than 1 percent of what the military departments had spent on PFOS and PFOA activities as of December 2016), but had not yet begun any response actions. At the time of our October 2017 report, the Army had not yet completed testing its drinking water for PFOS and PFOA.

DOD's March 2018 report to Congress provided updated information on actions taken (such as providing alternative drinking water or installing treatment systems) to address PFOS and PFOA in drinking water at or near military installations in the United States, as shown in figure 1 below. Specifically, DOD reported taking action as of August 2017 to address PFOS and PFOA levels exceeding those recommended in EPA's health advisories for drinking water for people (1) on 13 military installations and (2) outside 22 military installations.[16]

[16]At the time of our October 2017 report, DOD data showed that the department had initiated actions to address PFOS and PFOA in the drinking water for people (1) on 11 military installations, as of March 2017, and (2) outside 19 military installations, as of December 2016. Two installations (Chanute Air Force Base and Wright-Patterson Air Force Base) that DOD had previously reported to us as locations where actions had been taken to address PFOS and PFOA in drinking water outside the installations were not included in DOD's March 2018 report. DOD officials told us in September 2018 that there are no PFOS and PFOA impacts to drinking water outside these installations.

Figure 1: Military Installations Where DOD Has Reported Taking Action to Address Elevated Levels of PFOS and PFOA in Drinking Water, as of August 2017



Source: GAO analysis of Department of Defense (DOD) data; Map Resources (map). | GAO-18-700T

We reported in October 2017 that, in addition to actions initiated by DOD, the department also took action in response to state and federal regulators. DOD responded to four administrative orders requiring that DOD address PFOS and PFOA levels that exceeded EPA's health advisory levels for drinking water. One order was issued by the Ohio Environmental Protection Agency at Wright-Patterson Air Force Base in Ohio, and three orders were issued by EPA at the former Pease Air Force Base in New Hampshire; Horsham Air Guard Station in Pennsylvania; and the former Naval Air Warfare Center Warminster in Pennsylvania.[17] For example, at Wright-Patterson Air Force Base, levels of PFOS and PFOA that exceeded EPA's lifetime health advisory levels were found at two wells on the installation in 2016. In response to the order from the Ohio Environmental Protection Agency, the Air Force closed drinking water wells, installed

[17]Under Section 1431 of the Safe Drinking Water Act, EPA may issue orders necessary to protect human health where a contaminant in a public water system presents an imminent and substantial endangerment and if appropriate state and local authorities have not acted to protect human health. Pub. L. No. 93-523 (1974). These orders may require, among other things, carrying out cleanup studies, providing alternate water supplies, notifying the public of the emergency, and halting disposal of the contaminants threatening human health. The Ohio Environmental Protection Agency has similar authority.

new monitoring wells, and provided bottled water to vulnerable populations on the installation. Additional details on each order and examples of actions by DOD to address the orders were reported on in our October 2017 report.

According to DOD, it may take several years for the department to determine how much it will cost to clean up PFOS and PFOA contamination at or near its military installations. Additionally, DOD officials told us in September 2018 that they believe a legally enforceable EPA drinking water cleanup standard would ensure greater consistency and confidence in their cost estimates because such a standard would give them a consistent target to clean up to. In a January 2017 report on environmental cleanup at closed installations, we recommended that DOD include in future annual reports to Congress best estimates of the environmental cleanup costs for contaminants such as PFOS and PFOA as additional information becomes available.[18] DOD implemented this recommendation by including in its fiscal year 2016 environmental report to Congress (issued in June 2018) an estimate of the costs to respond to PFOS and PFOA.[19]

DOD Has Taken Steps to Address Health and Environmental Concerns with Its Firefighting Foam

In our October 2017 report, we found that DOD was taking steps to address health and environmental concerns with its use of firefighting foam that contains PFAS.[20] These steps included restricting the use of existing foams that contain PFAS, testing DOD's current foams to identify the amount of PFAS they contain, and funding research into the future development of PFAS-free foam that can meet DOD's performance and compatibility requirements (see table 1).[21] Some of these steps, such as limiting the use of firefighting foam containing PFAS, were in place. Others, such as researching potential PFAS-free firefighting foams, were in progress at the time of our review.

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[18]GAO, *Military Base Realignments and Closures: DOD Has Improved Environmental Cleanup Reporting but Should Obtain and Share More Information,* GAO-17-151 (Washington, D.C.: Jan. 19, 2017).

[19]Office of the Under Secretary of Defense for Acquisition and Sustainment, *Defense Environmental Programs Annual Report to Congress for FY 2016* (Washington, D.C.: June 2018).

[20]Firefighting foam used by DOD contains other types of PFAS, in addition to PFOS and PFOA.

[21]DOD's military specification for firefighting foam outlines performance and compatibility requirements. For example, the specification states how long it should take for foam to extinguish a fire and prevent the extinguished fire from reigniting and requires that firefighting foam approved for use by DOD from one manufacturer be compatible with foam from another manufacturer. At the time of our review, the military specification in place for firefighting foam was DOD, Mil-F-24385F, *Fire Extinguishing Agent, Aqueous Film Forming Foam (AFFF) Liquid Concentrate, for Fresh and Seawater* (Aug. 5, 1994).

Table 1: Department of Defense (DOD) Steps to Address Concerns about Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA) in Firefighting Foam

Step	Goal	Actions/status
Restricting use of firefighting foam	Following the May 2016 issuance of the Environmental Protection Agency's lifetime health advisory for PFOS and PFOA, the military departments issued policies restricting the use of firefighting foam at their installations.	Actions called for in military department policies: *Air Force*: Stop routine testing of firefighting equipment unless the released foam can be contained and managed. Treat all releases of firefighting foam with PFOS or PFOA as hazardous material releases.[a] *Navy*: Stop the uncontrolled release of firefighting foam except in emergency situations. Ensure that any foam that is discharged in a nonemergency situation is contained, captured, and properly disposed of.[b] *Army*: Prohibit all nonemergency discharges of firefighting foam, to include training and equipment testing.[c]
Testing firefighting foam with PFAS	DOD's intent was to eventually replace the existing firefighting foam that contains PFOS and PFOA.	According to DOD, firefighting foams approved for purchase and use by DOD since at least December 2015 do not contain PFOS, but these firefighting foams contain other types of PFAS and may contain PFOA. The Naval Research Laboratory was testing the different types of firefighting foams that were approved for purchase and use by DOD to determine the extent to which they contain PFOA and other types of PFAS.[d] Testing was expected to continue until late 2017 or 2018. Navy and Army officials said that they planned to wait for final testing results before deciding whether to select a specific firefighting foam to replace the foam used at their installations. The Air Force, however, had already selected a specific foam for use at its installations. This foam contains PFAS but, according to the Air Force, does not contain PFOS and contains little or no PFOA. Officials said that all Air Force installations in the continental United States had received this new foam.
Funding firefighting foam research	DOD was funding research into the development of PFAS-free firefighting foam because DOD believes that such a foam would significantly reduce the environmental impact of fire suppression training and operations, while maintaining the safety of personnel from fire hazards.	In October 2015, DOD's Strategic Environmental Research and Development Program issued a statement of need calling for proposals to develop a PFAS-free firefighting foam that can meet DOD's performance requirements and be compatible with existing foams and equipment. In fiscal year 2017, DOD funded three research projects that responded to the statement of need—one led by the Naval Air Systems Command, one led by the Naval Research Laboratory, and one led by a private firefighting foam manufacturer—with an estimated total cost of $2.5 million and an estimated completion date of 2020.

Source: GAO analysis of DOD data. | GAO-18-700T

[a]Office of the Assistant Secretary of the Air Force for Installations, Environment, and Energy Memorandum, *SAF/IE Policy on Perfluorinated Compounds (PFCs) of Concern* (Aug. 11, 2016).
[b]Office of the Assistant Secretary of the Navy for Energy, Installations, and Environment Memorandum, *Aqueous Film Forming Foam (AFFF) Control, Removal, and Disposal* (June 17, 2016).
[c]Assistant Chief of Staff of the Army for Installation Management Memorandum, *Limiting Use of Aqueous Film Forming Foam* (June 29, 2016).
[d]Navy officials told us during our review that they were testing the firefighting foam products that were currently included on DOD's qualified product list, which is the list of firefighting foams that have been approved for purchase and use by DOD.

DOD's military specification for firefighting foam, which outlines performance and compatibility requirements, also requires that firefighting foam purchased by the department contain PFAS. We reported in October 2017 that, according to DOD, there was no PFAS-free firefighting foam that could meet DOD's performance and compatibility requirements. As a result, the Navy—which is the author of the military specification—had no plans to remove the requirement for firefighting foam to contain PFAS. However, Navy officials told us during our review that if a PFAS-free foam were to be developed that could meet DOD performance and compatibility requirements the Navy would make any necessary revisions to the military specification at that time. Navy officials also said during our review that they were planning to revise the military specification to set limits for the amount of PFAS that are allowed in firefighting foam, following their testing on the amounts of PFOS, PFOA, and other PFAS found in foam used by DOD.

In June 2018, DOD reported to Congress that its military specification for firefighting foam was amended to set a maximum level of PFOS and PFOA (800 parts per billion).[22] DOD officials told us in September 2018 this maximum level applies to the amount of those chemicals in firefighting foam concentrate before it is mixed and diluted with water to create firefighting foam.[23] The DOD officials also said that 800 parts per billion is the lowest level of PFOS and PFOA that can be detected in firefighting foam concentrate by current testing methods and technologies, but DOD is working with foam manufacturers and laboratories to achieve lower detection limits. According to the June 2018 report, DOD plans to establish lower limits for PFOS and PFOA in firefighting foam in late 2018. The June 2018 report reiterated that, according to DOD, no commercially available PFAS-free foam has met the performance requirements of the military specification, and the report also stated that DOD-funded research efforts to develop a PFAS-free foam that can meet performance requirements are still ongoing.

Chairman Paul, Ranking Member Peters, and Members of the Subcommittee, this completes our prepared statement. We would be pleased to respond to any questions that you may have at this time.

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[22]Under Secretary of Defense for Acquisition and Sustainment, *Department of Defense Alternatives to Aqueous Film Forming Foam Report to Congress* (Washington, D.C.: June 2018).

[23]This level is distinct from EPA's lifetime health advisory levels for PFOS and PFOA (70 parts per trillion), which apply to drinking water and not to, for example, firefighting foam concentrate.

GAO Contact and Staff Acknowledgments

If you or your staff have any questions about this report, please contact us at Brian J. Lepore, (202) 512-4523 or leporeb@gao.gov or J. Alfredo Gómez, (202) 512-3841 or gomezj@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement. Other individuals who made key contributions to this statement include Maria Storts (Assistant Director), Diane B. Raynes (Assistant Director), Michele Fejfar, Karen Howard, Richard P. Johnson, Mae Jones, Amie Lesser, Summer Lingard-Smith, Felicia Lopez, and Geoffrey Peck.

(103014)

TESTING *for* PEASE

09/26/2018

MY PERSONAL STORY:

My name is Andrea Amico and I live in Portsmouth, New Hampshire. PFAS water contamination is a very personal issue for me. My husband and I moved to the beautiful seacoast part of New Hampshire in 2007 when my husband took a job at the Pease International Tradeport. Pease was a former Air Force Base that was open from 1956 to 1990. After closing in 1990, it was then redeveloped into an International Tradeport that is now home to more than 200 businesses and brings ~ 10,000 people a day there for work, college, healthcare, childcare, etc.

My husband and I were blessed with our first child in 2011 and it was a hard decision to pick the right daycare setting to send our daughter. I did not have the option to stay home with my daughter full time and my husband and I did the next best thing and found her a loving and caring daycare center. After months on the waiting list, we were thrilled to learn of an opening at a beautiful, new daycare center on Pease. The daycare was built in 2010 and it was right next door to my husband's work on Pease. It was a beautiful facility with bright colored classrooms and loving teachers. My husband could see the window of my daughter's classroom from his office and would stop by on his lunch break to feed her a bottle or take her for a walk. And in 2013, we were blessed with our second child, a son, who we also enrolled in the same daycare center on Pease right next door to my husband's work. Both of my children started daycare on Pease at the young age of 12 weeks old. When looking into child care facilities, we asked many questions of the daycare center (are your teachers experienced, what is your curriculum, what are your safety policies), but NEVER did it cross our minds that we had to question the quality of the water at the picture perfect daycare center my children were attending.

You can imagine the feeling of my heart sinking when I read in a local newspaper article on the Friday before Memorial Day weekend in May of 2014 that high levels of contaminants had been found in one of the Pease wells that supplies drinking water to the tradeport and was shut down. I immediately thought of my husband and two small children that were on Pease for work and daycare every day and drinking the water.

When I first read the article, PFAS was being referred to as PFCs. I had never heard of these chemicals prior to May 2014, but I quickly learned that there were many areas of concern related to PFAS exposure. I learned that PFAS are extremely persistent in the environment and don't break down or attenuate over time like other contaminants. I

learned that they bio accumulate in the body and have half very long half-lives, some taking decades to leave the body. And I also learned that they are associated with multiple adverse health effects that impact many systems of the body such as different types of cancers, impaired immune function in children, elevated cholesterol, fertility issues, and more. And that they cross the placenta to unborn children and can be passed to infants through breast milk which means future generations are at risk for the contamination we are facing today.

I started my advocacy journey 4 years ago with the initial intention of advocating for blood testing for my family and wanting to better understand their exposure to PFAS at Pease. My work quickly evolved into advocating for the entire Pease community (both past and present) to better understand the long term health impacts given this significant environmental exposure. I am a co-founder of a community action group called Testing for Pease with two other mothers, Alayna Davis and Michelle Dalton. Our role as community leaders has evolved in to working with other impacted community leaders across the nation by advocating on behalf of millions of Americans that have been unknowingly exposed to contaminated drinking water and now need more action and answers. As a community leader and advocate for impacted communities, I feel strongly that we must help impacted communities that are suffering now, we must learn more about the long term health impacts of PFAS, and we must advocate strongly for more protective measures to be put in place to prevent any other families from being exposed to harmful contaminants in drinking water in the future.

Since 2014, I have learned so much more about the chemistry, remediation, and possible health effects of PFAS. In 2015, my family participated in the PFAS blood testing program offered by NH DHHS and their PFAS levels were found to be elevated. My 7 year old daughter has the highest level of PFAS in her blood in our family. My children were exposed to highly contaminated water at daycare at an early and critical stage of their development. I will never stop worrying about the health of my children and I will forever live with the guilt that I unknowingly sent them to a daycare where they drank contaminated water. At times, the worry and guilt is consuming and I don't sleep much at night. However, I have tried really hard to channel this negative energy into something positive through my advocacy work because I feel strongly that families like mine deserve access to blood testing, medical monitoring, health study opportunities, clean water, remediation to remove these chemicals from the environment, and more answers to what the long term health impacts are given PFAS exposure. It is critical we learn from this very important public health crisis and do everything in our power to prevent another opportunity for so many Americans to be exposed to harmful contaminants in their drinking water.

THE PEASE STORY:

Being one of the first Department of Defense (DoD) sites to discover PFAS drinking water contamination, the Pease community has been a leader on many fronts and has been blazing a new trail in how to respond to this growing crisis around our nation. Through strong community organization, collaboration with several government agencies, and progressive leadership from the New Hampshire Congressional

Delegation, the Pease community has been offered a PFAS blood testing program to exposed community members, have treatment on drinking water wells & ongoing ground water treatment, and are currently working with ATSDR through the Pease CAP to coordinate a health study at Pease and a multi-site PFAS health study around the nation. We are extremely thankful to Senator Hassan and Senator Shaheen for their close collaboration with the impacted members of the community, the unprecedented legislation to help impacted communities, and their fierce leadership in addressing PFAS from the beginning of the discovery of the contamination at Pease. Senator Hassan was Governor of New Hampshire when the PFAS contamination was discovered at Pease and allowed for an open blood testing program of all impacted community members at Pease that started in 2015. She also re-opened the blood testing program at the community's request in 2016 when more community members were showing interest in participation after high levels of PFAS were found in the blood of the Pease community. Senator Hassan has sent several letters on behalf of the impacted community to federal agencies advocating for more action from the federal government for communities impacted by PFAS contamination. She also cosponsored legislation (introduced by Senators Schumer and Gillibrand) to require the EPA develop a maximum contaminant level for perfluorinated compounds (including PFOA and PFOS), 1,4 dioxane, and perchlorate in public water systems across America within two years of the bill's enactment. Senator Shaheen has also written several letters to federal agencies on behalf of the Pease community and coordinated a meeting with the Pease community and the Assistant Secretary of the Air Force, John Henderson. She has been instrumental in introducing legislation through the NDAA that mandates DoD to fund a PFAS health study at Pease, exposure assessments at eight DoD sites across the country, and a multi-site PFAS health study across the nation. Senator Shaheen was also critical in appropriating the resources to fund the studies for ATSDR to do this very important work. She has also introduced legislation on a PFAS Registry Act (supported by Senator Hassan), that directs the Secretary of Veterans Affairs to establish a registry to ensure that members of the Armed Forces who may have been exposed to PFAS on military installations receive information regarding such exposure for Veterans as this is a critical population that needs more attention and that we can learn from their PFAS exposure. Senator Hassan and Senator Shaheen have worked very hard from early on when the PFAS was discovered at Pease and our community is extremely grateful for their support, hard work, and continued leadership on this very important issue.

As a result of a strict order issued by the EPA in July of 2015, The Air Force has spent millions of dollars at Pease to investigate the PFAS contamination and take aggressive remediation action. Pease currently has two large Granular Activated Carbon (GAC) vessels on two of the drinking water wells with plans to add GAC and resin technology to the drinking water wells in the near future. The Air Force has also installed a ground water treatment system at the firefighting training area on Pease where large amounts of AFFF were released for training purposes and have very high levels of PFAS detected in the groundwater and soil. There is also ongoing construction of another groundwater treatment system in the airfield at Pease being coordinated and funded by the Air Force.

THE NATIONAL STORY:

The progressive work being done at Pease is not the same story that is playing out at other PFAS impacted communities across the nation. Multiple communities have discovered their contamination in the last few years, but their calls for blood testing, filtration, remediation, medical monitoring, and answers to health questions and concerns go unanswered by their government officials. In the absence of a consistent and coordinated approach from the federal government, states are taking different approaches to address this public health crisis. Without federal leadership, states are scrambling to find the resources to investigate PFAS contamination and to provide remediation to impacted sites. Some states take more protective measures to lower the acceptable levels for PFOA & PFOS than the current EPA health advisories (i.e. Vermont, New Jersey) and other states are including more than 2 PFAS in their total acceptable PFAS levels in drinking water (i.e Massachusetts, Connecticut, Vermont). Although the source of the PFAS contamination at several communities across the nation vary from DoD sites, chemical manufacturers, tanneries, and other industrial sites, the impacted communities wants and needs are very similar.

The need for the federal government to be the leaders in addressing the contamination is now. Although impacted communities are only recently discovering their contamination, the reality is that most communities have had ongoing exposure for decades and are dealing with the consequences of their exposure. Impacted communities cannot wait any longer for inaction and a disjointed effort from our government and instead need a consistent and coordinated effort at the federal level to tackle this growing and concerning public health issue.

COMMUNITY CHALLENGES:

According to the Environmental Working Group (EWG), PFAS water contamination is estimated to be impacting 110 millions of Americans across the nation. We must not lose perspective that these impacted communities are not just a dot on the map and remember that they are real people with families, and the consequences of the contamination is very personal and life changing.

A National PFAS Contamination Coalition formed in June 2017 after a successful and unprecedented national PFAS conference at Northeastern University in Boston that brought together scientists, academics, impacted community leaders, environmental lawyers, physicians, government officials, journalists, and more to address the growing PFAS issue in our country. The National PFAS Contamination Coalition has held monthly calls and webinars to bring community leaders across the nation together to collaborate, learn from each other's stories, stream line efforts, share best practices, and develop a coordinated plan at a national level to get more action.

Challenges faced by impacted communities:

- PFAS are presumed safe until proven toxic and ongoing exposure continues
- Lack of federal health advisories for all PFAS

- Current EPA Lifetime Health Advisories (LHAs) for PFOS & PFOA are too high and not protective of public health and sensitive populations (infants, children, already exposed populations)
- Lack of health and toxicology data for all PFAS
- Multiple health effects impacting many systems in the body associated with PFAS exposure
- Communities should not be financially responsible for the cost of alternative water supply, remediation, filtration, blood testing, medical monitoring, etc
- Replacement PFAS are replacing "one evil with another"
- Limited labs capable of standardized testing of water and blood means testing is not easily accessible, time consuming, and expensive
- Cost of PFAS is more than just remediation/filtration and has significant economic consequences on individuals, businesses, and our entire society (i.e. property values decreased; businesses lack the ability to attract/retain talented employees and customers; chronic illness reduces employee attendance & productivity and drives up healthcare costs)
- Chronic illness as a result of PFAS exposure result in loss of work/wages; loss of happiness; loss of productivity; loss of life
- PFAS cross the placenta and pass through breast milk indicating future generations will be impacted by PFAS contamination
- Additional expenses related to PFAS exposure that are burdening community members are medical bills; bottled water; home filtration systems; diagnostic testing; community organizing/operating costs
- Communities are often not seen as stakeholders that deserve a seat at the table for important discussions and critical decisions
- Lack of transparency from government agencies
- Lack of funding causes roadblocks in research, remediation, and making decisions for public safety at state/federal level
- Data is technical and not easily understood
- Inconsistent messaging from government agencies re: health effects, blood testing, and medical monitoring that downplays risks
- Inconsistent responses to contamination at local, state, and federal level creates community confusion, uncertainty, and mistrust
- Difficulty streamlining communication between multiple goverment agencies and community
- PFAS are unregulated contaminants which means communities continue to be exposed to multiple PFAS (most without any health or toxilogical data)
- Impacted communities worry about adverse health effects, safety/quality of their water, lost property values, chronic health issues, financial burden, how to monitor health, lack of accessible labs, lack of government guidance, lack of accountability from responsible parties

COMMUNITY CALLS FOR ACTION:

- Establish MCL of 1 ppt for all PFAS

- Classify PFAS as hazardous substance
- Treat PFAS as a class/family and regulate them together and not one compound at a time
- Improve lab analytical methods to test for many PFAS in water and blood and make those more accessible nationwide
- Prioritize public health and not chemicals when making critical regulatory decisions
- Improve response time on taking meaningful action
- Value community members as critical stakeholders by including us in meetings and ask for our input on important decisions – "Nothing about us without us"
- Provide more funding to states to allow for more testing and community response
- Do not give into industry and political pressure when making important decisions that impact public health. The protection of public health should be the top priority of our government.
- Work with DoD to find non fluorinated firefighting foam alternatives and to completely phase out the use of fluorinated foams.
- Do not allow the introduction of any new PFAS into production due to the large number already in production/environment with limited data
- Conduct another round of UCMR testing that includes more communities, a greater number of PFAS to test for with lower detection limits to provide a more accurate picture of the PFAS contamination picture nationwide
- Be honest and fully transparent in all the action steps taken to address PFAS contamination

CONCLUSION:

The federal government must take swift and protective action against all PFAS and not just a couple chemicals within this class. The government must stop giving PFAS the benefit of the doubt and instead give public health the benefit of the doubt. It is known that some of the chemicals in this class of PFAS cause harm to human health and therefore the government should not allow these chemicals to be in the products, environment, and drinking water of millions of Americans. Communities need a consistent and coordinated action plan from federal agencies to address PFAS contamination and we need action now. It is critical the federal government take a leadership role by lowering the standard for all PFAS to 1 ppt, prioritize health & toxicological studies on PFAS to advance the science, allocate resources for ongoing investigations & remediation efforts, and hold the polluters responsible for their actions. Impacted communities have suffered enough by being exposed to harmful contamination in their drinking water and the burden to pay for clean water, remediation, filtration, blood testing, medical monitoring, and health related expenses should not fall on the communities, too. Community members have already "paid" enough by unknowingly and to no fault of their own being exposed to these harmful contaminants and it is time for the government to step up, take control, and implement meaningful action in the best interest of public health and not in the interest of the polluters. Impacted communities cannot even begin to compete with the billion dollar budgets and

extensive legal teams of the responsible parties such as DoD and industry representatives that use and manufacture these chemicals. Instead we rely heavily on our government agencies charged with protecting public health and the environment to take action that put our best interests first. Thank you for the opportunity to testify at the Senate Subcommittee hearing and to provide this written statement for the record.

Sincerely,

Andrea Amico

Andrea Amico
Testing for Pease, Cofounder

Arnie Leriche
Community Co-Chair
Wurtsmith Restoration Advisory Board

Testimony before the Senate Homeland Security and Governmental Affairs Subcommittee on Federal Spending Oversight and Emergency Management

"The Federal Role in the Toxic PFAS Chemical Crisis"
September 26, 2018

Good afternoon Chairman Paul, Ranking Member Peters, and honorable members of the Subcommittee. My name is Arnold Leriche and I am a retired environmental engineer from the EPA and a Vietnam era veteran.

I retired to Oscoda, Michigan mostly because I wanted to go fishing on the Au Sable River, the many beautiful inland lakes, and Lake Huron.

One thing I quickly learned after moving to Oscoda, is that many people fill their freezers with the fish they catch and the wildlife they hunt. It's second nature to the residents of Northern Michigan.

Oscoda sits next to the former Wurthsmith Air Force Base on the banks of the Au Sable River and the shores of Lake Huron. The Air Force used firefighting foam at a training site on base. That training site is adjacent to Clark's Marsh, a beautiful wetland.

For more than 25 years PFAS contamination drained into Clark's Marsh and from that marsh into the rivers and lakes of Northern Michigan. The base closed in 1993, but it wasn't until 2010 that our state environmental department started to investigate the site for potential PFAS contamination.

I learned from news reports in 2012 that they had discovered fish in Clark's Marsh with the highest levels of PFAS contamination found anywhere in the world. Then they found very high levels of contamination in the adjacent Au Sable River. I learned then of the health effects of PFAS contamination. We were advised not to eat the fish. You can imagine how that feels to residents of Oscoda who have spent their lives eating that fish and serving it to their children.

We now know that the contamination is in the groundwater and the drinking water. And it's even spreading into Lake Huron, which is a source of drinking water for hundreds of thousands of Michiganders.

I participated in sampling the drinking water around Van Etten Lake which adjoins the base. I will never forget the lake resident who asked, "How long has the contamination been in my well?" I could see the fear in her eyes as she thought about her grandchildren who had been drinking that water for twenty years.

The Air Force owned a beach on Van Etten Lake, which has been given to the township. On this beach, our friends fish and have picnics, children play and learn to swim. At this beach, on most days, you will find a bright white foam washing up on shore. The EPA says that PFAS contamination in drinking water is safe up to 70 parts per trillion. In this foam, it is found at 165,000 parts per trillion.

Would you want your children and grandchildren playing in that water? Would you want them eating the fish?

The harm extends beyond the residents of Oscoda. We know that there was contamination in the drinking water on Wurtsmith when it was an active base. I have personally heard from veterans,

such as SSG Rick Thempto and Airman James Bussey, who are to this day suffering from health effects.

I appreciate that the Air Force has taken some steps to address the contamination at Wurtsmith. But our water is still poisoned and we still cannot eat what we catch. I listened to the testimony of the government witnesses. I am glad that DOD and EPA are beginning to acknowledge this problem and think about steps to help fix it.

But the people of Oscoda don't have any more time for delay or missteps. We need action now. We want the responsible parties and the federal government to take this seriously right now.

We need interim mitigation. They already have enough information to take remediation actions. For businesses on the former base, we need assistance with indemnification and insurance to secure employment and encourage development. We need assistance in providing municipal water to residents who cannot drink from their own wells.

I ask this Subcommittee, please do not forget about the people of Oscoda-Au Sable Townships, and those like us all around the country. Thank you for the opportunity to speak on their behalf, I look forward to you questions.

INTERNATIONAL ASSOCIATION OF FIRE FIGHTERS

Statement of

LIEUTENANT TIMOTHY PUTNAM

VICE-PRESIDENT, TIDEWATER FEDERAL FIRE FIGHTERS

before the

SUBCOMMITTEE ON FEDERAL SPENDING OVERSIGHT & EMERGENCY MANAGEMENT

UNITED STATES SENATE

On

THE FEDERAL ROLE IN THE TOXIC PFAS CHEMICAL CRISIS

SEPTEMBER 26, 2018

Thank you Chairman Paul, Ranking Member Peters, and distinguished members of the Subcommittee. My name is Timothy Putnam and I am Vice-President of the Tidewater Federal Fire Fighters, Local F 25 of the International Association of Fire Fighters (IAFF). I appreciate the opportunity to appear before you today on behalf of the International Association of Fire Fighters, General President Harold A. Schaitberger, and over 315,000 fire fighters and emergency medical personnel who serve this nation as the first line of defense against emergencies and disasters, natural or man-made.

I come before you today to offer my testimony on the federal role in the toxic PFAS chemical crisis. For over twenty-eight years I have been employed by the Department of Defense, first as an active-duty United States Marine where I served as an Aircraft Rescue Fire Fighter. After four years of military service I immediately transitioned to a civilian fire fighter position with the Department of Navy, specifically with the Navy Region Mid-Atlantic Fire and Emergency Services where I currently hold the rank of Lieutenant, assigned to serve at Joint Expeditionary Base Little Creek / Fort Story. As an active fire fighter, I have witnessed and participated in the routine use of Aqueous Film Forming Foam (AFFF) which is now known to contain the toxic chemicals referred to as Per- and Polyfluoroalkyl substances or PFAS.

The primary mission of the fire service is to deliver critical life-saving fire extinguishment as rapidly as possible. This is particularly true when the fire is being fed by vast quantities of flammable liquids in close proximity to people, such as aboard aircraft. To rapidly combat those fires, since the early 1970s, fire fighters have employed AFFF to aid in extinguishing Class B flammable liquid fires. AFFF works by forming a foam and film coating around the liquid, which

acts as a thermal and evaporation barrier to stop the combustion process. Until 2002 production of toxic AFFF included Perfluorooctane Sulfonic Acid (PFOS). PFOS was essentially banned in the United States that year and manufacturers switched to a less toxic formula which does not contain PFOS. However, the less toxic formula isn't without its own hazards. As this formulation breaks down, it forms a harmful substance known as perfluorooctane acid (PFOA). Today, most foam manufacturers have transitioned to the use of short-chain fluorosurfactants known as C6, but AFFF containing PFOA remains in widespead use.

PFOS and PFOA are part of a larger family of chemicals known as PFAS. PFAS is a very stable man-made chemical, sometimes referred to as a "forever chemical," that does not occur naturally in the environment and may take up to a century to completely break down. Produced in large quantities, substances containing PFAS have been widely used for their ability to repel stains, grease, water, and oil. Further, they were used in the manufacturing of coatings and treatments intended to for textile materials, carpets, packaging, and cookware. You have undoubtedly have heard of them as they are commonly referred to as Teflon and Scotchguard.

Human Exposure to PFAS and the Fire Fighter

Individuals are exposed to PFAS released into the air, water, and soil in areas where they are manufactured, stored, or used. Following the initial release, PFAS can be transported to other areas through windy conditions, movement of groundwater, flooding, or even food production. With their persistence in the environment, concentrations of PFOS and PFOA accumulate in people, wildlife, food sources, soil, and drinking water.

Typically, toxic chemicals enter the body through one of three routes: ingestion, inhalation, or absorption. Most commonly, people are exposed to toxic PFAS through ingesting contaminated food or drinking contaminated water. For some individuals, like fire fighters working with materials containing PFAS such as AFFF, the chemicals are likely to enter the body through inhalation or absorption.

While engaged in operations requiring the use of AFFF, fire fighters are regularly exposed to toxic PFAS. Personally, I have worked with toxic AFFF on a regular and continuous basis throughout my fire fighting career. During my twenty-eight years with the Department of Defense, the majority of my contact with AFFF containing PFAS occurred without the benefit of adequate personal protection equipment (PPE).

ARFF units are the first responder fire fighting vehicles at airports and airfields. Equipped with separate tanks holding large quantities of water and AFFF, airport fire fighting vehicles can place tremendous quantities of extinguishing agent on a fire. Typically, in aircraft-related incidents foam agents are the first line of attack. The effort to extinguish an aircraft fire frequently involves multiple ARFF vehicles working in a choreographed manner attacking the fire from different angles. Each of the attacking apparatus can place 1,500 to 2,000 gallons of the water and AFFF solution per minute on the fire. Some toxic foam becomes aerosolized as the agents are discharged from the vehicle.

During the 1990's the use of fire fighting foam agents at military bases was virtually unchecked. There was an abundant supply kept in the fire station without any limitation on its use or a requirement to protect one's self with PPE. In fact, during the early part of my career,

AFFF was thought to be so safe that I recall using it as a substitute for vehicle soap to wash fire department vehicles. We also used AFFF foam to clean the fire station floors. Of course, the primary use of AFFF foam was to fight fire and to prepare for any potential incidents. Fire fighters were required to train with and ensure the ready avilability of such foam. Thus, I performed daily apparatus equipment checks in which I determined the readiness of my assigned ARFF truck. Readiness checks are done by flowing a few gallons of the water and AFFF solution. The newly discharged foam suds were then captured and placed on a visual spectrometer to determine if the proper ratio of AFFF and water are present. We also conducted training exercises involving hands-on fire extinguishment of jet fuel supplied in an open-air burn pit. While training with handlines, fire fighters would wade into the flaming fuel pit to practice the technique of "pushing foam" across the burning jet fuel. Between the apparatus checks and hands-on training, use of and exposure to AFFF was a regular and common occurrence happening six to eight times a month for fire fighters working alternating shifts like me.

In the mid-1990's, the burn pit at Naval Air Station Oceana used for training was decommissioned and replaced by a stationary aircraft simulator fueled by propane. Different techniques and agents are used to fight gas fires versus liquid fuel fires. Burning propane gas fires are fought with plain water as AFFF foam agents are not normally used for gas fires. The move to the propane fed simulator greatly reduced the frequency of AFFF discharge during training.

As my career progressed, so too did base awareness of the environmental impacts of toxic foam as base officials began limiting the locations where fire fighters were permited to

release AFFF. In the early days of my career, AFFF was discharged from fire fighting vehicles on the front and rear apron of the fire station or on nearby grassy areas. Since the late 1990's base environmentalists have designated the areas where fire fighters could routinely discharge the foam. The first designated area I recall was both in and near the decommissioned open-air burn pit. After a few years, the designated area was again relocated to a refueling pit. A refueling pit is a recessed concrete pad that is equipped with drains and an oil-water separator. As these transitions occurred, the frequency of foam discharges occurring as part of regular vehicle readiness checks decreased from several times a month to once a week. By the time of my first transfer from Oceana in 2009, AFFF discharges happening as part of apparatus readiness checks dropped off to a monthly basis and now non-emergency AFFF discharges are taking place on a substantially reduced quarterly or a semi-annual basis in very controlled conditions with an effort being made to capture and recover those discharges. Speaking holistically, as more has been learned about the environmental consequences of PFAS release, fire departments have become more cautious in AFFF discharges.

The Health Effects of PFAS on Fire Fighters and the Need for Medical Monitoring

As we have become more aware of the environmental impacts of PFAS, our knowledge of the human impacts continues to evolve. We know that a single exposure to AFFF by fire fighters results in PFAS entering the body. PFAS remains in the human body for years even if there are no additional exposures. The half-life of PFAS ranges from 2-9 years. This long half-life means that the chemicals remaining in the body where they can build up to concentrations that may cause health effects. When fire fighters experience repetitive exposures, it is highly likely that they will maintain a high concentration of PFAS within the

blood and body tissue as compared to non-fire fighters.

There is evidence suggesting that PFAS can cause tumors in lab animals exposed to very high doses, particularly in the liver, reproductive organs, and pancreas. Studies among highly exposed populations have shown a more than insignificant risk of testicular, kidney, bladder, and thyroid cancer related to PFOA and PFOS exposure. The International Agency for Research on Cancer (IARC) classifies PFOA as a Group 2B carcinogen, meaning it is "possibly carcinogenic to humans" based on limited evidence of carcinogenicity in humans and limited evidence in lab animals.

Studies on non-cancer health effects are also limited due to small study populations and inconsistent results. However, research suggests that high exposures to PFAS are associated with developmental effects during pregnancy or breastfeeding, thyroid damage, increases in blood cholesterol levels, and liver damage. PFAS are corrosive and can cause damage to the skin and eyes, including blindness. Unfortunately, I only learned of this through information provided by my union, the International Association of Fire Fighters, and not my employer. I am convinced all fire fighters should receive mandatory annual training on the hazards of toxic foams.

Regulating PFAS and Approving Safer AFFF Formulas

In 2000, the United States Environmental Protection Agency (EPA) and 3M, the primary manufacturer of PFAS, agreed to a voluntary phase-out of production of AFFF containing PFOS, which was completed in 2002. AFFF containing the more harmful PFOS is no longer made in the U.S.

In 2006, the EPA and the eight major companies that manufacture PFOA launched the 2010/15 PFOA Stewardship Program, in which companies agreed to reduce emissions of PFOA by 95% by 2010 and phase out production by 2015. These voluntary phase-outs did not affect existing AFFF products containing PFAS.

Despite these voluntary efforts, AFFF containing PFOS may still be in use or in stockpiles stored in fire stations and warehouses for many years to come. With a twenty-five-year shelf life, AFFF containing PFOS will be around for another decade or possibly two, and will continue to remain aboard ARFF apparatus despite health concerns.

A suitable substitute for PFAS in fire fighting foams not only has to meet health and environmental standards, but it also must be effective at extinguishing Class B flammable liquid fires. The AFFF used in the U.S. military and in most civilian applications must meet specific requirements for surface tension established in Military Specification MIL-F-24385F to ensure its effectiveness against a wide variety of flammable liquid threats.

The EPA has engaged in reviews of safer substitutes for PFAS AFFF as part of the 2010/15 PFOA Stewardship Program and the New Chemical Program. One suitable substitute is an AFFF that contains certain fluorocarbon surfactants with fewer than six carbons (also referred to as C_6 or fluorotelomer foam) made through telomerization. These foams do not form PFOA when they degrade and are generally less toxic and less persistent in the environment compared to the longer chain PFOA, although they are likely to contain trace amounts of PFOA as a byproduct of manufacturing.

Another option is to develop an effective AFFF that is free of fluorocarbon surfactants altogether, which eliminates the environmental and health hazards associated with PFAS. A

number of these foams are currently on the market. While available for commercial and civilian uses, such foams may not meet the more stringent U.S. military performance standards.

Moving Forward Without Toxic Foam

Despite important advances limiting human and environmental exposure to PFOS and PFOA, we remain concerned that fire fighters continue to be exposed to these toxins in legacy foams still in use or in stockpiles. As a result, fire fighters are continually regularly exposed to foam containing PFAS and at risk for potential health impacts. As we learn more about the potential health impacts of fluorinated chemicals, we must take steps to reduce fire fighters' exposure and protect their health.

Washington State is leading the way in these efforts. In March, Governor Inslee signed legislation banning PFAS in Class B firefighting foam designed for flammable liquid fires and firefighting personal protective equipment. Steps are also being taken at the federal level. The recently negotiated FAA Reauthorization Act contains language championed by Senator Peters permitting airports to use non-fluorinated fire fighting foams. We support this language and are pleased airports will now have the ability to transition away from toxic foams.

We know PFAS presents a health risk to workers, such as fire fighters, who are exposed on a regular basis and thus we seek to ultimately discontinue the use of PFAS foams. In recent years, driven by the European and US reforms, fluorine-free foam technology has advanced to counter concerns raised with PFOS and PFOA fluorinated foams. Fluorine-free foams are now available in the international market.

Fluorine-free foams continue to gain wide acceptance in Europe and Australia where the use of Mil-Spec AFFF isn't required. Several European locations having transitioned to the new formulations have reported acceptable firefighting experiences with fluorine-free UL approved foams. In 2015 an engine fire occurred on a British Airways aircraft located at London's Heathrow International Airport. The fire was successfully extinguished using a fluorine-free foam. Following the incident, officials were not only pleased by the performance of the fluorine-free foam, but also recognized the fluorine-free foam came with the benefit of an absence of known health hazards, zero clean-up cost and no environmental damage. The IAFF supports the use of non-toxic foam formulations.

In the interim, we must acknowledge that fire fighters have been, and will continue to be, exposed to toxic PFAS. In addition to exposures from foam and as a by-product of combustion of consumer goods manufactured with PFAS, such as upholstery, in the past, PFOA was a chemical building block or by-product created within the manufacture of water repellent treatment and moisture barriers for turnout geat. Major U.S. manufacturers have assured IAFF that PFOA is no longer present within the moisture barrier of turnout gear or in the barrier treatments of used on turnout gear, but the toxin may be present in legacy gear. To better protect fire fighter health, we support discontinuing the use of legacy foams and turnout gear containing PFOA.

Few scientific studies of PFAS examine fire fighters. Those that have are of little statistical significance due to the limited size of the test group. We believe more studies on fire fighters' exposures and health impacts must occur. Additionally, we believe all fire fighters must receive annual physicals which include blood testing to determine the level of PFAS in the

fire fighter's bloodstream. Such information will allow fire fighters and their doctors to take active steps to better protect their health and treat any potential health impacts which may have already occurred.

Conclusion

On behalf of the International Association of Fire Fighters, I appreciate the opportunity to testify on the federal role in the toxic PFAS chemical crisis. As a nation, we have made significant positive progress in recognizing the emerging threat to human health caused by PFAS exposure. It is crucial that as we move forward, we take immediate steps to limit the fire fighter exposure to the toxic formulations of AFFF. To the extent that I or the IAFF can assist the Subcommittee in these efforts, I am happy to offer our expertise and pledge to work closely with you and your staffs.

Again, I'd like to thank the Subcommittee for the opportunity to testify today and am happy to answer any questions you may have.

Hello, my name is Scott Markham, and I am from the Parchment area in Michigan. I am here today as part of a contingent of citizens and activists, concerned and deeply affected by the pfas poisoning of our water and soil in the community in which we live. As you may know, our entire city water supply was contaminated by pfas pollution. Every member of my family drank this water at some point. Its effects on myself and my family remain unknown at this time.

Industries, like the paper mill responsible for the contamination in my community, are able to declare bankruptcy and skip town leaving their pollution behind for small towns like mine to grapple with. Mechanisms designed to address this contamination, like the Superfund program, and brownfield remediation programs, are consistently underfunded and given a low priority by legislators. The result has been to allow polluted industrial sites like ours to leak their contamination into the ground, air and water.

The time has come for Congress to do right by these communities. These polluting industries provided middle class jobs at one time, but those jobs are now long gone, and the legacy of those industries is often the pollution they've left behind. Human health, particularly in vulnerable low income communities, is suffering. I am here today to ask congress to make cleaning up these industrial sites a top priority, and to fund those remediation programs appropriately so that lives can be saved through removal of carcinogens and other harmful pollutants.

In addition, current EPA policy is that human impact studies are not required, and nothing is currently being done to know what a chemical's impacts will be on human health before its' released. I am

asking Congress to reform the EPA guidelines so that those studies are required before a chemical is released into our communities for mass use and consumption. In fact, in the case of pfas, 3M knew as early as 1981 that pfas caused cancer in mice and it was allowed to continue to be included in an endless number of products in the decades that followed in such massive quantities, that as of today there is nowhere on earth that does not have some detectable level of pfas.

I hope that hearings, testimonials, and reporting about pfas and other pollution will be a lesson to Congress that reforms are necessary. I ask that Congress put the value of human life above corporations, because this is not an economic issue, this is a social justice issue, with human lives including the lives of those in my community and my own family depending on Congress taking action so that never again will communities be helpless to deal with the contamination that is a threat RIGHT NOW, all across our country.

Thank you

MICHIGAN
LEAGUE OF
CONSERVATION
VOTERS

Date: September 26th, 2018
To: U.S. Senate
From: Bob Allison, Deputy Director, Michigan League of Conservation Voters
Re: Signatures requesting action from the U.S. Senate on PFAS contamination in Michigan

The Michigan League of Conservation Voters joins more than 500 of our members in urging the U.S. Senate **to take immediate action on PFAS water contamination in the state of Michigan.**

On behalf of the undersigned:

I am writing today to urge you to take immediate action to address the growing threat of PFAS drinking water contamination in Michigan.

There are now 29 communities where PFAS contamination has harmed public health and made our water undrinkable. This forever chemical, which builds up in the blood and stays there for years, does not present itself in illness or immediate symptoms, but causes chronic, life-altering disease and health issues that will plague thousands of Michiganders, and will continue to unless action is taken.

Worse still, the handling of the discovery of this contamination by our state has been marked by a continued lack of transparency. Six years ago, the Michigan Department of Environmental Quality *ignored a 2012 report that warned of widespread PFAS contamination in Michigan and* proposed urgent recommendations that could have protected families. This was done with the knowledge of the irreversible harm contamination would have on the health of Michiganders whose drinking water was polluted.

Michigan residents, like everyone, deserve to be able to trust that the water coming out of their own tap is safe to drink—yet increasing discovery of drinking water contamination statewide means thousands of residents cannot.

Moms, dads, children, grandparents, aunts, uncles—they are all being affected. Everyday people, who have done nothing but drink the water that they have access to, face life and death situations. Daily, they wonder: is this ailment due to contamination? Will their home now be unsellable? They feel they have been unknowingly poisoned—and no one is there to help them deal with the aftermath.

I urge you to take steps to lead on this issue and address the growing threat that PFAS contamination means for the people of our state. We cannot afford to wait for Michigan to act. This is a public health crisis that cannot be ignored.

Sincerely,

Mail Name	City	State	Zip
Michael Salgat	Plymouth	MI	48[redacted]
Phillip Alward	Fenton	MI	48[redacted]
Matthew Herrington	Flushing	MI	48[redacted]
Bette Swando	Saint Clair Shores	MI	48[redacted]
Robbi Chisholm	Wyandotte	MI	48[redacted]
Alicia Baker	New Hudson	MI	48[redacted]
Erik Peterson	Troy	MI	48[redacted]
Carol McGeehan	Holland	MI	49[redacted]
Mark Johnsen	Commerce Township	MI	48[redacted]
Jazmine Harvey	Kincheloe	MI	49[redacted]
Laura Lyons	Ludington	MI	49[redacted]
Susan Peters	Dewitt	MI	48[redacted]
Melissa Hoving	Portland	OR	97[redacted]
Carol Shuckra	Traverse City	MI	49[redacted]
Louis Linder	Briarcliff Manor	NY	10[redacted]

Bill Polesnak	Troy	MI	48
Joanne Wiertella	Dexter	MI	48
Delisa Norris	Southfield	MI	48
Bill Kastler	New Baltimore	MI	48
Mark Suchyta	Ann Arbor	MI	48
Suzanne Zelnik Geldys	Dearborn Heights	MI	48
Marjorie Castanien	Defiance	OH	43
Barbara Stevenson	Detroit	MI	48
Barb Wallace	Grand Rapids	MI	49
p fs	Ann Arbor	MI	48
Deborah Gardner	Caseville	MI	48
Kathy Tuckerman	Traverse City	MI	49
Rebecca D. Steel	Kalamazoo	MI	49
Juanita Butcher	Plainwell	MI	49
Dorene Doane	Sylvan Lake	MI	48
Wendy Nystrom	Big Rapids	MI	49
Jim Murphy	Havertown	PA	19
Margaret Rink	Chelsea	MI	48
Natalie Keast	Berkley	MI	48
Carol Berard	Saint Joseph	MI	49
Donna Wethy	Sterling Heights	MI	48
Karen Roeper	Traverse City	MI	49
Courtney Stanley	Comstock Park	MI	49
Shannon Abbott	Grand Rapids	MI	49
Brenda Jellies	Lawton	MI	49

Leslie Sutliff	Ashley	MI	48
Justin Eldridge	Wyoming	MI	49
Linda Prostko	Caledonia	MI	49
Lindsey Walker	Petoskey	MI	49
Dean Sherwood	Farmington Hills	MI	48
Jeremy Day	Greenville	MI	48
Ann Kraft	Chelsea	MI	48
David helfrecht	Saginaw	MI	48
Sheila Martin	Grand Rapids	MI	49
Alan Walczak	Grand Rapids	MI	49
Barbara Bachman	Farmington Hills	MI	48
Becky Sullivan	Saginaw	MI	48
Mary Thoma	Oakwood	OH	45
Julie Moylan	Troy	MI	48
James MCFALL	Topinabee	MI	49
Margaret VanHoudt	Spring Lake	MI	49
Elaine Connors	Madison Heights	MI	48
Laurie Muntter	Jenison	MI	49
Mark Boik	Sterling Heights	MI	48
Sandra Lintz	Indian River	MI	49
Marilyn Scott	Ann Arbor	MI	48
Mary Peterson	Saint Joseph	MI	49
Lori McElhaney	Hudsonville	MI	49
Marc Taras	Ann Arbor	MI	48
Jeanine Weber	Grand Rapids	MI	49

Carolyn Morado	Ann Arbor	MI	[redacted]
Paula Osburn	Onsted	MI	[redacted]
Michael Buza	Swartz Creek	MI	[redacted]
Charles Wolterink	Traverse City	MI	[redacted]
Edmund Ammen	Ann Arbor	MI	[redacted]
Barbara McGraw	Livonia	MI	[redacted]
Susanne Matthews	Wyoming	MI	[redacted]
Sue Balk	Monroe	MI	[redacted]
Robin Ripmaster	Grand Rapids	MI	[redacted]
Steven Johnson	Portage	MI	[redacted]
Nicholas Paganelli	Grand Rapids	MI	[redacted]
Scott Golding	Ann Arbor	MI	[redacted]
Ken Zimmerman	Ithaca	MI	[redacted]
Gina Bates	Apple Creek	OH	[redacted]
Thomas McKarns	Ann Arbor	MI	[redacted]
Cynthia Sherman-Jones	Chatham	MI	[redacted]
Jack Adams	Deford	MI	[redacted]
Debra Moore	Clio	MI	[redacted]
Marta Johnson	Grand Rapids	MI	[redacted]
Gary Salata	Canton	MI	[redacted]
Kristine Melendez	Livonia	MI	[redacted]
Trudy Hughes	Ann Arbor	MI	[redacted]
Mike Soto	Westland	MI	[redacted]
Orin Gelderloos	Dearborn Heights	MI	[redacted]
Lynn Donell	Livonia	MI	[redacted]

Debra Glen	Pinckney	MI	48
Susan Shink	Ann Arbor	MI	48
Natalie Cizmas	Ypsilanti	MI	48
scott flood	Niles	MI	49
Bob Kubiak	Clay	MI	48
Timothy Shields	Dearborn Heights	MI	48
Sharon Bodek	Rochester	MI	48
Monte Rogers	Spring Lake	MI	49
Jacqueline Tessman	Benton Harbor	MI	49
Tom Emmott	Traverse City	MI	49
Dorothy Frisch	Grand Rapids	MI	49
Dency Lippert	Manistee	MI	49
patricia martin	Mackinac Island	MI	49
Jerry Mawhorter	Royal Oak	MI	48
Martin Schnur	Comstock Park	MI	49
Maria Ross	Beverly Hills	MI	48
James Lange	Alto	MI	49
Stephen Fuller	Charlotte	MI	48
J McDaniels	Williamston	MI	48
Tamara Meyers	Ada	MI	49
Linda Looney	Grandville	MI	49
Theresa and Barbara Lamarr	Detroit	MI	48
Suzannah Greve	Traverse City	MI	49
Karen Rossman	Whitehall	MI	49
Phoebe Schutz	Lake Orion	MI	48

Joseph Byrne	Birmingham	MI	48
Marianne Fix	Trenton	MI	48
Katherine Heins	Traverse City	MI	49
Steve Frederick	Sault Sainte Marie	MI	49
Nichole Welch	Galesburg	MI	49
Virginia Jones	Kalamazoo	MI	49
Susan Burack	Hancock	MI	49
Gregory Cole	Oscoda	MI	48
Geraldine Seger	Lake City	MI	49
Marisa Gies	Detroit	MI	48
Liz Storm	Petoskey	MI	49
Jane Westerfield	Allendale	MI	49
Marion Collier	Birmingham	MI	48
Susan Frahm	Middleville	MI	49
Kaylee Swanson	Grand Rapids	MI	49
Shannon Donley	Grand Haven	MI	49
Janet Lenic	Comstock Park	MI	49
Jeanne Sekely	Marquette	MI	49
Tara Conaway	Byron Center	MI	49
William Jones	Allegan	MI	49
Sherril VandePutte	Ortonville	MI	48
Joe Kellerman	Bay City	MI	48
Audrey Minick Minick	Milan	MI	48
Pat Nicely	Grand Rapids	MI	49
Bonnie Elbode	Eastpointe	MI	48

Georgette and Paul Engard	Grand Blanc	MI	48
Mary O'Neill	Presque Isle	MI	49
Katie Parrish	Ann Arbor	MI	48
Anna Roush	Ypsilanti	MI	48
Chad Cooley	Grand Ledge	MI	48
Lori Pesci	Lake Orion	MI	48
Pat Arrowood	Gulliver	MI	49
Sandy Pardo	Garden City	MI	48
Lynne Crandall	Ann Arbor	MI	48
Debra Lisull	Ann Arbor	MI	48
Pamela Bloink	Rockford	MI	49
Marsha Boeltger	Waterford	MI	48
Amanda Bellfuss	Rockford	MI	49
Melissa Garey	Rockford	MI	49
Connie Tennant	Ann Arbor	MI	48
Mary Matthews	Northville	MI	48
Tessa Harvey	Ann Arbor	MI	48
james smit	Marquette	MI	49
Debbie Shannon	Grand Blanc	MI	48
Judith Richards	Lathrup Village	MI	48
Mary Mudie	West Bloomfield	MI	48
Michael Kwitt	Warren	MI	48
Sarah Schaefer	Grand Rapids	MI	49
Laurie Smith	Evart	MI	49
Michelle Daugherty	Ann Arbor	MI	48

Lisa Frucci	Niles	MI	49
Wilfred Von zastrow	Bloomfield Hills	MI	48
Johanna Harding	Lansing	MI	48
Laura Flak	Wyandotte	MI	48
Roy Smith	Flint	MI	48
Diane Merman	Monroe	MI	48
Martha M. Wilson	Van Buren Twp	MI	48
Peggy Johnson	Lake Ann	MI	49
Joseph Good	Oxford	MI	48
Bf Bayha	Westland	MI	48
Lynda Charlebois	Lapeer	MI	48
Julia Skelton	Van Buren Twp	MI	48
Roberta Marine	Lansing	MI	48
Al Norkey	Jackson	MI	49
Kathy Mason	Sebewaing	MI	48
Mike and Susan Raymond	Shelby Township	MI	48
Stacy Niemann	Battle Creek	MI	49
Melody Arnott	Dearborn Heights	MI	48
Peter & Martha Blom	Orchard Lake	MI	48
Barbara Speiser	Canton	MI	48
Janet Ginepro	Monroe	MI	48
June Picard Picard	Bay City	MI	48
Lorne Beatty	Brighton	MI	48
K Sneden	Lowell	MI	49
Cathy Wusterbarth	Oscoda	MI	48

Margaret Halpern	Ann Arbor	MI	48
Alyssa Moritz	Flat Rock	MI	48
Douglas Harter	Kalamazoo	MI	49
Lee Gorman	Ann Arbor	MI	48
Dennis Feichtinger	Trenton	MI	48
Toby Weiner Dolinka	Grand Rapids	MI	49
Kristen White	Grayling	MI	49
Katherine Busch	Wyoming	MI	49
Marthea Jager	Grand Rapids	MI	49
Sarah Adrian	Southfield	MI	48
Cody Angell	Belmont	MI	49
Steve White	Midland	MI	48
Matthew Schaut	Minneapolis	MN	55
steve trevaskis	Clarkston	MI	48
Mary Naour	Adrian	MI	49
Michael Seiler	Rochester	MI	48
Robert & Georgia Simpson	Flint	MI	48
Francine Dolins	Ann Arbor	MI	48
Ann C McGill	Brunswick	OH	44
Nzingha Masani-Manuel	Detroit	MI	48
Kimberly Gilbert	White Lake	MI	48
Ann Therese Foley	Nazareth	MI	49
Fawn Guffey	Charlotte	MI	48
Nelson S.	Ypsilanti	MI	48
Kyle de Beausset	Grosse Ile	MI	48

Kevin Cranick	Boyne Falls	MI	4
Joyce Oatley	Cadillac	MI	4
Steve Smith Smith	Bellaire	MI	4
Linda Kolich	Kalamazoo	MI	4
Dawn Uhen	Grand Rapids	MI	4
Kahley Crittenden	Grand Rapids	MI	4
Dixie Lumbard	Otsego	MI	4
Ginni Wandron	Traverse City	MI	4
Marcia Kutchin	Ada	MI	4
FABIAN MENDEZ	Grand Rapids	MI	4
Joyce Root	Kalamazoo	MI	4
Melissa Starrett	Kalamazoo	MI	4
Joell Garber	Grand Rapids	MI	4
Matt Lockwood	Belmont	MI	4
Darin Ellard	Kalamazoo	MI	4
Stacy Gaudio	Rockford	MI	4
Stephanie Morris	Cedar Springs	MI	4
Patricia Johnson	Oscoda	MI	4
Gail Weatherwax	Kalamazoo	MI	4
Casey Amidon	Kalamazoo	MI	4
Brandon Moeller	Portage	MI	4
Kathleen Steffens	Carp Lake	MI	4
Jane Hershberger	Hudsonville	MI	4
Kris VanKempen	Grand Rapids	MI	4
Terri Lupo	Plainwell	MI	4

Vicki Reese	Wyoming	MI	4[redacted]
Monica Vandervegte	Newaygo	MI	4[redacted]
Shannon Schwenke	Orleans	MI	4[redacted]
Kevin Brown	Grand Rapids	MI	4[redacted]
Fran Silva-Blayney	Colorado Springs	CO	8[redacted]
Julie Wiser	Belmont	MI	4[redacted]
Robin DeHaan	Kalamazoo	MI	4[redacted]
Jade Orlich	Grand Rapids	MI	4[redacted]
Tammy Cooper	Kalamazoo	MI	4[redacted]
GAYE RACZKOWSKI	Grand Rapids	MI	4[redacted]
Kristi Lloyd	Hickory Corners	MI	4[redacted]
Bonnie Anderson-Butler	Kalamazoo	MI	4[redacted]
Roger Storm	Wyoming	MI	4[redacted]
Belinda Johnson	Oscoda	MI	4[redacted]
Tess Nelkie	Tawas City	MI	4[redacted]
Becky Snyder	South Haven	MI	4[redacted]
Jade Cruz	Grand Rapids	MI	4[redacted]
Shelly Pennington	Dorr	MI	4[redacted]
Susie Austin	Belmont	MI	4[redacted]
Angela M. Garcia-Johnson	Belleville	MI	4[redacted]
Thomas Pattok	Belmont	MI	4[redacted]
Tony James	Kalamazoo	MI	4[redacted]
Heidi Zuniga	Allendale	MI	4[redacted]
Colby Crittenden	Grand Rapids	MI	4[redacted]
Ross Blake	Utica	MI	4[redacted]

Debi Pulido	Nashville	MI	49
Mary Michela	Prudenville	MI	48
Donna Tingley	Oscoda	MI	48
Linda Rothenthaler	Rockford	MI	49
Sharon André	Prudenville	MI	48
Jane Ludtke	Rockford	MI	49
Rich Deszell	White Lake	MI	48
J Mahaney	Sparta	MI	49
Ben Geiger	Kalamazoo	MI	49
Valerie Wychers	Dorr	MI	49
Ted Storm	Grand Rapids	MI	49
Stephanie Smith	Belmont	MI	49
Nancy Martin	Grand Rapids	MI	49
Chantal Storm	Grand Haven	MI	49
Jessica Federico	Grand Haven	MI	49
Lourene Rife	South Haven	MI	49
Paul Storm	Cedar Springs	MI	49
Nicole Eklund	East Tawas	MI	48
william weber	Newberry	MI	49
Tamara McArthur West	Haslett	MI	48
Courtney Breining	Roscommon	MI	48
Liz Cox	Belmont	MI	49
Jami Price	Caledonia	MI	49
Elissa Barkema	Grand Rapids	MI	49
Jennifer Van Eyk	Kalamazoo	MI	49

Cynthia Rousell	Caledonia	MI	4[redacted]
Jeanette Solomon	Rockford	MI	4[redacted]
Laurel Joseph	Grand Rapids	MI	4[redacted]
Jennifer Kramarz	Belmont	MI	4[redacted]
Ron Osga	Thompsonville	MI	4[redacted]
Michael LaCroix	Grand Rapids	MI	4[redacted]
Melissa Walters	Kalamazoo	MI	4[redacted]
Barbara Porter	Grand Rapids	MI	4[redacted]
Michal Enders	Middleville	MI	4[redacted]
Dave O'Leary	Oscoda	MI	4[redacted]
KIM LEPERT	Kalamazoo	MI	4[redacted]
Nancy Craig	Kalamazoo	MI	4[redacted]
Bictor Craig	Kalamazoo	MI	4[redacted]
Roberta Friday	Houghton Lake	MI	4[redacted]
Lisa Daubenspeck	Oscoda	MI	4[redacted]
Casey Gabhart	Kalamazoo	MI	4[redacted]
Sue Smits	Comstock Park	MI	4[redacted]
bruce evans	Hamilton	MI	4[redacted]
Robin Trebilcock	Rockford	MI	4[redacted]
Brenda Maurer	Kalamazoo	MI	4[redacted]
Meghan Stanford	Portage	MI	4[redacted]
Kimberly Heibel	Grand Rapids	MI	4[redacted]
Karen Jaynes	Black River	MI	4[redacted]
Marilyn Overholt	Oscoda	MI	4[redacted]
Sue Bockstanz	Kalamazoo	MI	4[redacted]

Amy Schneider	Comstock Park	MI	49
Crystal Gray	Grand Rapids	MI	49
Melanie Karr	Grand Rapids	MI	49
Patricia Baldwin	Grand Rapids	MI	49
Gordon VanLoozenoord	Belmont	MI	49
Sharon VanLoozenoord	Belmont	MI	49
James Mcpheron	Grand Rapids	MI	49
Deborah Finkler	Grand Rapids	MI	49
Deb Brase	Belmont	MI	49
Ken Brase	Belmont	MI	49
ELIZABETH MARCKINI	Cedar Springs	MI	49
Judy Croff	Grand Rapids	MI	49
Wyneese Stanford	Grand Rapids	MI	49
Colin McHugh	Plainwell	MI	49
Eileen Johnson	Lake Orion	MI	48
Susan Axtell	Gwinn	MI	49
Kim Miller	Cassopolis	MI	49
Linda Francisco	Oak Park	MI	48
Patricia I Sitran	Warren	MI	48
Del Tavares-Proctor	Pangburn	AR	72
Simone Proulx	Haslett	MI	48
Patricia Czurak Crater	Grand Rapids	MI	49
Cinda Birely	Rockford	MI	49
Janice Tomlian	Lansing	MI	48
Janet Hansen	Pontiac	MI	48

Danielle Congleton	Dewitt	MI	48
Brandy Storm	Grand Haven	MI	49
Helrn Silas	Portland	MI	48
Katy Steele	Grand Rapids	MI	49
Cheryl Church	Wells	MI	49
Victoria Honold	Eastpointe	MI	48
Judy Barber	Bradenton	FL	34
Hiiary Hunt	Kalamazoo	MI	49
Joyce Tanzer	Glendale	CA	91
Michael Hansen	Westland	MI	48
Kody Vitale	Brighton	MI	48
Joseph Cornelius	Gwinn	MI	49
Lisa James Novak	Kalamazoo	MI	49
Barbara Goudreau	Comstock Park	MI	49
Hannah Taylor	Wyoming	MI	49
Robert Goosney	Onaway	MI	49
Steven Bizzis	Portage	MI	49
Brenda Shinabarger-Howe	Dowling	MI	49
Melissa Leitch	Grand Rapids	MI	49
Stacy Loew	Grandville	MI	49
Terisa Baranoski	Comstock Park	MI	49
Lori Sharrar	Temperance	MI	48
Steve Hartzler	Lake	MI	48
Robin Vanderjagt	Belmont	MI	49
John Latta	Ann Arbor	MI	48

Karen Dukovich	Frankenmuth	MI	48
Stephen Wooden	Grand Rapids	MI	49
William Herman	Livonia	MI	48
Ronald Zurawski	Menominee	MI	49
Sherry Opalka	Kalamazoo	MI	49
Jon Krueger	Jackson	MI	49
Michele Kowalski	Eaton Rapids	MI	48
John Poore	Lansing	MI	48
Debra Bayley	Walled Lake	MI	48
Steve Keim	Columbiaville	MI	48
Matt Brzezinski	Saint Clair Shores	MI	48
Deborah Gibbs-Halm	Grand Blanc	MI	48
Lynda Asher	Ann Arbor	MI	48
Urmila Padmanabhan	Fremont	CA	94
Cheryl Landrum	Port Huron	MI	48
Lana Bobak	Rochester Hills	MI	48
Heath Post	Lansing	MI	48
Dianne Minicucci	Lake Ann	MI	49
Gretchen Rose	Cedar	MI	49
Evelyn Millstein	Royal Oak	MI	48
Vince Cerutti	Ann Arbor	MI	48
rosemarie werner	Standish	MI	48
Bonnie German	Rochester Hills	MI	48
Jeff Kronick	Lake Orion	MI	48
Marty Albert	Battle Creek	MI	49

Kathrina Spyridakis	Birmingham	MI	48[redacted]
Sarah Sercombe	Royal Oak	MI	48[redacted]
Rosalind Folman	Royal Oak	MI	48[redacted]
Dan Fogarty	Santa Rosa	CA	95[redacted]
Mark Messing	Traverse City	MI	49[redacted]
Shelly Winney	Grand Rapids	MI	49[redacted]
Cynthia Edwards	Ann Arbor	MI	48[redacted]
Lori Mulvey	Comstock Park	MI	49[redacted]
Derek Gendvil	Las Vegas	NV	89[redacted]
Philip Robar	Saint Louis	MI	48[redacted]
John Lorand	Mount Pleasant	MI	48[redacted]
Gale Shafkind	Royal Oak	MI	48[redacted]
Robin Graubarth	Ann Arbor	MI	48[redacted]
Margo Lesser	Birmingham	MI	48[redacted]
Kenneth Large	Royal Oak	MI	48[redacted]
Andrea Zajac	Williamston	MI	48[redacted]
Susan Gitterman	Ypsilanti	MI	48[redacted]
Kristin Klass	Bridgman	MI	49[redacted]
kathleen brown	Pinckney	MI	48[redacted]
Elise Muffitt	Ann Arbor	MI	48[redacted]
Daniel Cavanaugh	Belleville	MI	48[redacted]
Debra Lane	Fort Bragg	CA	95[redacted]
Patricia Austin	South Branch	MI	48[redacted]
Susan Sorg	Grand Rapids	MI	49[redacted]
Peggy Malnati	Farmington Hills	MI	48[redacted]

Francine Melotti	Oxford	MI	48
Jeffery Morgenthaler	Lowell	MI	49
Ken Galica	Farmington Hills	MI	48
Maureen Sheahan	Southfield	MI	48
Carl Michel	Ann Arbor	MI	48
Gavin Bornholtz	Grand Blanc	MI	48
Sue Basta	Commerce Township	MI	48
Don Thompson	Cambridge	MA	02
Carol Mohr	Ann Arbor	MI	48
Tia Pearson	Wahiawa	HI	96
Greg Brown	Key West	FL	33
Brenda Albanese	Sparta	MI	49
Lori Lyles	Flint	MI	48
Robert Moore	Clio	MI	48
Jason Moritz	Jackson	MI	49
James Shepherd	Rives Junction	MI	49
Ann Hildebrandt	Detroit	MI	48
Charles Dineen	Lawton	MI	49
Frank Vaydik	Saginaw	MI	48
Ann Marie Teli	Chesterfield	MI	48
Kala Friddle	Grand Rapids	MI	49
Steven Cypher	Rochester	MI	48
Tom Kozel	Clarksville	OH	45
Nicole Wolf	Rochester	MI	48
Roxanne Haslem	Grand Rapids	MI	49

Michael Sklar	Huntington Woods	MI	4[redacted]
Richard Tipton	Hubbardston	MI	4[redacted]
David Warren	Traverse City	MI	4[redacted]
Grace Strong	Ironwood	MI	4[redacted]
Marilee Mouser	Ithaca	MI	4[redacted]
Freya Harris	Atlanta	GA	3[redacted]
Anne Pavlic	Northville	MI	4[redacted]
Henry Velick	Ann Arbor	MI	4[redacted]
Marlea Shirley	Free Soil	MI	4[redacted]
Paul Kerman	Hazel Park	MI	4[redacted]
Leslie Watson	Gwinn	MI	4[redacted]
JoAnn Render	East Lansing	MI	4[redacted]
Joan Berger	Brownstown	MI	4[redacted]
Cynthia Dudley	Ludington	MI	4[redacted]
JoEllen Rudolph	Petoskey	MI	4[redacted]
Marianne Kovalcik	Sterling Heights	MI	4[redacted]
Bob Johns	Saint Johns	MI	4[redacted]
Julie Ozias	Waterford	MI	4[redacted]
Janet Anderson	Oak Park	MI	4[redacted]
Megan Faber	Denver	CO	8[redacted]
Christine Mathews	Fenton	MI	4[redacted]
Mark Swanson	Ann Arbor	MI	4[redacted]
daniel polley	Chicago	IL	6[redacted]
Diana Munch	Southfield	MI	4[redacted]
Annie McCombs	Kalamazoo	MI	4[redacted]

Rob Jenkin	Walled Lake	MI	4[redacted]
Georgiann Young	Saint Joseph	MI	4[redacted]
DENISE HAWKINS	Lathrup Village	MI	4[redacted]
Stefania Johns	Royal Oak	MI	4[redacted]
Maria Prokopowycz	Lapeer	MI	4[redacted]
Michael Maggied	Mesa	AZ	8[redacted]
Cindy Borske	New Hampton	IA	5[redacted]
Timothy Schacht	Grosse Pointe Park	MI	4[redacted]
Carol Sears	Grand Rapids	MI	4[redacted]
Eric Stordahl	Marquette	MI	4[redacted]
George White	Kalamazoo	MI	4[redacted]
Maria Miller	Grand Rapids	MI	4[redacted]
Carol Stoody	Clay	MI	4[redacted]
Jeanine Center	Ann Arbor	MI	4[redacted]
Nancy Godwin	Tucson	AZ	8[redacted]
John Renfrew	Marquette	MI	4[redacted]
Diane Good	Bellaire	MI	4[redacted]
Lindsay Conklin	Howell	MI	4[redacted]
Anne Horn	Okemos	MI	4[redacted]
Denise Brennan	Auburn Hills	MI	4[redacted]
Kristyn MacPhail	Littleton	CO	8[redacted]
Martha Vermeulen	Grandville	MI	4[redacted]
Tracy Holthaus	Kansas City	MO	6[redacted]
Ester Fuchs	Lapeer	MI	4[redacted]
Lisa Hammermeister	Granada Hills	CA	9[redacted]

Deborah Nicholas	Plymouth	MI	48
Kyle Peterson	Sterling Heights	MI	48
Lee Hegstrand	Grand Rapids	MI	49
Amanda Davis	Mount Clemens	MI	48
Susan Welsford	Norton Shores	MI	49
Oksana Bohatch	Grand Rapids	MI	49
Leslie Dryg	Grand Rapids	MI	49
Martha Kransdorf	Ann Arbor	MI	48
JAMES DAWSON	Davis	CA	95
Greg Collins	Coopersville	MI	49
Michelle Ash	Lake City	MI	49
Peter Rogan	Royal Oak	MI	48
Pamela York	Beverly Hills	MI	48
Patricia Murray	Ann Arbor	MI	48
Michele Reynolds	Oak Park	MI	48
Ann Wright	Ypsilanti	MI	48
Daniel Coyne	Kalamazoo	MI	49
Alison Zaharee	Whitmore Lake	MI	48
Dale Carpenter	Lake Orion	MI	48
Marilyn White	Whitehall	MI	49
Richard Han	Ann Arbor	MI	48
Emily Bovee	Rochester Hills	MI	48
Ernest McCarus	Ann Arbor	MI	48
Nancy Weatherwax	Albion	MI	49
Tom Porter	Ann Arbor	MI	48

Becky Posey	Clawson	MI	48
Peter Quackenbush	Dewitt	MI	48
Annette Briggs	Three Rivers	MI	49
Rick Brigham	Douglas	MI	49
Jack Preiss	East Lansing	MI	48
Andrea Rendziperis	Saline	MI	48
Dolores Reynolds	Grand Junction	MI	49
Jackie Byars	Ann Arbor	MI	48
Amanda Robert	Milford	MI	48
Ron Chelland	Norton Shores	MI	49
Margaret Kephart	Ann Arbor	MI	48
Kay Clifford	Ann Arbor	MI	48
Sharon Klotz	Parma	MI	49
kay courtney	Grand Rapids	MI	49
James Crowfoot	Ann Arbor	MI	48
John Krohn	Lansing	MI	48
Stephanie Senneker	Port Huron	MI	48
Margaret Slawson	Traverse City	MI	49
Ruth Lezotte	Suttons Bay	MI	49
GeorgAnne Dion	Marysville	MI	48
Daniel Livingston	Marshall	MI	49
Linda Luke	Van Buren Twp	MI	48
Karen Stankye	White Lake	MI	48
Jill Marcusse	Grand Rapids	MI	49
JO ANN MARCOUX	Ann Arbor	MI	48

Lee Engstrom	Grand Rapids	MI	49
Pat Tessler	Ann Arbor	MI	48
Judith Foy	Ann Arbor	MI	48
Joyce Stein	Brooklyn	MI	49
Kelly Anderson	Ann Arbor	MI	48
Thomas Bennett	Evart	MI	49
richard smith	Melvindale	MI	48
Hugh Hazelton	Hinsdale	IL	60
Theone Thomas	Royal Oak	MI	48
Anne Withers	Alexandria	VA	22
Michelle Bryant	Lake Orion	MI	48
Carol Hayford	Bloomfield Hills	MI	48
Paula Globerson	Ann Arbor	MI	48
Kathie E Takush	Reading	PA	19
Georgia Donovan	Rockford	MI	49
Gordon Jones	Grand Rapids	MI	49
Jan Sockness	Ann Arbor	MI	48
Sharon Kamarainen	Gladstone	MI	49
Brian Dalton	Dearborn Heights	MI	48
Katherine Mouzourakis	Westland	MI	48
Sandra Maar	Gwinn	MI	49
Virginia Catanese	Grosse Pointe	MI	48
Chantelle Hosner	Burt	MI	48
Jasmine Shock	Chesterfield	MI	48
Mort Zukerman	Grand Rapids	MI	49

Janice Prokop-Heitman	Plymouth	MI	48
Benjamin Lee	Cottrellville	MI	48
Charlene Jones	Lansing	MI	48
Christy Giesick	Clinton Township	MI	48
Michele St Peter	Flat Rock	MI	48
Jerry Bierens	Milford	MI	48
william brooks	Roseville	MI	48
Ron Katz	Huntington Woods	MI	48
Lynne Van Ness	Traverse City	MI	49
Paul McCullough	Prudenville	MI	48
Mindye Fortgang	Merrick	NY	11
Frank Gonzales Jr.	Plymouth	MI	48
Jack Lutz	Troy	MI	48
C. James Ringwald	Houghton Lake	MI	48
Lorraine Thompson	Saline	MI	48
Donna Browne	Sewell	NJ	08
Carolyn VandenBerg	Grand Rapids	MI	49
Mike Duffy	Hazel Park	MI	48
John P Davis	Huntington Woods	MI	48
Kathleen Davis	Marquette	MI	49
Matthew Rife	Ann Arbor	MI	48
Marie chuchvara	Davison	MI	48

Dear Chairman Paul, Ranking Member Peters, and Committee Members:

My name is Tess Nelkie. I live in Tawas City, Michigan, 12 miles south of Oscoda and the former Wurtsmith Air Force Base. I have lived in this area since 1974 and am a retired teacher of deaf and hard of hearing children. I taught for 41 years and worked with children from the whole county, including children from Oscoda. My program was housed in the Oscoda Area Schools for many years before being moved to a more centrally located classroom in the Tawas Area. My husband and I own Nordic Sports, a specialty sporting goods store in East Tawas. We opened the store in 1976. I am a member of Anglers of the Au Sable (I'm on the board of directors.), Fly Fishers International, Trout Unlimited, and Ducks Unlimited.

I became aware of PFAS in 2012 when I went to a public informational meeting in Oscoda. I fished and canoed on the Au Sable River, and its health was important to me. After the meeting, my husband and I were asked to be on a committee in conjunction with the Michigan Department of Health and Human Services to warn the public that they should not eat resident fish on the Au Sable River due to PFAS contamination. We met as a committee several times until warning signs were erected along the river. Because I fish, recreate, and hunt in and around the Au Sable River, its health is important to my health and my family's health. People in northeast Michigan fill their freezers with wild game such as venison, fish, ducks, geese, and rabbits. They forage for mushrooms and berries. This is not uncommon here. The schools in the county are closed on November 15th every year because that day is the opening of rifle season for deer hunting. This has gone on for decades dating back to long before I moved here over 40 years ago. The contamination has ruined this fishing/hunting tradition for many residents and visitors. It has cut off a reliable food source. Wild game used to be thought of as the healthy alternative to what was available in stores. No longer is this true. Our natural resources are contaminated to the point where every time I pour myself a glass of water from the tap, I question its safety. No longer do I enjoy a meal of bluegills. When duck hunting, I wonder where the duck's last resting pond was. Was it Clark's Marsh (a Duck's Unlimited project just off the former Wurtsmith AFB runway)? A marsh so contaminated with PFOS that the public is warned not to eat any fish of any size from there. If so, I'll pass on that duck. The hunting/fishing tradition and way of life is being ruined here. The fabric of the rural American life is deteriorating due to contaminated natural resources. This is a crisis because PFAS has sickened people and wildlife, and it continues to do so every day.

I want my government to require the U.S. Air Force to contain and remove the plumes of contaminated ground water that are sickening our people and natural resources. I want my government to listen to the ATSDR's recommendation for drinking water standards and make them more in line with what the scientists recommend. I want my government to require that the mess that was left by the Department of the Defense in Oscoda, MI be cleaned up by the Department of Defense. I want the Department of Defense to take care of the health of the veterans, their families, and all the families who live here and are dealing with health issues related to PFAS. I want to be proud of my government and defense department because they do the right thing because they are honorable people from an honorable country.

I ask that you please submit this letter into the record for the hearing titled "The Federal Role in the Toxic PFAS Chemical Crisis."

Sincerely,
Tess Nelkie
September 20, 2018

[redacted]

Gmail [redacted]

Oscoda / Wurtsmith PFAS Contamination - Impact Statement

[redacted] Sat, Sep 22, 2018 at 12:01 PM

IMPACT OF PFAS CONTAMINATION — WURTSMITH AIR FORCE BASE — OSCODA MI

PFAS contamination has changed my life in ways I did not dream possible.

Living in Oscoda MI had always been my dream. My great grandparents homesteaded within a few miles of my current Oscoda home. After receiving degrees from Michigan State and the University of Michigan and pursuing a career in the metro Detroit / Ann Arbor area, I retired to Oscoda. During my entire life I had always returned to the Oscoda community on the week-ends. It felt as though it was a pristine place. Lake Huron is majestic with beautiful sandy beaches, the AuSable River is mighty, providing for our electricity, and VanEtten Lake provides our fishing and boating water. The national and state forests are beyond compare. All provide needed employment in our area.

For many years Wurtsmith AFB was an integral part of our Oscoda community. The base was what we always thought to be a "good neighbor." My daughter pursued a medical career motivated by the wonderful experience she received as a civilian base volunteer at the military hospital. The members of the military enriched our lives; they came from all corner of our country and always were open to new friendships.

Then it ended. The military packed up and left. The problem was that they left a dirty big secret --- lethal contamination. Periodically military and federal staff are sent in to placate us. Small actions are taken but they can only be compared to the tiniest of band-aids taken from your medicine cabinet. Would you place such a small patch on a severed artery? I think not.

What do we need?

1. Appropriations so our rural community can test and extend municipal water lines to all of our citizens who fear their own wells
2. Appropriations for monitoring and restoring beautiful VanEtten Lake (running next to the AFB)
3. Appropriations for research on the removal or neutralizing of chemicals that have poisoned our water supply
4. Recognition that the Oscoda / Wurtsmith contamination is unique in that it enters nearby Lake Huron, one of the Great Lakes that hold 84% of our fresh water

My experience with PFAS contamination is a common story. It haunts me, impacting each day of my life. As I look out my windows, watching an eagle soar by, I feel guilty. The reason? I brought my small family here.

— one has died of lymphoma
— a 2nd is currently receiving chemo for lymphoma
— another developed a thyroid disease
— another developed a rare form of vaginal cancer
— still another is recovering from a brutal University of Michigan transplant in a final attempt to arrest his cancer.

When my CA grandchild visits she is no longer able to fry the fish she catches over our campfires. She no longer "tubes" behind our boat as there are often mounds of sticky white PFAS foam ringing VanEtten Lake. If we take her to the once pristine Lake Huron beach, in town, we have to be sure it is on a day when there is no foam.

There are the constant demands of hauling and paying for bottled water. At age 81 my spouse (with metal rods and 2 back fusions) never imagined having to watch me have the burden of constantly lifting cases of water. We are repeatedly told by a state agency that our "contact information has been forwarded" so our well can be tested. Proper forms have been filed with the health department. At first the government agency words

were reassuring but then we came to the realization that no date for testing has ever actually been established. Nothing is done. Data is continually published on government websites showing that a contaminated well is only 800 feet from our well.

The obvious question becomes, "Why not have your well tested independently if you are so concerned?" Even though the cost is in the hundreds, I tried. A toxicologist for the state of MI sent me a sheet listing 24 testing companies. None were in Michigan. I stopped calling after the first nine all told me that PFAS testing is considerably more involved that normal testing and that they do work for municipalities and commercial establishment but not for individuals.

Our once pristine community desperately needs IMMEDIATE FEDERAL ASSISTANCE to restore our beautiful waters, provide us with extended water mains for safe drinking water, and keep our economy producing jobs.

How ironic that the charity my husband and I chose, long ago to heavily support, is one that drills wells for safe drinking water in poverty stricken African nations.

Your fiscal action is imperative to the health and economic welfare of Oscoda citizens as well as to your own political futures. If your concern is not about those of us who have always supported the U.S. military at Wurtsmith AFB in Oscoda, then please plan for the impact of Wurtsmith contamination of the vast fresh water supply of the Great Lakes. The health of millions of citizens is at stake.

Jane Lauber [redacted]

[redacted]

[redacted]

Fwd: Martha's Personal PFAS Story

[redacted]

Sat, Sep 22, 2018 at 12:11 PM

---------- Forwarded message ----------
From: [redacted]
Date: Sat, Sep 22, 2018 at 12:07 PM
Subject: Fwd: Martha's Personal PFAS Story
To: [redacted]

Dear Chairman Paul, Ranking Member Peters, and Committee Members:

I grew up spending my summers at my grandmothers cabin in Oscoda. When my grandmother passed away, my mom continued to spend spring, summer, fall at the cabin and us kids would continue to visit in the summer. My mom was diligent about having our well water tested every year to make sure the water was good and the tests always came back clean. Of course they were not testing for PFAS. Before my mom passed away from cancer she told me that she felt like something was eating her body for the past year. She told me to pay attention to my body and act when something doesn't feel right. In fact, my mom's hands the last year she was alive were so bad that she couldn't barely hold a glass. Her joints ached.

In 2009 we renovated the cabin into our family year round home and moved up to Oscoda full time. My husband and I continued to test our well water and all was good. Then about a year after living full time in Oscoda and doing Reflexology for people in the area, my hands started to ache and I started to same the same troubles my mother had and I could no longer do Reflexology. It was only when I took a job in Grand Rapids and worked away from the home during the week did I notice that my hands didn't ache when I was not in the house. I started to investigate why this was happening and started to bring up my own bottled water. My hands no longer ached so I told my husband I wouldn't drink the water. As well our dog would not drink the water and there was no well water smell or anything, it tasted, smelled and looked perfectly fine.

Then the news came out in 2012 (but I didn't hear about it until 2016) that there is a PFAS contamination and it is affecting wells. We had our well tested for PFAS in late 2016 and they detected low levels of PFAS in our well coming from the airbase so they installed a water filter on our faucet. Our family, friends, visitors, and dog drink the filtered water. I have no problems with my hands. And since the PFAS levels in our well were apparently lower than what they detected in the township water supply I asked them why they recommend using the filter and eventually tying in to township water supply. They said it was because they don't know if the plume has already gone though our well system or is on its way or in the middle - they just don't know.

Many neighbors on our street who lived here before 2012, and were not tied-in to city water, have passed away from various forms of cancer or alzheimers. Seems very suspicious.

Bottom line: With these chemicals making their way unde ground and into wells - we need money to not only try to mitigate the plumes (if that is even possible) and more importantly tie all residents with wells into the municipal water supply. The township or DEQ or DHHS only need to test the municipal supply and not thousands of wells. Oscoda Township estimated that to clean up and tie everyone affected into municipal water supply would cost $10M. This needs to happen immediately as we have been dealing with this for 20 years. The airbase has contaminated the people of our town and they need to clean it up and fix it. It should be considered a "Natural Disaster" and "Disaster Relief" from the government should be mandatory for all the taxpayers in Iosco County!

One more very important concern: They say that PFAS can't penetrate the skin, which I don't believe for a

[redacted]

minute. And your skin is the largest organ in the body - thus all of us with wells that don't have whole house filtration systems are continuing to expose ourselves through bathing and watering our vegetable gardens.

Martha Gottlieb
[redacted]

"When the power of love overcomes the love of power, the world will know peace." Jimi Hendrix

[redacted]

Gmail [redacted]

Jeri testimonial

[redacted] Tue, Sep 25, 2018 at 10:52 AM

I have contaminated water. In my 40 years of living in Oscoda we have always had well water. Always believing that it was safe and sound having had it checked on numerous occasions. Little did I know that there was something nasty lurking in that water. Now I find that I'm diagnosed with Parkinson's disease. There is not Parkinsons disease in my family. Is there a correlation between contaminated water and ParkinsonsDisease? There's literature and scientific information indicating there is a probable connection between contaminated water and Parkinson's. So for 40 years I drank my water from A contaminated well that I did not know Was dangerous for me. Because I'v not been able to easily obtain information from The state of Michigan,on the situation and how dangerous it is now I must purchase water from the grocery store. I am a 76-year-old widow Seeking help from my friends to bring my gallons of water into the house for me Since I can't lift the bottles by myself.Now I wonder about my married children. Are they going to be OK? Is there a chance that their bodies have been affected by this Contaminated water?
My long-term solution to this problem is to connect city water. Just estimated that it will cost me approximately $7000 to do so. I ask you to please make this a priority for Michigan to have safe water for their citizens. Thank you
Jeri-Lynne Richardson
Oscoda Michigan

Sent from my iPhone

To Whom It May Concern, September 21, 2018

I am Marcy Harig. This is my testimony. I moved into the Belmont/ Rockford area starting in 1988. My husband Brian and I purchased a mobile home in the Northern Estates South Mobile Home Park, off of 131 and Post Drive. Only a mile away from what is now a major dump site on House Street. My husband passed away from cancer in 1998. I remained in our home until 2003.

In 2003, I moved into an apartment off of Plainfield and Five Mile Rd. In 2006, I moved back to Belmont/Rockford area. I purchased a mobile home in [redacted]. I am a current a resident. Again, only a mile away from the dump site on House Street.

The water in this area has always had a funny taste, even when my husband and I first moved here in 1988. We, (Brian and I) purchased a Brita water filter and installed it on our kitchen faucet when we lived on the South side. When I moved back to the Mobile Home Park in 2006, I used a Brita water Pitcher to filter the impurities. I found out many years later that, it does not filter out the PFAs. I didn't know there were PFAs in the water.

In 2017, I had been having health issues and went to have testing done. At first the Doctors couldn't find anything wrong. But, in February of 2018, I had some very serious health issues that put me in the hospital. After extensive tests, I have been diagnosed with MS. I was fifty-eight years old at the time. MS is usually diagnosed between the ages of thirty and fifty. I am almost sixty. I have no family history of MS. I now have to be on a specific diet, take vitamin supplements, avoid extreme heat, avoid extreme cold, and watch my physical activity output. If I do not, I could suffer a flare up. I have had four flare ups since February 2018. Each one lasts longer than the previous one. The last one was in August, and lasted 9 days.

I believe that the contamination which has been found in our drinking water may have caused this illness. I asked my Doctors about whether this could be a factor. Right now with lack of studies, there is no way to tell. But, said could be. Which brings me to another question, could this be what caused my husband's death?

I have been a resident of this area for a total of 25 years, and have drunk the water until February 2018. I now buy bottled water and do not drink water from public fountains, or in restaurants. I demand there be action taken to remedy this contamination so that nobody else has to get ill due to reckless dumping of toxic materials!

Sincerely, Marcy Harig

To Whom it May Concern,

My husband and I bought our first home in 2012 in Plainfield township in Grand Rapids, MI. We started out life her not knowing the water we were drinking could be harming us. In 2015 we had our first child and after a few months I was no longer able to breastfeed. I used our water to make my daughters bottles. I trusted that my township would only give us safe, clean water to drink. I mean why wouldn't they?! It sickens me to think about what me, my husband and daughter have been exposed to because our township swept the urgency of these chemicals in our water away. There was proof decades before today about the harmful chemicals in or water and no one did anything. We have recently installed a water filtration system in or kitchen so we at least have SAFE drinking water. We used money out of our own pocket to do this. We are still using the contaminated water to bathe and do our laundry with until we can afford a full house filtration system.

It's heartbreaking that the state of Michigan, which is surrounded by fresh water, does not care enough about it's residents enough to give us safe water. I hope this issue begins to be taken seriously and immediate actions are taken to make our water safe!

Sincerely,
The Crittenden Family
Grand Rapids, MI

To Whom It May Concern,

I am the mother of three young children, and I have concerns for their health. Why? I happen to live in the first home that is downstream from the Wolverine World Wide former tannery. Whatever the company recklessly dumped into the Rogue River--mercury, arsenic, cyanide, ScotchGuard---that poison continues to flow through my backyard. My children have been swimming in the polluted river and playing in the toxic muck since they were babies. Why? Because I was told it was "perfectly safe." Yet the EPA, the DEQ and the City of Rockford—THREE departments—they all knew that there were unsafe chemicals in the Rogue. All three fought to protect the interests of the City of Rockford and Wolverine World Wide. Nobody acknowledged that local children, my children, might be at risk.

Are they that callous? Perhaps! Local children had been at risk and, in fact, dying for years. We all had heard the whispers about the two cancer-stricken children who were [redacted] on Cahill Road. We heard the rumors about the sick kids who lived near the river just north of the tannery. We heard the rumors, but we wanted to believe our city leaders and neighbors who told us that everything was okay.

I had let my kids swim in the river. Why? I thought they were safe. City leaders had told me so. In the Rockford Squire, the City Manager said that the EPA was leaving town, and he called that "very good news." The citizen activists who fought that decision were ridiculed. Those activists are the same people who brought forth the info House Street. I trusted my city, my state and my federal government to protect me. I gave you my faith, and you put my children at risk. You publicly ridiculed those who were trying to keep my children away from danger. Who can I trust?

So yes, I have been affected. I live on a river that my children can not play near, swim in or eat the fish from. I still fear that the chemicals will make their way into my home, be it on my dog's feet or from the shoes or dust. Do you worry about arsenic, mercury and cyanide? I do. Every day, I worry.

A polluted river flows in my backyard. Am I safe? The city, the state—they tell me I am. Do I trust the people who once tried to deceive me?

I urge the federal government to move forward with the tannery cleanup and to hold all parties responsible for their action AND inaction. Please help us.

Best,

Julie Spahn

I was stationed at Wurtsmith AFB in the mid to late 80s and lived off base. We had well water. I was a firefighter at this base so I am sure I was exposed to the chemicals used in fire suppression.I was later diagnosed with Thyroid cancer and had it removed some 16 years ago now. You think I could get the VA to listen? Nope. Hope this helps.

To whom it may concern:

As a resident in the Belmon/Rockfordt, Michigan area, I have recently become startlingly aware of the chemical crisis in our water and food supply. Official testing of PFAS in well water has reached properties across the street from us. How can our water supply, which ultimately irrigates our food supply, have such poor government oversight? How can refuse and manufacturing companies have so little oversight regarding what they dump into our rivers and streams? The state of Michigan has several communities with PFAS contaminated drinking water. Shameful!

We had our well water privately tested, at a cost of hundreds of dollars. We are fine ... for now. What about the past? What about the future? The water table ebbs and flows. With contaminated water a few miles from us, we will always be at risk.

Why is the government not monitoring the huge companies near our rivers and streams? Why is the government not forcing them to clean up the areas they contaminated? Why are lobbyists allowed to influence our government officials on issues regarding our health and safety?

Government can regulate how manufactures list food statistics on food products, how gasoline for vehicles must be manufactured to ease the impact on air quality. Yet, it cannot ensure its people non-contaminated drinking water. Shameful!!!

Respectfully,
Susan Turoski
Rockford, MI

I wish to inform you of my concerns on our health issues here in Oscoda Mi. I purchased my home in 1990 on lake Van Etten. I knew Wurtsmith Air Force base was there close to the lake. What I didn't know was how the base was was contaminating the ground water. All the private wells of the residents in the area as well as the wells the base had put in for its service men and there families living on the base were contaminated. The chemicals from fuel spills and jet engine cleaning chemicals as well as fire fighting foam were washed down into the ground. The base closed but the contamination was identified before that and the process of letting the residents know about it had began. The Air Force was pushed and prodded into doing cleanup process but the worst of the contamination was knot known until a few years ago. That fire fighting foam had the worst contaminating chemicals in it to the human body and all types of animals and fish. The PFOS and PFOA chemicals have been tested and found to have serious health consequences for anyone exposed to them. My wife and I have health issues affecting us that no one our families have. Our well was tested and found to be contaminated with those chemicals. We now have Reverse Osmosis filters installed for drinking water but that was only for the last year or so. All those years before last year that we drank our well water has had an affect our bodies. The lake has the PFOA and PFOS in it and the fish we caught and ate were contaminated. This lake water is flowing out into Lake Huron where other cities draw there water from. The only way to get those chemicals out of the water is to run it through a special granulated charcoal filter system much like the Reverse Osmosis system. To my knowledge no city water is processed in that way to remove those chemicals. More people will be affected by these chemicals if they are not eliminated from any and all possible uses for them. All areas where fire fighting foam has been used or dump sites where these chemicals are found must be purged of them. We all want and need clean and safe drinking water. Our government needs to put into place standards and measures that assure we all have good clean water. I think you are in a position in government to do something about this issue of safe and clean drinking water for all people in Michigan and in the USA. Every day that these chemicals continue to be used anywhere in anything is a danger they will get into our water supply. Please take your position responsively as the peoples representatives in government and do the right thing. Give us clean and safe drinking water. All around the country PFOA and PFOS chemicals are being found in water supplies. The limit of 70 ppt is way too high for safe drinking water. Every affected city that did testing for the chemicals has said the limit needs to be lowered. I agree with that, what that number should be is zero as far as I'm concerned. Get an experts opinion and I hope it's less that 10. Ken Turczyn

I arrived at my first duty assignment at Wurtsmith AFB, Michigan in March 1984 as a young healthy 19 year old Airman.

I lived in the dormitory on base and utilized the base water for all personal needs at work and during off time.
In December 1985 after being on base less than 2 years I was admitted to the base hospital for 6 days as a newly diagnosed Type 1 insulin dependent diabetic. I was placed in medical limbo for 6 months while the Air Force medical review board decided my fate.

It was mandated that I change careers, one that I had hoped to be my lifetime vocation, and work in an entirely new field. I married another Air Force member, Tammy, and lived in base housing a few more years. We left Wurtsmith AFB in November 1992.

Not long after leaving my healthy young wife was diagnosed with Graves Disease (Hyperthyroidism). Not long after that I, too, was diagnosed with Graves' disease. Both conditions (Type 1 diabetes's and Graves' disease) are part of the endocrine system and are auto-immune disorders.

What are the odds of one household having 3 endocrinologic/autoimmune disorders after living at WAFB? It seems awfully suspicious. There is one common factor; we both drank the water.

So many others have suffered, as well. My base housing neighbors' 10 y/o daughter was also diagnosed as a Type 1 diabetic a year after myself. I wish I could find her so she could tell her story. Like me, she must give herself multiple injections, everyday. Must stick herself many times a day to check her blood sugar, everyday. Must worry about blood sugar highs & lows, all day, everyday, for more than 30 years now, as we will have to do for the rest of our lives.

The burden of the daily struggle & expense to just stay alive, trying to avoid kidney failure, blindness and neuropathy, can be overwhelming.

Tammy & I take daily medicines to treat our thyroid after having to undergo radioablation. We've both have spent huge amounts of time & money with hundreds of visits to endocrinologists over the years.

Please take the Veterans and local communities plea for help seriously and do the right thing: Recognize us and the real cause of so many sick people. THE WATER!

Chris Rogers
Seattle Washington
[redacted]

My name is Tammy Cooper and I live in Parchment, Michigan with my husband and three year old daughter. We moved to our dream home two and a half years ago. We thought we were coming to a city with wonderful schools, thoughtful citizens and to a place that is safe and secure. Our security was ripped from us the day we moved in, but we weren't made aware of that until July of 2018.

Parchment was once a town known for its paper mill, hence the name 'parchment' for parchment paper. Our city now is known for its record setting levels of PFAS in the municipal water. This is a legacy that will forever follow Parchment, and the tone of our town has changed. This city was built by hard working, middle class Americans, like the majority of cities across America. These honest, humble people have had their trust irreparably damaged as they have had to come to terms with feeding toxic chemicals to their families, to their children, to themselves. There is a sense of grieving in the community, and fear.

We should be able to feel secure in our homes. We lock our doors, we buy smoke detectors, we protect our families from physical dangers. We cannot control the actions of corporations that decide to dump contaminants into our soil. We trust government to do that. We believe that politicians are protecting us, and at a minimum ensuring we have clean food and water. We have to believe that, because we know we are doing all the right things for our families, and we believe that if we are good people and do good, go to work, pay our taxes, and contribute to our communities- we know if we do those things, we will reap what we sow.

It is earth shattering to come to the realization that government doesn't care about you. Sure, politicians are people too, and they may care on a personal level. We need you start caring on a legislative level. How many families need to be poisoned before you act? How much does the cancer rate need to rise to get you to stand up to corporations who put their profits before people? The cancer rate is one in three. We all know that corporations are lobbyists, and we know you take their money for your campaigns. Please do not sell your soul to them. Please help us protect our kids, our spouses, our pets and ourselves.

I am a mother who is still breastfeeding my three year old. I never thought I would still be nursing, but here I am. I exercise, I eat healthy, I don't drink or smoke. Health and safety are my top priorities. I have stopped consuming high levels of PFAS, but I am still feeding it to my daughter directly through my body. She is my only child, and the bond of breastfeeding will end with the knowledge that I am feeding her hazardous chemicals. At what concentration? I don't know. What are the long term effects? I don't know, and neither do you.

Where are your studies? I keep hearing the term 'emerging contaminant,' but what are your plans to do these studies? Are you securing funding, gathering data, contacting scientists? Do you even know what PFAS is? Do you know what filters will work? Do you know where the used filters can be properly disposed of? Do you care? What chemical is next, that we haven't even heard of? Corporations have scientists producing

these contaminants that you have never even heard of. They are looking out for themselves, but who is looking out for us?

We don't know where the contaminants are moving through the ground water, or what is even in the ground. The old paper mill, once filled with workers using 3M products, is now a rotting pile of toxic waste. Who is going to clean it up? Government is silent. Now is the time to act. Do not abandon us. Do not abandon the people who built this country. Do not allow these chemicals to mutate our genes, so that our great great grandchildren are predisposed to disease from something as unimportant as paper additives. We do not Need these products. We do not need things like toxic herbicides,or pesticides.

Say 'No' to companies promising convenience, when they are lining their pockets at the expense of human life. Make us proud to be citizens of this country that has so many resources, resources that we are destroying with no long term plan to address the damage we are allowing these companies to inflict on our environment. Pure Michigan is our slogan, but there is no such thing anymore. To our children, the beautiful freshwater lakes, forests filled with wildlife, will only be a legend unless you act immediately. Expand testing for contaminants, stand up to corporations, and represent the people who elected you. All of our lives depend on it.

Thank you.

I was stationed at WAFB from 1974 to 1979. During that time my family (Daughter, Son, and their Mother) lived on base with me). During that time the USAF discovered a TCE leak outside the Jet Engine Repair Shop (AKA Building 43). appx. 900 gallons were pumped out of the ground. It was discovered later that the water wells were contaminated with a cocktail of chemicals (TCE, Benzene, Jet Fuel, Fire Fighting Foam, just to name a few). According to MSDS all these chemicals cause severe health issues if not handled properly. We that were exposed to them are living proof they do.

My daughter has had several tumors remove from her female parts, my son has had heart issues and is mentally behind his age and is hyper active. Their mother has had cancer and tumors removed. The common denominator is they drank the poisoned water and we ate a steady diet of fish from Ausable River, Van Etten Lake, and Clarks Marsh.

I am experiencing complete loss of cartilage in my hands and feet and Austo Arthurites in most of the joints in my body above and beyond age related, Gastro Intestinal issues with severe bloating, diarrhea, constipation, and my thyroid is being watched by my doctor due to marginal readings.

Before you make any decisions ask yourself "How would I feel about drinking a glass full of water contaminated with the above chemicals?" How about giving a glass full to your children? Now do it day in and day out for five years as my family did.

Respectfully

Danny R Burns

Hi my name is Linda Cole. I'm writing this email as I want something to be down with the water problem in Oscoda Michigan. I have lived in the area, and have all kinds of medical issue's they know are related to Pfas. I've had a baby that I lost due to Trisomy 18. I've also had throid cancer, and a stroke. I have 2 other children I pray have no issue so far from the contaminated water I consumed there. My ex husband Rex [redacted] was stationed at Wurtsmith air Force Base for 4 years. He has so many issue. Non hogkins cancer. both hip replacements 2 times each, along with both his shoulders being replaced. I want this issue to be priority as it has effected my family dealy and alot of others out there. Please help us.
I'm also a member of the Veterans Civialans Clean Water Alliance.

Thank you,
Linda Cole
[redacted]

My name is David Gregory. I was stationed at Wurtsmith AFB from 1983 to 1987. During that time I lived on base as a B-52 crew chief. 10yrs after my honorable discharge, I was diagnosed with testicular cancer. At that time I was unaware I was exposed to PFAS in the base water supply. The cancer made me unable to have children. I've had several revision surgeries due to the mesh implant I have in my abdomen. My inability to have children cost me my marriage. I never thought my government, which I served with honor, would put me in this position.

David Gregory
USAF Veteran

My name is Lisa (Whisenant) Storey. I am from Oscoda and have lived there from 1961 - 1993.

Here is a brief family medical history (reason for my concern):

1 - My father died of cancer (spread throughout his whole body). He worked on the WAFB from before 1961 through 1984.

2 - My brother died of brain cancer. He was in the Navy and after he got out he started working at WAFB in the 1970s until sometime in mid to late 1980s.

3 - My biological father died of cancer. He was stationed at WAFB in the late 1950s to the early 1960s.

For these three the only thing that they have in common is WAFB - none of them are related by blood.

4 - My mother had a form of uterian cancer. She had worked on WAFB off and on throughout her adult life.

5 - Both of my two sons have ADHD. They were both born on WAFB and we lived on WAFB from 1984 through 1992.

6 - I have a skin disease - Roseacea - that started showing up on my face around 1990.

There are more issues, but not sure if they would be related or not.

The easiest way to get ahold of me is probably by email or my cell phone.

Thank you,

Lisa (Whisenant) Storey

[redacted]

Kimball, MI 48[redacted]

[redacted]

[redacted]

[redacted]

My name is James M. Bussey. I served at Wurtsmith afb Michigan from 1989-92. In January of this year i was sent to a special VA facility in New Jersey due to declining health. During my stay in Jersey i was tested for exposure to PFAS and other related compounds. I tested abnormally high for PFAS and 5 other related compounds. During my stay i was diagnosed with endocrine,heart,lung and liver damage among about a dozen other conditions. I have no doubt that my exposure is related to all my related health issues.

During my time at Wurtsmith i drank the water. I ate the fish i caught and on 2 occasions i was directly exposed to AFFF firefighting foam. I served proudly during my time but never bargained on the fact i was being poisoned. The Air Force knew Wurtsmith was poisoned and did nothing to notify service members about what was being done to them. Only now decades later are we finding out what was done to us. This is criminal and something needs to be done. People need to be provided with access to proper healthcare. I respectfully request that all the talking end and action to clean up the military mess begin.

James M. Bussey

[redacted]

September 25, 2018

Senator Gary Peters
724 Hart Senate Building
Washington, DC 20510

Senator Peters:

I thank you for taking the time to hold this very important meeting on September 26, 2018 regarding the Federal Role in the PFAS Crisis. It was one year ago we received our well water test results letting us know we had been drinking poison. We were amongst only a dozen or so homes that had high levels of PFAS in our area, we didn't know many more would also be discovered. At the time, we felt so alone, we didn't know where to turn, we didn't think anyone would pay attention or care to help. For you to be advocating for assistance on a federal level truly means so much.

My husband and two children have lived in our home for 8 years. We were so excited when we looked at our house for the first time, we couldn't believe we we're buying it! We were moving from a small place on a city lot to this one with over 5 acres, wooded, with a pool, a barn, and lots of room. It was a struggle to afford with both kids in daycare, but for years we did it on a very tight budget. Awhile after moving in, I started having sporadic health issues...which I brushed off but in the back of my head, did concern me. A few years ago however, a flood of symptoms came on which I could not ignore. It disrupted every aspect of my life. I went through a series of tests and exams and waiting and testing and scanning and waiting more. None of the doctors I saw could tell me any answers about why all of this was happening. And then, August 23, 2017, we received that letter that explained it all. It was the letter letting us know to stop drinking our water immediately because it's likely contaminated. Contaminated it was – 147.9ppt that day. Other tests showed the numbers doubled. I never imagined that the home we loved was what was hurting me. It was bittersweet news. I now knew that my symptoms were the result of chemical poisoning, I could stop chasing a diagnosis. Last year, I was buying life insurance and writing my will and estate. Now, my doctors are able to help me and, I am starting to feel better.

Our lives will never be the same, I struggle a lot of times enjoying nature and have difficulty eating and drinking – everything I look at feels contaminated. I go through periods of time which it's hard for me to drive home without crying because as I get closer to home it just makes me sad seeing how many homes and family's lives have been affected and how the area has been forever changed by the mishandling of this chemical. As people visit our home since we've found out the news, we have to instruct them not to use the taps, only drink from the water machine. I feel a lot of guilt for unknowing exposing others who all came to my home prior to knowing our water was bad. I also feel an enormous amount of sadness when I reflect on ailments of my own two children, they have drank this water for 8 years of their lives beginning at the ages of 6mo and 7 yrs old. Both complain of stomach issues and headaches frequently.

After living with this for the past year, I believe I've been able to capture my goals in four simple objectives; overall testing and monitoring, studies on medical effects, reasonable MCL's established, and prevention of water systems being contaminated.

In my particular situation, had industry and government put people's health first, the aquifer feeding the drinking wells in my area would've all had monitoring wells testing for PFAS. Both entities were fully aware of what was being disposed of directly into the soil. I'm told my long term solution for water is to install municipal water lines. Then I find out regulations on these systems also come with a curious set of rules. Rules such as, tests are done sporadically, no regulation on testing certain chemicals, less testing is done if the customer base is under X number of residents. My ideal situation would be that any area which has industry and/or a landfill (including past dumpsites) must have monitoring wells. Also I believe that municipal water systems should all be tested the same – no matter the customer base.

Any community which has been exposed to PFAS should have a medical study conducted. The C8 study was good research to add to a piece of the puzzle, however we cannot accept that as the only report we reference. Affects from exposure are going to have a wide range of results depending on the subjects, environment, genetics, type of PFAS exposed to, path of exposure, etc. We need to collect as much data as possible to see a comprehensive picture of what this family of chemicals can do to the body. I would've be so grateful had somewhere along my path of searching for a medical diagnosis, there had been a box for one of the doctors to check off to test for water contamination. I was tested for many things, but never did anyone ask me about what I was consuming for drinking water.

With the health studies being done, I feel the medical and science community would be able to come together and determine a more realistic MCL level for each of the PFAS types based on actual research. Today, we continually hear that 70ppt is the golden number. We are given the message that it is okay to stay at an elevated number until it's proven to be harmful...then it'll be lowered, this seems contradictive of how people should be taken care of – typically one would do the opposite....you exercise care until you find the limit which causes harm.

Lastly, we know there is no way to eliminate these chemicals once they are produced. I believe we need to heavily assess the benefits of these types of chemicals. How much do we need these given the fact they cause so much harm and we cannot get rid of them. Is there an alternative? Can we educate the public on how to lessen their PFAS "footprint" per say? I'd like to see the US adapt a practice that would treat industrial chemicals like food or pharmaceutical products; if it's found to be too harmful, it's not allowed to be produced. There should be a threshold which risk outweighs the benefit.

We thank you again for all of your time.

Jennifer Carney
[redacted]
Belmont, MI [redacted]

September 26, 2018

Senator Rand Paul, M.D.
Chairman
Subcommittee on Federal Spending
Oversight & Emergency Management
Committee on Homeland Security and
Governmental Affairs
U.S. Senate
Washington, D.C. 20510

Senator Gary Peters
Ranking Member
Subcommittee on Federal Spending
Oversight & Emergency Management
Committee on Homeland Security and
Governmental Affairs
U.S. Senate
Washington, D.C. 20510

Re: August 26 Hearing on "The Federal Role in the Toxic PFAS Chemical Crisis"

Dear Chairman Paul and Ranking Member Peters:

We, the undersigned organizations, are writing to commend the Committee for holding a hearing on PFAS chemicals and to urge decisive federal action to stop further contamination of our drinking water. Per- and polyfluoroalkyl substances (PFAS) are a family of toxic chemicals that pose serious threats to human health. Research shows probable links between PFAS and cancer, immune system deficiencies, high cholesterol, low fertility, and developmental issues in children and infants.[1] Moreover, the health risks of PFAS are magnified because they bioaccumulate in the food chain and persist for a long time in the environment. Even trace amounts of PFAS can be hazardous to our health.

Unfortunately, these widely-used toxic chemicals are contaminating drinking water across the country. In Oakland County, Michigan, wastewater from Tribar Manufacturing Inc. has led to PFAS concentrations in Norton Creek more than 450 times higher than the U.S. Environmental Protection Agency (EPA) alert level.[2] In Fayetteville, North Carolina, privately-owned wells near the Chemours plant are

[1] (2018, January 10). PFAS Health Effects. Retrieved September 25, 2018, from https://www.atsdr.cdc.gov/pfas/health-effects.html
[2] (2018, September 24). 'Astronomical' PFAS level sets new Michigan ... - MLive.com. Retrieved September 25, 2018, from https://www.mlive.com/news/index.ssf/2018/09/astronomical_pfas_contaminatio.html

contaminated with GenX as well as 16 other types of PFAS chemicals.[3] Studies indicate that known cases of PFAS contamination represent only a fraction of the problem; it is estimated that 1,500 drinking water systems serving 110 million Americans could be contaminated.[4]

Despite these staggering numbers, the actions taken so far at the federal level have neither matched the scale nor urgency of our national PFAS emergency. So far, the U.S. EPA has only issued lifetime health advisories, and for only two types of PFAS—PFOA and PFOS—out of the thousands of types of PFAS currently polluting our drinking water. Moreover, EPA's health advisory for 70 parts per trillion does not set an enforceable standard, and is 70 times higher than what is thought to be an approximate "safe" concentration in drinking water. Prominent experts recommend a health protective standard of only one part per trillion.[5]

The federal government has an important and necessary role in keeping people safe from these public health threats, and there are a number of actions that can and should be taken to remedy the PFAS crisis and to prevent future incidents from occurring.

We are calling on Congress and the EPA to take the following actions:

1. **Prevent future contamination.** To safeguard our drinking water and health, we need a national moratorium on further use of PFAS chemicals until and unless any specific ones are proven safe. Any exceptions should be strictly limited to true emergency needs where alternatives are not yet available, and we should work to develop safer alternatives for these uses as soon as possible.
2. **Ensure safe drinking water.** The federal government should set a health protective standard of *one part per trillion* for PFAS as a class of chemicals. EPA could accomplish this by setting a Maximum Contaminant Level (MCL), which would protect drinking water and ensure adequate cleanup of contaminated sites.
3. **Hold polluters accountable.** Instead of imposing a significant burden on communities and states, users and manufacturers of PFAS should pay for clean up, monitoring, and other expenses of this contamination. EPA should designate PFAS under existing polluter-pays programs, including section 311 of the Clean Water Act, Superfund, and the Resource Conservation and Recovery Act (RCRA).

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[3] (2018, September 8). More compounds found in wells near Chemours - News - The .... Retrieved September 25, 2018, from http://www.fayobserver.com/news/20180908/more-compounds-found-in-wells-near-chemours

[4] (2018, May 22). Report: Up to 110 Million Americans Could Have PFAS ... - EWG. Retrieved September 25, 2018, from https://www.ewg.org/research/report-110-million-americans-could-have-pfas-contaminated-drinking-water

[5] Grandjean, P., & Clapp, R. (2015). Perfluorinated alkyl substances: emerging insights into health risks. New solutions: a journal of environmental and occupational health policy, 25(2), 147-163.

We look forward to working with the committee on this important issue.

Sincerely,

Bart Johnsen-Harris
Clean Water Advocate
Environment America
600 Pennsylvania Ave SE, Suite 400
Washington, DC 20003

Shaina Kasper
VT/NH State Director
Toxics Action Center Campaigns
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Kara Cook-Schultz
Toxics Program Director
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MAYOR

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September 20, 2018

The Honorable Rand Paul, Chairman
Subcommittee on Federal Spending Oversight
And Emergency Management (FSO)
United States Senate - Committee on Homeland
Security and Government Affairs
340 Dirksen Senate Office Building
Washington, DC 20510

The Honorable Gary Peters, Ranking Member
Subcommittee on Federal Spending Oversight
And Emergency Management (FSO)
United States Senate - Committee on Homeland
Security and Government Affairs
340 Dirksen Senate Office Building
Washington, DC 20510

Dear Chairman Paul and Ranking Member Peters,

The City of Dayton, Ohio commends you for focusing the Subcommittee on Federal Spending Oversight and Emergency Management's (FSO) attention on the important topic of drinking water quality through your hearing titled, "[t]he Federal Role in the Toxic PFAS Chemical Crisis." The City is currently dealing with the impact of Perfluorinated Chemicals on its water supply, just as other communities across the United States are dealing with this emerging contaminant. The City was pleased to learn that the Senate decided to follow up on previous hearings on Perfluorinated Chemicals.

One of the City's greatest assets is the sole source aquifer which supplies the City and surrounding communities with access to clean drinking water. Since 1985, the City of Dayton has proactively protected the regions ground water through the Source Water Protection Program. Through this program, the City has a network of approximately 400 groundwater monitoring wells which allows the City to proactively detect and address contaminants before they harm the Great Miami Buried Valley Aquifer.

In late 2016, the City's monitoring wells near Wright-Patterson Air Force Base (WPAFB) detected high levels of PFOS/PFOA, and earlier this year, the City detected very low levels of PFOS/PFOA in its finished drinking water. While the levels in the finished drinking water remains well below the Health Advisory Level established by U.S. EPA, discussions with WPAFB to prevent further contamination of the City's drinking water have been slow because of internal rules and a lack of federal resources. Current law and regulations do not require WPAFB to take action unless the actual drinking supply (production wells) are contaminated, so all of the costs incurred by the City prior to the detections in the finished water are not currently eligible for reimbursement by WPAFB. Prior to these detections, the City has expended over $1.3M to install 136 new monitoring wells and complete sampling and analysis of the groundwater which supplies the City. These steps were all necessary to address the PFOS/PFOS contamination emanating from WPAFB and impacting the City's well field. The City feels this is the wrong approach. A change in the Department of Defense approach to one which enables WPAFB and other facilities to reimburse local communities for the costs incurred to prevent the contamination of the region's water supplies with PFOS/PFOA can save tens of millions of dollars because it is significantly less costly to prevent drinking water wells from being contaminated versus cleaning contaminated wells with expensive equipment.

The City of Dayton is grateful that the subcommittee is holding such an important hearing on PFAS. Given the City's experience with this issue, we believe robust federal funding should be available to local communities to use on preventative activities that mitigate PFAS contamination of drinking water; the Department of Defense should eliminate internal guidance or rules and allow the use of DoD funding to mitigate PFAS contamination at military installations and communities around military installations even though water tests may not show PFAS levels at or above 70 parts per trillion (ppt) health advisory level; and, the federal government should allocate resources to address potential PFAS contamination to communities that will see the greatest impact because of factors such as population size and economic costs associated with the cleanup of PFAS contamination.

Access to clean and reliable water is vital to the health and growth of communities across the country. Water contamination problems are far more expensive to clean up than they are to prevent. We strongly support the Subcommittee investigating this important issue and appreciate your consideration of the information shared in this letter. Thank you for your support of protecting our water supply from the spread of harmful chemicals. If you have any questions, please feel free to contact me. I look forward to hearing from you.

Sincerely,

Nan Whaley

Nan Whaley
Mayor of Dayton, Ohio

September 23, 2018

Senator Gary Peters
724 Hart Senate Office Building
Washington, DC 20510

Dear Senator Peters,

I'm a mother, wife, daughter, sister, aunt, neighbor, teacher, and friend. I feel like I am writing an obituary, well before my time. To most this contaminated water is just a headline. To our neighbors it means anxieties, stresses, and anger. For me, I truly have been poisoned. PFAS is our lives and deaths and so we are turning to you to turn inaction into action.

Every activity involving the use of our water that we used to do without having to think about the safety or cleanliness of the water, we must now do that same activity with water we know is contaminated, not do the activity altogether, or at the very least question the safety of the water. We have thought about the nightmare Wolverine and 3M have created in our lives every moment of every day. We wake up every morning with this tragedy on our minds, and we go to bed hoping the next day will not be so difficult.

Unfortunately, the next days have proved to be harder. It is my son getting sick constantly because his vaccines were found to be ineffective. It is having 13 vials of blood being drawn all at the same time from a small, two-year old body. It is taking away the joy of a child being able to drink safely from his hose on a hot summer day or play with cups in the bathtub. It is a home that doesn't feel the same. The days are my husband having high cholesterol, depression, and anxiety.

We were planning to grow our family in October 2017; but, again, PFAS and the company that dumped it stole those plans. We decided to put it off for a while when on June 20, 2018 we found out we were pregnant again; but, by July 21, we were wondering why we lost our 2nd child—10 weeks in the womb. It is sadness, grief, and constant wondering. Wondering why other humans would think it's okay to dump sludge on the bare ground. Why they think it is okay to minimize the impact on us. Wondering if every ailment we have is related to the water. Wondering if we would ever be able to sell our house if we wanted to. Wondering if the whole house filter is 100% reliable. Water, clean water, should be a human right and a life source.

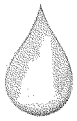
Our concerns about our son pain us every day. We have gone above and beyond to try and fix the curse Wolverine and 3M have left on his young life. We brought him to a toxicologist with research on a certain type of algae that could potentially help him excrete the chemicals faster. The toxicologist said not to do this for him because he could not risk any more depletion of essential nutrients and vitamins he needs to stay somewhat healthy. We have expressed time-and-time-again how hopeless we feel because there is nothing we can do for our baby. There are no medications or procedures to safely remove these chemicals from his body. We are left with horrible thoughts in fear of his future. What if he gets cancer? What if he does not reach puberty at the right age? What if he is infertile and cannot have kids? These worries, among countless more, will haunt us forever.

We are disgusted with how the investigation has played out, learning that our house may have been tested several months earlier had Wolverine not downplayed the severity of the situation to the

MIDEQ. Instead of our water being tested in April 2017, it was not tested until September 2017, resulting in months of unnecessary exposure. That is one of the reasons why were are turning to the US government, to help turn inaction in to action. PFAS has stolen nearly every happy moment of our lives. PFAS has robbed us of living normal lives; it can never fix the tainted memories it has cemented in our minds.

Sincerely,

Tobyn McNaughton
[redacted]
Belmont, MI
[redacted]



MERRIMACK CITIZENS FOR CLEAN WATER

September 20, 2018

Dear Senator Shaheen,

On Wednesday September 26, 2018, citizens from Merrimack NH who have been impacted by PFAS contamination are traveling on their own time and expense to attend the Senate Committee on Homeland Security & Government Affairs' subcommittee hearing The Federal Role in The Toxic PFAS Chemical Crisis. While we are aware that we cannot engage in the hearing process, we are compelled to join residents from all over the country that have formed a national PFAS Contamination Coalition group who will attend in support of and solidarity with our testifying members, Andrea Amico from New Hampshire and Arnie Leriche from Michigan. As a long-term New Hampshire resident, who has been compelled to fight for my community's health and wellbeing, I am hoping that Merrimack's impact statement can be present at this first and very important senate hearing.

The known extent of contamination of American communities with toxic fluorinated compounds, known as PFAS chemical, continues to grow at an alarming rate. In a March of 2018 report to the House Armed Services Committee, the Defense Department detailed that drinking and groundwater at or around at least 172 sites in 40 states, including military bases, civilian airports, industrial plants, landfills and fire training sites contains Perfluorinated chemicals at unsafe levels. It is currently estimated that 1500 drinking water systems, serving up to 110 million Americans, are contaminated with PFAS chemicals.

PFAS chemicals, used in a wide range of industrial applications, fire fighting foam and consumer products have been definitively linked to kidney and testicular cancer, liver and thyroid damage, developmental disruptions for fetuses and infants, and other serious health conditions. In June of this year, the Agency for Toxic Substances and Disease Registry released a report on PFAS stating that the safe level of PFAS chemicals in drinking water should be at least 7-10 times lower than the threshold recommended by the EPA.

Here in Merrimack, NH, we learned in March of 2016 that we have been exposed to drinking water that exceeded EPA PFOA advisories for almost 2 decades. With the closing of 2 much needed wells, our public water supply system still exposes us to 23-26 ppt PFOA exposure and also the additional presence of other PFAS compounds including PFOS, PFNA, PFHxS, PFHpA, PFBS, and the latest member of the family, GenX . 1,500 of our 27,000 Merrimack residents utilize private wells which if tested typically show a high level of the same PFAS compounds.

MERRIMACK CITIZENS FOR CLEAN WATER

According to New Hampshire Department of Environmental Services data generated by testing ground water, surface water, drinking water, storm drain outfalls, air emissions from the Saint Gobain facility in Merrimack and soil testing, all in an ongoing contaminant investigation area of approximately 60 square miles, we have exposure from past PFOA and PFOS and continued exposure from many additional and replacement PFAS compounds. The majority of the current and growing PFAS chemicals contaminating the Merrimack area bear no responsibilities to polluters as only PFOA and PFOS currently have health advisories, despite an extensive and growing library of health science linking every PFAS compound studied to health disruptive outcomes.

Merrimack is just one of many PFAS impacted communities across America I have become familiar with as in community after community I hear stories of childhood cancer clusters, severe and progressive autoimmune diseases, endocrine and reproductive health issues in children and adolescents, infant health disruptions, neurological anomalies and many, many cancer stories. New Hampshire has recently been identified as having the highest pediatric cancer rate in the nation, in my community alone, we currently have 3 elementary aged students whose childhood is being disrupted by having to fight for their life. Additionally, in Merrimack, state data ending in 2014 (which is overdue for updating) shows higher than expected cases of the following cancers: kidney, bladder, prostate, thyroid, leukemia, brain, uterine, colorectal and mesothelioma. I have come to loath the word "case" as each is more than a case and more than a statistical or cost/benefit analysis variable; each is a child, mother, father, brother, sister, friend, neighbor and most of all, a victim.

Merrimack is just one of countless communities identified in 40 states and as victims of this chemical crisis we don't just bear the pain of our losses and health struggles but also the cost of bottled water, water filtration systems, medical bills and chronic stress, depression and anxiety. Remediation, cleanup and cessation of pollution are needs we have yet to see, we do not have access to the labs that provide blood testing, our physicians have no guidance, our health data is not gathered or acknowledged and as a social worker of 20 years I can assure you that the impact of millions of Americans who feel abandoned by their nation is not a healthy state for our nation.

We are traveling to Washington with communities all across America to begin a partnership with congress, to ask for your hand, to work together for solutions. We cannot change the past but I know we have the ability to do better and together we must make America safe again. Our children are our future, we must work to remove these toxins from their path and make right what we can as despite our differences do we not share a love of country and our people?

Laurene Allen, LICSW, Merrimack, NH

September 26, 2018

The Honorable Rand Paul
Chairman
Senate Committee on Homeland Security and Governmental Affairs,
Subcommittee on Federal Spending Oversight and Emergency Management
439 Hart Senate Office Building Washington, DC 20510-6250

The Honorable Gary Peters
Ranking Member
Senate Committee on Homeland Security and Governmental Affairs,
Subcommittee on Federal Spending Oversight and Emergency Management
439 Hart Senate Office Building
Washington, DC 20510-6250

Dear Chairman Paul and Ranking Member Peters,

Thank you for holding this important hearing. We are writing on behalf of the millions of people across the United States impacted by PFAS in their drinking water, in their homes and in their communities. Commonly used in firefighting foam, food packaging, textiles and manufacturing processes, PFAS contamination constitutes a public health emergency that must be remedied quickly.

PFAS is a family of approximately five thousand chemicals that are used as greaseproof and water proofing agents. They are used in class B firefighting foam, food packaging, clothing, building materials and manufacturing processes. They are incredibly persistent and do not break down, prompting scientists to call them "virtually indestructible. " They can stay in our bodies for up to 8 years or more, and have been linked to health effects such as cancer, hormone disruption and immune suppression. Even newborn babies have been found to have PFAS in their bodies, exposed before birth.

While chemical makers were forced to stop making two older generation PFAS -PFOA and PFOS-, thousands of PFAS remain in use. This means that even as we address legacy contamination, communities face ongoing pollution from the next generation of PFAS, trading one problem for another and creating a whack-a-mole approach to regulation.

We are encouraged that the committee is investigating this issue. States have been at the forefront of confronting this issue for many years. Several states have taken action in the past three years to address PFAS including setting their own reference levels, suing manufacturers and preventing future contamination by banning products containing these chemicals.

In addition to cleaning up contamination around military bases and in communities, there are several specific actions that Congress, the Administration, and states can and should take to protect public health and prevent ongoing contamination of drinking water. Specifically:

1. **Phase out the use of fluorinated firefighting foams in favor of safer alternatives.** Fluorinated (PFAS) firefighting foams have been widely used by airports, ferry systems, transportation departments, oil refineries, railroads, chemical plants, as well as by local fire departments and fire training facilities for decades. The PFAS-containing foams used at military bases and other

locations are largely responsible for contaminating drinking water and creating many contaminated sites across the country at great cost to states and federal taxpayers. The Department of Defense has estimated it will cost more than $2 billion to address PFAS contamination at military bases alone.

2. **Preventing future contamination by reducing sources of these chemicals must be a priority to protect public health and avoid skyrocketing costs of cleanup.** Washington State recently banned the sale of PFAS foams to fire departments and other users, as well as banning the use of PFAS foams in fire training, including at airports. Congress should phase out PFAS chemicals in firefighting foam, mandate the proper disposal of remaining stocks by the manufacturers, and require safer effective alternatives that protect life, property and fire fighters. In addition, the Department of Defense must change its military specification requiring the use of fluorine-based firefighting foams. Effective firefighting capability can be achieved without the use of PFAS, yet the current military specification requiring PFAS limits the options available to the military and only exacerbates contamination of drinking water. An updated specification is sorely needed.
3. **Require Polluters to Pay for Clean Up.** It will cost billions to clean up PFAS pollution. Taxpayers should not be forced to cover these costs. Communities facing PFAS contamination should not bear the added burden of paying to clean up pollution they did not create. Manufacturers must be held accountable. Congress should establish a program that requires PFAS manufacturers to pay for cleaning up contaminated sites. In addition, citizens must have the ability to take action against PFAS polluters.
4. **Stop further contamination by banning PFAS.** States are already stepping up to eliminate PFAS from key product sectors including food packaging, firefighting foam and textiles. Congress should phase out all uses of these chemicals to avoid further contamination and additional clean up costs.
5. **Ensure states, local governments and the public have adequate information and technical assistance to fully address the PFAS crisis.** Congress should require food and drinking water to be fully tested for PFAS. Congress should further require that PFAS are added to the Toxic Release Inventory list in the Emergency Planning and Community Right-to-Know Act and regulated as: toxic pollutants and hazardous substances under the Clean Water Act; hazardous substances under Superfund, and hazardous waste under the Resource Conservation and Recovery Act. Doing so would ensure that federal, state and local agencies can identify and prioritize areas in need of remediation. Finally, Congress should also provide funding to EPA to develop and provide technical assistance and testing methods needed to sufficiently address the problem

Decades of widespread use of PFAS means that these chemicals are everywhere. PFAS contamination impacts everyone in a community. We need solutions now to ensure clean and safe drinking water for all.

Sincerely,

Pamela Miller
Executive Director
Alaska Community Action on Toxics

Linda Reinstein
President
Asbestos Disease Awareness Organization

Katie Huffling
Executive Director
Alliance of Nurses for Healthy Environments

Nancy Buermeyer
Senior Policy Strategist
Breast Cancer Prevention Partners

Ansje Miller
Director of Policy and Partnerships
Center for Environmental Health

Kathleen Curtis
Executive Director
Clean and Healthy New York

Emily Donovan
Co-Founder
Clean Cape Fear

Lynn Thorp
National Campaigns Director
Clean Water Action/Clean Water Fund

Andrea Delgado
Legislative Director, Healthy Communities
Earthjustice

Rebecca Meuninck
Deputy Director
Ecology Center

Bruce Speight
Director
Environment Washington

Patrick MacRoy
Deputy Director
Environmental Health Strategy Center

Scott Faber
Vice President
Environmental Working Group

Marcia Cooper
President
Green Newton

Sue Phelan
Director
GreenCAPE

Lynn Nadeau
Treasurer
HealthLink

Bill Walsh
Founder & President of the Board
Healthy Building Network

Laura Rubin
Executive Director
Huron River Watershed Council

Madeleine Foote
Legislative Representative
League of Conservation Voters

Maureen Swanson
Director, Healthy Children Project
Learning Disabilities Association of America

Kaci Smith
Co-President
Learning Disabilities Association of Arkansas

Carolyn P. Kingsley
Learning Disabilities Association of Georgia

Tracy Gregoire
Healthy Children Project Coordinator
Learning Disabilities Association of Maine

Anne Fogel
Secretary, LDA of South Carolina
Learning Disabilities Association of South Carolina

Dr. Joy S. Marsh
State President
Learning Disabilities Association of Tennessee

Cheryl Osimo
Executive Director
Massachusetts Breast Cancer Coalition

Janet Domenitz
Executive Director
MASSPIRG

Laurene Allen, LICSW
Merrimack Citizens for Clean Water

Cody Angell
Michigan Demands Action Against Contamination

Lisa Wozniak
Executive Director
Michigan League of Conservation Voters

Diana Zuckerman, PhD
President
National Center for Health Research

Erik D Olson
Senior DIrector, Health & Food
Natural Resources Defense Council

Liz Hitchcock
Acting Director
Safer Chemicals Healthy Families

Sarah Doll
Executive Director
Safer States

Kristi Marsh
Founder and President
Savvy Women's Alliance

Ted Schettler MD, MPH
Science Director
Science and Environmental Health Network

Robin Schneider
Executive Director
Texas Campaign for the Environment

Laurie Valleriano
Executive Director
Toxic Free Future

Shaina Kasper
Vermont and New Hampshire State Director
Toxics Action Center

Kara Cook-Schultz
Toxics Director
U.S. PIRG

Andrew Rosenberg, Ph.D.
Center for Science and Democracy at the Union of Concerned Scientists
Union of Concerned Scientists

Miriam Gordon
Program Director
UPSTREAM

Lauren Hierl
Executive Director
Vermont Conservation Voters

Adrienne L. Hollis
Director of Federal Policy
WE ACT for Environmental Justice

Michelle Naccarati-Chapkis
Executive Director
Women for a Healthy Environment

Jamie McConnell
Director of Program and Policy
Women's Voices for the Earth

September 26, 2018

The Honorable Rand Paul
Chairman, Subcommittee on
FSO and Emergency Management
Committee on Homeland Security
U. S. Senate
Washington, DC 20510

The Honorable Gary Peters
Ranking Member, Subcommittee on
FSO and Emergency Management
Committee on Homeland Security
U. S. Senate
Washington, DC 20510

Re. September 26 hearing on the Federal Role to the Toxic PFAS Crisis

Dear Chairman Paul and Ranking Member Peters:

The National Ground Water Association (NGWA) applauds the Subcommittee's holding of the hearing on "the Federal Role in the Toxic PFAS Crisis." Contamination from per- and poly-fluoroalkyl substances (PFAS) is nearly ubiquitous across the country, and more resources--technical and financial--are needed to accurately identify and address the scale of the problem.

NGWA is a trade association and professional society with over 10,000 members committed to the management, protection and use of groundwater resources. Our members are contractors, scientists, engineers, manufacturers and suppliers, who are actively working to address PFAS contamination on a daily basis--whether working on contaminated sites to devise remediation plans or assisting individuals directly with the testing and treatment of drinking water supplies.

NGWA offers the following recommendations and observations about the federal role in responding to the PFAS crisis:

- To most effectively manage PFAS contamination, **regulatory certainty that is enforceable must be established at the federal level,** as soon as possible. Absent of this certainty, states are enacting their own limits, creating additional challenges for the detection and remediation of contamination across states.
- Sound science is an integral part of any regulatory determination. Therefore, chemicals must be assessed individually, and limits must not be set until toxicology values are determined for each chemical. This science must be conducted at the federal level to provide greater certainty across all states where contamination has been detected.

- Federal resources must be provided to increase the number of labs capable of testing for PFAS via EPA's method 537. Many states have no labs that use method 537, and the limited number of labs make testing for PFAS cost-prohibitive, particularly for private well owners.
- Private wells pose unique challenges in detecting contamination because there are no requirements for well owners to routinely test their water. Federal funding for technical assistance programs to conduct well owner outreach and financial support for water testing must be prioritized, particularly in rural areas.
- While PFAS in drinking water is a challenge, it is not a challenge without a solution. Like all contaminants in drinking water, treatment options are available to ensure drinking water remains safe and reliable. Funding should be made available for point-of-use devices to treat contaminated drinking water.

NGWA and its members look forward to continuing to serve as a resource for the committee. Our members stand ready to volunteer their expertise, as solutions and assistance are developed. NGWA also produced a comprehensive guidance document on the state of knowledge and practice surrounding groundwater and PFAS. Please contact Lauren Schapker, NGWA government affairs director, if you would like a copy of this resource or with any questions at lschapker@ngwa.org or 202.888.9151.

We look forward to working with the committee on this important issue.

Sincerely,

Terry S. Morse, CIC
Chief Executive Officer
National Ground Water Association

The State of New Hampshire
Department of Environmental Services

Robert R. Scott, Commissioner

September 25, 2018

U.S. Senator Rand Paul
Chairman, U.S. Senate Subcommittee on Federal
Spending, Oversight & Emergency Management
340 Dirksen Senate Office Building
Washington, DC 20510

Dear Chairman Paul and Members of the Subcommittee:

Thank you for this opportunity to provide the perspective and requests of the New Hampshire Department of Environmental Services. New Hampshire has been dealing directly with Per- and Polyfluoroalkyl Substance (PFAS) contamination since 2014 when contamination of a public drinking water well was discovered associated with the former Pease Air Force Base. We have since found multiple other sites associated with PFAS contamination.

One of the biggest challenges with this family of emerging contaminants is determining and implementing protective and enforceable drinking water standards. Due to a lack of federal standards, states have been forced to create their own standards. This results in a patchwork of conflicting standards throughout the nation that causes confusion and unnecessary stress to the affected communities and families, as well as the regulated entities, as they are unsure of what standards are safe. The creation of national safe drinking water standards will allow states to focus their efforts on communication, implementation and compliance assurance – the appropriate roles considering states' funding and staffing constraints.

Sincerely,

Robert R. Scott
Commissioner

cc: NH Governor Christopher T. Sununu
U.S. Senator Jeanne Shaheen
U.S. Senator Maggie Hassan

OSCODA-WURTSMITH AIRPORT AUTHORITY
3961 E. Airport Drive, Oscoda, Michigan 48750
Tel. (989) 739-1111 Toll Free (866) 658-7499 FAX (989) 739-0207 Weather (989) 739-1310

A Formal Request from Oscoda-Wurtsmith Airport Authority
Seeking Indemnification Protection and Additional Environmental Restoration Response Support at the Former Wurtsmith Air Force Base, Oscoda Michigan

In response to the discovery of United States Air Force (or Air Force) having released Poly- and Perfluoroalkyl Substances (PFAS) in soils, groundwater and residential water supply wells - - securing additional commitments from the United States Government (or Government) is now critically important. Oscoda-Wurtsmith Airport Authority and its' constituent municipalities, along with all successors in operation of former Wurtsmith Air Force Base (Wurtsmith A.F.B.) properties, respectfully seek indemnification protection as well as additional and more timely environmental restoration response activities from the United States Government.

A. Indemnification Protection

1. When closing Wurtsmith A.F.B., the United States Government executed a Public Benefit Transfer (PBT) Agreement with Oscoda-Wurtsmith Airport Authority (dated December 19, 1994). The PBT Agreement establishes each party's obligations and commitments during future reutilization of the former military properties. It cites the Comprehensive Environmental Response and Liability Act (CERCLA) Sections 120(h)(3) and 120(h)(4) - - which establishes the Government's obligation to clean up Air Force generated contamination even after the completion of land transfer transactions.

2. PFAS contamination at Wurtsmith A.F.B. has been discovered subsequent to base closure and the related land transfer conveyance documents. Therefore, neither the 1994 PBT Agreement, land transfer documents nor the cited CERCLA laws specifically envision and address the Government's clean up obligations in response to Air Force generated PFAS contamination. Of significant concern is the need to protect the Local Redevelopment Authority in response to any claims associated with personal injury or property damages that might result from the Air Force generated environmental contamination.

Oscoda-Wurtsmith Airport Authority respectfully seeks to secure a firm obligation and commitment from the United States Government to immediately hold harmless, defend and indemnify in full - - Oscoda-Wurtsmith Airport Authority, its' constituent municipalities and all successors in operation of former Wurtsmith A.F.B. properties, in response to any claims

of personal injury or property damage - - resulting from, or which is predicated upon, the release or threatened release of any and all forms of environmental contamination resulting from Air Force activities at the former Wurtsmith Air Force Base.

B. Additional and Timely Environmental Restoration Response Activities

As stated above, the Comprehensive Environmental Response and Liability Act (CERCLA) sets forth the Government's obligation to cleanup Government generated environmental contamination from former Department of Defense sites. CERCLA does not specifically include provisions for Local Redevelopment Authority's to participate when establishing response priorities for the Government's site investigations or cleanup. Therefore, Local Redevelopment Authorities and potential developers face months or even years while waiting for the Government to investigate and / or restore contaminated property. Such circumstances hinder and can derail important local redevelopment projects.

A current example is described below.

An existing tenant at Oscoda-Wurtsmith Airport is expressing significant interest in developing at least one, and perhaps two, very large aircraft maintenance hangars. Each aircraft maintenance hangar is expected to create 150 new jobs. Therefore, the envisioned project is a very high priority for the local community. In response to the discovery of potential PFAS contamination and related issues, the developer is now reticent to implement this important project at Oscoda-Wurtsmith Airport. As a result, they are now also looking for development sites at other airports.

The actual environmental condition of the Oscoda development site is unknown. Therefore, timely performance of an Environmental Site Assessment is necessary in order to retain the developer's interest. The Government's current environmental response work at Oscoda-Wurtsmith Airport primarily involves intercepting PFAS in contaminated groundwater. It is our understanding that project funding limitations and other resource restraints currently preclude the Government's environmental response team from also performing full environmental site assessments. Therefore the needed full Environmental Site Assessment is being commissioned and funded by state and local agencies. In other words, state and local agencies are assuming costs associated with performing site investigations that really should be the Government's responsibility. The estimated cost for completing this single site investigation and developing a responsive 'Due Care Plan' is $60,000.

Oscoda-Wurtsmith Airport Authority is seeking to establish provisions which empower the Local Development Authority to establish priorities and otherwise direct the Government's environmental site assessments and cleanup response initiatives.

Alternatively, the Government will provide the Airport Authority with access to a source of federal Government funding that will pay for environmental site investigations and establishing 'due care' plans that are directly commissioned by Oscoda-Wurtsmith Airport Authority.

Thank you for considering these important requests. If there are questions or additional information is needed, please contact me or our Airport Manager - - Mr. Gary Kellan, by calling [redacted] or via email at [redacted]

Sincerely,

Kevin Boyat, Chairman
Oscoda-Wurtsmith Airport Authority

Southern Environmental Law Center

122 C Street NW, Suite 390
Washington, DC 20001-2109
202-828-8382
Fax 202-347-6041
SouthernEnvironment.org

October 2, 2018

The Honorable Rand Paul
Chairman, Subcommittee on Federal Spending Oversight and Emergency Management
United States Senate
439 Hart Senate Office Building
Washington, DC 20510

The Honorable Gary Peters
Ranking Member, Subcommittee on Federal Spending Oversight and Emergency Management
United States Senate
432 Hart Senate Office Building
Washington, DC 20510

Dear Chairman Paul and Ranking Member Peters:

Southern Environmental Law Center (SELC) thanks the U.S. Senate Committee on Homeland Security and Government Affairs, Subcommittee on Federal Spending Oversight and Emergency Management for holding a hearing on the Federal Role in the Toxic PFAS Chemical Crisis.

Communities across the country, including communities in North Carolina, have been harmed by PFAS pollution over the past century. The federal government is now aware of the extent of destruction that PFAS can cause to our bodies and the environment. The federal government must act immediately to combat this class of harmful chemicals.

SELC respectfully requests to submit the attached comments to the record for the hearing entitled "The Federal Role in the Toxic PFAS Chemical Crisis" before the Subcommittee on Federal Spending Oversight and Emergency Management held on September 26, 2018. SELC originally wrote these comments for the Environmental Protection Agency's Docket EPA-HQ-OW-2018-0270 on PFAS contamination, however they may provide valuable information to the subcommittee as it continues to investigate the PFAS chemical crisis.

Sincerely,

Navis A. Bermudez
Federal Legislative Director

SOUTHERN ENVIRONMENTAL LAW CENTER

Telephone 919-967-1450 601 WEST ROSEMARY STREET, SUITE 220 CHAPEL HILL, NC 27516-2356 Facsimile 919-929-9421

September 28, 2018

Andrew Wheeler
Acting Administrator
Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

Eric Burneson
Director, Standards and Risk Management Division
Office of Ground Water and Drinking Water
Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

RE: Comments on EPA Response to Per- and Polyfluoroalkyl Substances (PFAS), Docket ID No. EPA-HQ-OW-2018-0270

Dear Acting Administrator Wheeler and Director Burneson:

The Southern Environmental Law Center offers the following comments on actions that the Environmental Protection Agency must take to address the presence of per- and polyfluoroalkyl substances (PFAS) in the nation's drinking water, surface and groundwaters, air, and soil. These comments are submitted on behalf of Cape Fear River Watch, North Carolina Conservation Network, North Carolina Coastal Federation, Sound Rivers, Haw River Assembly, Catawba Riverkeeper Foundation, and the French Broad Riverkeeper.

For nearly four decades, E.I. du Pont de Nemours and Company ("DuPont") and the Chemours Company FC, LLC ("Chemours") knowingly contaminated the air, water, and soil in southeastern North Carolina, including the drinking water supply of more than 250,000 North Carolinians. The people of North Carolina are worried that the years of drinking, fishing from, and swimming in the companies' polluted waters have permanently harmed the health of themselves and their families. And they are furious that companies like DuPont have historically polluted other communities with the same compounds and were simply permitted to continue their toxic pollution in new places.

As EPA has witnessed at its Community Engagement events throughout the country, North Carolina is not the only state that has been intentionally used as a dumping ground for PFAS chemicals—pollution that will persist for years in people's bodies and the environment. There must be immediate action on PFAS. But EPA's current proposed actions are entirely inadequate. Most importantly, (1) they only consider two of the thousands of existing PFAS, allowing companies to continue using the regulatory loopholes that they have used for decades,

and (2) they do nothing to stop additional toxic PFAS from spewing into our air, soil, and water, and remaining there for decades.

A. PFAS are toxic and bioaccumulative, and they persist in the environment and in our bodies.

It is well established that PFAS are a threat to the health and safety of the public. Two of the commonly studied PFAS, perfluorooctanoic acid ("PFOA") and perfluorooctyl sulfonate ("PFOS"), have been found to cause developmental effects to fetuses and infants, kidney and testicular cancer, liver malfunction, hypothyroidism, high cholesterol, ulcerative colitis, lower birth weight and size, obesity, decreased immune response to vaccines, reduced hormone levels and delayed puberty.[1] Epidemiological studies suggest that many of these same health outcomes result from exposure to other PFAS.[2] PFAS have been found in the air and dust, surface water and groundwater, and soil and sediment.[3] They are extremely resistant to breaking down in the environment, can travel long distances, and have even been found in the Arctic and in the open ocean.[4] They take years to leave the human body, and instead slowly accumulate over time.[5]

Concerned about the extensive health effects of PFOA and PFOS, in 2016, EPA established a lifetime health advisory of 70 parts per trillion ("ppt") for the combined concentrations of PFOA and PFOS in drinking water.[6] Since then, in June 2018, the Agency for Toxic Substances and Disease Registry released an updated Draft Toxicological Profile for PFOA, PFOS, and other PFAS. The report suggested that many of the chemicals are much more harmful than previously thought. For instance, the minimum risk levels, or the amount of a chemical a person can eat, drink, or breathe each day without a detectable risk to health, was determined to be only 11 ppt for PFOA, and 7 ppt for PFOS.[7]

Within the past several decades, companies like DuPont and Chemours have replaced PFOA with "short-chain" PFAS, which have fewer carbons.[8] In May of 2015, two hundred researchers and scientists warned government officials, manufacturers, and the public not to

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[1] Arlene Blum, et al., "The Madrid Statement on Poly- and Perfluoroalkyl Substances (PFASs)," 123 *Environ. Health Perspectives* 5, A 107 (May 2015) (hereinafter "The Madrid Statement"); U.S. Environmental Protection Agency ("EPA"), Fact Sheet on PFOA & PFOS Drinking Water Health Advisories, 2, *available at* https://www.epa.gov/sites/production/files/2016-06/documents/drinkingwaterhealthadvisories_pfoa_pfos_updated_5.31.16.pdf (last visited Sept. 19, 2018).

[2] ATSDR, Toxicological Profile for Perfluoroalkyls, Draft for Public Comment, at 5-6, 25-26 (June 2018) (hereinafter "Draft 2018 Toxicological Profile for Perfluoroalkyls"), *available at* https://www.atsdr.cdc.gov/toxprofiles/tp200.pdf (last visited Sept. 19, 2018).

[3] U.S. Dep't of Health and Human Services, Agency for Toxic Substances and Disease Registry, Draft Toxicological Profile for Perfluoroalkyls, 2 (Aug. 2015), included as Attachment 1.

[4] *Id.*; *see also* EPA, Technical Fact Sheet - Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA) (Nov. 2017); The Madrid Statement at A 107.

[5] ATSDR, Toxicological Profile for Perfluoroalkyls, Draft for Public Comment, at 3 (Aug. 2015).

[6] EPA, Fact Sheet on PFOA & PFOS Drinking Water Health Advisories at 2.

[7] CFPUA Statement on Recently Released DHHS Report, June 21, 2018, *available at* https://www.cfpua.org/civicalerts.aspx?AID=893; *see also* Draft 2018 Toxicological Profile for Perfluoroalkyls.

[8] *See* Melisa Gomis et al., "Comparing the toxic potency in vivo of long-chain perfluoroalkyl acids and fluorinated alternatives," 113 *Environ. International* 1 (2018) (hereinafter "Gomis 2018 study"), included as Attachment 2.

underestimate the danger of short-chain PFAS alternatives.[9] Yet EPA has done exactly that, stating that short-chain PFAS "are generally less toxic and less bioaccumulative in wildlife and humans."[10] The California Department of Toxic Substances Control reviewed recent scientific literature on PFAS compounds, including short-chain PFAS alternatives and, in February 2018, released a draft report highlighting the danger of short-chain PFAS:

> Shorter-chain PFASs are marketed as less toxic compared to the longer-chains, mainly because they appear to bioaccumulate less and to be more readily eliminated from some organisms. Nevertheless, they are equally persistent and more mobile in the environment than the chemicals they are replacing, and also show potential for toxicity.[11]

Citing a 2018 study which compared short and long-chain PFAS compounds, the report ultimately found that the short-chain alternatives could be more toxic than the compounds they are replacing:

> PFECAs and shorter-chain PFAAs may have *similar or higher toxic potency* than the longer-chain PFAAs they are replacing. Using a toxicokinetic model and existing toxicity data sets, a recent study found that PFBA, PFHxA, and PFOA have the same potency to induce increased liver weight, whereas GenX is more potent. The authors concluded that previous findings of lower toxicity of fluorinated alternatives in rats were primarily due to the faster elimination rates and lower distribution to the liver compared to PFOA and other longer-chain PFAAs.[12]

Short-chain alternatives only *appeared* to be less toxic than long-chain PFAS, such as PFOA, because it was leaving the bodies of animal test subjects more readily than long-chain compounds. For humans, however, short-chain PFAS "could likely be intrinsically as potent as their predecessors."[13] As explained by the 2018 study cited by the California Department of Toxic Substances Control, "short-chain PFASs that are rapidly excreted in a species such as the rat may not reach internal concentrations sufficient to result in toxic effects that it could in other species with a longer half-life, such as humans."[14] Therefore, short-chain PFAS are likely to stay in the human bodies long enough to cause severe toxic effects. Short-chain PFAS created to replace PFOA and PFOS could be as harmful, if not more harmful, than the compounds they

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[9] The Madrid Statement at A 107; *see also* Scheringer et al., Helsingor Statement on poly- and perfluorinated alkyl substances (PFASs) 114 *Chemosphere* 337 (2014).
[10] EPA, Risk Management for Per- and Polyfluoroalkyl Substances (PFASs) under TSCA, *available at* https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/risk-management-and-polyfluoroalkyl-substances-pfass (last visited Sept. 19, 2018).
[11] California Department of Toxic Substances Control, "Product – Chemical Profile for Perfluoroalkyl and Polyfluoroalkyl Substances (PFASs) in Carpets and Rugs" 6 (2018) (hereinafter "CDTSC 2018 Report"), included as Attachment 3.
[12] *Id.* at 29 (citation omitted).
[13] Gomis 2018 study at 7-8.
[14] *Id.*

were created to replace.[15] Additionally, because some short-chain PFAS are less effective, larger quantities of short-chain PFAS may be used in manufacturing processes.[16]

B. <u>For decades, chemical companies have freely contaminated our environment with PFAS</u>.

In North Carolina, for nearly four decades, DuPont knowingly contaminated the air, water, and groundwater at its Fayetteville Works Facility, and the Cape Fear River—the drinking water supply for more than 250,000 North Carolinians. After DuPont created Chemours,[17] and passed responsibility for its pollution to its then-subsidiary, the facility continued to quietly release hundreds of thousands of pounds of toxic PFAS.

This was not the first time DuPont contaminated a community and its drinking water. Before DuPont polluted the air and water in southeastern North Carolina, the company devastated communities in West Virginia with its pollution containing PFOA.[18] DuPont knew about the dangers of PFOA beginning in the early 1960s, after the company conducted studies that showed the chemical caused liver damage, was resistant to degradation, and could cause birth defects.[19] By 1981, DuPont found PFOA in the umbilical cord of a pregnant employee, demonstrating that the chemical's toxic effects could reach fetuses.[20] By 1982, DuPont knew that PFOA emissions from its facility's stacks in West Virginia traveled beyond the boundaries of its West Virginia facility and was warned by its own medical director that surrounding communities were likely being exposed to the company's poisonous dust.[21] By 1987, DuPont found the chemical in drinking water around its West Virginia facility, yet told no one outside the company.[22]

Nevertheless, when DuPont lost its supply of PFOA from the 3M Company in 2000, it decided to begin making PFOA in North Carolina, starting a new legacy of pervasive environmental pollution in a new place.[23] Years later, plagued by thousands of civil lawsuits from its PFOA pollution in West Virginia; scientific evidence showing that PFOA causes birth

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[15] *See also* Gomis 2018 study; Gloria Post et al., "Key scientific issues in developing drinking water guidelines for perfluoroalkyl acids: Contaminants of emerging concern," 15 *PLoS Biol* e2002855 (2017); Melissa Gomis, "From emission sources to human tissues: modelling the exposure to per- and polyfluoroalkyl substances," (2017); Nan Sheng et al., "Cytotoxicity of novel fluorinated alternatives to long chain," 92 *Archives of Toxicol.* 359 (2017); Melisa Gomis et al., "A modeling assessment of the physicochemical properties and environmental fate of emerging and novel per- and polyfluoroalkyl substances," 505 *Sci. of the Total Environ.* 981 (2014); J.M. Rae et al., "Evaluation of chronic toxicity and carcinogenicity of ammonium 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)-propanoate in Sprague Dawley rats," 2 *Toxicol. Rep.* 939 (2015).

[16] The Madrid Statement at A 107.

[17] E.I. du Pont de Nemours and Company owned and operated the Fayetteville Works facility from the 1970s until the company formed Chemours Company FC, LLC, and transferred ownership to Chemours in 2015.

[18] *See* Nathaniel Rich, "The Lawyer Who Became DuPont's Worst Nightmare," *N.Y. Times*, Jan. 6, 2016, *available at* https://www.nytimes.com/2016/01/10/magazine/the-lawyer-who-became-duponts-worst-nightmare.html (last visited Sept. 19, 2018).

[19] *Id.*

[20] *Id.*

[21] *Id*; *see also* Motion for Partial Summary Judgment, Exhibit 7, *Little Hocking Water Ass'n, Inc. v. E.I. du Pont Nemours & Co.*, 91 F. Supp. 3d 940, 962 (S.D. Ohio 2015), included as Attachment 4.

[22] Motion for Partial Summary Judgment, Exhibit 12, *Little Hocking Water Ass'n, Inc.* v. *E.I. du Pont Nemours & Co.*, 91 F. Supp. 3d 940, 962 (S.D. Ohio 2015), included as Attachment 5.

[23] Nathaniel Rich, "The Lawyer Who Became DuPont's Worst Nightmare," *N.Y. Times*, Jan. 6, 2016.

defects, cancer, and other severe health effects; and pressure from the public and EPA, DuPont was compelled to stop making PFOA.[24] And, it replaced it with the equally harmful GenX.

DuPont studied GenX, its new toxic PFAS substitute, beginning as early as 1963, discovering over time that GenX produced toxic effects in laboratory animals similar to that of PFOA, including cancers in the liver, pancreas, and testicles.[25] Still, the company began quietly releasing the chemical into a North Carolina drinking water supply, the Cape Fear River, in the early 1980s, as a result of its many manufacturing processes.[26] DuPont also began emitting hundreds of millions of pounds of GenX and other PFAS into the air each year, and allowing the chemicals to leak from its open pits, ditches, and pipes into the aquifers that supply the drinking water wells for hundreds of families.[27]

Three decades later, when DuPont began making GenX as a replacement for PFOA at the Fayetteville Works Facility in North Carolina,[28] the company did not disclose to the North Carolina Department of Environmental Quality or to the public that GenX has harmful health effects similar to those of PFOA, or that DuPont had already been dumping the chemical into the Cape Fear River for nearly three decades.[29]

DuPont created a new company, Chemours, to bear the weight of its hundreds of million dollars' worth of legal liabilities from its PFOA contamination. When Chemours took ownership of the Fayetteville Works Facility in 2015, it simply continued DuPont's tradition of toxic pollution.[30] Hundreds of thousands of people in North Carolina have been devastated by DuPont and Chemours' decades of PFAS contamination. Until PFAS are strictly regulated, millions more throughout the country will be harmed by these companies' blatant disregard for communities near their facilities.

C. EPA must regulate PFAS as a class of compounds.

There are over 3,000 PFAS in circulation on the global market,[31] and possibly 5,000 to 10,000 in total.[32] EPA has a proposed a regulatory process which addresses one PFAS at a time. This will not protect the health of the public and the environment.

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[24] *Id.*

[25] DuPont and Chemours' TSCA filing to EPA, "8EHQ-06- 1643 6_8EHQ-06- 16478," Jan. 8, 2013, included as Attachment 6.

[26] Amended Complaint, *N.C. Dept. of Environmental Quality v. Chemours*, 17 CVS 580, 16 (N.C. Super. 2018) (hereinafter "NC DEQ Amended Complaint"), included as Attachment 7.

[27] *See generally* Exhibit 22 of NC DEQ Amended Complaint, "Focused Feasibility Study Report – PFAS Remediation," included as Attachment 8.

[28] NC Amended Complaint at 18.

[29] *Id.* at 14, 20-21.

[30] *See* NC Amended Complaint.

[31] KEMI, Swedish Chemicals Agency, Occurrence and use of highly fluorinated substances and alternatives 6 (2015), *available at* https://www.kemi.se/en/global/rapporter/2015/report-7-15-occurrence-and-use-of-highly-fluorinated-substances-and-alternatives.pdf (last visited Sept. 19, 2018).

[32] Combined Presentations from EPA PFAS Community Engagement in Fayetteville, NC, slide 18, Aug. 14, 2018, *available at* https://www.epa.gov/sites/production/files/2018-08/documents/r4_combined_presentations_.pdf (last visited Sept. 19, 2018).

EPA made the mistake years ago of failing to address the entire class of PFAS. In 2006, EPA asked companies, including DuPont, to voluntarily phase out their use of PFOA, and gave the companies nearly a decade to do so.[33] DuPont then took advantage of the lack of regulation on PFAS and simply shifted to using GenX, a structurally similar compound, to replace PFOA. Despite DuPont's own studies of GenX showing that the chemical had health effects in laboratory animals consistent with the effects of PFOA, DuPont and later, Chemours, intentionally pumped GenX and numerous other PFAS into the drinking water for over 250,000 people in southeastern North Carolina for decades.

EPA is poised to make the same mistake. The agency's proposed response fails to address the entire class of PFAS, and will again allow companies like DuPont and Chemours to avoid regulation of their PFAS pollution. EPA has proposed:

- "evaluat[ing] the need for a maximum containment level (MCL) for PFOA and PFOS,"
- "beginning [...] to propose designating PFOA and PFOS as 'hazardous substances' through one of the available statutory mechanisms,"
- "developing groundwater cleanup recommendations for PFOA and PFOS at contaminated sites," and
- "taking action [...] to develop toxicity values for GenX and PFBS."[34]

Each of EPA's proposed actions is limited to *only two* PFAS out of *thousands* of existing PFAS. Moreover, EPA only proposes enforceable regulations for PFOA and PFOS—legacy PFAS that companies like DuPont and Chemours have already switched out for new PFAS alternatives, such as GenX.

In addition to holding PFAS manufacturing companies accountable for their pollution, EPA's regulation of PFAS as a class will ensure that the agency considers the cumulative effects of PFAS mixtures on humans and the environment. As evidenced by the situation in North Carolina, these compounds are not released one at a time. Dozens, if not hundreds, of different PFAS are released together into the air, water, and soil.[35] Therefore, people and the environment are exposed not only to PFOA or PFOS, but toxic mixtures that can cause greater harm than a single PFAS would.[36] Any regulatory action, therefore, must consider the cumulative effects of exposure to numerous different PFAS over an entire lifetime.

EPA cannot wait for health studies to be conducted on each individual PFAS before it acts. In May 2009, the Agency for Toxic Substances and Disease Registry released its first draft Toxicological Profile for Perfluoroalkyls for public comment.[37] Over 9 years later, EPA is still releasing draft versions of this report for public comment—the latest version of which discusses

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[33] EPA, Fact Sheet: 2010/2015 PFOA Stewardship Program, *available at* https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/fact-sheet-20102015-pfoa-stewardship-program#what (last visited Sept. 19, 2018).
[34] EPA, PFAS National Leadership Summit, *available at* https://www.epa.gov/sites/production/files/2018-08/documents/pfas-meeting-summary_final_508.pdf (last visited Sept. 19, 2018).
[35] Combined PFAS well samples around Fayetteville Works Facility and air emission estimates, included as Attachment 9.
[36] Wang Ting et al., "Hydrophobicity-dependent QSARs to predict the toxicity of perfluorinated carboxylic acids and their mixtures," 32 *Environ Toxicol Pharmacol* 2 (2011).
[37] Draft 2018 Toxicological Profile for Perfluoroalkyls at iv.

only 14 PFAS out of the thousands of existing PFAS.[38] Still, the public has not seen any enforceable regulations on PFOA, which has been in production for over 60 years,[39] and has long been known to cause developmental effects to fetuses and infants, kidney and testicular cancer, liver malfunction, hypothyroidism, high cholesterol, ulcerative colitis, lower birth weight and size, obesity, decreased immune response to vaccines, reduced hormone levels, and delayed puberty.[40]

States and other countries have recognized the need for PFAS to be regulated together. For instance, Vermont has issued a drinking water health advisory for the sum of five different PFAS. Vermont has determined that the combined levels of PFOA, PFOS, perfluorohexane sulfonic acid ("PFHxS"), perfluoroheptanoic acid ("PFHpA"), and perfluorononanoic acid ("PFNA") should not exceed 20 ppt.[41] Massachusetts has similarly issued a public health guideline for the combined levels of PFOA, PFOS, PFNA, PFHxS and PFHpA, stating that public water supplies should "take steps expeditiously" to lower the combined levels of the five PFAS "to below 70 ppt for all consumers."[42] Other states that have addressed PFAS in addition to PFOA and PFOS include Connecticut, Minnesota, and New Jersey.[43] Sweden and Germany have proposed that the European Union restrict the manufacture of about 200 PFAS.[44]

EPA must use existing environmental statutes, as discussed in Section F, to regulate the entire class of PFAS in order (1) to prevent companies from creating new PFAS to avoid regulation as they have done in the past, and (2) to account for exposure to toxic PFAS mixtures that already exist in our air soil, and water. Anything less will not protect communities like those in southeastern North Carolina from future harm.

D. <u>EPA must prevent PFAS at the source</u>.

EPA's current proposed actions do nothing to stop PFAS from entering the environment in the first place. Instead, EPA plans to put the burden on public water supplies, their customers, and others to filter and clean up PFAS that have been already allowed to permeate throughout drinking water supplies, rivers and lakes, and soil. EPA's strategy is not feasible. Both site remediation and drinking water treatment for PFAS are extremely costly and difficult, and

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[38] *Id.* at 1.
[39] Andrew Lindstrom, et al., "Polyfluorinated Compounds: Past, Present, and Future," 45 *Environ. Sci. Technol.* 19 (2011).
[40] The Madrid Statement at A 107; U.S. Environmental Protection Agency ("EPA"), Fact Sheet on PFOA & PFOS Drinking Water Health Advisories, 2.
[41] Vermont Department of Health, "Drinking Water Health Advisory for Five PFAS (per- and polyfluorinated alkyl substances)," July 10, 2018, *available at* http://www.healthvermont.gov/sites/default/files/documents/pdf/ENV_DW_PFAS_HealthAdvisory.pdf (last visited Sept. 19, 2018).
[42] Massachusetts DEP, "PFAS in Drinking Water," *available at* https://www.mass.gov/files/documents/2018/06/11/pfas-in-dw-fs_0.pdf (last visited Sept. 19, 2018).
[43] Interstate Technology Regulatory Council, PFAS Fact Sheets, Section 4 Tables, *available at* https://pfas-1.itrcweb.org/fact-sheets/ (last visited Sept. 19, 2018).
[44] KEMI, Swedish Chemicals Agency, Proposal to ban 200 highly fluorinated substances, Dec. 20, 2017, *available at* https://www.kemi.se/en/news-from-the-swedish-chemicals-agency/2017/proposal-to-ban-200-highly-fluorinated-substances/ (last visited Sept. 19, 2018); Public Consultation, Germany, In Collaboration With Sweden, Proposes A Restriction On C9-C14 Perfluorocarboxylic Acids (PFCAS), Their Salts And Related Substances (Precusors)," included as Attachment 10.

conventional techniques are often ineffective.[45] Because EPA does not plan to combat PFAS pollution at its source, the agency's plan will not protect human health and the environment.

As evidenced by the presentations EPA gave in its Community Engagement Event in Fayetteville, North Carolina, EPA knows what the sources of PFAS are.[46] They include PFAS-manufacturing facilities and facilities that use PFAS as part of their industrial processes, wastewater treatment plants, and landfills.[47] Once PFAS enters the environment, it moves aggressively. The chemicals "end up virtually everywhere, including air, dust, wastewater treatment plant (WWTP) effluent, biosolids, soil, inland and ocean waters, drinking water, and food, [...] in the deep ocean, and in underground aquifers, in rainwater and snow, and in pristine Arctic lakes, far from any point source."[48]

The North Carolina Department of Environmental Quality has spent the last 14 months trying to determine how far DuPont and Chemours' PFAS contamination has spread from their Fayetteville Works Facility, consuming significant staff resources. GenX has now been found in over 600 private wells up to 5.5 miles away from the facility's border, in levels as high as 4,000 ppt.[49] Robeson County's health director has stated that the presence of GenX in Robeson County likely indicates that Chemours' contamination has spread into the Lumber River basin and even the Pee Dee River in South Carolina.[50] The North Carolina Department of Environmental Quality has found the chemical in rainwater at levels as high as 810 ppt five miles from the facility, and as far as 7 miles from the facility.[51] Scientists from the University of North Carolina Wilmington have measured GenX in the rainwater as far as Wilmington—nearly 80 miles from the facility—in concentrations higher than 500 ppt.[52] Last December, GenX was even found in local honey at 2,070 ppt.[53] North Carolina has witnessed the ability of PFAS to invade every facet of the world we live in.

EPA states that it will "evaluate the need for a maximum containment level (MCL) for PFOA and PFOS."[54] While the promulgation of maximum contaminant levels under the Safe Drinking Water Act is important for protecting the public's drinking water supply, it is

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[45] Combined Presentations from EPA PFAS Community Engagement in Fayetteville, NC, slide 7, 30-40, Aug. 14, 2018, *available at* https://www.epa.gov/sites/production/files/2018-08/documents/r4_combined_presentations_.pdf (last visited Sept. 19, 2018); Interstate Technology Regulatory Council, Remediation Technologies and Methods for Per- and Polyfluoroalkyl Substances (PFAS) (Mar, 2018), *available at* https://pfas-1.itrcweb.org/wp-content/uploads/2018/03/pfas_fact_sheet_remediation_3_15_18.pdf (last visited Sept. 19, 2018).

[46] Combined Presentations from EPA PFAS Community Engagement in Fayetteville, NC, slide 28, Aug. 14, 2018.

[47] *Id.*

[48] CDTSC 2018 Report at 19.

[49] NC DEQ Amended Complaint at 27.

[50] Steve DeVane, "Robeson County testing for GenX near St. Pauls," *the Fayetteville Observer*, Feb. 2, 2018, *available at* http://www.fayobserver.com/news/20180202/robeson-county-testing-for-genx-near-st-pauls (last visited Sept. 19, 2018).

[51] NC DEQ Amended Complaint at 2.

[52] Ralph Mead, UNCW, Presentation for the Cape Fear River Assembly, "Environmental Mass Spectrometry," slide 14, May 23, 2018, included as Attachment 11.

[53] Adam Wagner, "How did GenX end up in a jar of honey? DEQ is investigating," *StarNews Online*, Dec. 4, 2017, *available at* http://www.starnewsonline.com/news/20171204/how-did-genx-end-up-in-jar-of-honey-deq-is-investigating (last visited Sept. 19, 2018).

[54] EPA, PFAS National Leadership Summit, *available at* https://www.epa.gov/sites/production/files/2018-08/documents/pfas-meeting-summary_final_508.pdf (last visited Sept. 19, 2018).

extraordinarily difficult and expensive to remove PFAS from water. Relying exclusively on maximum containment levels to clean up drinking water puts the entire burden on local water utilities and their customers. As evidenced by the situation in North Carolina, this is not fair, feasible, or effective.

The Cape Fear Public Utility Authority, which services 200,000 customers in North Carolina, discovered in the summer of 2017 that PFAS from Chemours' Fayetteville Works Facility was in its finished water. One of the PFAS, GenX, reached levels of up to 1,100 ppt in the treated drinking water.[55] In September 2017, Chemours agreed to stop pumping its PFAS-contaminated wastewater directly into the Cape Fear River.[56] However, PFAS levels in the Cape Fear River and in the utility's finished drinking water have persisted from contamination in the soil and groundwater at the facility,[57] sediment in the Cape Fear River and its tributaries,[58] and possibly even bacteria that coat the inside of pipes which pump treated drinking water.[59]

The Cape Fear Public Utility Authority has now spent $1.8 million addressing Chemours' PFAS pollution, and is planning to install advanced treatment technology that could have a life-cycle cost of $196 million through 2055.[60] It projects that its customers, who have already been harmed by Chemours' pollution for decades, will face a 14 percent increase in their water bills because of the actions the utility must now take to combat PFAS.[61] During its presentation to the House Select Committee on North Carolina River Quality on April 26, 2018, the Cape Fear Public Utility Authority emphasized that even its upgraded treatment system will not eliminate PFAS in finished drinking water, and that the only way to effectively address the contamination is by controlling the source of the compounds.

Communities that have been injured by the intentional pollution from large chemical companies should not be the ones to bear the heavy financial burden of cleaning up their own drinking water. EPA must prevent additional PFAS from being pumped into our air, water and soil. None of EPA's current proposals will do so, and they fail to protect communities from the harm suffered by those in southeastern North Carolina.

E. <u>EPA's failure to control PFAS has resulted in longstanding contamination across the country, which EPA must now confront</u>.

The number of PFAS-contaminated sites continues to grow. Initially, PFAS pollution was thought to be somewhat limited to PFAS manufacturing facilities, but it is now understood

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[55] June 19 to July 25, 2017 GenX Surface Water Sampling Results, included as Attachment 12.
[56] Partial Consent Order, *N.C. Dept. of Environmental Quality v. Chemours*, 17 CVS 580 (N.C. Super. 2018), included as Attachment 13.
[57] Exhibit 22 of NC DEQ Amended Complaint, "Focused Feasibility Study Report – PFAS Remediation."
[58] "Report to the Environmental Review Commission from the University of North Carolina at Wilmington Regarding the Implementation of Section 20(a)(2) of House Bill 56 (S.L. 2017-209)," included as Attachment 14.
[59] Cheryl Hogue, "What's GenX still doing in the water downstream of a Chemours Plant," *c&en*, Feb. 12, 2018, *available at* https://cen.acs.org/articles/96/i7/whats-genx-still-doing-in-the-water-downstream-of-a-chemours-plant.html (last visited Sept. 19, 2018).
[60] Combined Presentations from EPA PFAS Community Engagement in Fayetteville, NC, slide 78, Aug. 14, 2018, *available at* https://www.epa.gov/sites/production/files/2018-08/documents/r4_combined_presentations_.pdf (last visited Sept. 19, 2018).
[61] *Id.*

that the contamination is widespread. PFAS contamination exists not only at PFAS manufacturing facilities and facilities that use PFAS as part of their industrial processes, but also at military bases; fire-fighting foam application, training, storage, and disposal sites; manufacturing sites of fire-retardant materials; landfills; wastewater treatment plants; airports; and many other locations.[62] PFAS contamination is a national problem, and EPA must act.

Many sites potentially contaminated with PFAS have yet to be characterized, added to the National Priorities List (the list of contaminated sites eligible for cleanup and financed under the federal Superfund program), or cleaned up. As of May 2017, EPA estimated there were over 1,000 sites potentially contaminated by PFAS (including 315 Department of Defense sites with fire training areas, 535 airports, and hundreds of PFAS manufacturing facilities).[63] Against this artificially low estimate,[64] there were less than 90 Superfund sites with known PFAS impacts.[65] Because PFAS do not degrade in the environment,[66] PFAS-contaminated sites require *active clean up* to eliminate the harm to human health and the environment. EPA must therefore identify and characterize the sources of PFAS, add any known contaminated sites to the Superfund National Priorities List, and prioritize those sites for cleanup.

So that responsible officials and parties know how best to reduce the risks of PFAS contamination and exposure, EPA must also develop and publicize PFAS test methods for all environmental media. It must evaluate and identify effective treatment technologies for remediating PFAS-contaminated soils, sediments, and waters. These must include methods for preventing PFAS-polluted groundwater from entering surface waters. And EPA must develop tools, data, and guidance for remedy selection, remedial action, and performance monitoring.

In many cases, the costs associated with environmental contamination are unfairly borne by state and federal governments, public and private utilities, and members of the public. EPA must instead hold the polluters financially responsible for these costs—including the costs for remediation on and off site, effective filtration systems at an individual and utility scale where drinking water supplies are polluted with PFAS, human health studies, environmental sampling, and ongoing monitoring. Finally, EPA should implement an aggressive enforcement strategy against companies that have knowingly and intentionally released PFAS into the environment, such as DuPont and Chemours.

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[62] *See* PFAS Environmental Occurrence, available at https://clu-in.org/contaminantfocus/default.focus/sec/Per-_and_Polyfluoroalkyl_Substances_(PFASs)/cat/Occurrence/ (last visited Sept. 19, 2018).

[63] L. Gaines, EPA, Presentation: Per and Polyfluroalkyl Substances (PFASs) at Superfund Sites, at 4 (May 2017) (hereinafter, "EPA PFAS Superfund Sites"), *available at* http://www.newmoa.org/events/docs/259_227/GainesEPA_May2017_final.pdf (last visited Sept. 19, 2018).

[64] EPA's estimate that 1,000 sites across the country are potentially contaminated by PFAS is artificially low considering Michigan alone has confirmed the state has 35 sites with PFAS contamination. *See* Michigan Department of Environmental Quality, Confirmed PFAS Sites (Sept. 12, 2018), *available at* https://www.michigan.gov/documents/deq/deq-map-confirmedPFASsites_611932_7.pdf (last visited Sept. 20, 2018).

[65] EPA PFAS Superfund Sites at 6.

[66] Interstate Technology Regulatory Council, Environmental Fate and Transport for Per- and Polyfluoroalkyl Substances Fact Sheet, at 1 (Mar. 16, 2018) (hereinafter "ITRC Fate Fact Sheet"), included as Attachment 15.

EPA has stated that it will "begin[] the necessary steps to propose designating PFOA and PFOS as 'hazardous substances,'" specifically under Section 102 of Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA").[67] While it is important for polluted sites to be cleaned up, designating PFAS as "hazardous substances" under CERCLA does not prevent industrial facilities and others from creating hazardous waste sites in the first instance. Therefore, in order for EPA to protect human health and the environment, it must utilize its entire arsenal of environmental statutes, as discussed more fully in the next Section.

F. EPA must use its statutory tools to control PFAS at the source, protect public and environmental health, and require polluters to bear the costs associated with their PFAS use.

Despite their known risks to human health and the environment, little federal regulation applies to PFAS—leaving state governments, owners and customers of public water systems, and individuals to pay for the costs associated with PFAS contamination, or to resort to post-injury legal claims against the polluting companies that have damaged their health and well-being. As discussed in Section D, the public and environmental health threat must be controlled and eliminated *before harm occurs*. EPA has a legal and moral obligation to require industry to install technology that prevents PFAS from entering the environment, ensure that the public is informed about risks of PFAS already in the environment, limit the use and distribution of PFAS, and hold polluters responsible. In order to do this, EPA must take the following actions.

1. Designate all PFAS as "hazardous air pollutants" under the Clean Air Act and promulgate national emissions standards.

PFAS are found in ambient air, with elevated concentrations observed near emission sources, such as manufacturing facilities, wastewater treatment plants, fire training facilities, and landfills.[68] Short-range atmospheric transport and deposition results in PFAS contamination in soil, sediment, surface water, groundwater (including drinking water supplies), and other media near emission points, as well as several miles away.[69] Long-range atmospheric transport processes are responsible for the widespread distribution of PFAS, including in remote areas with no direct emission sources.[70]

The Clean Air Act was enacted to "protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare." 42 U.S.C. § 7401(b). To fully protect against PFAS contamination from emissions sources, EPA must designate PFAS as hazardous air pollutants.

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[67] EPA, PFAS National Leadership Summit, *available at* https://www.epa.gov/sites/production/files/2018-08/documents/pfas-meeting-summary_final_508.pdf (last visited Sept. 19, 2018).
[68] ITRC Fate Fact Sheet.
[69] *See id.*
[70] *Id.*; *see also* EPA, Contaminated Site Clean-up Information, Per- and Polyfluoroalkyl Substances (PFASs), Environmental Distribution and Accumulation (2018) (hereinafter, "PFAS Environmental Occurrence"), *available at* https://clu-in.org/contaminantfocus/default.focus/sec/Per-_and_Polyfluoroalkyl_Substances_(PFASs)/cat/Occurrence/ (last visited Sept. 19, 2018).

"Hazardous air pollutants" are those pollutants that are known or suspected to cause cancer or other "adverse health effects," such as reproductive effects or birth defects, or "adverse environmental effects." 42 U.S.C. § 7412(b)(2). EPA must periodically review the list of hazardous air pollutants and add pollutants "which present, or may present" such risks. *Id.* Because PFAS are known toxins which cause serious adverse health and environmental effects,[71] EPA must (1) list all PFAS as hazardous air pollutants; and (2) promulgate national emission standards for all major sources and area sources of PFAS. 42 U.S.C. § 7412(b)(2), (d).

2. Designate all PFAS as "hazardous substances" and "toxic pollutants" under the Clean Water Act, and affirm that the Act prohibits the discharge of pollutants—including PFAS—to surface water via hydrologically connected groundwater.

PFAS are released into surface waters by industrial facilities, wastewater treatment plants, firefighting foam activities, and land application of biosolids (i.e., sewage sludge).[72] Once released into surface water, PFAS remain in the water, causing harm to people who fish and swim in—or whose drinking water comes from—polluted waters.[73] PFAS in surface water can also contaminate groundwater through groundwater recharge or be transported to the oceans where they are then transported globally by ocean currents.[74] And, PFAS discharged to groundwater can result in large plumes and discharges to surface water.[75] Because the Clean Water Act is the primary tool for restoring and maintaining the nation's waters, 33 U.S.C. § 1251(a), PFAS must be regulated as "hazardous substances" and "toxic pollutants" under the Act. EPA must also affirm that the unpermitted discharge of pollutants—including PFAS—through hydrologically connected groundwater is prohibited.

a. PFAS are hazardous substances.

Section 311 of the Clean Water Act requires EPA to designate as hazardous substances those substances which, when discharged in any quantity into surface waters, present an "imminent and substantial danger to public health or welfare, including, but not limited to, fish, shellfish, wildlife, shorelines, and beaches." 33 U.S.C. § 1321(b)(2)(A). The Clean Water Act then prohibits discharges of hazardous substances in quantities that may be "harmful to the public health or welfare or the environment." *Id.* § 1321(b)(3), (4). PFAS easily satisfies the definition of "hazardous substance" because PFAS are persistent, bioaccumulative, and toxic to both humans and animals.[76] EPA must designate them as "hazardous substances."

b. PFAS are toxic pollutants.

PFAS must similarly be designated as "toxic pollutants" under section 307 of Clean Water Act. 33 U.S.C. § 1317. "Toxic pollutants" are "those pollutants, or combinations of pollutants, including disease-causing agents, which after discharge and upon exposure, ingestion, inhalation or assimilation into any organism . . . , cause death, disease, behavioral abnormalities,

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[71] *See* Section A, *supra.*
[72] Draft 2018 Toxicological Profile for Perfluoroalkyls at 552-554.
[73] ITRC Fate Fact Sheet at 13.
[74] *Id.*
[75] *Id.* at 12.
[76] *See* Section A, *supra.*

cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction) or physical deformations, in such organisms or their offspring." 33 U.S.C. § 1362.

Designation as a toxic pollutant appropriately results in enhanced measures to protect human health and the environment from the dangers posed by the pollutant, including, for example, more stringent disclosure requirements in the NPDES permitting process (40 C.F.R. § 122.21), effluent limitations in NPDES permits (33 U.S.C. § 1317(a)), pretreatment standards (33 U.S.C. § 1317(b)), water quality criteria to control concentration levels for the pollutants (33 U.S.C. § 1314), guidance to states for establishing protective water quality standards (33 U.S.C. § 1313), and prohibitions on the disposal of pollutant-containing sludge (33 U.S.C. § 1345). These enhanced protective measures should apply to all PFAS because PFAS are toxic pollutants. As EPA develops analytical test methods for specific PFAS, those compounds should also be added to the Priority Pollutant List, so that water quality criteria and effluent limitations guidelines can be developed more quickly.[77]

c. Unpermitted discharges of PFAS through hydrologically connected groundwater are prohibited under the Clean Water Act.

As explained more fully in our comments on "Clean Water Act Coverage of Discharges of Pollutants via a Direct Hydrologic Connection to Surface Water" (Docket ID No. EPA-HQ-OW-2018-0063),[78] the purpose and plain language of the Clean Water Act requires EPA to protect the nation's waters from unpermitted discharges to surface waters through hydrologically connected groundwater.[79] An overwhelming majority of federal courts have held the same.[80] Moreover, people who rely on the nation's waters for fishing, swimming and other recreation, and as sources of drinking water, benefit from these types of groundwater discharges being monitored, controlled in keeping with leading industry practices, and limited in a way that ensures water quality will not be further degraded. "Because the CWA's goal is to protect the quality of surface waters, the NPDES permit system regulates any pollutants that enter such waters either directly or through groundwater."[81] EPA should affirm that rule of law.

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[77] At EPA's August 2018 PFAS National Leadership Summit in Fayetteville, NC, the agency indicated it "is beginning the necessary steps to propose designating PFOA and PFOS as 'hazardous substances' through one of the available statutory mechanisms, including potentially CERCLA Section 102." By designating PFAS as "hazardous substances" or "toxic pollutants," EPA would automatically add PFAS to CERCLA's Section 102 Hazardous Substances List, 42 U.S.C. 9601(14) (defining hazardous substance), thereby applying the more expansive cleanup and reporting requirements under that law *and* the Clean Water Act.

[78] EPA Docket Folder for "Clean Water Act Coverage of Discharges of Pollutants via a Direct Hydrologic Connection to Surface Water", Docket ID No. EPA-HQ- OW-2018-0063, *available at* https://www.regulations.gov/document?D=EPA-HQ-OW-2018-0063-0001 (last visited Sept. 19, 2018).

[79] *See generally* Ltr. from F. Holleman to S. Wilson re: Comment on "Pollution of Surface Waters by Pollution Transmitted From a Point Source through Groundwater with a Direct Hydrological Connection to the Surface Water" (Docket ID No. EPA-HQ-OW-2018-0063) (Apr. 18, 2018), included as Attachment 16.

[80] *Id.* at 9-15.

[81] *Williams Pipe Line Co. v. Bayer Corp.*, 964 F.Supp. 1300, 1320 (S.D. Iowa 1997).

3. Designate and regulate PFAS-containing waste as a "hazardous waste."

Industrial facilities may also release PFAS to the environment via on- and off-site disposal of wastes.[82] EPA must ensure that PFAS-hazardous wastes are carefully managed and disposed.

"Hazardous waste" is waste with properties that makes it dangerous or capable of having a harmful effect on human health or the environment. *See* 42 U.S.C. § 6903(5). EPA has developed a comprehensive program to ensure that hazardous waste is managed safely from the moment it is generated to its final disposal (cradle-to-grave). *See* 400 CFR parts 260 through 273. To ensure the safe management and disposal of PFAS-containing wastes, EPA must list PFAS as a "hazardous waste" under 42 U.S.C. § 6921.

4. List PFAS as toxic chemicals under the Toxic Release Inventory.

The Emergency Planning & Community Right-To-Know Act's Toxics Release Inventory requires industrial and federal facilities to disclose information to the public about toxic chemical releases and pollution prevention activities. *See* 42 U.S.C. § 11023. EPA may add chemicals to the Toxics Release Inventory list where there is sufficient evidence that a chemical causes or is "reasonably anticipated to cause" human health effects, such as cancer or serious reproductive issues. *Id.* at 11023(d)(2). EPA may also add a chemical that—because of its toxicity or toxicity and persistence, or toxicity and tendency to bioaccumulate—is known to cause or is "reasonably anticipated to cause" a "significant adverse effect on the environment." *Id.* So that the public can be informed about toxic PFAS releases in their communities, EPA must add all PFAS to the list of toxic chemicals.

5. Utilize the Toxic Substances Control Act to require disclosure of PFAS risks and limit the manufacture, processing, and use of harmful PFAS.

In enacting the Toxic Substance Control Act (TSCA), Congress found that "among the many chemical substances and mixtures which are constantly being developed and produced, there are some [that] may present an unreasonable risk of injury to health or the environment." 15 U.S.C. § 2601(a). For these chemicals, pre-manufacture data must be developed to identify the effects of the chemical substances and regulation must be implemented to protect against the risks. *Id.* § 2601(b). PFAS presents unreasonable risks to human health and the environment,[83] and EPA must utilize its authority under TSCA to protect against those risks.

As an initial matter, EPA must enforce its TSCA section 5(e) orders, including the Order the agency entered into with DuPont and Chemours.[84] For decades, the companies have violated EPA's Order, EPA has failed take enforcement actions against them, and now, Chemours

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[82] ITRC Fate Fact Sheet at 3.

[83] *See* Section A, *supra*.

[84] EPA, Consent Order and Determinations Supporting Consent Order for PMN Substances P-08-509 (2009) (hereinafter "TSCA Order"), included as Attachment 17. In order for DuPont to manufacture GenX and related chemicals, the EPA issued the Order to DuPont under TSCA in 2009. When DuPont transferred ownership of the Fayetteville Works facility to Chemours in 2015, Chemours became responsible for complying with the order.

continues those violations.[85] The companies have released nearly 100,000 pounds of PFAS compounds from its stack emissions each year, including GenX compounds at a rate of 2,758 pounds per year.[86] Chemours' emissions are contaminating surface water, groundwater, and drinking water sources with PFAS, despite that Chemours was required to "recover and capture (destroy) or recycle the [PFAS] substances at an overall efficiency of 99% from all the effluent process streams and the air emissions."[87] Based on EPA's determinations that preceded the Order, EPA's issuance of the Order was mandatory, and so is its enforcement. *See* 15 U.S.C. § 2604(e).

To broadly address the manufacturing of PFAS as a class, EPA should exercise its authority under TSCA Section 4 to require PFAS manufacturers and processors to conduct toxicity testing of all PFAS and disclose the results, as well as all currently available data, to EPA. 15 U.S.C. § 2603. Similarly, EPA should require reporting of PFAS production, including PFAS byproduct production at very low thresholds under the revised Chemical Data Reporting Rule. *See* 15 U.S.C. § 2607; 40 C.F.R. Part 711.

EPA must also take action under 15 U.S.C. § 2604 to protect against the unreasonable risks posed by PFAS. Where a "chemical substance…presents an unreasonable risk of injury to health or the environment," EPA is required—"without consideration of costs or other nonrisk factors"—to protect against those unreasonable risks, including by issuing an order limiting or prohibiting the manufacture, processing, or distribution of the substance." 15 U.S.C. § 2604(a)(3)(A); 15 U.S.C. § 2604(f). It is indisputable that PFAS as a class poses serious risks to health and safety of the public and the environment; therefore, EPA should ban the development of new PFAS and strictly limit the manufacture, processing, and distribution into commerce of existing PFAS. EPA should also halt the use of all PFAS in Aqueous Film Forming Foam and firefighting gear for military and civilian use, and require industry to find safe alternatives for these and other uses.

Finally, EPA should issue a Significant New Use Rule for *all PFAS*, and should prohibit new uses of PFAS, including their use in "articles." *See* 15 U.S.C. § 2604(a); 40 C.F.R. 720.3(c). Although EPA has proposed a Significant New Use Rule for PFOA and related chemicals, the rule covers only long-chain PFAS.[88] Short-chain PFAS can, however, be even more toxic.[89] Therefore, Significant New Use Rules regarding PFAS should apply to all PFAS—short-chain and long-chain—including their use in articles (such as nonstick cookware or water resistant clothing).

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[85] Southern Environmental Law Center Notice of Intent to sue Chemours under the Toxic Substances Control Act, May 7, 2018, included as Attachment 18.
[86] *Id*; See Combined PFAS well samples around Fayetteville Works Facility and air emission estimates, included as Attachment 9.
[87] TSCA Order (Attachment 17) at 36; Southern Environmental Law Center Notice of Intent to sue Chemours under the Toxic Substances Control Act, May 7, 2018.
[88] EPA, "Risk Management for Per- and Polyfluoroalkyl Substances (PFASs) under TSCA," *available at* https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/risk-management-and-polyfluoroalkyl-substances-pfass (last visited Sept. 119, 2018).
[89] *See* Section A, *supra*.

G. Conclusion

Far too many communities like those in North Carolina have been harmed by PFAS pollution throughout the country in the past century. EPA is now fully aware of the extent of destruction that PFAS can cause to our bodies and the environment. The agency must use its statutory tools to combat this class of chemicals that has infected every facet of our daily lives. Its current proposal does nothing to protect future communities, and EPA has a legal and moral obligation to do more.

Thank you for considering these comments. Please contact us at ggisler@selnc.org or 919-967-1450 if you have any questions regarding this letter.

Sincerely,

Geoffrey R. Gisler

Jean Zhuang

Kelly Moser

SIERRA CLUB

September 26, 2018

The Honorable Rand Paul, Chairman
Senate Committee on Homeland Security and Governmental Affairs,
Subcommittee on Federal Spending Oversight and Emergency Management
439 Hart Senate Office Building
Washington, DC 20510-6250

The Honorable Gary Peters, Ranking Member
Senate Committee on Homeland Security and Governmental Affairs,
Subcommittee on Federal Spending Oversight and Emergency Management
439 Hart Senate Office Building
Washington, DC 20510-6250

Dear Chairman Paul and Ranking Member Peters,

The Sierra Club is extremely concerned about the issues we all face with the recently identified problems related to the family of organofluorine chemicals known as PFAS. These chemicals have contaminated water resources across the country and are widely found in many consumer products. Widespread human exposure to these dangerous chemicals has occurred globally. Sadly, these chemicals are extremely persistent in the environment and have contaminated even the remotest regions of the planet.

As a society, we face the pressing issue of ending exposure to these chemicals, which are so pervasive now that exposure is hard to avoid. We also face the issue of banning the production of these chemicals, and an extensive clean up effort, similar to the effort we have undertaken with PCBs. As well, we have the daunting task of destroying these chemicals, which is no small feat, given that they are some of the most persistent and difficult to destroy chemicals ever made.

Municipal waste incinerators are not designed to burn hot enough to destroy these chemicals and few other practical combustion options exist. Experts reviewing the military's SERDP research program highlighted research into safe disposal as a "critical need" and disposal as a "continuing liability" for the Department of Defense.[1] As there are no regulations for the safe management or methods documenting the effective destruction of these chemicals, if take-back programs are

[1] SERDP. 2017. Summary Report: SERDP and ESTCP Workshop on Research and Demonstration Needs for Management of AFFF-Impacted Sites. September 2017.

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initiated, these highly persistent, toxic chemicals will most likely go to the cheapest disposal option available - either a landfill or a municipal incinerator. If you bury PFAS chemicals, they will eventually reach groundwater. Poorly controlled incineration leads to air emissions of PFAS. One recent study of a modern municipal waste incinerator in the Netherlands, found incomplete removal of PFOA during normal operation.[2]

In light of these pressing facts, we ask this committee to direct federal agencies to address the PFAS crisis:

Require military bases, airports, fire departments and other locations where PFAS are used to store existing stocks of chemicals safely, until safe, effective destruction technologies are identified and required.

Direct the National Academy of Sciences to determine which technologies will completely destroy all PFAS chemicals so that additional releases will not pollute our air and waters.

Work with Department of Defense, Department of Energy, and the states to identify and require the use of analytical test methods that will identify and quantify the entire class of PFAS chemicals.

Require PFAS testing methodologies sensitive enough to detect and regulate PFAS chemicals at exposure levels linked to toxic outcomes for use in identifying and regulating all PFAS congeners.

Require both regulation of PFAS emissions to the environment and reporting of any (exempted) production, use, and disposal of PFAS chemicals under Emergency Planning and Community Right-to-know Act, Comprehensive Environmental Response, Compensation and Liability Act, Resource Conservation and Recovery Act, Clean Water Act, Clean Air Act and Safe Drinking Water Act so that industrial producers, users, States, and affected communities can effectively deal with these chemicals in environmental media.

[2] Abel Arkenbout, 2018. Long-term sampling emission of PFOS and PFOA of a Waste-to-Energy incinerator. DOI: 10.13140/RG.2.2.14281.19046

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Utilize existing international scientific information about effective replacements for AFFF fire fighting foam with fluorine free alternatives to enable the alternatives to comply with the military specification (MILSPEC) for fire-fighting foams for use in liquid fuel fires.

States are the best resource the federal government has for developing some of the important exposure information regarding PFAS chemicals. To encourage further research, Congressional funding should be earmarked to allow states to test their drinking water sources with the best test methodologies available. These testing methods must identify the largest number of PFAS chemicals at the lowest detection limit available. Laboratories tasked with this work need to coordinate with federal agencies so the quality assurances and quality controls ensure consistency and accuracy.

We thank you for your diligence in addressing this vexing problem of PFAS chemical exposure and look forward to hearing back from you on how you plan to resolve the problem of the lack of exposure data from drinking water, the lack of a robust and complete test method for drinking water, and the lack of safe, effective disposal methods for these chemicals.

Sincerely,

Debbie Sease
Legislative Director
Sierra Club
Washington, DC

Cc:
James Lankford, (R) OK;
Michael B. Enzi (R) WY;
John Hoeven (R) ND;
Kamala Harris (D) CA;
Doug Jones, (D) AL;
Susana Reyes Vice-President Conservation Sierra Club Board of Directors;
Jane Williams, Chair, Sierra Club Air Committee,
Eric Uram, Chair, Sierra Club Toxics Committee;

My Story: Eric J. Tobin

My story starts before I was born. My mother was an airmen's wife stationed at Wurtsmith Air Force Base from 1973-1978, and so my mother was drinking the water in Oscoda from conception, through my development, and my birth at the base Hospital. My sister and I were breastfeed by our mother, so whatever bad things were in the water were concentrated and delivered into us as infants. As toddlers we also drank the water and bathed in it. When I was born I was severely jaundice. So our exposure to the chemicals that were in the water was for about 4 years of our most vulnerable time in our lives and our development. As a child I was prone to chronic respiratory illnesses and was even diagnosed as being allergic to the cold. Going up I was shy and in elementary I was put into special Ed. As I grew up I was able to rejoin normal classes and got good grades, but I always had a problem with reading and writing.

At 17 I developed a severe case of Gilberts Disease which caused my liver and spleen to enlarge, put me in the hospital with a temp close to 104, and quarantined me. They thought I had mono complicated by hepatitis according to what it said on my medical notes of the time. At this time, I met a fantastic girl at that time and I married her in 1994. It was our hope that we would have a decent size family with 4 kids. We soon discovered that both my wife and I had fertility issues. I was found to have a low sperm count and low motility. After trying for seven years with fertility treatments we had almost given up when my wife got pregnant. Our excitement was short lived due to finding out that there was no heartbeat. We tried again and eventually she was able to become pregnant with our son. Without any prevention, we have not been able to get pregnant since.

At about the time my son was born (2000) I developed what they only termed as complex migraine. It was a migraine that did not have a headache, but would basically shut down my body, limiting my mobility, speech, and cognitive function for about 20 mins to an hour, after which, I would be extremely tired and want to lay down. To date the doctors have not been able to explain this, but have decided to treat it with medications used for epilepsy or anxiety. After a lot of trial and error it seems like they discovered medications that limited the events to only once a twice a year instead of three times a day. They also came to the conclusion that the events were brought on by my eyesight and/or Stress. This was also part of the reason that I do not like reading.

After 2008 I started getting weak and began getting cramps that first were in my legs and later progressed to all most everywhere in my body. As time went on it became worst, muscles started twitching for no known reason, and at times I can barely walk. I continually pushed my doctors for answers. They ordered tests to try an answer those questions. In 2013 they found that I had very low levels of Testosterone and vitamin D. With more tests they could not give a reason why my Testosterone levels were low while not by being caused by a testicular problem or a pituitary tumor. The doctors figured that is why I am feeling so weak and said I needed hormone replacement therapy or I would start to experience muscle loss and worse symptoms. Our first attempts to correct the problem failed and I am now on once a week injections. The doctors have attributed the cramps to Benign Cramp Fasciculation Syndrome and treated me with Gabapentin and Carbamazepine.

At about this same time they discovered a monoclonal protein in my blood, which means I have monoclonal gammopathy of unknown significance (MGUS) and that I would have to be seen by oncology for the rest of my life. MGUS is the pre cancer for Multiple Myeloma, a terminal blood and bone cancer. All of my labs and risk factors put me in the moderate to high risk of it turning into the cancer with the next 20 years. So far my condition is stable.

Today I feel like I have the body of an 80 year old. The issues I have, I have been told are uncommon for someone in their 40's. All of my life I have baffled and mystified doctors on my combinations of conditions and their effects on my quality of life. Last year I was in the doctor's office or hospital at least once a week for various things. I have had countless tests, procedures and have seen almost every type of specialist there is with very few answers. Within the last few years I discovered that it is very likely that I have been exposed to TCE and PFAs by my beginning of life at Wurtsmith AFB. It saddens me to think that the organization that was meant to protect me, may lead to my untimely death and the part of the reason why my wife and I could not have the family size we wanted. I would hope that the powers to be and our government would step up and get the bottom of the problems and take care of what they have caused. Take care of the Veterans, their families, and anyone else affected by the contamination, it is your duty.

Water Quality Association

Statement for the Record

Committee on Homeland Security and Governmental Affairs
United States Senate

Re: Hearing entitled "The Federal Role in the Toxic PFAS Chemical Crisis"

September 26, 2018

I am writing to the committee on behalf of the Water Quality Association (WQA) – a not-for-profit association for the residential, commercial and industrial water treatment industry – to communicate our continued support for implementing measures to understand the impact of per- and polyfluoroalkyl substances (PFASs) on human health and to urge support of point-of-use (POU) and point-of-entry (POE) – at the tap or whole house – water treatment technologies to battle these contaminants.

I would also like to thank the committee for holding this hearing and for its focus on PFASs contamination. Our association was encouraged by the FY18 National Defense Authorization Act's (NDAA) inclusion of a national study through the Department of Defense on human health implications of PFASs in drinking water, ground water, and any other sources of water and relevant exposure pathways. This will be the first ever nationwide study on the human health impacts of PFASs which will help Federal agencies and states communicate the risks of PFAS contamination.

Though several options are available to treat water and prevent PFAS exposure, using centralized treatment facilities would be extremely expensive, as it would require upgrading drinking water treatment plants not currently designed to remove these chemicals. Many economically challenged communities already struggle to fund necessary maintenance and upgrades to their existing infrastructure for roads, bridges and drinking water pipes. Asking these communities to pay for additional upgrades to their drinking water treatment plant would only increase that burden.

Research shows POU and POE technologies can be used to successfully treat for these contaminants at the home or in a building.[1] They cost only a fraction of the price our society would need to bear to upgrade our drinking water treatment plants for PFAS removal. Furthermore, Department of Defense expenditures on PFAS investigations and cleanup reached nearly $200 million by the end of 2016.[2] POU and POE technologies offer a cost-effective alternative that could reduce the federal monetary burden for current and future PFAS related expenditures.

These POU and POE technologies include Reverse Osmosis, Carbon Filtration and Anion Exchange. Reverse Osmosis products have been independently tested through WQA in collaboration with the Minnesota Department of Public Health[3]. Carbon Filters have been independently tested by NSF International. And Anion Exchange products have been independently tested through the Water Research Foundation. The testing has shown each of these technologies, with the right design

[1] http://www.health.state.mn.us/divs/eh/hazardous/topics/pfcs/
[2] https://www.denix.osd.mil/derp/home/documents/aqueous-film-forming-foam-report-to-congress/
[3] http://www.health.state.mn.us/divs/eh/wells/waterquality/poudevicefinalsummary.pdf

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parameters and configuration, can be used as a successful final barrier in the home to protect people from the harmful effects caused by the presence of these chemicals in our drinking water. These tests help the Federal agencies, states, and the public learn how to prevent unhealthy exposures.

In May 2016, The Federal EPA published a lifetime Health Advisory of 70 parts per trillion for the sum of PFOS and PFOA in drinking water. PFOS and PFOA are two of the more than 3,000-4,000 PFAS chemicals. Manufacturers voluntarily phased out use of PFOS in 2000-2002 and PFOA in 2010-2015. This health advisory is not legally enforceable under EPA regulations or the Safe Drinking Water Act but may be given weight in state regulation.

So far, twenty states have established their own health advisory levels, action levels, drinking water criteria, or state standards for PFASs in ground water, surface water, or drinking water. Attached with this letter is a summary of state actions to address PFASs. Through legislation and agency activities, states are continuing to look for crucial information on the identification, characterization, and monitoring of PFASs and the impacts to human health. There remain gaps in research on PFASs.

WQA staff participated in the Federal EPA summit on per- and polyfluoroalkyl substances (PFASs), in May 2018, and continue to be a resource on PFAS treatment options as communities and legislators try to learn more about the widespread occurrence of PFASs from many sources and how POU and POE treatment can serve as an inexpensive and immediate solution to protect public health.

WQA represents more than 2,500-member companies, including equipment manufacturers, supplier, dealers and distributors of water quality improvement products and services. WQA also operates a product certification program attesting to the safety and efficacy of a variety of water treatment products; and provides training to water treatment specialists through its professional certification programs.

We appreciate the committee's continued focus on PFAS, and WQA stands ready to serve as a resource as Congress works to find sensible, cost-effective solutions to these nationwide problems. If you need any additional information, please contact David Loveday, WQA's Director of Government Affairs, at dloveday@wqa.org or by phone at (630) 505-0609.

Sincerely,

Pauli Undesser
Water Quality Association
Executive Director
pundesser@wqa.org
630-929-2514

October 5, 2018

The Honorable Rand Paul
Chairman
Subcommittee on Federal Spending Oversight
and Emergency Management (FSO)
United States Senate
167 Russell Senate Office Building
Washington DC, 20510

The Honorable Gary C. Peters
Ranking Member
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The Honorable Michael B. Enzi
United States Senate
379A Russell Senate Office Building
Washington, DC 20510

The Honorable Doug Jones
United States Senate
326 Russell Senate Office Building
Washington, DC 20510

The Honorable John Hoeven
United States Senate
338 Russell Senate Office Building.
Washington, D.C. 20510

Dear Chairman Paul, Ranking Member Peters, and Committee Members,

I am writing to request action be taken by the United States Federal government to clean up the PFAS contamination and secure a clean water source for the area in and around the former Wurtsmith AFB.

As a native of Oscoda, Michigan I was born and raised drinking, swimming and recreating in the waters of Oscoda including Van Etten Lake, Lake Huron, Oscoda Area School swimming pool and the AuSable River. As a competitive swimmer and daughter to the local swim coaches, our family revolved our lives around water. Upon turning 18 years old I became a civilian employee of the USAF at the Base beach lifeguarding on a body of water the USAF has contaminated with PFAS. By age 28, I had developed breast cancer and severe Rheumatoid Arthritis despite my healthy lifestyle guided by my knowledge as a Registered Dietitian.

As years passed, my friends and family also developed cancers and immunological diseases including kidney cancer, liver cancer, lupus, increased cholesterol and thyroid diseases. Some continue to struggle with the effects of these diseases but unfortunately many have passed away including my neighbors Jerry [redacted] and Nancy [redacted].

Our community is angry and struggling. We now have a decommissioned base that our community is attempting to utilize to enhance our economic base, but the entire property is highly contaminated and the contamination bleeding into the surrounding community and waterways. We live in fear that the pump and treat system that has been pumping groundwater into a river and on to Lake Huron with levels of PFAS over 1,000 ppt is approaching our municipal water supply. Recently significant foam events were identified by community members just one mile from our municipal water supply intake and in the Saginaw Bay threatening many other water supplies. In addition, foam that is characteristic of PFAS foam is covering the shores of many of our inland lakes which the Michigan DEQ has admitted they do not understand.

As a co-leader of the NOW Need Our Water group formed to address the PFAS contamination, I personally am furious. Furious that the time I used to spend taking care of my health through quality family time, exercise, proper self-care and community volunteering is now spent navigating the roadblocks, secrets, technical language and excuses both the State of Michigan and the US government has created for this crisis. This approach is embarrassing to me as someone that travels throughout Michigan, the U.S. and the world and speaks with others that live in places that govern from the basis of what government was created, to protect the people.

This is a water crisis! Funds must be directed to address this widespread contamination and provide clean drinking water to those affected. We cannot wait any longer for these silent, toxic chemicals to be removed from the source....the former Wurtsmith USAF base in Oscoda Michigan. Municipal water lines to residents in the areas of concern and the eighteen additional GAC filtration systems must be installed immediately to ensure the health and welfare of the citizens and environment of Northern Michigan. Our government must act NOW!

I respectfully request submission of this letter into the record for the hearing. Thank you for your consideration, time and effort to hold this very important hearing.

Cathy Wusterbarth
Co-Leader NOW Need Our Water
[redacted]
Oscoda, MI [redacted]

September 24, 2018

Senator Gary Peters
724 Hart Senate Office Building
Washington, DC 20510

Dear Senator Peters,

My name is Sandy Wynn-Stelt. My husband and I moved into our home in 1992, in what we thought was the perfect location. It was a quiet and rural neighborhood, which was just what we wanted. My husband worked as a Protective Services worker and I worked in mental health. We loved the idea of a home that was our sanctuary, peaceful, full of nature and away from others. We did not know that the Christmas tree farm directly across the street was actually a previous dump site which Wolverine World Wide used to dispose their tannery waste. In March of 2016, my husband was diagnosed with stage 4 liver cancer. He died just three weeks later. A year later, in 2017, I learned that my well water has been contaminated with PFAS and related compounds. My drinking water has tested at levels of 27,000; 38,000 and most recently 71,000 ppt, significantly higher than the lifetime health advisory of 70 ppt set by the EPA.

Losing my husband Joel is hard to measure in dollars. Joel and I were married for almost 25 years, and we lived together four years before that. We completed each other. We were a couple that both complimented and challenged the other person to be better and do better. We did not have a day that we didn't laugh together, not a giggle but laughing until it hurt. We could read each other's minds and could finish each other's sentences. We would drive everywhere on vacations simply because we loved to be together to talk. He retired from the state, and then came to my business every day to 'work', which really was an excuse for us to spend time together. The house is so quiet without him.

Without him here, it is truly like a part of me is missing. I don't have someone to hold my hand and reassure me that everything will be fine. I don't have someone to lay in bed and listen to me be scared about the future. I don't have someone to eat dinner with and talk about our day, or politics, or baseball. I don't have someone to be with me when my parents die, when my nephews graduate, and when I accomplish something-anything. I don't have someone to grow old with, travel the world with, or laugh with. I've lost my travel buddy. Our friends are wonderful, but I'm now the 'third wheel'. I avoid going with them so that we don't feel uncomfortable looking at the empty chair that Joel would be in. They avoid inviting me so that I won't be reminded of fun things we did before. Life becomes very lonely when your husband is gone.

The hardest thing for people to understand is that when you become a widow, your life literally stops. But gradually, over time, you do heal. I started to feel some joy, look forward to some things, find new activities and interests. I started to connect with things. In 2017 I signed up to volunteer for the American Red Cross and was supposed to do Hurricane Relief. I had decided that I could put my passion for mental health to good use and there was a desperate need for mental health professionals throughout the summer. Literally the week I was to be deployed all of the contamination issue became consuming. I had to turn down the deployment to Houston, to Florida and to Puerto Rico. I couldn't leave because this became such a nightmare.

And now, because the entire situation is at a standstill, I am forced to simply continue to grieve without closure. Every time I meet with the media, meet with lawyers, answer emails and texts about this, talk to consultants, or answer questions from strangers I'm brought back to the fact that my husband died suddenly and painfully due to water contamination for decades that progressively damaged his liver. Its like a bad dream that you can't wake from, and you are forced to stay grieving day after day after day.

I never used to have to worry about levels of chemicals in my blood. My blood levels have tested at 5,000,000 ppt. No one can tell me what this will do to me, though it is in all probability what will end my life. Now that I know that I have some of the highest recorded levels of PFAS in my blood, the anxiety is overwhelming. I have no idea what this may cause in the future. I lay awake contemplating the potential reality that one day I will have to drive to chemotherapy alone, without my husband to be there for support.

Joel and I worked very hard to pay off our mortgage as early as possible. We believed that it was the best way to invest our money. We even bought the lot next door to us for the same reasoning, believing that a real estate investment strategy would pay off. Additionally, we assumed that Wolverine's property (which we did not know was Wolverine's or a landfill) was going to be developed. We had sunk a ton of money into our property for those reasons and more. Now, I'm left with a property that is essentially valueless given my location and the levels of contamination; my husband is certainly rolling in his grave. Everything we worked for now seems to have been for nothing.

The future of my business is in jeopardy. Initially, my business partner and I were hoping to expand. Now, she does not feel as comfortable accepting new risks because my body is overloaded with PFAS. The risk that I may not be around to ensure the business will succeed is too high.

My family is also struggling with this, which bothers me extensively. My mother-in-law is 89 years old and is constantly worried that I will die like her son did — an outcome that is very real. My husband was the patriarch of the family, and his sudden death has left me to fill that role. My sister-in-law calls crying, and my nephew struggles to grasp this situation. I used to entertain family and friends every weekend, now they hardly come over. Part of it is because people are nervous. I recently had cousins come over for the weekend. I had to explain why there was bottled water in the bathroom, why things now had to be done a certain way.

In the past ten years, my neighborhood has grown. At last count, we have more than 15 kids within a quarter mile of the recently found dump site, many of them under the age of six. I cannot imagine the anxiety that their parents feel. We all have water systems in our homes and have to carry 48-pound jugs of water into the home and load them into a water dispenser. In the winter, my neighbors and I have to store these several of these water jugs in the house, or they will freeze. We have become a neighborhood that does not borrow a cup of sugar, but instead will call to borrow a jug of water if we are caught short. Children in the neighborhood cannot play in the sprinkler, fill their pools, or drink from the hose outside. We cannot garden and harvest food.

Contamination from PFAS and related compounds that had been disposed nearby have devastated my neighborhood and community. This is a 'forever' chemical that cannot be seen, smelled, or tasted. There was no way for any of us to know. It will not evaporate, dissolve, burn or dissipate. It is a secret contamination and is much more prevalent that was initially believed. This contaminate can no longer be ignored. We need to have funding for not only discovering where this has been discarded, but also funding for further testing in the health affects of these chemicals. Standards need to be established based on scientific research that is relevant to medical findings after research has occurred, not based on the minimal amount of research that has been published. And we need to be proactive in the future, not allowing chemicals to be discarded without researching the affects that can occur.

My dream home is no longer worth anything, and in fact is probably a liability. The investment in property is gone. I have lost my husband. I will eventually probably succumb to something related to this contamination. But despite this I am hopeful that our representatives can use my story, and the story of my neighbors to prevent this from happening to others.

Sandy Wynn-Stelt

[redacted]

Belmont, MI [redacted]

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

Senate Committee on Homeland Security and Governmental Affairs
Subcommittee on Federal Spending Oversight and Emergency Management
"The Federal Role in the Toxic PFAS Chemical Crisis" – September 26, 2018

The Honorable Gary C. Peters

1. What steps is EPA taking to establish the methods for measuring PFAS in soil and groundwater? What is the expected timeframe for these methods to be established and agreed upon nationally?

The EPA validated and published its original method (Method 537) for monitoring 14 PFAS in drinking water (including drinking water obtained from groundwater sources) in 2009. This method was expanded in November 2018 (published as Method 537.1) and can now measure 18 different PFAS. The EPA is working to develop additional drinking water analytical methods for other PFAS as well as two different methods for quantifying 24 PFAS in surface water, groundwater, and wastewater matrices (non-drinking water) and solids (e.g., soil and sediment). The EPA anticipates completing these new methods in 2019. These new methods will include multi lab validations to document repeatability and will be added to the EPA's Hazardous Waste Test Methods SW-846. The EPA has developed and continues to conduct research to develop new analytical methods which can be used to measure a wide variety of PFAS in different media.

2. As recently as five years ago, EPA had to rely upon industry provided records to understand what PFAS chemicals were manufactured or utilized. The Agency's Significant New Use Rule authority provided by the recent TSCA reauthorization was intended to help the agency better understand what chemicals are being produced or used here in the United States. Can you elaborate on EPA's use of the "Significant New Use Rule" authority to potentially understand new uses of PFAS chemicals before they are commercialized? Specifically, will the Significant New Use Rule help EPA better understand the implications of PFAS chemicals as a class, or does EPA interpret the authority provided by Congress to be more narrowly tailored to assess the two specific chemicals, PFOA and PFOS?

The EPA has published several SNURs under TSCA to require manufacturers (including importers) and processors of some PFAS chemicals to notify the EPA at least 90 days before starting or resuming new uses of these chemicals. The EPA action prohibits new uses of PFAS chemicals until notice is submitted, EPA reviews, and makes a determination regarding unreasonable risk posed by the new use. The EPA is required to take action, as appropriate, to address any unreasonable risk. The SNURs apply to all PFAS chemicals included in the SNURs, not just PFOA and PFOS.

Relevant to understanding which PFAS chemicals on the TSCA Inventory are active in U.S. commerce, the EPA will soon be publishing an updated version of the TSCA Inventory that will include all substances designated as either active over the past 10 years or inactive per reporting under the TSCA Inventory Notification (Active/Inactive) framework rule.

The Honorable Margaret Wood Hassan

1. How many Americans are known or expected to have been exposed to PFAS in their drinking water? Is this estimate you provide for people on public water supplies or does it include people on private drinking water wells?

The EPA worked with states and public water systems (PWSs) to characterize the occurrence of six PFAS in the nation's drinking water served by public water systems (PWSs) by including six PFAS in the third Unregulated Contaminant Monitoring Rule (UCMR) under the Safe Drinking Water Act (SDWA) (UCMR does not sample private wells.). From 2013-2015, drinking water samples were collected and analyzed for six PFAS in nearly 5,000 PWSs across the nation, accounting for approximately 80 percent of the U.S. population served by PWSs (approximately 250 million people).

The EPA found 4.0 percent of PWSs (198 out of 4,920 systems) reported results for which one or more of the six PFAS (PFOA, PFOS, perfluorononanoic acid (PFNA), perfluorohexane sulfonic acid (PFHxS), (perfluoroheptanoic acid) PFHpA, or perfluorobutane sulfonate (PFBS)) was measured at or above the minimum reporting limit during one or more sampling events at one or more sampling locations. The minimum reporting limit is lower than EPA's lifetime HA. The UCMR data are the best-available data on the frequency and level of occurrence of these PFAS in public water systems nationally, but they do not provide information on the occurrence in private wells.

2. How many Americans have been exposed to levels of PFOA and PFOS that exceed the EPA drinking water guideline?

To provide Americans, including the most sensitive populations, with a margin of protection from a lifetime of exposure to PFOA and PFOS from drinking water, the EPA has established the health advisory levels at 70 parts per trillion. When both PFOA and PFOS are found in drinking water, the combined concentrations of PFOA and PFOS should be compared with the 70 parts per trillion health advisory level. This health advisory level offers a margin of protection for all Americans throughout their life from adverse health effects resulting from exposure to PFOA and PFOS in drinking water. The health advisory value is derived based upon peer-reviewed studies of the effects of PFOA and PFOS on laboratory animals (rodents) demonstrating the potential for developmental effects. Under the third Unregulated Contaminant Monitoring Rule, discussed in the response to the preceding question, the EPA found that 1.3 percent of the participating PWSs (63 out of 4,920 PWSs reporting) had at least one sample that measured PFOA and/or PFOS at concentrations greater than 70 ppt. The EPA believes the UCMR3 data provide the best-available data regarding the frequency and level of contaminant occurrence in public water systems. However, the EPA has not developed estimates of the national population served by public water systems at levels greater than the Health Advisory. The EPA also does not have nationally representative data on PFOA and PFOS levels associated with private wells.

3. When did the EPA begin developing its drinking water guideline for PFOA and PFOS?

The EPA initiated its health assessments for PFOA and PFOS in 2009. Draft Health Effects Support Documents for PFOS and PFOA were released for public comment in February 2014. The final Health Effects Support Documents and Lifetime Health Advisories were published in May 2016. See Health Effects Support Documents and Health Advisories for PFOA and PFOS at https://www.epa.gov/ground-water-and-drinking-water/supporting-documents-drinking-water-health-advisories-pfoa-and-pfos.

4. When were the guidelines publicly available?

The non-regulatory Lifetime Health Advisory levels for the sum of PFOA and PFOS concentrations was released in May 2016.

5. When were the data documenting the presence of PFAS under the Safe Drinking Water Act's Unregulated Contaminant Monitoring Rule analyzed? When were they made publicly available?

The UCMR 3 data were collected from 2013-2016 and were analyzed thereafter. The EPA published UCMR 3 data approximately quarterly throughout the monitoring program following review. The data summary was published in January 2017, available at https://www.epa.gov/sites/production/files/2017-02/documents/ucmr3-data-summary-january-2017.pdf. The EPA continues to assess the data.

6. How many years have passed since the EPA has known that PFAS – including PFOA and PFOS are present in public drinking water supplies?

The EPA conducted a nationwide survey of drinking water systems under the third Unregulated Contaminant Monitoring Rule, which began sampling drinking water in 2013.

7. What is the difference between a guideline and a standard?

Standards, such as maximum contaminant levels set under the Safe Drinking Water Act (SDWA), are enforceable requirements that drinking water systems must follow. Guidelines, such as the EPA's Health Advisories, are non-enforceable and non-regulatory. They are intended to provide technical information to state agencies and other public health officials on potential health effects, analytical methodologies, and treatment technologies associated with drinking water contamination. The health advisory level for PFOA and PFOS were calculated to offer a margin of protection for fetuses during pregnancy and breastfed infants as well as for all Americans throughout their life.

8. If an EPA standard is developed, are all states required to meet the standard?

Yes, when the EPA establishes a standard under SDWA, states, territories, and tribes are required to meet that standard. In addition, states, territories, and tribes that have been delegated primary enforcement responsibility (primacy) must adopt standards that are no less stringent than the EPA's regulations.

9. If an EPA standard is developed, are DoD facilities required to meet the very same standard(s)? Why or why not?

DoD facilities that are public water systems and are located within the United States (including territories) are required to meet SDWA requirements, including meeting any applicable drinking water standards.

10. The Centers for Disease Control Agency for Toxic Substances and Disease Registry released its Toxicity Profile for PFAS this summer. The ATSDR guidelines for PFOA and PFOS are almost 10 times less than the EPA drinking water guidelines. Why is this?

On June 20, 2018, ATSDR released a draft Toxicological Profile for perfluoroalkyls for public comment. This document includes Minimal Risk Levels (MRLs) for four PFAS – Perfluorooctanoic acid (PFOA), Perfluorooctane sulfonic acid (PFOS), Perfluorononanoic acid (PFNA), and Perfluorohexane sulfonic acid (PFHxS). ATSDR released the draft Toxicological Profile after working collaboratively with the EPA, the Food and Drug Administration, the National Institutes of Health (including the National Institute of Environmental Health Sciences), the National Toxicology Program, the U.S. Geological Survey, and the Department of Defense (DoD).

ATSDR's MRLs and the EPA's Health Advisories (HAs) are two different tools that are used in different situations. Drinking Water HAs provide information on contaminants that can cause human health effects and are known or anticipated to occur in drinking water. They are a concentration in drinking water that is not expected to cause any adverse human health effects over an exposure period (e.g. 1-day, 10-day, lifetime). The EPA's health advisories are non-enforceable and non-regulatory and provide technical information to states agencies and other public health officials on health effects, analytical methodologies, and treatment technologies associated with drinking water contamination. Drinking water HAs are calculated incorporating toxicity (i.e., reference doses or RfDs) and exposure parameters (i.e., drinking water intake, body weight, and other potential sources of exposure).

ATSDR's MRLs are toxicity values that are intended to be used to help public health professionals determine areas and populations potentially at risk for health effects from exposure to a particular chemical. MRLs do not take into account specific exposures like a drinking water HA. MRLs are intended only to serve as a screening tool to help public health professionals decide where to look more closely; they are not intended to indicate a maximum safe exposure level. Drinking water HAs provide non-enforceable technical guidance to state agencies and other public health officials who have the primary responsibility for overseeing drinking water systems. The health advisory level for PFOA and PFOS offer a margin of protection for fetuses during pregnancy and breastfed infants as well as for all Americans throughout their life.

ATSDR's MRLs for PFOA and PFOS differ by an order of magnitude from the toxicity values that were derived by EPA in development of the drinking water HAs due to differences in the critical study selected (PFOA) and uncertainty factors applied (PFOS). Other health agencies may issue different values based on their own analyses, including more stringent values that may reflect more conservative assumptions. The EPA supports the efforts of other federal partners, including ATSDR, to develop information related to PFAS. The EPA continues to take concrete steps, in cooperation with our federal and state partners, to address PFAS and ensure all Americans have access to clean and safe drinking water. The EPA will continue to carefully review the draft ATSDR Toxicological Profile and will consider any information that may inform our approach to PFOA, PFOS, and other PFAS.

11. In your opinion, do the EPA guidelines meaningfully reduce risk to human health?

The EPA's health advisories are non-enforceable and non-regulatory and provide technical information to states agencies and other public health officials on health effects, analytical methodologies, and treatment technologies associated with drinking water contamination. The EPA's health advisory level for PFOA and PFOS offers a margin of protection for all Americans throughout their life from adverse health effects resulting from exposure to PFOA and PFOS in drinking water.

12. Based on the scientific evidence, do you think that the EPA guidelines set for PFOA and PFOS are health protective? Are they specifically protecting infants who are bottle fed with water from their contaminated home source or those who are breast fed where moms are drinking contaminated water?

Based on the available scientific evidence, the EPA believes the Health Advisory levels for PFOA and PFOS are protective of human health. These levels include margins of safety and consider sensitive individuals, including fetuses during pregnancy and breastfed and bottle-fed infants.

13. Do you think that the EPA drinking water guidelines should be developed for the suite of chemicals measured in the UCMR and not just for PFOA and PFOS?

The EPA will work with our federal, state, tribal, and local partners on response actions and research into the health and environmental impacts of these PFAS substances. The EPA is continuing to work to develop a PFAS Management Plan that will outline the Agency's approach to addressing the PFAS challenge.

14. The last drinking water standard EPA developed was way back in the 1990s and in fact was only a lowering of the arsenic standard. Does EPA have the person power and technical abilities to develop PFAS federal drinking water standards?

The EPA's technical experts are dedicated to assuring that National Primary Drinking Water regulations assure public health protection in accordance with SDWA. The EPA has promulgated a number of drinking water regulations that strengthen public health protection since the 1996 amendments to SDWA. These regulations, including those designed to reduce risks from arsenic, disinfection byproducts, radionuclides, and microbial pathogens that can come from a variety of sources including surface water, ground water and airplane drinking water systems, were developed in consultation with states, the EPA's National Drinking Water Advisory Council, the Science Advisory Board and/or other interested stakeholders.

Additionally, SDWA requires the EPA to regularly assess and evaluate unregulated contaminants. The EPA has published four Contaminant Candidate Lists, promulgated and implemented four Unregulated Contaminant Monitoring Regulations, and made regulatory determinations for 25 contaminants in accordance with SDWA. The EPA must also review each national primary drinking water regulation at least once every six years and revise them, if appropriate. As part of the "Six-Year Review," the EPA evaluates any newly available data, information and technologies to determine if any regulatory revisions are needed. Revisions must maintain or strengthen public health protection. The EPA's third Six-Year Review evaluated thousands of peer reviewed studies and millions of data points from drinking water treatment systems and was published in January 2017. The results of that review identified rules the EPA can evaluate whether to modify to strengthen public health protection in future years. This review ensures that existing rules are offering the maximum public health benefit feasible.

For more information about the timelines under which drinking water regulations were promulgated, please see https://www.epa.gov/sites/production/files/2015-10/documents/dw_regulation_timeline.pdf.

15. If so, how long would it take to develop and promulgate a standard?

Under the SDWA-mandated regulatory determination process, the EPA must consider three criteria when making a determination to regulate a contaminant:

- *The contaminant may have an adverse effect on the health of persons*
- *The contaminant is known to occur or there is a high chance that the contaminant will occur in public water systems often enough and at levels of public health concern*
- *In the sole judgment of the Administrator, regulation of the contaminant presents a meaningful opportunity for health risk reductions for persons served by public water systems*

When making a determination, the EPA first publishes a preliminary regulatory determination in the Federal Register (FR) and provides an opportunity for public comment. After review and consideration of public comments, the EPA would publish a final FR notice with the regulatory determination decisions. If the EPA were to make a final determination to regulate a particular contaminant, the Agency would start the rulemaking process to establish the National Primary Drinking Water Regulation (NPDWR). The SDWA requires that the EPA propose a regulation within 24 months of making a determination to regulate a contaminant, and to promulgate a regulation within 18 months of proposal (with an option of extending this time frame by up to 9 months).

The EPA believes the time frame allotted for promulgating drinking water regulations is appropriate because of the steps required under SDWA. As part of this process, the EPA reviews health effects data that the Agency would use to set a maximum contaminant level goal (MCLG). The MCLG is the maximum level of a contaminant in drinking water at which no known or anticipated adverse effect on the health of persons would occur, allowing an adequate margin of safety. MCLGs are non-enforceable public health goals. Once the MCLG is determined, the EPA sets an enforceable standard, which is established as either a maximum contaminant level (MCL) or a "treatment technique." The MCL is the maximum allowed level of a contaminant in water which is delivered to any user of a public water system.

The EPA must consider feasibility of treatment and monitoring when selecting an enforceable limit. SDWA also requires the EPA to prepare a health risk reduction and cost analysis in support of any NPDWR. The EPA must analyze the quantifiable and non-quantifiable costs and benefits that are likely to occur as the result of compliance with the proposed standard. The EPA must determine if the benefits of the regulation justify or do not justify the costs. Finally, the EPA must consult with experts and stakeholders including the National Drinking Water Advisory Council and the Science Advisory Board. These analyses and consultations can take significant time but assure that state and local resources are focused upon the most important public health priorities.

16. How many people's health will be harmed in the time it takes to develop a national standard?

Protecting public health is the EPA's primary mission. The EPA will continue to carry out the requirements of SDWA in order to ensure that citizens across the United States continue to have safe and clean drinking water.

17. When we know that very small amounts of PFAS can negatively affect health, why is EPA treating results below the UCMR minimum reporting levels (MRLs) [20 ppt PFOA; 40 ppt PFOS] as "zero"? Are they zero or are they levels that we need to be concerned about?

The HA for PFOS and PFOA is 70 ppt.

The EPA set the MRLs for UCMR 3 after looking at the performance of multiple laboratories that conducted studies to determine how low they could reliably measure the concentration of contaminants. To establish these levels, the EPA vetted those MRLs through the notice-and-comment UCMR 3 rulemaking. The EPA set the UCMR 3 MRLs such that we would have high confidence that a capable analyst/laboratory could meet those levels and report numeric results. Per the rule, no results below that level were reported.

The EPA is aware that some laboratories are able to reliably measure PFAS in drinking water at lower levels. The EPA advises states or others who may be leading the collection of PFAS data since the UCMR to consider establishing lower MRLs to meet any project-specific data quality objectives, provided the laboratories can demonstrate acceptable performance at the specified concentrations of interest.

18. The PFASs have been in commerce for tens of years. Can the Lautenberg Amendment to the Toxics Substances Control Act be used to require pre-market testing of all of the PFASs? What is preventing this from happening?

The EPA's new chemicals review program reviews all new PFAS chemicals intended for TSCA uses before they are allowed to commercialize and must make a determination regarding unreasonable risk of injury to health or the environment. The EPA reviews new substances to identify whether the range of toxicity, fate, and bioaccumulation issues that have caused past concerns with long-chain PFAS may be present, as well as any concerns that may be raised by new chemistries, in order to make an affirmative safety determination. In addition to being able to require testing under TSCA section 5(e), the EPA will also restrict uses pending development of additional information related to the chemical (e.g. testing), where appropriate. Whether and what type of testing may be necessary depends on a number of factors such as the specific uses of the new chemical, and the similarities or differences of the new chemical relative to other PFAS chemicals Many of the PFAS on the active TSCA inventory have been through the new chemical review described above, PFAS that were in use prior to the enactment of TSCA were not subject to such a review. Approximately 200 of the PFAS that have been through EPA's new chemicals program have an associated consent order. Most of those orders contain a requirement for testing if certain conditions are met. Of these, approximately 140 have commenced production.

19. Filtration is the currently feasible technology to remove PFAS from water. The filters that contain the PFAS are then disposed of. Where are they disposed of? Are these toxic? Does this mean that PFAS should be listed as Superfund chemicals and disposed of in hazardous waste facilities?

Currently available methods for removing certain PFAS from drinking water include granular or powdered activated carbon, anion exchange, or high-pressure membrane separation techniques including reverse osmosis or nanofiltration. These methods may generate PFAS-contaminated waste, which should be managed consistent with state, tribal, and local requirements and in a manner that will minimize the potential for environmental releases.

The Resource Conservation and Recovery Act (RCRA) regulates hazardous waste disposal. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, aka Superfund) regulates the cleanup of hazardous substances released to the environment. All chemicals designated as RCRA hazardous waste are CERCLA hazardous substances, though not all chemicals designated as CERCLA hazardous substances are RCRA hazardous waste. The EPA is currently evaluating all statutory mechanisms available to address PFOA and PFOS.

20. PFASs are measured in waste water and in sewage sludge. Does this mean that PFASs are now in our rivers, streams and lakes? Are our fish contaminated? If yes, why is EPA not regulating discharge to waterways?

PFAS are very persistent and mobile in environmental media, including wastewater and sludge. Some evidence shows that certain PFAS have been accumulating in the environment and in wildlife (including fish). The EPA and states regulate discharges of pollutants to Waters of the United States under the National Pollution Discharge Elimination System. The EPA and states are evaluating approaches to ensure that PFAS discharges to the environment are minimized.

21. What is EPA's plan to further engage with the community in NH and get direct input from Granite Staters about PFAS contamination in their waters?

The EPA held a community engagement meeting in Exeter, NH in June 2018. The EPA received input from community members at this meeting as well as through a public docket, which closed on September 28, 2018. The EPA is continuing to work to develop a PFAS Management Plan that will outline the Agency's approach to addressing the PFAS challenge. The Agency is working to release the plan as soon as possible.

Post-Hearing Questions for the Record
Submitted to Maureen Sullivan
Deputy Assistant Secretary of Defense, Environment, Safety & Occupational Health
Office of the Assistant Secretary of Defense, Energy, Installations & Environment
U.S. Department of Defense
From Senator Gary C. Peters

"The Federal Role in the Toxic PFAS Chemical Crisis"
September 26, 2018

Question 1: Your testimony noted that since PFOS is no longer manufactured in the United States, U.S. firefighting foams should not contain PFOS, though some legacy stocks still remain. Please provide a list of the fluorinated foams that are currently scheduled for purchase by the Department. Has the Department either performed, or contracted to be perform, any health based studies on the newer formulations of foams?

Answer: The Department purchases from various manufacturers which are listed on the Departments Qualified Products List (QPL). The Defense Logistic Agency ASSIST website allows users to access specifications, standards, and products on-line: https://assist.dla.mil/online/start/. Attached is the QPL for Aqueous Film Forming Foam To date, the Department has not conducted studies regarding the safety of substitute chemicals. As part of our research and development proposals we are requiring the investigators to include an assessment of the human health and environmental impacts of proposed substitutes and byproducts.

Question 2: GAO noted that DOD had identified 391 active and closed installations with known or suspected releases of PFOS and PFOA, and had reported spending almost $200 million on environmental investigations and mitigation actions at or near 263 of those installations. Can you estimate the total cost the Department will incur for testing and remediating PFAS contamination?

Answer: DoD cannot estimate the total cost the Department will incur for testing and remediating PFAS contamination at this time. As of July 2018, DoD has identified 401 active and Base Realignment and Closure installations with one or more areas where there is a known or suspected release of PFOS and/or PFOA. Now that DoD has an initial list of known and suspected release areas, the DoD Components are following the Comprehensive Environmental Response, Compensation and Liability Act process to investigate these areas to confirm if a release occurred. The DoD Components will continue collecting information on the nature and extent of the releases to determine if cleanup actions are necessary.

Question 3: Your testimony noted that DOD policy is to remove and properly dispose of local warehouse supplies of aqueous fire-fighting foams containing PFOS (other than for shipboard use) where feasible. Can you describe "proper disposal" in more detail? How are the foams

disposed of, given their unique chemical composition and the environmental challenges associated with them?

Answer: The Army and Air Force will dispose of the C8 aqueous fire-fighting foams (AFFF) and other AFFF-related waste by incineration. The Navy policy requires that AFFF be disposed of by incineration, while the AFFF-contaminated water can be treated using granular activated carbon treatment (preferred method) or disposed of via solidification/landfill, incineration, or another equally protective disposal technology.

Question 4: Michiganders are concerned with an unnatural foam that has been appearing near known contamination sites. This unnatural foam is known to have high concentrations of PFAS, and is washing up on the shores of water bodies, including Van Etten Lake in Oscoda. PFAS contaminated foam is likely due to the plume entering the lake from the contaminated source at the former Wurtsmith Air Force Base. What actions are being taken by DOD to address and remediate this unnatural foam that is occurring on waterways adjacent to the military bases, including the former Wurtsmith Air Force Base?

Answer: DoD has not taken actions to address foam on waterways adjacent to military bases in Michigan. The Environmental Protection Agency Lifetime Health Advisory applies to drinking water only, and the Michigan Department of Human and Health Services (MDHHS) issued a statement that said "incidental swallowing of PFAS-containing lake water or foam is not expected to harm human health".

Post-Hearing Questions for the Record
Submitted to Maureen Sullivan
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Office of the Assistant Secretary of Defense, Energy, Installations & Environment
U.S. Department of Defense
From Senator Margaret Wood Hassan

"The Federal Role in the Toxic PFAS Chemical Crisis"
September 26, 2018

Question 1: When did DoD first test for PFAS in water used for drinking on military bases?

Answer: DoD has not taken actions to address foam on waterways adjacent to military bases in Michigan. The Environmental Protection Agency Lifetime Health Advisory applies to drinking water only, and the Michigan Department of Human and Health Services (MDHHS) issued a statement that said "incidental swallowing of PFAS-containing lake water or foam is not expected to harm human health".

Question 2: Did those tests only test for PFOA and PFOS?

Answer: No, under the UCMR3 drinking water purveyors were required to test for the following six PFAS: PFOS, PFOA, PFNA, PFHxS, PFHpA, and PFBS.

Question 3: Were the results shared with the public and if so, when?

Answer: During the active sampling period of 2013-2015, EPA posted results of the UCMR3 testing online via its National Drinking Water Contaminant Occurrence Database: https://www.epa.gov/dwucmr/occurrence-data-unregulated-contaminant-monitoring-rule#3. The final results were posted in January 2017. In addition, UCMR3 Community Water System participants were required to publish any detections of unregulated contaminants in their annual consumer confidence reports by 1 July each year."

Question 4: The concentrations made publicly available are, in some cases 100 times higher than the EPA guidelines. How do you know that people drinking this water (now or in the past) are not harmed by the water they are drinking? Is DoD conducting clinical screenings? Is DoD testing the blood levels of the PFAS in the service people and people who work and reside on these bases?

Answer: DoD has expeditiously taken action to find and eliminate exposure to drinking water with PFOS/PFOA above EPA's LHA on DoD installations. DoD owns and operates 524 drinking water systems worldwide on its installations. Of the 524 DoD-owned drinking water systems, DoD identified 24 that tested above the EPA LHA levels and has taken appropriate action to

reduce PFOS/PFOA below the EPA LHA levels. Where DoD is not the drinking water supplier for its installations, 12 systems tested above the LHA level. DoD worked with the drinking water supplier to determine appropriate actions consistent with the EPA recommended actions. DoD is not currently conducting clinical screenings or testing the blood levels of PFAS in service people or people who work and reside on our bases. However, as specified in the Section 315(c) of the National Defense Authorization Act of Fiscal Year 2019, DoD will conduct an assessment of the human health implications of PFAS exposure for individuals who served as members of the Armed Forces and were exposed to PFAS at military installations.

Question 5: Does DoD only test for PFOS and PFOA on bases and installations?

Answer: No, all drinking water sample results include all 14 PFAS that are listed in the current drinking water analytical method (i.e., EPA Method 537, Rev.1.1).

Question 6: Does DoD only test for multiple PFAS chemicals in water on bases or installations when required by a state – such as in NJ or in NH?

Answer: No, all drinking water sample results include all 14 PFAS that are listed in the current drinking water analytical method (i.e., EPA Method 537, Rev.1.1).

Question 7: When DoD finds PFAS (PFOA, PFOS and multiple others – now at least 14 others) in groundwater on military installations, are the data made available in a timely manner (within a month or so) to people living on base AND off base? And if not, why not?

Answer: Throughout the cleanup process, DoD works in concert with regulatory agencies and communities, and shares information in an open and transparent manner. When elevated levels of PFOS and PFOA are detected that may pose an unacceptable risk to human health, DoD uses a proactive outreach strategy to promptly notify potentially affected community members. Outreach efforts may include: • Communicating to potentially affected communities (e.g., notifying the residents of his or her personal drinking water results, fact sheets on installation web sites); • Partnering with local regulatory and governmental organizations to reach stakeholders; • Hosting public meetings (e.g., Restoration Advisory Board meetings); • Alerting and engaging with the media; • Messaging through community social media; and • Updating community leaders.

Question 8: Has DoD educated its clinicians about the damaging health effects of PFAS on military personnel?

Answer: Yes, the Military Departments have provided information to educate clinicians at the Military Treatment Facilities on PFAS exposures and potential health effects. The Military Department public health organizations are a central source of health risk communication, health

effects, and other health-related information for exposures of concern, including PFAS, to our Service members, their families and other residing and working on the installations.

Question 9: When DoD detects PFAS on its property, does it test downgradient drinking water or rivers, lakes or streams or does it ONLY test on its property?

Answer: The DoD Components will collect information on the nature and extent of the releases both on and off installations to determine if cleanup actions are necessary. The Department considers the EPA's health advisory toxicity information when assessing risk to human health under its cleanup program consistent with EPA risk assessment guidance. Throughout the CERCLA process, DoD works in concert with regulatory agencies and communities and shares information in an open and transparent manner.

Question 10: Has the DoD ever provided an alternative water supply for residents on base or issued health advisories due to concerns over PFAS contamination?

Answer: Yes, for DoD-owned drinking water systems that tested above the EPA's LHA for PFOS and PFOA, we are following EPA's LHA recommended actions to ensure no one is drinking water with elevated levels of PFOS and/or PFOA. These actions include, but are not limited to: providing bottled water, and adding treatment systems, such as granular activated carbon filter, to remove PFOS/PFOA. Where DoD is not the drinking water supplier, installations were encouraged to ask if their drinking water suppliers if it had tested the drinking water and if the results were below the EPA LHAs. For the 12 suppliers where the drinking water tested above the LHA level, the installations reached out to the drinking water supplier to understand what actions the purveyor is taking to reduce the levels of PFOS/PFOA. DoD has not issued a health advisory, we are following EPA's LHA and recommendations.

Question 11: In the annual defense bill signed into law earlier this month, there's a clause urging the DoD to develop fluorine-free firefighting foams. Any updates on starting this process? What are the challenges or setbacks that need to be addressed, so that we can achieve this goal in the future?

Answer: DoD is funding research on fluorine-free substitutes for AFFF which can meet the military's stringent performance requirements. In FY 2019, DoD will initiate demonstrations of existing replacement AFFF formulations at DoD facilities to determine if their performance can meet DoD's needs. We are committed to finding a fluorine-free substitute for AFFF that meets the military's stringent performance criteria while protecting human health. When these demonstration projects are completed we will have a better understanding of the capability and environmental impacts of several fluorine free foams.

Question 12: Is DoD using the same methods as EPA for detection of all 14 PFAS chemicals in water?

Answer: Yes, DoD uses the EPA Method 537, revision 1.1, for detection of all 14 PFAS chemicals in drinking water.

Question 13: If not, why not?

Answer: Not applicable.

Question 14: If a federal drinking water standard is set, will DoD comply with it? Will DoD clean up all contaminated drinking waters to a standard(s) set by EPA?

Answer: As part of our compliance with the SDWA, for DoD drinking water systems we comply with federal drinking water standards, i.e., maximum contaminant level - MCL. As part of the CERCLA process DoD performs a risk assessment to determine if there is an unacceptable risk to human health or the environment. If an unacceptable risk is found, then DoD needs to take a cleanup action. To determine the site-specific cleanup standard, CERCLA identifies specific criteria which must be met in order for a standard to be designated as an applicable or relevant and appropriate requirement (ARAR). A federal drinking water standard (i.e., MCL) under the SDWA is an example of an ARAR.

Question 15: DoD falls back on the excuse of "military readiness" as a rationale for not complying with health and environmental protections – how will DoD treat PFAS contaminated waters?

Answer: DoD follows the CERCLA process, which provides a consistent risk-based approach to address on-base and off-base migration of PFOS and PFOA releases. As a first step, the Military Departments identified installations where DoD stored or used AFFF containing PFOS or PFOA and suspect there was a release. The Military Departments then determined whether there is exposure through drinking water and if the source is from DoD activities. The DoD works with the communities and private individuals to break the drinking water exposure pathway. Then the Military Departments are prioritizing sites for further actions using the normal CERLCA risk-based process.

Post-Hearing Questions for the Record
Submitted to Linda S. Birnbaum, Ph.D., D.A.B.T., A.T.S.
Director
National Institute of Environmental Health Sciences and National Toxicology Program
National Institutes of Health
U.S. Department of Health and Human Services
From Senator Margaret Wood Hassan

"The Federal Role in the Toxic PFAS Chemical Crisis"
September 26, 2018

Question 1. You've provided us with the latest scientific evidence on the adverse health outcomes caused by or associated with a subset of the PFAS chemicals. Is there sufficient science to tell us that multiple PFASs and not only PFOA and PFOS should be limited or removed from drinking water?

Answer of Dr. Birnbaum: Regarding safe drinking water levels, several states, relying on the best available science, have elected to establish their own guidance for PFAS in drinking water. These states include Connecticut, New Hampshire, New Jersey, Vermont, and Minnesota, and their guidance covers multiple PFAS, including PFOA, PFOS, PFNA, PFHxS, and PFHpA.[1] Additionally, federal agencies have released draft toxicity assessments on some PFAS other than PFOA and PFOS, including GenX chemicals and PFBS[2]. These assessments are expected to be finalized in 2019. As the latest science becomes available, public health officials at both the federal and state level are better positioned to make informed decisions in establishing guidance and/or regulatory limits for drinking water and other exposure media as may be appropriate. NIEHS-supported research helps create a scientific basis for such decisions.

Question 2. Everyday there are new scientific studies demonstrating that people are exposed to PFAS from their water, dust in their homes, food, and air. What is known about the exposures from sources other than water? Should we be concerned?

Answer of Dr. Birnbaum: Humans are exposed to PFAS through a myriad of pathways, practices, and products. While much attention is placed on ingestion of drinking water, science shows other pathways can have relevance for human exposure. For example, carpets and clothing containing stain-repellant PFAS can shed microparticles that adsorb to household dust and are, in turn, incidentally ingested by children and adults. Packaging materials—such as pizza boxes, beverage containers, and food wrappers—can also contain PFAS that can migrate to foods. Certain PFAS in municipal water may be dermally absorbed via swimming, bathing, or

[1] Several states have established guidance to date relating to the presence in drinking water of multiple per- and polyfluoroalkyl substances, including for perfluorooctanoic acid (PFOA); perfluorooctane sulfonate (PFOS); perfluorononanoic acid (PFNA); perfluorohexanesulfonic acid (PFHxS); and perfluoroheptanoic acid (PFHpA).
[2] PFBS means perfluorobutanesulfonic acid (PFBS).

dish washing and research in this area continues. The practice of landfarming—a process of composting waste products on agricultural land—can result in uptake of PFAS by plants and animals in the food chain. Ongoing research in the area of exposure can help inform regulators in making sound decisions to protect public health. On an individual basis, multiple actions can be taken to minimize such exposures. If an individual is concerned about their drinking water containing PFOA and/or PFOS, they can contact their drinking water provider, consider using an alternative or treated water source, and consult their local and state health departments for guidance about steps they can take to reduce their exposure. Citizens who are concerned about their drinking water should consider contacting their local water utility to understand what contaminants may be found in their drinking water.

Question 3. If we should not be concerned, should the drinking water guidelines reflect multiple sources of PFAS of exposure? And if they should, would this result in a lower or higher allowable concentration of PFAS in water?

Answer of Dr. Birnbaum: NIEHS subject matter experts continue to collaborate with, and share technical information with, EPA and other regulatory agency scientists responsible for developing drinking water health advisories and guidelines. Federal interagency collaboration is occurring on a range of individual chemicals within the PFAS class. Also, notably, EPA commonly uses a relative source contribution (RSC) factor in calculations leading to regulatory limits in drinking water. The RSC assumes that exposures occur in pathways other than ingestion of drinking water.

Question 4. The EPA is taking small steps to phase out the production and use of long-chain PFAS – including PFOA and PFOS. Is there evidence that short-chain alternatives are less toxic, persistent, and bioaccumulative?

Answer of Dr. Birnbaum: Current evidence indicates there are differences in toxic potency—the exposure level at which toxic effects occur—and persistence among the many PFAS chemicals. Our understanding has not yet developed sufficiently to enable broad generalizations regarding whether short-chain alternatives are less toxic and less persistent than the longer-chain chemicals within the PFAS class. The National Toxicology Program Division at NIEHS has conducted studies in rats to evaluate toxicokinetics of seven individual PFAS—PFBS, PFHxS, PFOS, PFHxA, PFOA, PFDA, and 8:2 FTOH.[3] These animal studies are designed to help us better understand how these PFAS are handled within, and eliminated from, the body.

[3] The seven individual PFAS for which the National Toxicology Program Division at NIEHS has conducted toxicokinetic studies are: perfluorobutanesulfonic acid (PFBS); perfluorohexanesulfonic acid (PFHxS); perfluorooctane sulfonate (PFOS); perfluorohexanoic acid (PFHxA); perfluorooctanoic acid (PFOA); perfluorodecanoic acid (PFDA); and 8:2 fluorotelomer alcohol (8:2 FTOH).

Question 5. Does NIEHS or the National Toxicology Program have the technical tools it needs to test PFASs using high throughput screening methods? If not, what is needed? If yes, why are these chemicals not tested?

Answer of Dr. Birnbaum: NIEHS and the National Toxicology Program are well-positioned to both understand, and advance scientific knowledge about, human health effects associated with exposure to PFAS and health effects in rodent models induced by PFAS. NIEHS and NTP are actively contributing to this growing knowledge base using existing resources. For high throughput screening, advanced equipment, techniques, and computing power are needed that allow teams of researchers to more rapidly map biochemical pathways associated with adverse health effects than they would if they approached their research using traditional methods. However, cost and access to these nascent high throughput technologies—namely robotic laboratory architecture and big data capacity—can be limiting factors. Currently, NIEHS possesses medium throughput screening capability, and conducts high throughput screening through partnerships with NIH's National Center for Advancing Translational Sciences (NCATS) and EPA's National Center for Computational Toxicology (NCCT). NIEHS is using all these new technologies, as appropriate, in its studies of PFAS under the NTP Responsive Evaluation and Assessment of Chemical Toxicity (REACT) Program as was summarized in my written testimony. The greatest needs for advancing PFAS toxicity research relate to chemistry. We now recognize there are hundreds of PFAS to which people may be exposed and thousands of PFAS have been identified. Most everything we understand about potential health effects is from studies of a handful of compounds. When the number of chemicals of interest is so large, inevitably a major limiting factor relates to chemistry—that is, our ability to obtain, synthesize, and measure all of these chemicals. Once obtained and identity-verified, NIEHS has many tools at our disposal to test a library of compounds against a wide array of biological targets. Ideally resources are created either through private sector investment or in the public sector such that a large number of PFAS chemicals can be procured by any interested scientific research team. Likewise, robust analytical methods would need to become available to measure a larger number of PFAS chemicals either in experimental settings or in the environment. In addition, since 1999 the Centers for Disease Control and Prevention's (CDC) National Biomonitoring Program has regularly assessed the U.S. population's exposure to certain PFAS including PFOA, PFOS, PFNA, and PFHxS.[4] CDC's laboratory methods for PFAS are designed to evaluate population exposures and were recently updated to include additional PFAS such as GenX and other short-chain alternatives.

[4] Certain PFAS included in the CDC's National Biomonitoring Program include: perfluorooctanoic acid (PFOA); perfluorooctane sulfonate (PFOS); perfluorononanoic acid (PFNA); and perfluorohexanesulfonic acid (PFHxS).

Post-Hearing Questions for the Record
Submitted to Linda S. Birnbaum, Ph.D., D.A.B.T., A.T.S.
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National Institutes of Health
U.S. Department of Health and Human Services
From Senator Gary C. Peters

"The Federal Role in the Toxic PFAS Chemical Crisis"
September 26, 2018

Question 1: Are there any life stages that are not thought to be implicated or affected by PFAS?

Answer of Dr. Birnbaum: As I mentioned in my testimony, we only have knowledge regarding a small percentage of PFAS compounds. In most cases, we are drawing primarily on data from animal studies. These data suggest that for some of the chemicals studied, the same exposure may affect children and adolescents as well as pregnant mothers and their offspring to a greater degree than persons at other stages in life. This principle also holds true for exposure to other chemicals.

Post-Hearing Questions for the Record
Submitted to Brian J. Lepore
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Defense Capabilities and Management
U.S. Government Accountability Office
From Senator Gary C. Peters

"The Federal Role in the Toxic PFAS Chemical Crisis"
September 26, 2018

1. **Has GAO done any prior work on DOD's environmental liability for contaminants, including the costs of limiting future exposure or cleaning up prior exposure? If so, what were some of the recommendations GAO made? Has GAO faced specific push back in discussions with DOD that may indicate DOD disagrees with the foundational challenges related to contaminants?**

In 2016, we reviewed the extent to which the Department of Defense (DOD) has made progress in capturing and reporting environmental cleanup costs at installations closed under the base realignment and closure (BRAC) process. DOD is obligated to ensure that former installation property closed under BRAC is cleaned up to a level that is protective of human health and the environment before such property can be transferred to other federal and nonfederal parties. We issued a report on this work in January 2017 (**GAO-17-151** – Military Base Realignments and Closures: DOD Has Improved Environmental Cleanup Reporting but Should Obtain and Share More Information).

Our 2017 report included a recommendation for DOD to provide Congress with better visibility over the costs for the environmental cleanup of properties closed under BRAC. Specifically, we recommended that DOD disclose in its annual reports to Congress on environmental cleanup costs that those costs will increase due to the costs of cleaning up the contamination left by per- and polyfluoroalkyl substances (PFAS) and other emerging contaminants. We also recommended that future reports to Congress include the best estimates of these costs as additional information becomes available. DOD agreed with us and, in its environmental cleanup report issued to Congress in June 2018 (the fiscal year 2016 annual report), DOD stated that it expected that environmental cleanup costs would increase due to the investigation and cleanup of two particular types of PFAS (perfluorooctane sulfonate, or PFOS, and perfluorooctanoic acid, or PFOA). DOD also reported that, as additional information became available on environmental cleanup costs, it would include a best estimate of those costs in its reports to Congress. DOD further stated that as of December 31, 2016, it had spent about $202 million on sampling, analysis, and response actions to address PFOS and PFOA.

Our 2017 report also recommended that DOD more effectively share information and address environmental cleanups and transfers by creating a repository or method to record and share lessons learned about how various locations have successfully addressed cleanup challenges. DOD agreed with this recommendation and stated that it would develop a process to record and share lessons learned in conjunction with its fiscal year 2017 annual report to Congress. In July 2017, DOD issued a memorandum to the services directing them to collect BRAC success stories to be posted on the DOD Environment, Safety, and Occupational Health Network and Information Exchange. In September 2018, DOD posted these success stories on the website.

GAO has not experienced push back from DOD on recommendations made in our last two relevant reports. DOD concurred with all five recommendations we made in GAO-18-78 – Drinking Water: DOD Has Acted on Some Emerging Contaminants but Should Improve Internal Reporting on Regulatory Compliance. This report was the basis for our testimony at this hearing. DOD also concurred with both recommendations we made in GAO-17-151, which are discussed above.

Additional GAO work with implications for DOD environmental liabilities:

- *Agent Orange: Actions Needed to Improve Accuracy and Communication of Information on Testing and Storage Locations*, https://www.gao.gov/products/GAO-19-24, November 2018
- *Defense Infrastructure: DOD Can Improve Its Response to Environmental Exposures on Military Installations*, https://www.gao.gov/products/GAO-12-412, May 2012
- *Superfund: Interagency Agreements and Improved Project Management Needed to Achieve Cleanup Progress at Key Defense Installations*, https://www.gao.gov/products/GAO-10-348, July 2010
- *Superfund: Greater EPA Enforcement and Reporting Are Needed to Enhance Cleanup at DOD Sites*, https://www.gao.gov/products/GAO-09-278, March 2009